# Teaching Geography

## Focus on new geographical dimensions

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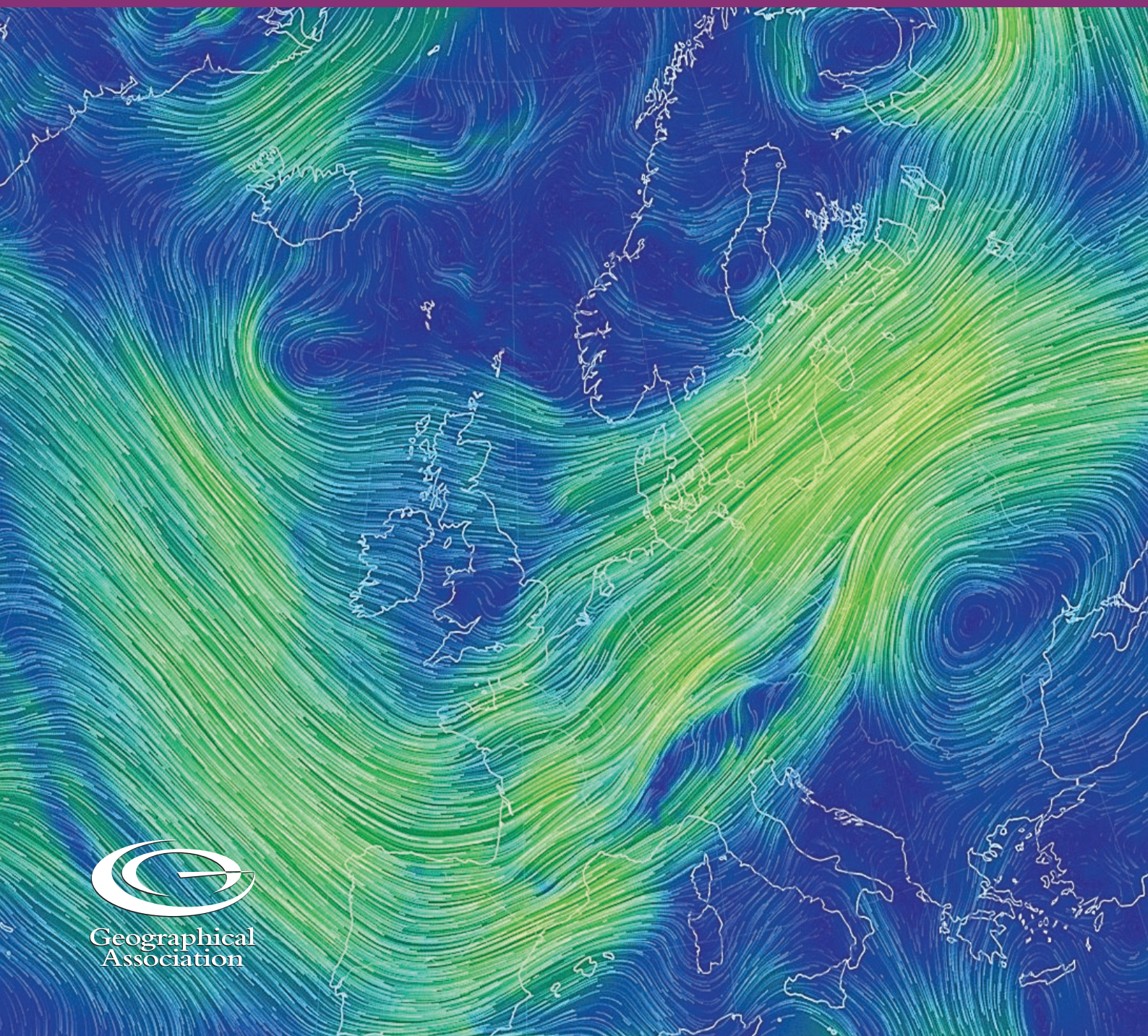

Geographical Association

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# Writing for *Teaching Geography*

*Teaching Geography* provides a forum for sharing:
- practical strategies for teaching geography
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- curriculum innovation and change in geography.

If you have a teaching strategy, practical idea, resource to share or particular view on educational practice, we would like to hear from you.

*Teaching Geography* welcomes articles from PGCE students, NQTs and practicing teachers. If you have an idea but have never submitted an article before and would like some advice, please contact Melanie Norman (*m.j.norman@brighton.ac.uk*), the Editor of *Teaching Geography*, who will be happy to discuss it with you.

We welcome the submission of the following types of article:

1. **Planning and pedagogy** articles critically discuss and illustrate approaches to teaching geography. (1500 words)

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3. **Change and challenge** articles discuss current educational views and how they impact upon geography. (1000–1500 words)

4. **How to...** articles provide practical advice and strategies for geography departments. (750 words)

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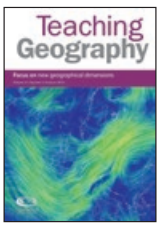


**Cover Image:** Upper air movements on 12 July show the southerly movement of the jet stream. Will this unsettled weather be typical of summer 2016?
**Source:** *http://earthnullschool.net*


*Environmental policy*

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# Editorial: New geographical dimensions

Melanie Norman, Editor

*The Editor introduces this issue of* Teaching Geography, *'New Geographical Dimensions'.*

Although this editorial was written in early August, by the time you receive your Autumn 2016 issue of *Teaching Geography* the first term of the new academic year will be well under way and the delights of travel during the summer break will be featuring in many of your geography lessons. Teachers will also be busy getting to grips with the new specifications for GCSE and A level studies. New experiences all round, which is why the focus of this journal, *New geographical dimensions*, is well timed.

Our first article in this issue is written by Klaus Dodds, Professor of Geopolitics, who provides valuable insight into the complexities of 'Global Governance' a topic within the new A level specifications that may be new to some of you. One of our Editorial Board members, Hannah Spencer, has written a brief introduction and provides a number of suggestions for using the article with A level students, accompanied by downloadable resources.

Geoff Jenkins' piece suggests a simple way of developing fieldwork skills using primary quantitative data, a requirement of the new GCSE specifications, through the use of loggers strategically placed around the school grounds.

Weather and climate are included in the curriculum at all levels of secondary teaching so David Preece's feature on 'Bringing the atmosphere to life' is a welcome addition, especially for those less familiar with the subject content. His article also provides us with the spectacular cover of this journal.

The new GCSE and A level specifications bring greater demands for student literacy and numeracy and the articles by Richard Waller *et al*, Rob Jones and Jonathan Nakivell, and Lucy Fryer all suggest ways of enhancing such skills through geography lessons, fieldwork and virtual activities. John Larner shares his way of getting his students to make the transition from GCSE to A level study through helping them to develop habits of independent reading and thinking in order to understand what type of geographer they are. The all-day event discussed in Jonathan Andrews' article also helps students to develop their literacy and thinking skills through a geographical activity based around the Sustainable Development Goals. Year 12 and year 7 students worked collaboratively and it is interesting to read how the outcomes of the day were presented through speeches, dances, plays, poetry and models.

Hardly new but still underused in many schools are activities related to GIS. As Fred Martin points out in his archive article, the first feature in this journal on using GIS appeared in 1993 and the 1991 Geography National Curriculum stipulated that '*Pupils should be able to evaluate the effectiveness of a composite thematic map as a Geographical Information System.*' (DES,1991,Gg1/10a). Using GIS has gradually become simpler and more accessible to non-specialists. Raphael Heath's account of 'Ashcloud Apocolypse' using GIS activities generated excitement in schools around the world and readers are in still time to be involved with the 2016 World GIS Day (see p 114). Nicola Walshe encourages the use of GIS as part of everyday geography lessons and discusses the value of online story maps in supporting geographical learning. Fred's article also makes the point that GIS packages have changed the very meaning of 'map': it now refers to any spatial resources that have been geo-referenced, whether OS map, satellite image or vertical photo.

Anyone who is starting a new role as Head of Geography this autumn will be encouraged to work towards the Secondary Geography Quality Mark (SGQM) after reading Alastair Smith's journey to achieving the award. Even if you are not new to the role of HoD, Alastair indicates how positive SGQM is for the whole department. Now is the time to apply as Alastair says it is best to begin the process in the Autumn term.

This journal has its own 'new dimensions' as we say farewell and many thanks to Ruth Totterdell who retired at the end of August 2016. Ruth and I worked together on *Teaching Geography* for five years and I wish her a long and happy retirement. I would also like to welcome Elaine Anderson who started at the GA on 1 September as Head of Publishing. The *Teaching Geography* Editorial Board looks forward to working with Elaine in the years ahead.

**Reference**

DES (1991) *Geography in the National Curriculum* (England), London: HMSO.

Editor Dr Mel Norman on the South Downs near Beachy Head. **Photo:** Tony Norman.

Klaus Dodds

# Global governance

*With an introduction and suggestions for application by Hannah Spencer, a member of the* Teaching Geography *Editorial Board, this article by Klaus Dodds outlines the topic of global governance, a new content area of the A level specifications. He discusses the complexities of managing and implementing supranational laws and conventions.*

Accompanying online materials

## Introduction

*The new A level specifications include content with which many geography teachers may be unfamiliar. One such area of study is entitled 'Global Systems and Global Governance'. DfE guidance suggests that all specifications must allow students to '… investigate the increasing numbers of norms, laws and conventions, referred to here as 'global governance', that aim to regulate the consequences of globalisation on people, places and environments around the world' (DfE, 2014). Although examination boards will focus on different case studies and examples of global governance, all must cover the underlying theory. Global governance can seem an abstract concept so it is important to understand how it is implemented in today's globalised world. In this article Professor Klaus Dodds outlines what global governance is and describes the complexities of managing and implementing it.* (Hannah Spencer)

## What is global governance?

Global governance is the term used to describe the ways in which national governments, international organisations, corporations, institutions and civil society order their collective affairs. Global governance differs from international politics in two fundamental ways: first, those 'collective affairs' are global in scope and intensity and frequently exceed the capacity of any one state to manage them; and second, 'governance' encompasses norms and values as well as laws and regulations. Global governance is not reducible to the affairs of nation-states and the international system, and to understand it we must analytically grasp a suite of actors, issues, sites and spaces, rules and regulations, as well as norms and values such as diplomacy and the role of markets.

If we add a word like 'good' or 'bad' to our term 'global governance' then we are forced to think about what a good form of global governance would look like, feel like and so on. Take a contemporary example, such as the treatment of refugees from Afghanistan and Syria (Figure 1). We have formal rules and regulations (e.g. the 1951 Refugee Convention and the 1967 Protocol), whose signatories are expected to respect and enforce them (over 140 countries are signatories to the 1951 Convention). But we also have, in moments of crisis, opportunities to inspect the way in which the rules and regulations are enforced and the 'spirit' (values and norms) in which obligations are met. 'Good global governance' might look and feel quite different to those at the sharp end of the refugee crisis in places like eastern Greece than it does to European political elites and even host communities within the European Union.

Global governance might sound like an abstract concept but it affects all our lives. For example, the conduct of global trade is shaped by rules and regulations monitored by a global institution: the World Trade Organisation. It is important, therefore, to understand both the underpinning theory of global governance and how it operates in practice, and this article will explore some examples.

## Geographies of global governance

One way to understand global governance, and ensure that we don't see it as something abstract and divorced from our everyday lives, is to trace its framing and impact geographically, in terms of its twin characteristics of interdependence and inequality.

Interdependence acknowledges that our world does not correspond neatly to the ideal of international politics – a world of independent and sovereign states operating in an international system. In reality, there is no clear-cut line between domestic, overseas and global issues; environmental pollution and conflict do not respect international borders. National governments might declaim portentously about protecting 'national economies', 'national defence' and 'national values', but these assertions ring hollow. It is difficult to think of examples where national governments, even superpowers such as China and the United States, can operate indifferent to other actors, including non-state actors such as corporations and civil society groups.

The world is also highly unequal. Critics of the way global governance operates would contend that for all the talk of legal frameworks, and regardless of how well intentioned individual negotiators and collective negotiations might be, some states, corporations and organisations are better able to take advantage of the mechanisms of governance than others. Any discussion of global governance has to recognise its contested nature. What counts as 'global'? Who gets to define 'global'? How far does 'global' extend? We could ask similar questions about 'governance', let alone how it is implemented and policed. As geographers, with our interest in 'where', we quickly perceive that 'global governance' is geographically varied in practice. One way to think about that is to note which states or organizations have or have not signed up to conventions concerning human rights, trade barriers, arms control and the like. There is no global convention, including those addressing human rights, which has been universally adopted: within countries and regions, there is still variation on issues such as gay and trans-

gender recognition, abortion rights, the enduring presence of slavery and the lack of civil and human rights for prisoners. We might refer to these variations as 'governance gaps'; and the examples above hint at cases where 'gaps' are deliberately engineered or where national governments (often, but not always, outside the English-speaking and western world) claim that their countries/cultures are exceptions to emerging global norms, rules and values.

## Governance gaps

Governance gaps haunt the concept and implementation of global governance. One major gap relates to participation. When we speak of global governance, whether it involves climate change or trade, are we convinced that all interested parties are represented in key negotiations and implementation agreements? Civil society organisations and indigenous peoples contend that participation (and not just turning up) depends on the infrastructural resources – such as access to expert advice and knowledge of international law – of the negotiating parties. Another governance gap pivots around enticement (i.e. what incentives are there for co-operation and engagement and conversely what are the disincentives?) and the simple fact that global governance is time consuming and expensive. In December 2015, the parties discussing the United Nations Climate Change Conference met in Paris for Conference of the Parties (COP21) and agreed – after twenty years of negotiation – what is termed the Paris Agreement. While it might appear obvious that a global deal addressing climate change reduction is a necessary, even urgent, task, it still requires considerable enticement and pressure for all parties to commit to long periods of patient negotiation. Lastly, jurisdiction gaps (e.g. affecting areas of the world like global commons such as oceans, the atmosphere and Antarctica where implementation and regulation might not align well with relevant authorities) are a common problem in global governance, and can be complicated by jurisdictional clashes and overlaps: where the interaction of global, regional, national and local governance is not straightforward.

One way to trace through these 'gaps' is to think geographically. For example, when it comes to participation we should map out where participants hail from and think about the resources delegations are able to muster. In international negotiations and conferences, it is noticeable that the countries and corporations originating in the Global North are well represented, and that civil society organisations and countries from the Global South are driven to complain that their 'voices' and 'interests' are overwhelmed or under-represented. The issue of enticement and incentives can also be studied geographically. For instance, in the meetings of the International Whaling Commission, the pro-whaling member Japan uses economic incentives to help persuade other members, often countries from the Global South, to support their whaling operations in the Southern Ocean. In the process, whaling becomes something akin to a 'culture war' between those who think it is morally bad as opposed to others who think it is integral to their identity politics. The arguments for and against cetacean conservation get lost in the meantime. Finally, if there are 'jurisdictional gaps' to confront these often manifest themselves in particular sites and spaces around the globe such as the global commons.

Global governance, for the geographer, is shaped by scale, networks and outcomes. In scalar terms, global governance is not something imposed from the 'top down'. It might appear that way if we focus on large states and institutions – the United States and the United Nations for instance – but the rules, regulations and norms and values that make global governance possible depend on a whole series of interactions, from the global to the local and everyday. Human rights protection is a good example here. Article 2 of the 1948 UN Universal Declaration of Human Rights remains foundational:

> *Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status. Furthermore, no distinction shall be made on the basis of the political, jurisdictional or international status of the country or territory to which a person belongs, whether it be independent, trust, non-self-governing or under any other limitation of sovereignty.*

While the Declaration made claims about 'everyone' and 'all', the implicitly Western conception of human rights was not universally accepted, and subsequent UN conventions and conferences, such as the 1993 Vienna Conference on Human Rights, reminded the global community that securing 'consensus' on human rights takes a great deal of patient negotiation and engagement with different religious and political ideologies and economic and value systems.


**Figure 1:** Is the treatment of refugees from Afghanistan and Syria an example of 'good global governance?
**Photo:** ©Mustafa Khayat.

While there may be a widespread global architecture for recognising and protecting human rights, its implementation is patchy. As civil society organisations such as Amnesty International continue to remind us, the protection of human rights varies around the world not only through national and regional legal and political frameworks but also in an everyday sense depending on how police forces, judiciaries, militias and the armed forces do or do not respect human rights. In the very worst cases, disasters, massacres and civil wars reveal only too clearly that human rights protection remains a work in progress. In 1994, in the midst of a terrible genocide in Rwanda, the international community stood accused of failing to act. What should have happened, according to the critics, was that global norms and rules governing human rights protection should have persuaded – even compelled – UN members such as the United States and its allies to intervene to prevent further genocide, under the terms of the 1948 Genocide Convention.

When teaching the geographies of global governance, our analytical focus should be on how rules, regulations, norms and values ideologically on the one hand frame global governance and on the other implement it. Once we follow through particular topics and issues, whether human rights or global trade, we discover that there are governance gaps and geographies of unevenness that manifest themselves through the outcomes of global governance. When for instance 'we' choose to intervene or not to intervene in conflicts such as Rwanda, Sudan or Syria, 'we' participate in shaping the outcomes of global governance.

The decision to intervene or not to intervene is not straightforward. Human rights protection is only one element in the decision-making of states, corporations and civil society organisations. In the case of Syria, global and regional superpowers such as the US, Russia, Iran and Turkey have a patchwork of aims and interests. Saving Syrian civilians from death and hardship will be one of many interests at stake. Civil society groups, while committed to human rights protection and post-conflict recovery, have pressures of their own to contend with: securing funding, determining the scope of their operations, ensuring the safety of their staff. The protection of human rights can be very patchy: local geopolitical circumstances can shape operational safety. Refugee camps across the border in Turkey and Jordan are clearly crucial safe havens in comparison but even these might not be entirely free from violence.

Whatever we think of the current efficacy of global human rights protection, we should be clear that the situation would be far worse without UN conventions and international organisations and civil society groups working for the care and support of refugees. While resourcing and implementation can be uneven, countless people and communities owe their lives to the global rules and norms established by the international community in the aftermath of the Second World War. And whether we like it or not, people traffickers have played a vital role in helping the luckier and/or better resourced refugees and migrants to comparative safety.

## Case study: The world's oceans

Global governance can be studied in many ways, but the aim is always to convey to students how the ideas and practices associated with global governance manifest themselves through rules, systems, norms and values. Moreover, global governance is literally 'grounded' in everyday lives and everyday settings. We can devise global trade rules and norms *ad infinitum* but we rely on local bodies for their enforcement. We can have set up

**Figure 2:** The world's oceans and Antarctica are examples of spaces not under the exclusive control of sovereign states. RRS James Clark Ross on the Scotia Sea, on the edge of the Southern Ocean. One of the British Antarctic Survey's ships, it is primarily a marine research vessel for biological, oceanographic and geophysical cruises. **Photo:** Anna Totterdell.


**Figure 3:** The disputed South China Sea.

bodies of international law, but we still rely on individual national authorities to respect, enforce, police and punish where appropriate. And if these organisations fail to act we might conclude that 'global governance' is a chimera.

Case studies, as all teachers recognise, are a great way to show how theory plays out in practice. One area that I think lends itself well to a study of global governance is the knotty question of what are termed Areas Beyond National Jurisdiction (ABNJ), or 'global commons'. These are spaces that are not under the exclusive control of sovereign states. Good examples include the world's oceans, Antarctica, the Earth's atmosphere and even outer space (Figure 2). If we confine ourselves to the Earth rather than the universe, the world's oceans provide plenty of opportunities to develop global governance case studies.

The most important global regime governing how we act in relation to the world's oceans is the 1982 United Nations Convention on the Law of the Sea (UNCLOS). With over 160 signatories, and a handful of non-signatories including the United States (due to the reluctance of the Senate to approve US ratification), it is a widely acknowledged and respected body of maritime rules, regulations, norms and values. It established the maritime rights of coastal states, e.g. a 200 nautical mile exclusive economic zone (EEZ) and the rights of non-coastal states, e.g. access rights to the areas of the seabed beyond the EEZ, and transit/communication rights of all parties around the world's oceans and seas. UNCLOS addresses environmental management, natural resources management, and navigation; the specialist UN International Maritime Organization (IMO) continues to work on the conduct and regulation of marine affairs. However, the rights of coastal states, such as the right to declare an EEZ, only matter in practice if other states respect them. If other countries believe that they have a right to the resources within the EEZ, for example fish stocks or oil reserves, disputes and even violent conflict can result.

### *The South China Sea dispute*

While UNCLOS provides a framework, as an instrument of global governance it is not fail-proof. It does not, for instance, mean that disputes over marine access no longer arise. In the South China Sea six countries – China, Taiwan, Brunei, Malaysia, the Philippines and Vietnam – are engaged in a series of territorial disputes (Figure 3). They are contesting maritime boundaries, resources, access and inhabitation, and the ownership of a series of remote and barely inhabited islands, such as the Spratly archipelago.

As the second largest semi-enclosed sea and major maritime trading space with resource potential including oil and gas, the South China Sea is one of the most geopolitically contentious areas in the world today. The most important litigant, China, stands accused by the other actors as engaging in bullying and outlandish behaviour. By deploying its superior naval forces and logistical supply chains, China has established a permanent presence on a series of disputed islands. In some cases this has involved marine engineering, including dredging and landscaping, in order to transform empty rocks into inhabitable places and thus qualify as 'islands' (under UNCLOS rules, if something is an island rather than a rock the sovereign authority can begin to establish an EEZ with associated rights to exploitation and management).

China is re-engineering the very matter of the Earth in order to qualify for global governance entitlements.

While this might all seem quite remote to the lives of ordinary Chinese citizens, popular education plays a role in this process of colonisation and exploitation. Maps and charts were published, in the popular media and school textbooks, showing the major part of the South China Sea, demarcated by what is known as the 'nine-dash line', as belonging to China. Popular geographies play their part in helping the citizen or community believe that they have a rightful stake in regional and global governance. In other places, however, other school children are being taught that the South China Sea belongs to their countries. In 2013 Zhiguo Gao, a Chinese judge on the UN's International Tribunal on the Law of the Sea, published an academic article which argued that the nine-dash line was justified under international law and had 'become synonymous with a claim of sovereignty over the island groups that always belonged to China and with an additional Chinese claim of historical rights of fishing, navigation, and other marine activities (including the exploitation of resources, mineral or otherwise) on the islands and in the adjacent waters' (Gao and Jia, 2013, p. 108).

International law, bilateral and multilateral diplomacy and twin-track negotiations have so far failed to resolve the South China Sea dispute. The 2002 Declaration on the Conduct of Parties reaffirmed the importance of UNCLOS, but disagreements remain over the conduct of parties including disputes over dredging work, fishing and oil and gas exploration and exploitation. Some areas of co-operation have emerged, such as the 2005 Joint Marine Seismic Undertaking involving China, Philippines and Vietnam. But since then progress has stalled as the interested parties disagree over how global governance might help them address their disputes.

The South China Sea dispute can be seen as a cautionary tale. For all the declarations and conventions hailing the necessity for global governance, we appear to have a case study which reminds us that states and governments guard their national interests and security jealously. They will only invoke global governance mechanisms as and when it suits their interests, ignoring provisions that do not coalesce around their resource and security agendas. For China watchers, the role and scope of the Chinese navy is an area of growing interest, in particular its employment of what is called 'force projection', or 'power projection'. Naval forces are often in evidence when islands, resources and even access through and to seas and oceans is disputed, and as China's naval presence in the area has increased so the United States and its regional allies such as Japan, Taiwan and Philippines have looked to their own maritime security.

## Conclusion

Global governance is a process and an outcome. That it is a contentious term has the advantage of drawing our attention to how we as human beings organize our affairs. While we do not always get to choose, let alone control, our affairs, our ideas about rules, regulations, order, norms and values inform – even haunt – the practices of governance. As countries such as China, and indeed the Global South, become more involved in shaping the ideas and practices of global governance we will see further evidence of how challenging it can be to build, establish and protect consensus when addressing a global population which will reach 10 billion by the end of the 21st century. How those ideas of governance develop, and how and where they are implemented (with corresponding gaps, inequalities and unevenness) will continue to be profoundly geographical.

### *Application*

*Professor Dodds' article provides opportunities to inspire both geography teachers and students alike. As an overview of a complex topic, it would be useful to give a copy of the article to students to read before their first lesson on global governance, asking them to draw out themes and define key words. Concept maps might be particularly useful here to promote discussion during introductory lessons. Indeed, the article is ideal for supporting the most able geographers, particularly those preparing for university interviews, in their wider reading on the subject. Abstract questions such as 'What counts as global?' and 'Who gets to define global?' can provide useful challenges to encourage risk-taking in student responses. The download which accompanies this article provides questions and tasks which could be applied during the study of global governance.* (Hannah Spencer) | **TG**

**Online resources**
The download which accompanies this article provides questions and tasks which could be applied during the study of global governance. Go to *www.geography.org.uk/tg* and click Autumn 2016.

**Klaus Dodds** is Professor of Geopolitics in the Department of Geography at Royal Holloway, University of London. He was a member of the A-Level Content Advisory Board.

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# Encouraging students to read beyond the core text

Richard Waller, Christopher Adams, Gill Miller and David M. Schultz

*This article considers the importance of information literacy skills in the context of the changing GCSE and A-level curricula and the transition to university. It provides advice on the ways in which students can be encouraged to engage with a more diverse mix of sources and considers the results of trialling these ideas in the classroom.*

Accompanying online materials

Information literacy refers to the suite of skills associated with the location, evaluation, synthesis, and effective use of information resources (Waller and Schultz, 2015). A forum at the 2015 GA Annual Conference identified specific challenges that can deter students from undertaking independent research, leading to an over-reliance on course textbooks and complementary resources selected by teachers. This in turn limits the development of the skills that underpin successful academic outcomes at more advanced levels of study and constitute vital employability skills in today's knowledge-based economy (Cheuk, 2008).

When undertaking subject research, students tend to (1) select the top hits from a Google search, (2) use the most accessible sources, and/or (3) give up if nothing relevant is rapidly located. The forum discussion identified the subsequent need to support students undertaking literature searches and to provide guidance in assessing sources and using them effectively in related assignments. Teachers also identified practical barriers that limit access to appropriate sources, including limited library holdings, lack of access to academic journals, and the cost of specific A level resources.

In this article, we consider the importance of information literacy skills in the context of the changing GCSE and A level curricula and the transition to university. We suggest ways in which students can be encouraged to engage with a more diverse mix of sources and trial these methods in the classroom.

## Why is this important?

Information literacy skills are needed for all A level subjects and should be nurtured throughout post-16 studies. Information literacy also enables students to make an effective transition into higher education, where this skill is central to successful degree outcomes.

A-level geography provides an ideal opportunity for students to develop their information literacy skills. The breadth and depth of geographical study requires students to expand their knowledge and understanding of specific topics well beyond the limited coverage in core texts. The new subject criteria state that specifications 'must enable students to develop as critical and reflective learners, able to articulate opinions, suggest relevant new ideas and provide evidenced argument in a range of situations' (DfE, 2014, Geography subject content July 2014, Section 3, p. 4).

This standard cannot be achieved without the ability to locate, evaluate and comprehend relevant literature.

To obtain a top grade at A level, students must be able to demonstrate a depth of knowledge gained through engagement with a variety of sources and viewpoints. Information literacy skills enable students to assess the reliability of what they read, develop their awareness of contested views, and articulate and justify their own opinions. In the new specifications, information literacy skills are also an essential tool for independent coursework, enabling students to identify relevant literature, locate their work in the context of existing geographical research, and justify their chosen topic.

Students progressing to undergraduate degree programmes will be required to make extensive use of their information literacy skills. However, they can find the extent and diversity of scholarly literature overwhelming and a barrier to effective transitions into higher education. By developing information literacy skills in the sixth form, teachers can play an important role in providing students with the skills and confidence required to make the transition into higher education much less daunting. Even for students not going on to university, locating information and being able to read it critically is an important skill in any context.

## Practical approaches

The effective use of resources involves a number of distinct stages, illustrated in Figure 1. This highlights three strategies that will help students to develop core information literacy skills (see Waller and Schultz (2015) for further detail).

### *Developing effective search strategies*

To develop online search strategies, students can use Google Scholar, a variant of the Google search engine that targets academic sources. To identify relevant information quickly and easily, careful thought must be given to the development of appropriate search terms. This involves practice and perseverance. Students could for example identify the number of hits generated by the phrase 'climate change', which would produce millions of hits and no means to discriminate between them. On the other hand, a search for 'How climate change affects sparrow distributions over Asia' would be too narrow, producing too few hits. Other topics that could be used to identify and refine search phrases include income inequality, fracking, disposal of nuclear waste, or the extinction of dinosaurs.

**Figure 1:** Appropriate and inappropriate approaches to the effective use of sources.

| | Recommendations | Things to avoid |
|---|---|---|
| **Identify topic** | Have a clear purpose at the outset.<br>Know what you are looking for. | Relying on a vague idea. |
| **Plan search** | Identify specific words and phrases and trial different options. | Using overly broad search terms. |
| **Search** | Use Google Scholar in addition to Google.<br>Scan through the list to get an initial sense of the type and quality of your search results. | Simply selecting the first hits obtained. |
| **Assess usefulness** | Articles tend to be more recent, shorter and more concise.<br>Look for number of citations.<br>Look for author names you may recognise from references in course textbooks. | Giving no explicit consideration to the reliability of the sources obtained. |
| **Read** | Scan before reading in detail to get a sense of the structure.<br>Focus on sections of specific relevance.<br>Reading the abstract alone (if available) may suffice. | Reading the entire resource from beginning to end. |
| **Make notes** | Only note what you understand.<br>Maximum two pages per article.<br>Look for conclusions and evidence. Include a few facts and location. | Copying large chunks of text. |

### *Identifying reliable resources*

A variety of approaches can be used to assess the reliability of a source (Figure 2). In higher education, peer-reviewed sources are preferred. Peer review is a process whereby academic articles submitted for publication are reviewed by a number of independent experts. This commonly leads to the revision of the article, and in some cases outright rejection. Although this does not mean peer-reviewed articles are 'correct', peer review is an important metric of quality.

Students should understand the difference between primary, secondary and tertiary sources. Primary sources are the original source of the information: they report the research undertaken by the author. Secondary sources report results found in primary sources. Tertiary sources are further removed from primary sources and include introductory textbooks and newspaper articles. Secondary sources usually provide a more scholarly approach to their topic, including citations and references to their source material, whereas tertiary sources simply describe the science. In terms of reliability and quality, primary sources are the best, but A level students may also find the reflections of secondary source articles useful.

### *Engaging with the resource*

Knowing what to read and what not to read can save students a lot of research time. The most efficient students read with a purpose and focus only on the relevant sections. Students rarely if ever need to read and understand an entire paper, and reading the abstract or conclusion (if available) may suffice.

## Classroom experiences with these exercises

Using ideas and resources relating to the 2015 GA Annual Conference forum, a series of lessons were trialled with able students from a selective grammar school with the aim of developing information literacy skills and improving the quality of essay assignments. The handouts used are available to download in the online resources.

The first exercise, at the beginning of year 13, asked students to identify a book in the school library of relevance to any topic on the AQA specification and to explain how it could be useful. Subsequent classroom discussion encouraged students to reflect on their existing approaches to background reading and research. Specific approaches to improving information literacy were outlined and a simple guide to information literacy provided (SCONUL, 2011).

The second exercise required students to assess the reliability of a range of resources on the potential impacts of climate change, an issue used as an off-topic exemplar. These resources included a basic website (BBC, 2014), a specialist website (NSIDC, 2015), a peer-reviewed journal article (Vuille *et al*., 2008), a recent IPCC report (Vaughan *et al*., 2013), and a report written by a climate-sceptic organisation (Easterbrook *et al*., 2009). Students identified the pros and cons of the resources, ranked them in terms of their reliability, and identified those they would be most likely to use, as well as any they would reject.

Subsequent teacher-led discussion indicated that the students typically rated source reliability

according to the depth and breadth of the information contained and were consequently most likely to discard the basic website on account of its limited detail. The students did not, however, consider nature and credibility of the authors. For instance, students failed to identify the polemical perspective of the climate-sceptic report; instead they interpreted the format, clear referencing and academic 'feel' of the report as indicating an authoritative source. Finally, the students questioned their ability to understand all the detailed information contained in the journal article (Vuille *et al*., 2008).

The students then applied these skills to a set essay on plate tectonic theory. They were specifically asked to consider their sources, to use Google Scholar and to include references. The resultant essays often showed greater breadth of reading which, for the more accomplished answers, provided a more balanced discussion with a greater range of support. In subsequent essays, many of the students continued to show effective incorporation of a range of sources.

## Conclusion

Success at A level and beyond requires students to undertake detailed research and to critically engage with sources beyond the core materials provided. Locating relevant material and appraising the reliability of sources are challenging tasks, that in combination with practical barriers can easily discourage students from undertaking independent research. Teachers can play a key role in the development of information literacy skills through the inclusion of simple strategies and practical exercises that can be used to help students locate, evaluate and effectively employ resources, thereby enabling students to utilise a wider range of resources for the benefit of assessed work. | **TG**

1. **Who is the author?**

If you are unable to identify an author, this is an immediate cause for concern. If you can identify an author, run a quick Google search to find out more about their background and subject credentials.

2. **Has the resource been peer reviewed?**

Journal articles that have been subject to external review are widely considered to be more reliable and impartial than those that haven't.

3. **Is it a primary, secondary or tertiary source?**

Primary and secondary sources are more directly related to the original research and likely to be more reliable than tertiary sources.

4. **When was the resource published?**

In general terms, recently published resources are likely to be more current and therefore more reliable. This is particularly the case in rapidly developing areas of research, for example climate change.

5. **Is there any evidence of bias?**

A resource may be promoting a particular viewpoint, so its coverage may be biased. If possible, check out the author and their organisation (Q1) and consider whether there is a reason for bias (e.g. the research was funded by a lobby group).

6. **How many times has the article been cited?**

A search using Google Scholar will indicate how many times an article has been cited. A greater number of citations generally means the source is more influential and well regarded (although it does also depend on how recently it has been published).

**Figure 2:** Questions to ask when appraising the reliability of a source.

**Online resources**
You can download the handouts trialled with able students with the aim of developing information literacy skills and improving the quality of essay assignments. Go to *www.geography.org.uk/tg* and click Autumn 2016.


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David Preece

# Bringing the atmosphere to life in the classroom

*In this article, David presents a review of some of the more dynamic weather and climate teaching resources available to help in teaching the day to day working of the atmosphere.*

Accompanying online materials

The key to bringing geography alive is to help students understand the real world around them. Nowhere is this more important than in understanding our atmosphere. With the climate change debate regularly at the forefront of global issues, and natural hazards becoming more challenging to predict and manage, knowing how the atmosphere works is a vital part of a geography curriculum.

At the micro-scale, the Royal Meteorological Society's Met Link website *(www.metlink.org)* provides excellent resources for understanding processes, or for conducting micro-scale fieldwork around the school environment. At the 'extreme event' scale, as geography teachers our case study knowledge of events such as Typhoon Haiyan is superb: located resource materials have been produced, with DVDs, links and real examples of what has happened. Both ends of this teaching experience offer opportunities to really engage students, and draw them in to the small- or large-scale dramas of the atmosphere.

However, our understanding of the day-to-day working of the atmosphere is often more theoretical; reverting to principles of atmospheric physics. The focus of student learning is to understand the processes that drive the atmosphere, but we tend to have few opportunities for them to apply this knowledge.

In this article, I present a review of some of the more dynamic weather and climate teaching resources available. With regular use of these ideas in these resources, the Earth becomes our classroom, and the fieldwork is above our heads.

## Integrating live data sources

Increasingly, big data providers are making semi-live feeds of their data and analysis available online for free-to-access public consumption. The challenge for teachers is to know how and where to access these fantastic – but quite niche – resources. A solution to this challenge has been provided by Met Check *(www.metcheck.com/UK)* – an evolution of a UK-based website that originally started in 1998 as a provider of 30-day forecasts for hobby groups. Now expanded, the website provides a single site gateway to access many of the highest quality data sources that show current weather for the UK.

Accessed via drop down menus, the site enables users to display animated images of a large range of weather options – from the standard Met Office synoptic chart and temperature distribution, through to satellite imagery and three-dimensional visualisation of rainfall patterns. There are still options aimed at specific hobbies – you may want to use these to theme your lesson, or link it to, for example, numeracy targets and wider cross-curricular projects and aims. Often, embedding weather components into other lessons is a practical way to familiarise students with the idea of weather information as a source. Rather than learning from a textbook diagram, students can instead analyse and interpret live weather conditions – identifying the odd one out from a sequence of images of a similar feature, or producing a synoptic chart from the satellite imagery and conditions shown.

Perhaps more interesting is the extent to which we can start to utilise these sources as diagnostic tools. Take the classic lesson on the air masses of the UK as an example. Ordinarily, we might draw a diagram showing the different air masses, and explain the expected weather conditions for each. However, using the air mass satellite images (Figure 1) *(www.metcheck.com/UK/airmass.asp)*, we can see live images which have had an artificial colour applied to show what air mass they are (a key is included). This RGB composite image can be paused, advanced and rewound, showing the development of conditions and the interaction at the front. Taking this further, the map of the jet stream and forecast can be used to explain how this boundary exists – and what it might look like in the future. Students can now be actively involved in analysing, interpreting and predicting the systems – using higher order thinking to take apart and apply what they know to make competent predictions. Using the data, rather than simply observing it, is the first stage to a more engaging pedagogy of weather and climate processes.

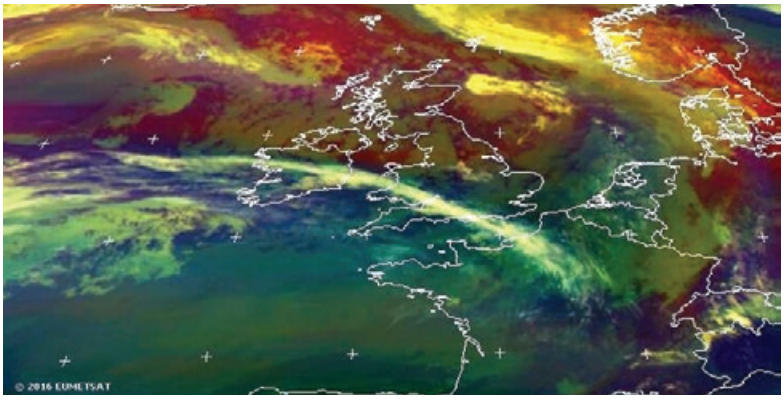


**Figure 1:** The mixing of polar and tropical air resulting in unsettled June weather. **Image:** ©2016 EUMETSAT.

## Modelling and explaining the patterns

The opportunities offered by live data feeds are immense, but the real learning takes place when we can encourage students to apply and interpret this knowledge. This requires access to a 'simulated' Earth – where we can interact with and explore live data, and demonstrate to students how the various aspects of the atmospheric and ocean

physics correlate. In 2014, a visualisation was made available on the internet which offered this capability on an open-source basis. Hosted on a free public website *(http://earth.nullschool.net)*, the visualisation combines a range of data feeds with an open-source model that replicates the flexibility of a Google Earth-style interface. The model is a visualisation of the computer forecasts, and updates every three hours, with further details of data sources on the website.

At the simplest level, the Earth model allows classroom teachers to call up anywhere on the planet and present a visualisation of the live feed conditions. If there is a tropical storm somewhere on the globe, your students can see it happening in front of them, and get a sense of the scale of what they will see on the news. Figure 2 shows imagery from the South Pacific Ocean on the morning before Cyclone Pam hit on Vanuatu. The wind focus, nature and location of the eye of the storm show students just how significant this event is, and the live nature allows them to interact with it – with Twitter feeds, news stories and the unfolding events making this more than just another case study.

What makes the Earth model particularly useful for this kind of understanding is the interactive layers. Clicking on the 'earth' in the left corner brings up a menu, enabling the user to control what they see in the atmosphere. You can choose whether to explore atmosphere or ocean, what and how to animate, and how to scan through it in time and space. The menu gives you scope to pick different variables from a list that includes wind, temperature, relative humidity, through to cloud water and sea level pressure. In the 'atmosphere', the option of atmospheric pressure layers enables you to fly through the troposphere and stratosphere, and explore the interaction of vorticity in the mid-planetary boundary layers (700hPa and 500hPa), while the higher altitudes (250hPa) correspond to the jet stream and stratospheric winds respectively (Figure 3). For students – particularly at the higher levels – the chance to identify how the different cells, air masses and winds interact with each other is unparalleled.

The application of knowledge enables simple diagnostics to be carried out within lessons on any given day and with any climatic features. Starting with a simple wind pattern for a location, students can be prompted to work backwards and identify the key climate features. What is the wind direction? What air masses would you expect to see? What conditions would you expect? What jet stream position would you anticipate this bringing? Each of these queries and student predictions can be tested by altering the variable – were they right? What was their reasoning?

More advanced students may be challenged by a forecast scenario. For a given pattern of the jet stream – either live, or archived – what weather would you want to see? Students are then expected to think through the conditions – working out how they would arrange the fronts, the wind patterns and what air masses would be involved.

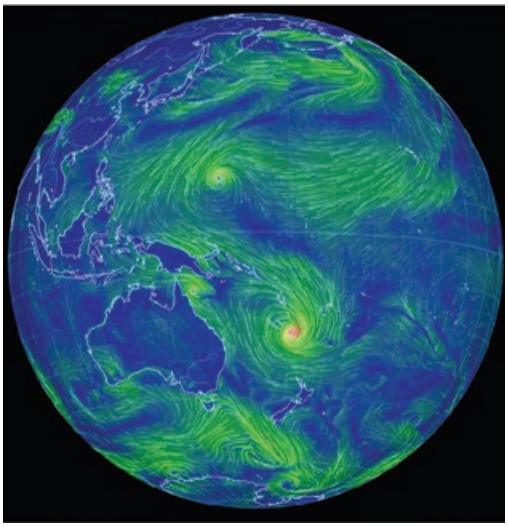

**Figure 2:** Imagery from the South Pacific Ocean on 14 Mar 2015 (0900Z), showing Tropical Cyclone Pam as it approached the coast of Vanuatu. **Source:** *http://earth.nullschool.net*

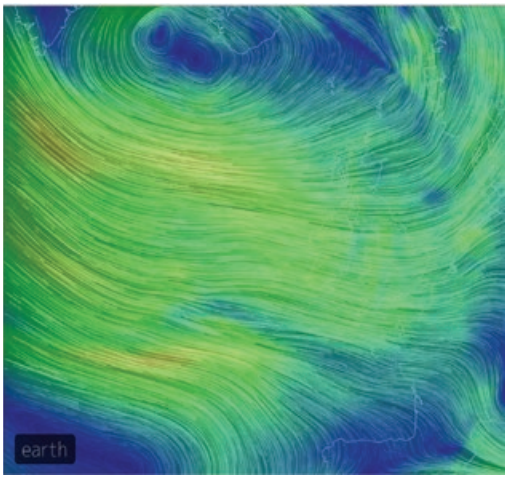


**Figure 3:** Unsettled weather over the UK on 27 Jun 16. Here, the 700 hPa winds start to show far more of the upper level winds. **Source:** *http://earth.nullschool.net*

Clearly, this kind of resource can be combined with the Met Check resources described previously: being able to visualise the wind patterns of a synoptic chart, or get a sense of how the atmospheric patterns and air masses of the satellite feed can generate a wind pattern. Students are able to see how the synoptic chart generates a frontal system, visible on satellite, and with RGB composite air masses to explain how the depression is created. The Earth simulator shows how this wind appears at surface level, and higher in the atmosphere, demonstrating the role of the vorticity and jet stream in creating and exacerbating this particular event.

## Implications

The weather is a wonderfully dynamic and unpredictable system. Although the fundamentals of atmospheric physics are well understood, and we can effectively teach, represent and model them, there is no reason to limit our teaching to this approach alone. To really engage our students in higher order thinking about the weather, we need to be showing them how it really works – and utilising as many data sets and representations as possible. Use lots of websites, and keep challenging your students to look to the skies and explain what they see! | **TG**

**Online resources**
A PowerPoint to accompany this article showing further images is available to download. Go to *www.geography.org.uk/tg* and click Autumn 2016.

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Geoff Jenkins

# Investigating the microclimate of school grounds

*Geoff demonstrates how using a USB logger can make a successful and effective fieldwork activity in the school grounds.*

The investigation of small-scale climates around schools has long been a popular geography fieldwork project. Microclimates are most pronounced at night, especially on clear calm ones when an open area can cool several degrees lower than a nearby more sheltered area. Getting students to measure temperatures through the night is impossible at most schools unless loggers can be left out for several days. In the past, this has meant using a single large logger with several wired temperature probes, but the recent availability of cheap USB temperature loggers has made this activity easier and more successful.

A typical USB logger looks like a memory stick (Figure 1). It is affordable, simple to use, has an adjustable sampling rate, and can store enough data points (over 8000) to make measurements every minute for five days, for example. It has a resolution of 0.1 degrees Celsius with a temperature range adequate for any climate in the UK. To download the data, the logger is simply plugged into a USB port of a PC; software is usually supplied which will display a plot of the time history of temperature and also allow the data to be saved in an Excel file. Loggers agree well with one another (although any small differences can be corrected for by running them side-by-side for a few hours and comparing), and accuracy is fine for microclimate measurements. Used outdoors they must be protected from rain, dew, etc and this can be done using a plastic bag or a small yogurt pot (Figure 2). Like all temperature sensors, they will not read accurately when exposed to sunlight, so are best suited to work at night or in the shade.

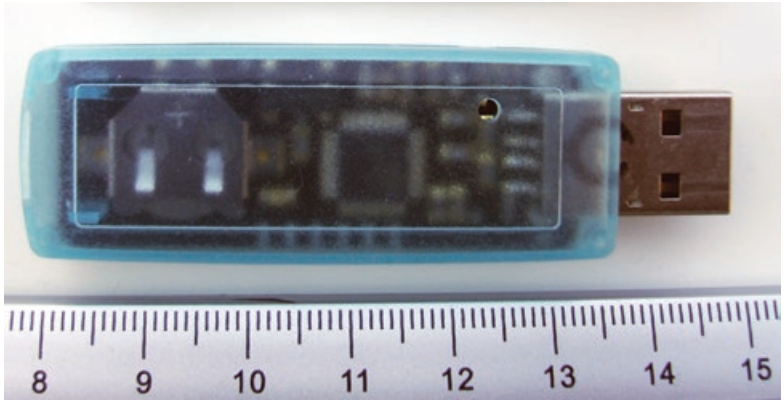


**Figure 1:** A typical USB temperature logger. **Photo:** Geoff Jenkins.


**Figure 2:** The small yogurt pot used to protect the logger from damp, pinned down to prevent removal. **Photo:** Geoff Jenkins.

## The investigation

The temperature of the grounds of Yateley Manor School was monitored using seven loggers over three nights in December. Loggers were put in pots and placed at locations around the school where different climates might be expected, ranging from an open area in the middle of the rugby pitch to a sheltered courtyard. The pots were pinned into grass using U-shaped staples made from coat-hangers, or cable-tied to fences or posts where available. One logger was placed (unsecured) on a fenced-off tennis court so was thought to be safe but went missing, presumably carried off by a fox or other animal.

The temperature plots from two of the loggers in the investigation, on the rugby pitch and in an open courtyard, are shown in Figure 3. The first night (21 December) was cloudy, and the temperatures at the two locations (in fact, all the locations) were very similar. The second night (22 December) was partly cloudy, and the two temperatures differed by up to 4 degrees Celsius, but the third night (23 December) was very clear and calm and differences of up to 5.5 degrees Celsius were measured.

Using similar temperature plots from each of the loggers, minimum temperatures were read off at each of the locations, and these were plotted on a Google Earth image of the school and its grounds (Figure 4) . The coldest temperature, just above freezing, was found on the rugby pitch, and the place that kept warmest was a gap between two buildings that had been simply roofed over; this stayed some 8 degrees Celsius warmer than the rugby pitch. Other locations, with greater or lesser amounts of shelter, gave minimum temperatures somewhere between these two.

## What can we learn from the observations?

When the sun shines, it warms up the ground, which in turn warms the air around us. But all the time, heat (in the form of invisible infra-red radiation) is being given off by the surface of the ground, and this cools the surface. During the day, the heat absorbed from the sun is greater than heat lost from the ground, so the ground gradually warms up. At night, when there is no sun to warm us, temperatures will fall. If the night is clear, with no cloud, the heat emitted from the ground can escape freely to outer space, so open ground will cool down rapidly, and cool the air next to it. If the night is cloudy, most of the heat emitted by the ground will be effectively trapped by the clouds, so the temperature will not fall anything like as much.

The amount of heat given off by the ground on a clear night will depend on its location.

Open ground will radiate heat to the sky everywhere, so lots of heat will be lost, and the temperature will fall rapidly. But at a well sheltered location, for example in a courtyard, much of the heat that escapes from the ground 'bounces back' off the walls of the courtyard, so the cooling will be much less rapid. In between these two extremes, for example at the base of a wall which is open to only half the sky, temperatures will fall less rapidly than in the open, but more quickly than when enclosed on all sides. Thus on a clear night, the loggers will measure very different temperatures. On the other hand, on a cloudy night differences between the very open site and the very sheltered one will be much less, because clouds are sheltering all the locations. Wind is also important; if it is windy, this will move the air around and act to equalise any differences. And in the case of loggers very close to buildings, the warmth of the buildings themselves (either because, in winter, they will be artificially heated or, in summer, they absorb heat from sunshine during the day) will have affected the microclimate.

Demonstrating in this fieldwork project that clouds can have a blanketing effect, trapping heat and preventing temperatures falling, can lead naturally to a discussion of the greenhouse effect. Carbon dioxide and other greenhouse gases, although they are dispersed throughout the atmosphere rather than in a single layer, have a similar blanketing effect to that of clouds, so increases in the amount of $CO_2$ will lead to more heat (that would otherwise escape to outer space) being trapped and hence lead to rising air temperatures near the surface.

### *Other investigations*

If you have enough loggers, or as a separate study, look at temperatures at different heights above the ground, so you can build up a three-dimensional microclimate, and not just a surface one. The loggers are so light that you can use three or four bamboo canes cable-tied together to get them up to 6 metres or more. Then think of some ways you could get them up even higher! They can even be buried for a few days (suitably protected, of course) to study how temperatures vary at different depths (for example, 10cm or 20cm) below ground. Look at the microclimate of a bigger area than the school by letting students who live in different types of terrain in your community (for example, city centre, suburb, countryside, coast, hill, valley) take a logger home for a few nights, then plug them all in and compare.

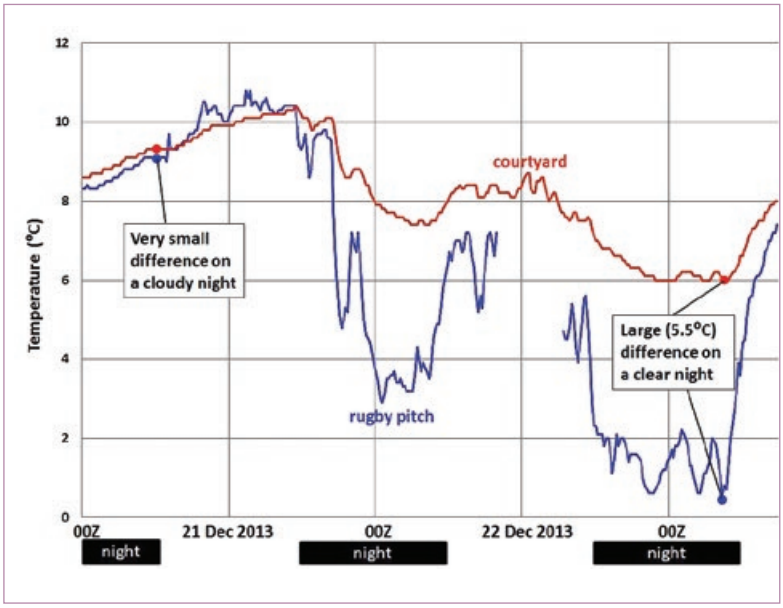


**Figure 3:** Temperatures measured by two loggers at different locations in the school grounds. The period from about 10 GMT(Z) to 15 GMT on 22 December on the rugby pitch has been deleted as the logger was in direct sunlight, making readings inaccurate.

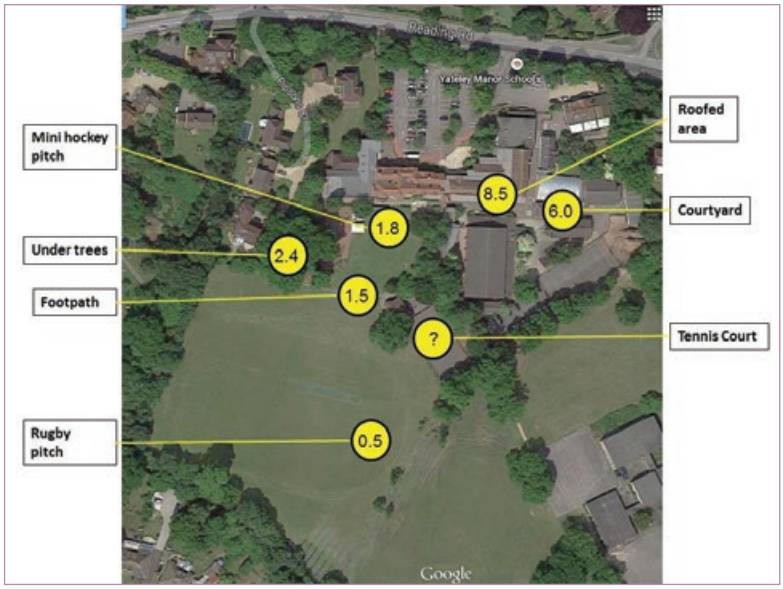


**Figure 4:** The minimum temperatures logged at each location around the school were plotted on a Google map; these all occurred at about 04GMT on 23 December 2013. An alternative would be to enter the data directly into Google Earth.

## Conclusion

The new GCSE subject content requires students to demonstrate fieldwork skills using primary quantitative data, and understand the evidence for different causes of climate change, including human activity. This microclimate activity can contribute to both the fieldwork and climate change aspects of these new specifications. | **TG**

**Geoff Jenkins**, worked in the Met Office from 1974–2011. He chaired the Education Committee of the Royal Met Society from 2008–2014, and, now retired, is still a member of the committee.

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**Some suppliers of USB temperature loggers**

*www.mindsetsonline.co.uk/Catalogue/ProductList/dataloggers?catalogueLevelItemID=3fbc75bb-621c-409c-b6e2-f49d3a8a4f17*
*www.lascarelectronics.com/temperaturedatalogger.php?datalogger=402*
*www.sensormetrix.co.uk/carbon-21-usb-temperature-data-logger_p_779.php#*

**Acknowledgements**

The author would like to thank Yateley Manor School for allowing him to use their grounds, and particularly Brandon Ashton and Sheila Conway of for their help.

Rob Jones and Jonathan Nankivell

# Developing numeracy skills through fieldwork

*Rob and Jonathan outline how they collaborated with the school's mathematics department to develop a joint scheme of work to develop numeracy skills through fieldwork along a river.*

Key stage 3 river fieldwork is always a great fieldwork activity for the summer term, but making good use of the collected data has been problematic when the field trip is so close to the summer holidays. In our school, the geography department developed a link with the mathematics department to overcome this problem. Working collaboratively to plan and teach a unit on river processes for our year 8 students, we hoped to help the students better interpret and evaluate the results of their river investigations. In mathematics lessons the students learnt how to analyse and present the collected data, and in geography lessons they learnt the concepts and skills underlying the rivers fieldwork unit.

## Developing numeracy in geography

The DfE (2013a) programme of study for geography highlights the need to develop and extend numeracy within the geography curriculum. It states the need to 'communicate geographical information through numerical and qualitative skills' and to 'draw conclusions from geographical data'. The DfE (2013b) programme of study for mathematics states mathematicians 'should apply their knowledge in science, geography and other subjects'.

Collaborating with the mathematics department and developing our own teaching of numeracy is of increasing importance as mathematics and numeracy will account for 10% of the final examination of the new GCSE.

## Creating links with the mathematics department

Our first steps involved face-to-face discussions with the head of the mathematics department to look for areas where the geographical learning processes coincided with the mathematics programme of study. We found that the mathematical skills which we as geographers wanted to cover during the fieldwork tied in closely with the statistics element of the key stage 3 mathematics programme of study and the department's data handling unit. The links between the geographical learning and the mathematics curriculum were categorised by difficulty to enable us to differentiate materials and tasks more easily (Figure 1). We felt this was necessary, both to extend our more able students and to develop our own ability to teach numeracy and statistics.

| Stage of investigation | Process | Links to mathematics curriculum | Difficulty |
|---|---|---|---|
| **Stage 1:** Before the trip | Designing tables for data collection | Rounding, significant figure and estimates, using appropriate units to design a data collection table | Low |
| | Hypothesising | Making conjectures about patterns and relationships | Medium |
| **Stage 2:** Data collection on field trip | Collecting and measuring data – river width and depth | Using standard units of length | Low |
| | Calculating velocity, flow rates and discharge | Using compound units to solve problems | High |
| | Measuring river gradient | Using Pythagoras' theorem and trigonometric ratios | High |
| **Stage 3:** Data presentation back at school | Graphs of cross-sectional area<br>Scatter graphs | Constructing appropriate tables, charts and diagrams; choosing axes and scale | Medium |
| **Stage 4:** Data analysis back at school | Relationships between variables | Identifying variables and expressing relationships between variables, algebraically and graphically | High |
| | Spearman's rank | Making and testing conjectures about patterns and relationships; looking for proofs or counter-examples | Medium/ High |
| | Correlation function in Excel | Exploring what can and cannot be inferred in statistical settings and beginning to express their arguments formally | High |
| | Outlying points | Describing simple mathematical relationships between two variables (bi-variate data) in observational and experimental contexts and illustrating them using scatter graphs | High |
| | Cross-sectional area – either using the trapezium rule or just by counting squares under the cross-sectional graph | Applying formulae to calculate and solve problems involving the area of trapezia | Low/High |

**Figure 1:** Links between the geography rivers project and the mathematics curriculum.

Once these links had been established and the learning opportunities identified, we began a series of joint departmental meetings. These revealed that the two departments were interested in different learning outcomes, and agreeing these became an essential part of the planning process. It was also important for both teachers and students to recognise and understand the different terms used in mathematics and geography: for example, river discharge (geographical term)/flow rate (mathematical term); anomalies on scatter graphs (geographical term)/outliers (mathematical term).

After three meetings, a framework was created allocating responsibilities (Figure 2). The week-by-week framework ensured that the two departments were working in tandem, which was important because we wanted the students to see the links between the subject areas.

| | Geography | Mathematics |
|---|---|---|
| Week 1 | Introduction: Location of the river, geology, relevant theories and context | Using Bradshaw's model to create hypotheses |
| Week 2 | Methods: Decide which methods and equipment to use to collect data. Create a risk assessment | Design the data collection sheet to be used in the field |
| Week 3 | Data collection in field (Figure 3) | Data collection in field (Figure 3) |
| Week 4 | Use of GIS (GEGraph) to present the data spatially | Data presentation: Bar charts, scatter graphs and other appropriate techniques |
| Week 5 | Data analysis: looking at the data from a geographical perspective. Does it fit established geographical ideas? | Data analysis: looking at relationships between variables and the use of statistical analysis where appropriate |
| Week 6 | Conclusion: Were the hypotheses correct? Can they explain the results? | Evaluation: Looking at the reliability of the investigation. Were the results reliable, and significant? |

**Figure 2:** Mathematics and geography joint planning.

## Benefits of a jointly planned fieldwork unit

- **Additional time.** Working collaboratively with other departments provides an opportunity to share workload and frees up time to focus on the deeper geographical understanding of the topic.
- **Shared expertise.** The mathematicians' grasp of calculations such as river velocity and cross-sectional area, and their graphical analysis and presentation skills, enhanced the geographers' understanding. Working collaboratively raised the profile and status of the project: students were aware that they were doing a jointly assessed project, i.e. two assessments in one.
- **Professional development.** Working with another department and being involved with joint planning has extended our understanding of numeracy and how we can better integrate it into our lesson planning.

We found that the students benefited greatly from this combined approach to learning: their data presentation and analysis improved. They were also able to see the links between geography and maths. The approach was viewed by the maths department as a good opportunity to use real data to statistically analyse real world events. Through the peer planning and the fieldwork day itself, a level of camaraderie developed between the two departments which will be built on in the future and will be of benefit as we plan and strengthen our GCSE curriculum.

**Figure 3:** Students calculating velocity using a ranging pole, tape measure, stop watch and an orange. **Photo:** Rob Jones.

## Future developments

In the future, we hope to take greater advantage of peer planning and do some peer-teaching and observation. Experiencing how the maths department teaches numeracy will extend our professional development by providing opportunities to improve our teaching of numeracy and statistics throughout the key stages in geography.

Although this collaborative teaching gained us teaching time, we still found ourselves short of time in the final weeks of term to mark, moderate, provide feedback and give students the opportunities to reflect on and improve their work. Consequently we have planned the fieldwork earlier for next year. Also next year, we are considering extending the collaborative working approach to a joint investigation with the science department on river water pollution levels. | **TG**


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DfE (2013a) National Curriculum in England: Geography programmes of study. Available online at *www.gov.uk/government/publications/national-curriculum-in-england-geography-programmes-of-study* (last accessed 16 April 2016).

DfE (2013b) National Curriculum in England: Mathematics programmes of study. Available online at *www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study* (last accessed 16 April 2016).


**Useful video**

*www.youtube.com/watch?v=W4DCLw3WEGo* Area under graphs: The trapezium rule to estimate area (last accessed 16 April 2016).


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Raphael Heath

# Developing an explosive scheme of work

*Raphael based his 'Ashcloud Apocalypse' event, for schools around the world, on a series of GIS-based analytical and problem-solving activities. Here he describes how he planned the event, and how he used the resources with his year 9 students.*

Accompanying online materials

World GIS Day takes place in mid-November, and is a great opportunity for schools around the world to get involved in a shared online mapping activity. 'Are you ready for Ashcloud Apocalypse 2015?' shouted the posters around my school in September 2015, hoping to hook students into the project. 'Ashcloud Apocalypse' was based on a series of GIS-based resources on tectonics I had devised, culminating in a global mapping event, during which students would calculate the risk to their home from a large scale volcanic eruption. To promote 'Ashcloud Apocalypse' to schools I built a website giving free access to the resources. A combination of social media, news media and conference presentations attracted schools worldwide to participate in the event.

| | |
|---|---|
| **Lesson 1** | Using GIS to study tectonic patterns and places at risk |
| **Lessons 2–3** | Understanding plate tectonics |
| **Lesson 4** | Exploring plate boundaries using GIS elevation profile |
| **Lesson 5** | Global pattern of eruption frequencies and intensity |
| **Lesson 6** | Studying volcano types |
| **Lessons 7–10** | Learning about the impacts and management of volcanoes |
| **Lesson 11** | Investigating mega eruptions |
| **Lesson 12** | Ashcloud Apocalypse event – calculating hazard risk |
| **Lesson 13** | Evaluating hazard risk calculation |
| **Lessons 14–15** | Analysing Ashcloud risk results map |
| **Lesson 16** | Write summary report about preparing for an Ashcloud event |

**Figure 1:** Overview of the tectonics scheme of work. The resources to support this scheme of work can be found at *http://arcg.is/1CXqvfZ*.

## A new scheme of work

I hoped the tectonics scheme of work (Figure 1) would intrigue my year 9 students, encouraging creativity and promoting higher level thinking skills. In the first lesson, I gave students a GIS map showing the world's volcanoes and the previous month's earthquakes (Figure 2). They explored the pattern of earthquakes and volcanoes, described where the earthquakes took place and located the most powerful ones. Being able to explore the map independently, making discoveries by themselves and correcting misconceptions about locations, engaged students in this interactive activity, and it formed a good introduction to an explanation of the nature of plate boundaries and the Earth's internal processes. Turning on other layers of the map, such as population density and wealth, and getting students to consider which places would be most affected by tectonic processes, extended the task. For a higher level thinking task, I challenged students to think about what other information they would need to work out which places would be most affected.

Next, students worked through some of the excellent Annenburg Learner online lessons on plate tectonics. To review students' understanding of the key terms (Figure 3) I used the Quizlet website to create a range of quizzes, and also devised a GIS map activity. This required them to create elevation profiles between plate boundaries for any location and explain the shape by applying their knowledge to an unfamiliar context. For example, they would see that along the Indian Ocean the land was low and flat before it suddenly rises around Indonesia, which is therefore a destructive boundary (Figure 4).

Having dealt with the introductory concepts we moved to on study volcanic processes in more detail. I produced a GIS map (Figure 5) which contained data based on all recorded eruptions for the last 2000 years.


**Figure 2:** GIS map of live earthquakes and volcanoes.

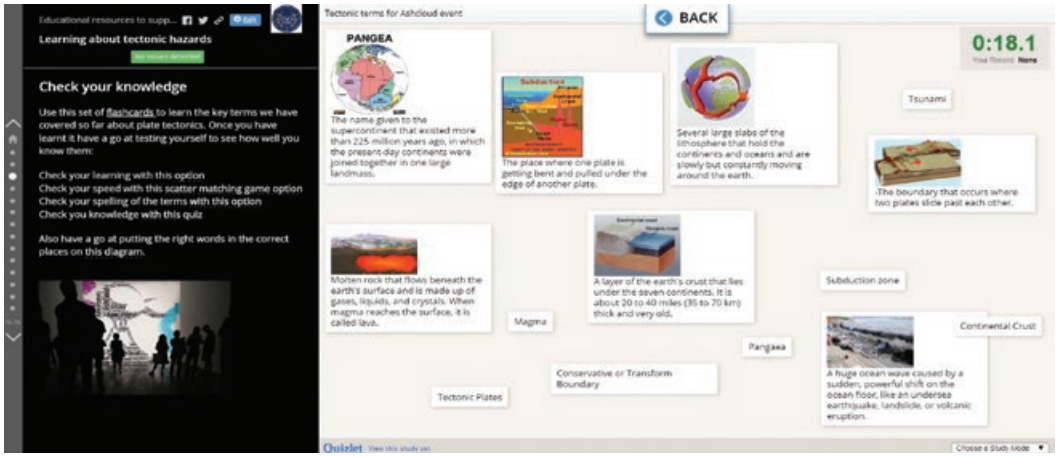


**Figure 3:** Example of the scatter quiz for tectonics in Quizlet.


**Figure 4:** Elevation profile GIS tool showing the destructive boundary around Indonesia.

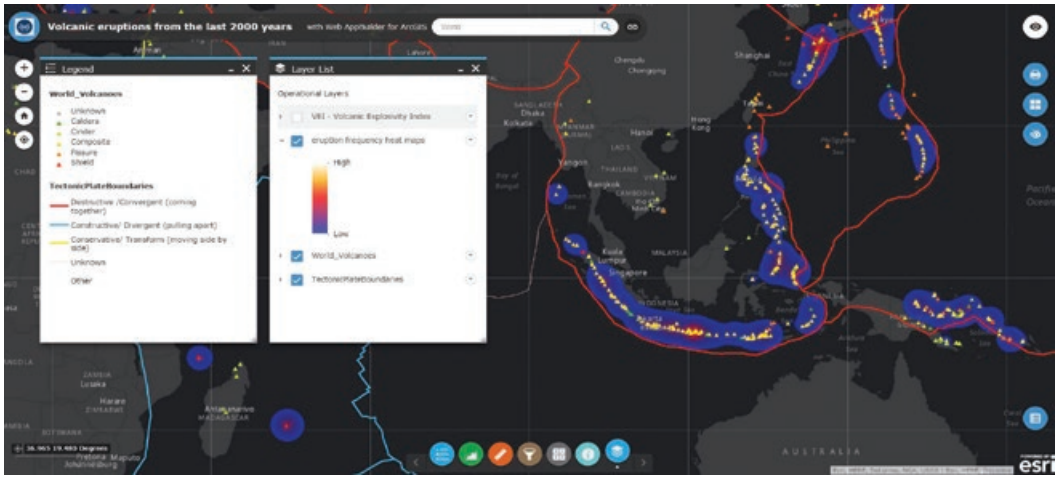


**Figure 5:** Map of world volcanoes over 2000 years, showing explosivity and frequency of eruptions.

A heat map showed areas where the most frequent eruptions had occurred and proportional circles highlighted larger volcanic eruptions on the Volcanic Explosivity Index. The map also included tools which enabled students to produce summary graphs of the volcanic data for different locations. Using these tools, they produced a report showing the parts of the world where most volcanic activity had taken place. Some students began to spot that the nature of eruptions varied on different boundaries, with the most powerful tending to occur on destructive margins. Most volcanic eruptions are small. However, there are some volcanoes which are classed as 'mega' or 'super' volcanoes. These have the potential for massive eruptions and it was this type of volcano which was the focus of the GIS Day activities.

## Ashcloud Apocalypse

As GIS Day approached, schools around the world geared up to take part in the online Ashcloud Apocalypse activity. My school ran an Ashcloud Apocalypse assembly, during which I showed a film (Figure 6) made using an iPad and the FX Guru app: the special effects made it look as though a volcano was erupting in the school grounds and lava bombs were blitzing the staff room! I also created an augmented-reality volcano display based on a large model volcano with a copy of the 'AR effects' app trigger image at the top: this produced a realistic-looking animated explosion while students stood next to it with the marshmallows (Figure 7)!

**Figure 6:** Screen shot from one of the special effects videos showing an eruption in London (available at *http://gisevent.wix.com/gisday2015#!promotional-videos/c2tp).*

**Figure 7:** Augmented-reality volcano display with students 'toasting' marshmallows! © Raphael Heath

In lessons we introduced the idea that a mega eruption from Campi Flegrei in Italy would not only have local impacts but also global consequences, such as cooling climates. For the Ashcloud risk mapping activity, students were asked to calculate the risk to their home location based on a range of factors listed in Figure 8. They looked up data for nine factors on the online maps and recorded a rating between 1 and 5, where 5 represented highest risk, for each factor (Figure 9). Following their calculations, students evaluated the methodology and suggested improvements.

Worldwide, over 9000 students contributed data, and I loaded all the results into a GIS map for students to analyse. The thousands of dots of data produce a complex, unclear pattern: I used this as an opportunity to discuss with students how the data could be processed to make the patterns easier to see (Figure 9). To help students analyse the data the map contained tools which enabled them to produce summary graphs of the data for any location, as well as some maps summarising the results by local authority.

## Reflections and the future

The resources for this scheme of work, which are available online, make good use of ICT, and specifically of GIS. The tasks provided students with new challenges, promoted higher level thinking and developed a range of skills. Ashcloud Apocalypse was also a great opportunity for a high-profile event to raise awareness of the subject in the school. It is great that there is a growing community of geography teachers who see the value of collaborating on learning projects, and I hope that this contributes to enhancing the status of geography and inspiring students to appreciate its relevance.

*Factors which influence your likelihood of being affected by a mega eruption*

Distance from mega eruption

Altitude (higher altitudes would be worse affected by colder global climates)

Climate (cold places will get even colder)

*Factors that affect the vulnerability of the local population*

Population density

Income level (poor areas will be less able to afford emergency supplies and aid)

Transport congestion (heavy volumes of traffic will make it more difficult for aid to reach you)

Health score (e.g. ash fall will disproportionately affect people with asthma)

Community spirit (the willingness of neighbours to help each other)

Infrastructure, remote and rugged terrain (in this conditions emergency aid will take longer, and find it more difficult, to reach you)

**Figure 8:** Factors affecting the Ashcloud risk (linked to the GIS activity to calculate risk at *http://arcg.is/1trmRGO).*

**Figure 9:** Students calculating their risk score in the Ashcloud Apocalypse Event.

*Questions for departmental discussion:*

- To what extent can using GIS activities in lessons enhance learning beyond textbook-based maps?
- How can GIS activities be incorporated across different topics?
- Are there opportunities for further developing students' spatial literacy skills?
- What whole-school high-profile events could your department put on to raise the profile of the subject?
- Does your department keep up to date with geography events which you can get involved in? | **TG**

**Online resources**
The Ashcloud Apocalypse event website, *http://gisevent.wix.com/gisday2015*, was awarded the Silver Publishers Award by the GA in 2016. A list of useful weblinks is available to download. Go to *www.geography.org.uk/tg* and click Autumn 2016.

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**Note**
'The Great Geography Map Off', the 2016 World GIS Day event, focuses on mapping climate change. It takes place in November and is free for all schools to participate. For more details go to *http://themapoff.wix.com/mapoff*

# Using ArcGIS Online story maps

Nicola Walshe

*GIS should not be taught as a 'bolt-on' activity but integrated into the geography curriculum. This article explores how story maps can be used in the geography classroom, by either the teacher or the students, to support geographical learning.*

In my experience, geography teachers sometimes shy away from engaging with GIS in their classrooms. It can be seen as being too technically complex, too difficult to integrate into an already busy curriculum, too time-consuming to produce resources for or simply impossible to do in departments with limited access to computers. Even those teachers who have embraced the potential of GIS can find it difficult to convert their colleagues: this often results in isolated pockets of GIS excellence with little collaboration or support in between. However, the use of GIS to support geographical learning is not going to go away. The 2014 Geography National Curriculum states that at key stage 3 students should 'interpret a range of sources of geographical information, including ... GIS', referring specifically to using GIS to view, analyse and interpret places and data. The new specifications at both GCSE and A level refer to the use of GIS. For this reason, I have been working on trainee teacher use of GIS in the geography classroom: not as a 'bolt-on' used once a year to satisfy a particular specification or curriculum, but as a tool to support and develop our students' geographical understanding and skills.

ArcGIS Online is a collaborative, cloud-based GIS platform that allows teachers to create, view, interrogate and display a wide range of spatial data very easily. Building on the desktop version of ArcGIS software, much of the functionality of ArcGIS Online can be used free of charge by creating an individual user account on their website (*www.arcgis.com*). Teachers (or students) can use this free account either to create their own maps or to access the large gallery of existing maps. In ArcGIS Online, I have found story maps to be particularly useful in the classroom. Story maps combine interactive maps (created in ArcGIS Online) with content, such as text, photographs or videos, to tell the story of a place, event, issue or pattern in a geographic context. Put simply, they are like a standard PowerPoint presentation, but with the facility to incorporate interactive maps. This article explores how story maps can be used in the geography classroom, by either teacher or students, to support geographical learning.

## Using story maps in the classroom

As a teacher, you can engage with story maps in a variety of ways, from using readymade story maps from the online gallery, to creating your own, or asking your students to produce their own. In this way, you can begin to build up a bank of useful resources as you develop your own, and ultimately your students', story map skills.

There is a large, searchable gallery of story maps on the Esri website *(http://storymaps.arcgis.com/en/gallery/#s=0)*. Some suggested examples are listed in the resources that accompany this article.

These can be used in much the same way as any online resource; for example, you could use the images on the 'Before and After the Hwy 530 Landslide' story map (Figure 1) as the stimulus for an engaging starter activity, or ask students to explore the 'Age of Megacities' for a homework task (Figure 2). However, their particular value lies in their interactive nature – teachers and students can interrogate the maps, photographs or other data to explore the geography behind them in more depth. As with any freely available resource, it is important to engage critically with the story maps on the gallery; consider who produced it (and why), and how reliable it might be. This is something you should also encourage your students to do as they begin to explore the story map gallery (much as you would do with other online data sources or websites, such as Wikipedia).

## Creating your story map

Once you are familiar with a range of story maps from the gallery, it is relatively easy to progress to creating your own. This could be a story map to illustrate the different spatial effects of a natural hazard, for example, or to display your and your students' content, such as photographs and spatial data at the end of a field trip.


**Figure 1:** On March 22, 2014, a major landslide occurred near Oso, Washington, USA. This swipe map allows for viewing of imagery from before and after the event.

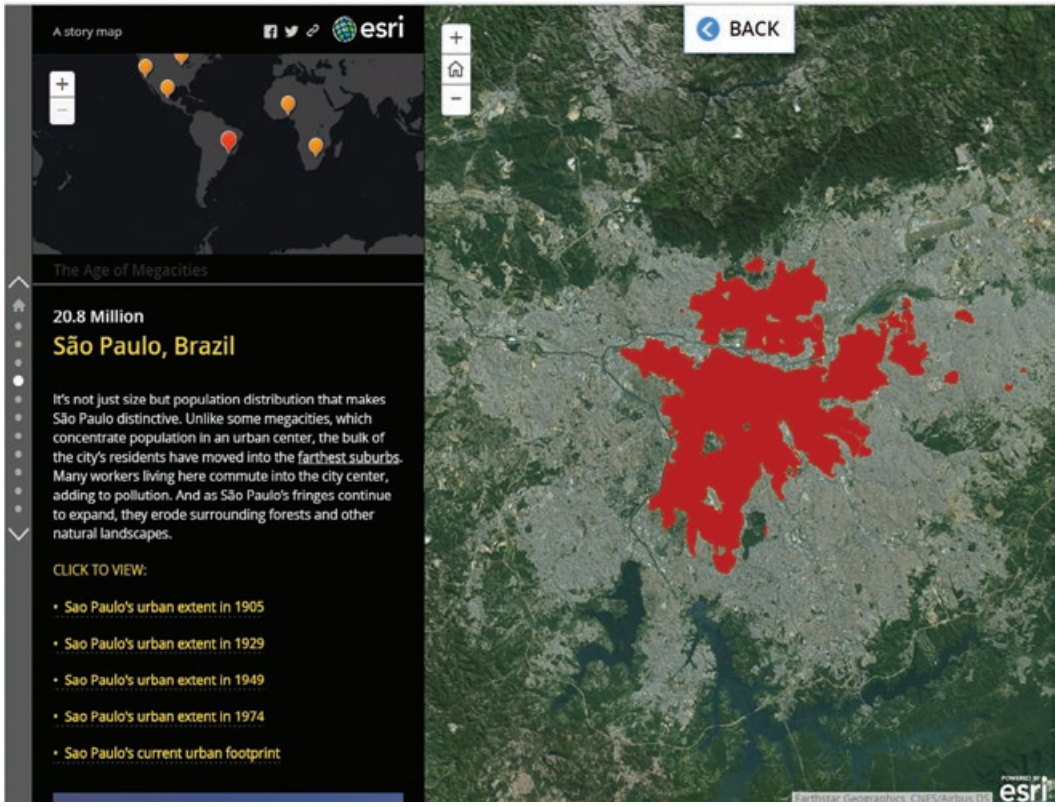


**Figure 2:** This story map shows the footprint of Sao Paulo in 1949. This can be compared to its footprint today where the bulk of the city's residents have moved into the farthest suburbs. As the cities fringes continue to expand, they erode surrounding forests and other natural landscapes.

There is a wealth of information online to help you create your own story map (see the resources that accompany this article), from detail on the Esri website, through to various instructional videos on YouTube or blogs.

Story maps can be as detailed or interactive as you wish to make them; whatever their format, the general process for creating a story map is straightforward.

1. Navigate to the ArcGIS Online story map website either by searching for 'story map' or using the URL *https://storymaps.arcgis.com/en*
2. Select your story map – there are a number of different story map formats (or story map apps as they are called), and you need to decide which best suits your purpose. Some of the most useful formats are:

- **Map journal.** This is probably the most useful story map format as it allows you to present an in-depth account or narrative of a concept or issue. For example, you might produce a story map on the causes and impacts of a natural hazard, such as the flooding in York. Map journal allows you to include a range of base maps (pre-existing or your own), data from organisations such as the Environment Agency or Police.UK, and images and video footage from news and other websites.
- **Map tour.** This guides the user through a sequence of places. For example, you could use a map tour to locate and describe key places in a particular case study, such as the Lesotho water transfer and hydropower project. Alternatively, you might use one to display images, data and video collected by your students from a range of fieldwork locations. It is also possible to create a map tour in the field using the Esri 'Snap2Map' app; this is a free app which creates a story map using photographs on your phone which you can then view and edit on your return.
- **Swipe.** A 'slider' tool enables you to compare two maps or images of the same location, for example 'before and after' images of an area affected by a tsunami or landslide (Figure 1).

3. Assemble your content – the photographs, video, audio files, and text you want to use, depending on the story map app you have chosen. Any media content needs to be online already; for example, personal images from Picasa or Facebook, or videos from websites such as YouTube or news sites.
4. Build your maps – a web map is an interactive map that contains layers of geographic information. If you wish to include your own web maps, you first need to create these in ArcGIS Online. You can use ArcGIS Online with either an organisational account or a free public account for this, either adding your own data or using content from Esri and other data publishers. For further information on what functionality is available with a public account and the benefits of a subscription account, visit *https://doc.arcgis.com/en/arcgis-online/reference/faq.htm#anchor2*
5. Create your story map – use the app to combine your map(s) with other content. This is a very straightforward process which you are led through simply by the story map app.
6. Publish your story map – there are several options for publishing your story map. You can link to your story from your website, blog, Twitter feed etc, or embed it in a web page; for example, you could put a story map onto your departmental or school website.


**Figure 3:** Students from Wellington College used Story maps to show their fieldwork data collection which can be viewed on the web-based GIS portal 'The MapWell'. **Source:** *http://wellyteamgeo.maps.arcgis.com/home.*

Creating your own story maps is a powerful tool for engaging students in the geography of your lesson; publishing your story maps makes them accessible to students both in school and at home, so they can interact with the content in their own time. More than just looking at a map, whether it is in an atlas or online, combining GIS maps with other digital media and spatial information in a story map allows us to interrogate them, so they can more easily be used to support geographical enquiry. For example, students presented with a story map illustrating a range of spatial information on the climate and glaciers of Nepal could be asked to explore the impact of climate change in Nepal and its potential risks to the local population.

## Students engaging with story maps

Finally, students can create their own story maps in school or at home, for example to display their own fieldwork data (Figure 3), to explore a particular case study (such as the causes, impacts and responses to a volcanic eruption), or to present an independent study (increasingly important, given the return of the independent study at A level). One particularly successful example was produced by a year 12 student, supported by a trainee teacher. Following a field trip to the River Afon Conway in Wales, Hannah used Map journal to 'tell the story' of the river. Her story map used a base map of the course of the river, and included larger scale maps, images and text at a number of sites, fitting together to explore how the characteristics of the river changed along its profile. Completing the map not only allowed Hannah to combine her own data with a range of secondary images and information, it also supported her enquiry into the extent to which the Afon Conway fits the Bradshaw model. Using a story map facilitated her geographical thinking, taking it beyond what might have been possible with more traditional methods of data presentation.

## The benefits of story maps

In conclusion, I have found story maps very useful for developing geographical thinking in the classroom. They enable teachers and students to engage with a range of digital media, including maps created within a GIS, to explore a particular geographical place, theme or concept in more depth. The interactive nature of story maps moves significantly beyond other presentational software, such as PowerPoint, allowing teachers and students to display and interrogate a wide range of geographical information very easily. Being able to zoom in and out of the maps can help students understand different spatial scales: for example, exploring the incidence of disease at the local, national and international scale; and their ability to incorporate up-to-date data sets, such as crime statistics or the most recent earthquakes, has the potential to highlight the relevance of geography as a subject. Finally, they provide a simple introduction to ArcGIS Online software, which could act as a springboard for both teachers and students to move to using the full GIS functionality. I would argue that the benefits of using story maps far outweigh any concerns about using an unfamiliar technology; as with any software, GIS or otherwise, the important consideration is how to use story maps to facilitate or develop geographical thinking in your classroom. | **TG**

**Online resources**
You can download a list of useful story maps that can be found on the searchable gallery on the Esri website and links to online support to help you create your own story map. Go to *www.geography.org.uk/tg* and click Autumn 2016.

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Lucy Fryer

# Collaborative learning through Edmodo

*This article considers some of the possibilities offered by the social learning network Edmodo for student and teacher learning.*

In 2008 Alan Parkinson and Val Vannet wrote a *Teaching Geography* article about the possible use of digital resources in geography lessons. Eight years later, and technology is in use in most classrooms, but the joy of this increasingly technological world is that new ideas are always being developed. Edmodo is a social networking site designed by teachers for teachers with over 50 million teachers, students and parents registered all around the world. As part of my MEd I explored the usefulness of this site for teachers and students. Here I will describe some of the outcomes of my research, which suggests ways of using the site.

## Students working collaboratively

Abrams (2005) defines collaboration as 'a process in which participants are collectively responsible for developing knowledge through structured activities, and in which the instructor's role is to facilitate and co-participate in the learning process' (p. 24). This suggests that while the teacher's role is crucial the main responsibility for learning lies with the students.

Mason and Watts (2012), exploring the benefits of online collaboration, concluded that 'networked groups generally outperform equal-sized collections of independent problem solvers' and that 'centrally positioned individuals experience better performance than peripheral individuals'. This indicates a potential benefit for student learning, but also suggests that teachers should consider group sizes and composition to ensure all students participate. Another factor for teachers to consider, explored by a number of researchers including Cliff-Hodges (2002), is the issue of student anxiety about giving a 'silly' or 'wrong' answer during collaborative work: building confidence through scaffolding tasks is a possible solution. Boticki *et al.* (2011) also suggest that students need experience of the benefits of collaboration over approaching tasks.

My focus was identifying any benefits of using Edmodo for student collaborative work. It was clear from the outset of my research that many of my students used social media in relation to their learning: 87% of my year 11s (48 students) reported discussing school work on social media, so the concept of sharing was already in place.

## Method

The aim of my research was to use student collaboration in Edmodo to improve geographical writing (Figure 1). I created groups of three students of similar ability and set them an exam-style question based on a photograph using Edmodo. Students were asked to respond to the image by describing any impacts they could see in, or infer from, the image (Figure 2). The photo helped to minimise student anxiety about their first attempt at an Edmodo activity. Each student responded to the question and also had the opportunity to improve their peer's answers. They then marked the improved answer (Figure 3). The Cambridge IGCSE geography skills paper often presents students with images to interpret. This provided an ideal context for the use of Edmodo.

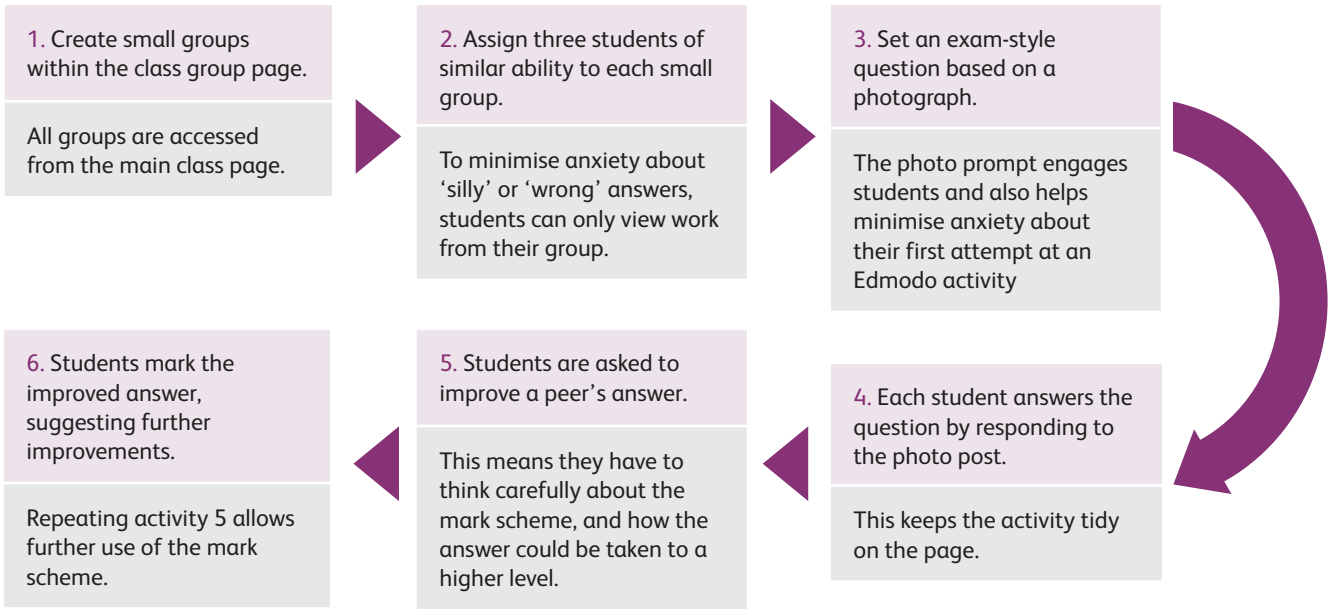


**Figure 1:** A flow chart of the method used for student collaboration in Edmodo. Purple panels indicate steps taken by students, with reasoning in grey panels.

The image also provided weaker or less confident students with a stimulus to get them started on the task. The skills students developed would also be useful when answering questions on the longer theory paper.

## Teachers working collaboratively

Teachers can be part of their school network and use it to share resources. You could also set up group pages to discuss ideas. I set up a CPD session on how to use Edmodo – this was a staff-only group with trial activities and a 'how-to' guide.

On a much larger scale, there are opportunities for international collaboration. By signing up to the relevant 'community' ('Social Studies' and 'Science' for geographers) you can share ideas with teachers all over the world. I have benefited greatly from this; for example, I posted a request for opinions on a couple of international pages and within half an hour had nine responses from a range of countries. When logging into Edmodo a quick scan of recent posts on the home page suggests resources – especially those used in other countries – you might not otherwise find. A useful facility for exploring 'place' is 'Mystery Skype': you can request a Skype with a class in another country so students can ask each other questions.

## Conclusion

In the pre-Edmodo questionnaire, 26 % of students thought social media would help with class and homework tasks; however this increased significantly, to 80 % , in the final questionnaire. Students liked the fact that teachers could upload lesson resources, and being able to check the detail of the instructions made homework easier. Staff also liked the homework organisation because of the clarity of deadlines and the fact that work could be marked online from anywhere with a computer and access to the internet. Online marking offers the potential for progress tracking; with Edmodo you can instantly create handy graphs for each student, showing their scores over time.

I have explored only one small aspect of Edmodo in detail; my impression is that it could work well although the process needs careful thought. However it has provided a good basis for further research, and it certainly offers lots of opportunities for international advice and support. | **TG**

**Figure 2:** Louisiana National Guard sets up a road block in the upper 9th Ward of New Orleans as water in the industrial canal starts to overtop the levees and pour into the city on September 1, 2008. Students were asked to respond to this image. **Photo:** ©Chuck Simmins.

### *Answer 1*

Transportation limited by flood. Damage to natural habitats. Possible risk of human injury or death by drowning. Could damage morale/ happiness of locals.

### *Answer 2*

Damage to homes due to hurricanes such as Katrina can force people to migrate from the area and increase strain on insurance companies due to the large number of claims. Roads are flooded which could hinder transport and response of emergency services. Sediment could be deposited in homes and roads making them dangerous and taking nutrients away from fields where they are needed for farming. The soil could be eroded and natural habitats destroyed by the excess water. Not only that but on the social side of things, there is risk of human injury and even death by drowning which lowers the morale of local people and could cause irrational behaviour with negative impacts as a result of the stress and panic of the situation.

### *Answer 3*

When Hurricane Katrina struck the city of New Orleans in 2005 most of the major roads in and out of the city were damaged. This was aggravated by the complete failure of the levee system, breaching in over 20 places. Along with blocked roads hindering the evacuation efforts it took 16 days for New Orleans airport to reopen. The official death toll was 1464 people. The aftermath of Hurricane Katrina was characterised by extensive reporting of looting, murder and rape. While some criminal acts did occur, such as the emptying of an entire Walmart, many reports were also exaggerated, inflated, or simply fabricated.

**Figure 3:** Students were asked to describe any impacts they could see, or infer from, the image in Figure 2. Using Edmodo these students' responses were improved by comments from peers and reference to the mark scheme.


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Fred Martin

# From the archive: The moving landscapes of maps

*Fred draws on articles from the* Teaching Geography *archive to outline how map skills, and even our definition of a map, have changed over forty years.*

There have been about 80 articles specifically about maps in *Teaching Geography* over the 40 years since the first issue. The skills needed to select, draw and process map data to give meaningful information have changed radically over this period: even our definition of a map has changed.

## The place of the atlas

The atlas is always good place to start. Herbert Sandford (1978) set out the fundamentals of maps in atlases, raising questions about how information could be represented, misrepresented and misinterpreted. In 1983, he followed up by setting out criteria that could be used to select an atlas (Sandford, 1983) and four years later raised concerns that knowledge of places was going out of fashion (Sandford, 1987). He also noted that atlas maps in the UK were not keeping up with those used in other countries, especially those that used environmental styles of mapping.

Articles about using an atlas have also argued about the type of projection that should be used, e.g. in 1988, when the argument for equal area maps was made (James, 1988), though it was noted that the GA had made a similar recommendation in 1907. It would also do so again in 2007 (Rooney, 2007). There were further articles about projections (Wright, 2003, 2008) but since then, there have been no articles that focus on using a traditional hard copy atlas. The development of digital technologies may be partly responsible for this.

## Research and thinking about maps

Articles have presented research findings and raised issues about maps. Simon Catling (1980) listed the many types of maps that were in use in primary and middle schools. He also explored the reasons why maps are used and presented ideas for how map reading and interpretation could be taught.

In a guest article, entitled 'Graphicacy comes of age', Professor Balchin (1985) made a powerful case for graphicacy to be taught on a par with literacy and numeracy. Together with 'articulacy', this would have made 'the four aces'.

Rod Gerber (1981) presented research findings that showed what students of different ages were able to understand about maps. He argued that scale, distance, area, symbols and other map features needed to be individually taught, preferably through direct experience. As the new language of the National Curriculum took hold, Patrick Wiegand (1991) presented a clear structure for progression in map skills, accompanied by suggested activities that could be used to achieve specific outcomes at different levels.

## Ordnance Survey maps

Patrick Bailey (1976) raised concerns about the increasing cost of reproducing OS maps in publications. Although the use of OS maps has been integral to many articles, little specific has been written about them. OS maps are still essential, though digital versions are now available both online and as geo-referenced resources that can be used in a GIS.

## Classroom activities

Numerous articles about how to teach mapwork have appeared in this journal. Some have involved practical work to help students learn about globes and maps (Francis, 1985; Rhodes, 1994; Hookway, 1998). It would be sad if these 'hands on' methods were completely replaced by the virtual worlds and landscapes one can create using digital graphics. There have also been articles about drawing sketch maps by hand such as Barr (1983). This is a skill that still seems to be required for public examinations, though it may be difficult to answer why. Jeans (2003) addressed how students with visual impairment can be helped to read maps.

## GIS for all

The first article on using GIS appeared over twenty years ago (Freeman *et al*., 1993). This held out the promise of a revolution in how maps could be drawn and map data processed. A succession of articles followed, introducing different GIS software, e.g. Sheppard, 1995. Yet ten years later, Diane Freeman (2003) from AEGIS suggested that teachers were still 'unsure of getting started' with GIS. The use of GIS, however, has continued to make progress, as demonstrated by a succession of authors, for example Peter O'Connor (2009) and Raphael Heath (2015, 2016): in this issue he shows how a GIS project was carried out simultaneously by students in different countries. It seems that some teachers have moved much faster and further than others in exploiting the potential of GIS.

## Satellite imagery

Ian Selmes (1991) introduced the topic of using satellite imagery with students. This was followed by articles that helped teachers understand how satellite imagery is produced and how to interpret false colours (McMorrow, 1992; Hilton, 1991). Satellite imagery, of course, is the basis on which many digital maps are made, such as those in Google Earth, though these mostly use simulated real colours that make them look more like vertical aerial photos. GIS packages have changed the very meaning of 'map': it now refers to any spatial resource that has been geo-referenced, whether OS map, satellite image or vertical aerial photo.

## Powerful maps

Digital technologies have also helped create a new range of maps that rely on visual effects to show quantitative data in different ways. The power of digitally created maps to change perceptions of distributions and patterns was introduced by Anna Barford and Danny Dorling in 2007. This edition also included an article on using Worldmapper to show the origin and destination of refugees (Rooney, 2007). Further ways of using the Worldmapper approach were presented in Dorling (2012) and in 2015, Dorling and Hennig used maps they called 'population cartograms' to show the pattern of results for that year's General Election (Figure 1).

## Conclusions

Maps have featured centrally in many other *Teaching Geography* articles, indeed probably in most of them. The number of articles specifically about maps, however, is indicative of the importance of the role they have played, and continue to play, in the subject. While some of the earlier articles may now seem dated, others address topics that are still with us. Digital technologies have served to make available a much wider range of mapping techniques and resources and perhaps even make geographers question if old map drawing skills are still needed. New skills and knowledge are certainly needed. The power of the map, however, has not been diminished: if anything, it appears to have increased.

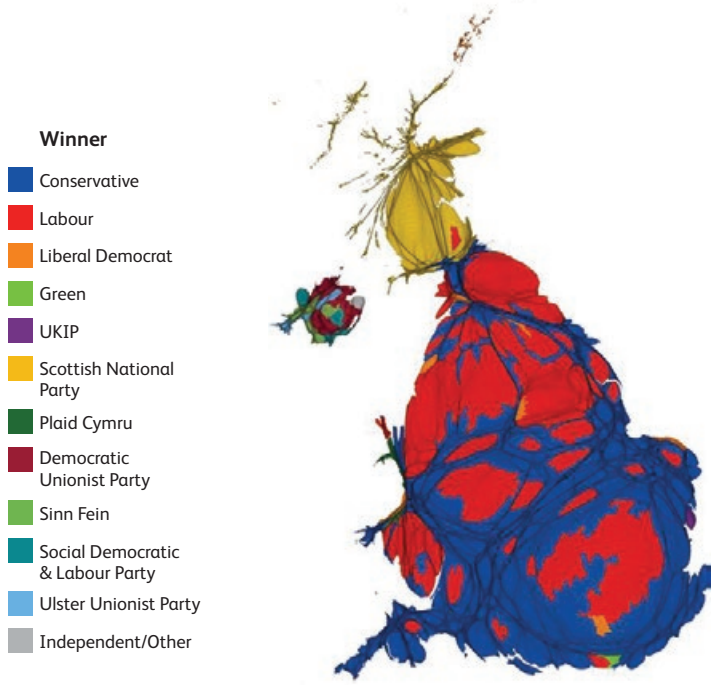


**Figure 1:** A population cartogram in which area is proportional to population of the UK 2015 General Election winners, from the Autumn 2015 issue of *Teaching Geography*.

Perhaps the best place to end is with the article by David Gardner (2015) in which he noted the importance that Ofsted inspectors attached to using maps. The key to the article lies in its title: 'Maps as a matter of routine'. No matter what style of map, or the technology by which it is produced, it is their constant and embedded use that is essential in a geographical education. | **TG**


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John Larner

# Encouraging thinking about global issues

*John draws on the example of Easter Island and Malthusian theories of population to get his A level students thinking about their own perspectives on the major challenges facing the world in the 21st century.*

Accompanying online materials

Students who make the transition from GCSE to A level geography find that their subject deals with the most important global issues of this century, and is increasingly relevant to their own futures. Does this alarm them, or are they energised by the challenges ahead? Are they pessimistic or optimistic about the future? At the start of their course, a lesson about the 'collapse' of society on Easter Island can be a useful way to get them thinking about their own perspectives and begin to develop mature attitudes to world issues.

A level specifications, both current and impending, confront students with a range of global issues. Palin (2011) notes that typically, A level geographers will be starting to shape their view on key global topics: deforestation, land degradation, overpopulation, depleting fossil fuels and uneven food distribution. This shaping of ideas is crucial to students' meaningful understanding of the world, and in this first lesson there is an excellent opportunity to get them thinking about the type of geographer they are, examine current environmental issues and, ultimately, form their own perspectives on them. The lesson aims to help students realise the profound nature of their subject and develop a mature approach to these key geographical issues.

## Discovering Easter Island

As a geographer, I was never fully aware of how I viewed these issues until I was travelling around the world, post-university. During a routine Southeast Asian flight a single page article about Easter Island in *National Geographic* sparked a 'light-bulb moment' (Figure 1): it captured my imagination and clarified my thinking about the subject I had studied for the past three years.

Further reading deepened my interest in the island: finally, I could see why it is such a pivotal case study when considering possible future scenarios for our world. A chapter in the intriguing book *Collapse* (Diamond, 2005) confirms its value:

> *The Easter Islanders' isolation probably also explains why I have found that their collapse, more than the collapse of any other pre-industrial society, haunts my readers and students.* (p. 119.)

Diamond (*op. cit.*) highlights the importance of the Easter Island example for students who are interested in societal collapse and the various scenarios which may play out in our own future. He also notes that the fate of the Easter Islanders captures students' attention: they realise that geography really does embrace the 'bigger picture'. As a teacher, there is a challenge in taking the work of academics such as Diamond (*op. cit.*) and distilling it into more accessible chunks for students to think about, discuss and apply.

## Lessons learned from Easter Island

The first session I teach my A level group asks students firstly to consider what type of geographer they are; whether they hold optimistic or pessimistic views. The students are given certain information about Easter Island. It doesn't give much away, just a few photos to suggest the isolation and remoteness of the island, a hint of a previous indigenous lifestyle and finally an overview of the Moai statues (Figure 2). The case study is presented as a mystery surrounding population collapse; one which the students can solve, providing they collaborate and share ideas. They show an immediate interest in the mystery and the

**Figure 1:** An article about Easter Island captured John's imagination. **Photo:** ©Creative Commons Nicolas de Camaret.

**Figure 2:** The Maui statues are human figures carved by the Rapa Nui people between the years 1250 and 1500. Nearly half are still at Rano Raraku, the main moai quarry, but hundreds were transported from there and set on stone platforms around the edge of Easter island. **Photo:** Creative Commons ©Nicolas de Camaret.

obscurity which shrouds the fate of the islanders. After sharing some background information, I give out a set of cards (available to download) for the students to order. Pairs of students approach it in different ways: some create a chronological timeline, while others divide events into those that took place before the Dutch explorer Jacob Rogaveen first came to the island in 1722 and those that took place afterwards. (This order of categorisation may suggest that the students see the arrival of European explorers as a 'trigger' for the destruction of indigenous culture.) I facilitate the investigation by giving students three questions to explore:

- What caused the dramatic collapse of the island population?
- How many waves of population decline took place?
- What similarities link the situation on Easter Island to those faced by our planet today?

As students work through the card sort activity and discuss the questions they see that population increase and economic development depend on natural resources such as fuel and food, and that exhausting these resources can lead to societal collapse. From this, they could infer similarities between the example of Easter Island and the globally interdependent 21st century world: perhaps the famous Moai statues on Easter Island have their modern equivalents in the skyscrapers of global financial centres, and human conflict will increase as resources dwindle. The Easter Island case study is a valuable geographical study in its own right, but it is even more important when students start to apply it to today's world.

## Different perspectives

The second part of the lesson examines questions of population growth and food resources. We explore the view of Thomas Malthus (Malthus, 1798), that 'the power of population is … greater than the power in the earth to produce subsistence' and contrast it to the view of Ester Boserup (Boserup, 1965) that 'necessity is the mother of invention …'; '… the power of ingenuity would always outmatch that of demand'.

Once students have an understanding of these different perspectives, the class can debate the issues and begin to formulate their own views. They consider which of these views most closely matches their own: is their view of the future optimistic or pessimistic? The teacher can encourage students to think, for example, about international migration, increasing desertification and famine in the Sahel, water shortages in the southwest of the USA; and elicit whether they take an optimistic or pessimistic view of the future.

This lesson could be taught at any point during the A level course but I have found it most useful at the start: it provides an engaging introduction to the course; it helps students handle the leap from GCSE to A level; and it encourages independent wider reading and thinking. Demonstrating the relevance of key theorists like Malthus and Boserup to geographical thought, and exploring the holistic nature of geography helps students begin to understand the complexity and depth of the subject. | **TG**

**Online resources**

John's Easter Island mystery cards are available to download. Go to *www.geography.org.uk/tg* and click Autumn 2016.

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Jonathan Andrews

# Replacing the Millennium Development Goals

*Jonathan outlines an all-day event for year 7 students, led by year 12 students, that explored the new Sustainable Development Goals that replace the Millennium Development Goals.*

The Millennium Development Goals (MDGs) expired this time last year. Their intention was to establish measurable, ambitious, but achievable, international development goals to help improve the quality of life of citizens around the world. The eight goals were to eradicate poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability; and develop a global partnership for development. Each goal had at least one specific, measurable target and a date by which it should be achieved.

In September 2015 the United Nations Summit replaced the MDGs with Sustainable Development Goals (SDGs) (Figure 1). These 17 new goals aim to end poverty, fight inequality and injustice, and tackle climate change by 2030 (UNDP, 2015).

## Our Geography Ambassadors

The College has appointed nine year 12 students as Geography Ambassadors. They have a wide-ranging role which includes helping in lessons and promoting the subject within the College. The Ambassadors wanted to devise an initiative that would help year 7 students engage with some of the main challenges facing the planet, and identified three main issues: poverty, waste management and climate change (Figure 2). The UN replacement of the MDGs by SDGs offered a fantastic context to explore major issues facing the planet: had the MDGs been too ambitious? Had they been as appropriate as they could have been? If the MDGs were still valid, why not just extend the deadlines? The Ambassadors thought a suspended-timetable, all-day event would be an excellent opportunity to investigate these issues with year 7.

## Planning

The event was to have three aims. We wanted to increase student awareness of global issues and challenges; to create their own set of SDGs, with specific targets and reasons for their inclusion; and to display their work, exploring their own and each other's viewpoints.

To prepare for the day, the Ambassadors worked in small groups to design engaging lesson resources which would challenge the year 7 students' understanding of the issues. We invited three experts to take part:

- Carla Lewis, a Project Manager for World Vision in Niger. Carla had worked in several LDCs, helping address poverty and gender equality issues
- Catherine Airlie, a former Energy Markets reporter with a wealth of knowledge about climate change and ways of addressing it
- Rachel Hill, of the Northamptonshire Waste and Energy Education Team, who leads sessions in schools and community groups on effective waste management strategies.

## On the day

The day itself was split into four: a brief outline of the day and introduction of the guest speakers; learning about the main challenges facing the planet over the next few decades; suggesting how to address these challenges; and showcasing the students' work.

The briefing explained the significance of the MDGs; then the guest speakers described the nature and significance of their work. There was an opportunity for students to ask questions and to share their prior knowledge and understanding of current global issues.


**Figure 1:** The UN Sustainable Development Goals.


**Figure 2:** The workshops focused on poverty, waste management and climate change. **Photos:** Creative Commons and Ruth Totterdell.

Then the year 7 students were divided into six groups of around 20 to take part in 40-minute workshops on each of the three main topics. These were led by the Geography Ambassadors, supported by members of staff. The Ambassadors used a wide range of resources, as well as the knowledge and expertise of the invited experts, to help the students understand the key problems facing the planet. The poverty workshop adapted 'The Poverty Challenge' resource (Christian Aid, 2012) to explore the causes of poverty; in a plenary, students considered ways that some of the causes could be eradicated or mitigated. In the waste management workshop, students addressed ways of reducing waste and using modern technology to manage waste more sustainably, developing an informative presentation. Finally, the climate change workshop explored the causes and possible consequences of climate change and assessed the suitability of different management strategies.

During the third part of the day, each group created resources or materials to promote their own set of Sustainable Development Goals. This element was designed to encourage creativity: students worked together to create a range of different outcomes, including speeches, dances, plays, poetry and models, as well as more conventional presentations.

For the final 90 minutes of the day, students gathered in the main hall to display their work as a Market Place activity. This gave them the opportunity to examine the work of other groups and question the relevance and realism of their goals. They were also challenged by their teachers and the guest speakers to substantiate their opinions. Students were invited onto the stage to present their plays, dances, models and speeches. The breadth of the students' imagination was particularly pleasing. Finally, the guest speakers selected the group they thought had fulfilled the three key aims of the day most successfully and presented them with a bottle of safe, clean drinking water, to highlight the fact that 750 million people around the world do not have access to clean water.

## Reviewing the day

Overall, we had a successful day. All students were actively engaged in the tasks; they could justify their opinions and demonstrate an awareness and understanding of global issues. The Ambassadors learnt new skills, creating lesson resources and meeting deadlines, and the process improved their own knowledge of development issues. One has even been inspired to look into teaching geography as a profession!

The year 7 students will be able to apply their newly acquired knowledge to key stage 3 topics, for example the year 7 'Threatened World' unit in which they learn about sustainability, and in year 9, studying different development models and the role of trade and aid in tackling poverty.

The day served also to raise the profile of geography and global learning across the school. | **TG**

### Note

The Global Learning Programme sets out to improve the teaching of global learning. Teachers can access free training, guidance, resources and support. Find out more about GLP-England at *www.glp-e.org.uk* or GLP-Wales at *http://globaldimension.org.uk/glpwales*

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Alastair Smith

# The Secondary Geography Quality Mark

*Alastair outlines his department's journey as they worked towards the GA's Secondary Geography Quality Mark and describes the positive impact it had on geography in his school.*

In September 2014 I was appointed Head of Geography after several years as a Post-16 Head of Year. After spending so much time dealing with pastoral issues, I had to adjust quickly to my new academic role. I was faced with the twin challenges of improving results and uptake at GCSE and A level and reinvigorating a subject that had somehow lost its excitement. My first step, in early September, was to wade through the subject inspection report from Ofsted, and I noticed the inspectors had recommended that we join the Geographical Association. I already knew that the GA promoted and supported geography teaching by publishing high-quality resources for teachers, as well as running CPD events, so it was a great place to start. While on the GA's website I clicked on a link to the Secondary Geography Quality Mark (SGQM). This is a framework developed by the GA to enable subject leaders to raise the standards of geography in their school, support the teaching of quality geography and promote departmental leadership and management.

At first I was sceptical; surely for this sort of thing I needed to go on a CPD course for a day or two and get some nice coloured brochures that I could hand out to everyone at the next departmental meeting? As I read on, however, the SGQM began to sound really appealing: in fact, it was perfect, as the detailed framework was easily incorporated into the Departmental Improvement Plan that I was trying desperately to piece together. After a discussion with my department I arranged a meeting with my head teacher; within a few minutes he agreed that it was a great starting point for the department. Registering for the SGQM was easy, and after receiving support from the GA through the SGQM Virtual Learning Environment we started a departmental audit so we could identify areas for improvement. As a team, we put our action plan together and began collecting evidence and addressing the key indicators that would help us raise standards in all areas of the department.

## Reflections

Was it worth it? Definitely. The SGQM was the most challenging CPD that we have ever completed, but it is the one that has been the most beneficial to the department, pushing us further than we would have thought possible. The progress that has been made in a year is phenomenal. Geography has now firmly made its mark in school; it is certainly the talk of the staffroom. We are starting to see better results (with a predicted 30% rise in three levels of progress at GCSE), alongside a dramatic increase in student numbers: for the first time ever geography has the largest cohort for an optional subject at GCSE. We are also promoting geography in primary schools: we have forged strong links with local feeder schools, many of whom are completing projects to improve their pupils' geographical skill base and aid their transition when they join the school in year 7. At Easter 2016 we took over 50 GCSE students and six members of staff on the school's first trip abroad, to Iceland (Figure 1).

## If you are thinking about the SGQM

This is my advice:

1. Make sure you begin the process early in the cycle, ideally the autumn term. This means you will have plenty of time to complete your audit, put together your planning documents, collate evidence and submit in June.
2. Work on the SGQM together as a team, allocating key indicators to different members of the department. You can incorporate these into appraisal targets for the year.
3. Make contact with a school that already has the Quality Mark; this will point you in the right direction and support you along the way. The QM administrator can arrange this.

Do you want to take your department forward? If so, what are you waiting for? | **TG**

If you wish to find out more about the Secondary Geography Quality Mark contact Julie Beattie, *jbeattie@geography.org.uk*

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**Figure 1:** GCSE students at Skógafoss, Iceland, Easter 2016. **Photo:** Alastair Smith.

# Reviews



*Reviews of new geography resources.*

## BOOKS

### MasterClass in Geography Education: Transforming Teaching and Learning

Editor: Graham Butt; Series Editor: Sue Brindley
ISBN: 978-1-4725-3571-9
Bloomsbury Academic, 2015
224 pp, 19x25cm
Pb: £22.49

Aimed at people who are embarking on geography initial teacher education, studying for a Master's degree in geography, or undertaking geographical research in the classroom, this is a very accessible book which is arranged in discrete, standalone sections.

It blends theory and practice, allowing teachers working towards Master's credits for full degrees to engage with the 'big questions' of geographical research and pedagogy, enabling them to take control of their own professional development; in a wider sense, it helps to re-professionalise geography teachers.

There are four sections:

**Contextualising** – explores the nature of research, what it means to be part of the research community, the role of research in geographical education and the importance of a research-active profession. This leads to a discussion of the links between research and 'professional' practice.

**Constructing** – reviews geographical knowledge, through the development of the National Curriculum and its relationship with political and ideological concepts. The role and importance of theory within research is also discussed.

**Researching** – deals with the different research questions, problems and methodologies commonly encountered in geographical research, and emphasises the importance of a good research proposal to a research project.

**Producing** – offers advice on completing your research project. Drawing on the experience of recently completing researchers, this section offers many practical tips for successful research.

Each section ends with a discussion piece by a leading academic encouraging the reader to reflect on what they have just read and to think critically about their own research.

As a current EdD student, I found this book accessible and easy to read, and several sections supported and refreshed my own research. It would have been an excellent addition to my reading at Master's level, and I would strongly recommend it to anyone involved in geographical research.

*Paul Hunt, Member of the GA's Secondary Phase Committee.*

## BOOKS

### Geography: Ideas in Profile

Danny Dorling and Carl Lee
ISBN: 978-1-78125-530-8
London: Profile Books, 2016
176 pp, 14x19cm
Pb: £8.99

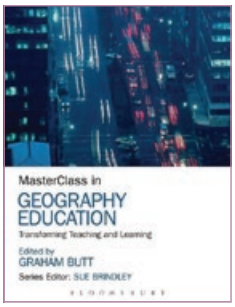
I read this book on the train on the way up to the GA Annual Conference in Manchester. I started at Bicester and by the time I reached Stoke-on-Trent I had finished. Put simply, this book is superb; a geographical page-turner.

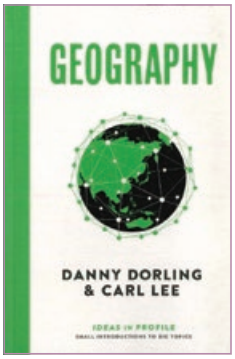
Each of the five chapters traces and unpicks a key theme. The first, 'Tradition', describes the history of geography from the first humans to the Industrial Revolution. Chapter 2, 'Globalisation', moves the story forward, focusing on energy as the central unifying concept for geographers today. These chapters are followed by 'Equality', which argues that geography is the subject to provide solutions to the problems that face us, and 'Sustainability', which is about creating a better world, using geography as a tool to map a route through the 21st century. The book concludes with 'Mapping the future', which celebrates geography as an enabling subject, putting geographers in a unique position to join the dots, to see the big picture, and to 'make the complex comprehensible' (p. 144).

The book is written in an accessible, almost conversational, style. Each paragraph contains a story or a nugget of information. It is not always immediately clear how these link together or relate to the theme, but this is also a strength, as it gives the writing pace and enables the reader to make the links and join the dots as they progress through the chapter. The stories themselves are always interesting and often surprising, covering topics from the Opium Wars to Bolivia's trade in lithium.

This is a 'must read' for all geographers; certainly at A level and beyond. I am also going to encourage my non-geographer friends to read it, as it explains why our subject is so important. It explains why I am a geographer.

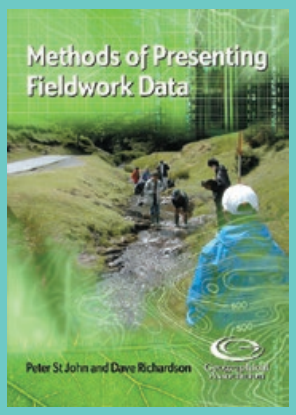
*Rebecca Kitchen, GA's Secondary Curriculum Leader.*



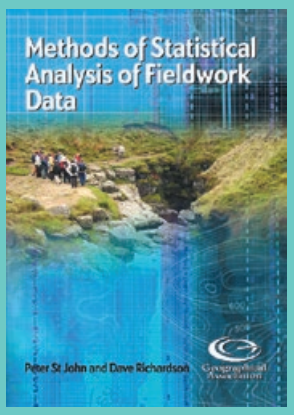



# GA publications to resource the A level specifications

## Fieldwork resources

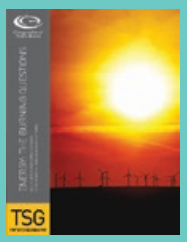



Methods of Presenting Fieldwork Data




Methods of Statistical Analysis of Fieldwork Data

## Top Spec Geography




Energy: The burning questions


Changing Populations


Changing Places


The Rapidly Changing Arctic


Emerging Superpowers


Tectonic Hazards


Health Issues in Geography


HIV/AIDS as a Development Issue


Contemporary Conflicts

| | | | |
|---|---|---|---|
| **AQA** | **Component 1:** Physical Geography | | Tectonic Hazards<br>The Rapidly Changing Arctic |
| | **Component 2:** Human Geography | NEW | Changing Places<br>Changing Populations: The new Europe<br>Health Issues in Geography<br>Energy: The burning questions |
| | **Component 3:** Geography Fieldwork Investigation | | Methods of Presenting Fieldwork Data<br>Methods of Statistical Analysis of Fieldwork Data |
| **Edexcel** | **Topic 1:** Tectonic Processes and Hazards | | Tectonic Hazards |
| | **Topic 4:** Shaping Places | NEW | Changing Places<br>Changing Populations: The new Europe |
| | **Topic 6:** The Carbon Cycle and Energy Security | | Energy: The burning questions |
| | **Topic 7:** Superpowers | | Emerging Superpowers: India and China |
| | **Topic 8:** Global Development and Connections | | Health Issues in Geography<br>Contemporary Conflicts and Challenges |
| | **Coursework:** Independent Investigation | | Methods of Presenting Fieldwork Data<br>Methods of Statistical Analysis of Fieldwork Data |
| **Eduqas** | **Component 1:** Changing Landscapes and Changing Places | NEW | Changing Places |
| | **Component 2:** Global Systems and Global Governance | | Changing Populations: The new Europe |
| | **Component 3:** Contemporary Themes in Geography | | Tectonic Hazards<br>Emerging Superpowers: India and China<br>Energy: The burning questions |
| | **Component 4:** Independent Investigation | | Methods of Presenting Fieldwork Data<br>Methods of Statistical Analysis of Fieldwork Data |
| **OCR** | **Paper 2:** Human Interactions | NEW | Changing Places<br>Contemporary Conflicts and Challenges<br>Changing Populations: The new Europe |
| | **Paper 3:** Geographical Debates | | Health Issues in Geography<br>HIV/AIDS as a Development Issue<br>Tectonic Hazards |
| | **Paper 4:** Investigative Geography | | Methods of Presenting Fieldwork Data<br>Methods of Statistical Analysis of Fieldwork Data |

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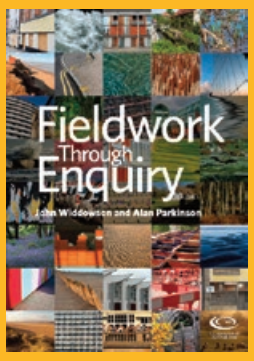
# GA publications to resource the GCSE (9–1) specifications




## GCSE Geography Teachers' Toolkit


Is the Future Sussed?


Hot and Bothered


For Richer and Poorer


Life on the Edge

NEW!


Form, Process and People

| | | | |
|---|---|---|---|
| **AQA** | **Paper 1:** Living with the Physical Environment | **NEW** | Form, Process and People: A study of UK river and coastal landscapes<br>The Haiti Earthquake: Impacts and responses (DVD) |
| | **Paper 2:** Challenges in the Human Environment | | Is the Future Sussed? A study of sustainable urban living<br>For Richer and Poorer? A study of uneven development |
| | **Paper 3:** Geographical Applications | | Fieldwork Through Enquiry |
| **Edexcel A** | **Component 1:** The Physical Environment | **NEW** | Form, Process and People: A study of UK river and coastal landscapes<br>Hot and Bothered? A study of climate change |
| | **Component 2:** The Human Environment | | Is the Future Sussed? A study of sustainable urban living<br>For Richer and Poorer? A study of uneven development |
| | **Component 3:** Geographical Investigations: Fieldwork and UK Challenges | | Fieldwork Through Enquiry |
| **Edexcel B** | **Component 1:** Global Geographical Issues | | Hot and Bothered? A study of climate change<br>For Richer and Poorer? A study of uneven development<br>Is the Future Sussed? A study of sustainable urban living |
| | **Component 2:** UK Geographical Issues | **NEW** | Form, Process and People: A study of UK river and coastal landscapes<br>Fieldwork Through Enquiry |
| **Eduqas A** | **Component 1:** Changing Human and Physical Landscapes | | The Haiti Earthquake: Impacts and responses (DVD) |
| | **Component 2:** Environment and Development Issues | | Hot and Bothered? A study of climate change<br>For Richer and Poorer? A study of uneven development |
| | **Component 3:** Applied Fieldwork Enquiry | | Fieldwork Through Enquiry |
| **Eduqas B** | **Component 1:** Investigating Geographical Issues | | Is the Future Sussed? A study of sustainable urban living<br>For Richer and Poorer? A study of uneven development |
| | **Component 2:** Problem Solving Geography | **NEW** | Form, Process and People: A study of UK river and coastal landscapes<br>Hot and Bothered? A study of climate change<br>Life on the Edge? A study of extreme environments |
| | **Component 3:** Applied Fieldwork Enquiry | | Fieldwork Through Enquiry |
| **OCR A** | **Paper 1:** Living in the UK Today | **NEW** | Form, Process and People: A study of UK river and coastal landscapes<br>Is the Future Sussed? A study of sustainable urban living<br>Extreme Weather: The Somerset floods (DVD) |
| | **Paper 2:** The World Around Us | | For Richer and Poorer? A study of uneven development<br>Hot and Bothered? A study of climate change |
| | **Paper 3:** Geographical Skills | | Fieldwork Through Enquiry |
| **OCR B** | **Paper 1:** Our Natural World | **NEW** | Form, Process and People: A study of UK river and coastal landscapes<br>The Haiti Earthquake: Impacts and responses (DVD)<br>Hot and Bothered? A study of climate change |
| | **Paper 2:** People and Society | | Is the Future Sussed? A study of sustainable urban living<br>For Richer and Poorer? A study of uneven development |
| | **Paper 3:** Geographical Exploration | | Fieldwork Through Enquiry |

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