# ONEGEOLOGY: A PRAGMATIC APPROACH TO INTERNATIONAL STANDARDS

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## 1. INTRODUCTION

It is perhaps not readily apparent to most who have heard about OneGeology that one of the project's four key aims is to accelerate the development of standards. The project has taken a different, pragmatic, approach to doing this – instead of focusing on the development of the standards themselves it decided to be a vehicle for applying, communicating and disseminating standards, and perhaps just as importantly, illustrating graphically the benefits that standards bring when they are in place and also how the absence of standards impedes interoperability and completeness of information. OneGeology is a global venture to increase the accessibility of geological map data. Geological survey organisations from 113 countries are currently participating in OneGeology and to date 41 of those are serving geological data to a dedicated web map portal. The reason for the success of OneGeology since its inception in February 2006 lies in its four unifying goals: make existing geological map data web accessible; transfer know-how to the developing world; accelerate the progress of an emerging geoscience data interchange standard; use OneGeology to raise the public profile and understanding of geoscience.

## 2. ORIGINS

The OneGeology concept grew out of several stimuli - the UN International Year of Planet Earth 2008 (IYPE); increasing demand for geological surveys to produce digital geological map data for their territories; the spatial data infrastructures being planned and created in many nations and regions (for example, the INSPIRE Directive in Europe); the frustratingly slow development of interoperability in the geosciences; and last but not least, the need to address the digital divide between the developed and developing nations. OneGeology's proposition was to design and initiate a multi-national project to mobilise geological surveys to act as the drivers and sustainable data providers of a global dataset and use the vehicle of creating a tangible geological "map" to accelerate progress of a data model and interchange standard for geoscience data. At the same time the initiative would transfer know-how to developing countries, reduce the length and expense of their learning curve and help them to serve maps and data that could attract investment. In March 2007, at a kick-off meeting in Brighton, 81 participants from 43 nations and 53 national and international bodies discussed how best to achieve the

OneGeology objectives. The resulting "Brighton Accord" gave the initiative the international backing it needed, and captured the imagination of the world's press and media - the story was taken up across the globe, placing OneGeology very much in the public eye. Coordination and technical teams from several nations began work on the objectives and in less than 18 months made substantial progress (www.onegeology.org). In large part this progress was due to the fact that the community had pragmatically agreed that OneGeology was about making geological data available in a standard data structure first, i.e. making geological map data accessible without geological reconciliation. Scientifically, semantically and geometrically harmonising geological units across frontiers would be something for the longer term, indeed something that providing public web access to un-harmonised data would actually catalyse. By the time of the International Geological Congress in Oslo a globally distributed team had delivered a web map portal and the protocols, registries and technology to "harvest" and serve data from around the world. They exchanged know-how and produced guidance ("cookbooks") and provided support so that any geological survey could participate and serve their data. They moved forward and raised the profile of the interchange standard – GeoSciML; the "engine" for which OneGeology was, and is, providing the "wheels". Last, but not least, significant amounts of geological map data became readily accessible on the internet.

## 3. TECHNOLOGY

The technology to achieve OneGeology is not complex, but the scale of the deployment is world leading. A basic principle of OneGeology is that it must be open to all geological surveys to participate, regardless of development status and the project has devised protocols and systems to ensure this. OneGeology is thus open to those who currently possess only traditional paper geological maps, and to those operating sophisticated web mapping systems. The end-user does not require specialist software, only access to the Internet via a web browser. In its first phase OneGeology delivered digital geological map data from participating nations using Web Map Services (WMS). Several nations are now using Web Feature Services (WFS) and thus embracing GeoSciML fully. The OneGeology model is a distributed, dynamic and sustainable one, which leaves the data where it is best looked after and updated; that is with the provider nations. Each survey either registers its web service with the OneGeology Portal, or works with a partner survey (a "buddy") to serve that data. OneGeology technology is compliant with the international Open Geospatial Consortium (OGC) Web Map Service standard. Geological surveys may use a variety of software (eg MapServer) to serve their data. The Portal displays the map data served by each country and provides users with the ability to zoom, pan, switch map data on and off, change its opacity and convert it to KML or WCS.

## 4. OUTREACH AND COMMUNICATION

Communication and media attention are seldom-used weapons in the armoury of those who develop standards; that is a mistake. It is astounding what external and media pressure can do to support and encourage nations, public agencies and their employees to share and deliver. The power of a white space on a map is immense, all the more immense if that map is on the internet. Pehaps part of that influence is due to the fact that OneGeology outreach has not been limited to the science and academic community. Media interest in OneGeology has been extraordinary – over 700 articles and broadcasts worldwide in August 2008, after the launch in Oslo, from Nature to Vatican Radio, each in its own way describing to audiences, who we would usually never reach, why geology is important to society. Google references to OneGeology grew from 4000 on 1 August 2008 to over 220 000 in mid-August. It is not the size of this number alone that excites; when you look more closely at some of these web pages you see the way that "liberating" the data has allowed others to innovate and use their imaginations – from new teaching resources for geography students, to animated mash-ups and fly-throughs of Mount Fuji. The project has been unanimously endorsed by the Directors of the geological surveys of the world meeting in Oslo and is providing a tangible catalyst for future collective and coherent action by surveys – prime within which will be the development of harmonised methodologies and thus standards. In delivering its portal and technical protocols OneGeology has also ensured the geoscience domain is contributing to the creation of spatial data infrastructures for planning and policy-making – something major global and regional bodies (including the United Nations and the European Union) have been advocating for some years. It has been welcomed by, and become an active part of, the GEO/GEOSS programme; in large part because it has taken a practical "just let's do it" approach.

## 5. REGIONAL ACCELERATION

The global project has spawned regional components and in Europe the European Commission, under its eContent*plus* programme, agreed to fund a 2-year, €3.25 million, 20 nation project known as OneGeology-Europe. This will move OneGeology forward faster and allow developments in higher resolution and applied data. It will also begin to tackle something far more intractable – the development of agreed geoscientific terms and their classification, starting with the prime object - rock type; without this basic agreement there can be no real harmonisation of our science. But here we return to OneGeology's original concept – make the data available "as is" and challenge the community to sort out the lamentable scientific disharmony! In the USA the National Science Foundation is providing almost $700 000 for a related initiative in the 50 US states – a Geoscience Information Network. These and other continental initiatives in South America and Asia are well linked to ensure complementarity of development and maximum synergy and benefit globally.

## 6. IN THE FUTURE

Where does OneGeology go next and how can we sustain the progress made? The team is now taking steps to put in place a robust, yet flexible, governance and operational structure and move OneGeology to incorporated status. They are also continuing the technical progress, and increasingly Web Feature Service technology is being applied to provide significantly more functionality. Some difficult questions remain. How do we fund and provide continuity for a growing and thus more demanding infrastructure and user base? Do we expand the portal to include map data from academia, commerce and the public? How do we maintain authentication if that happens? Should OneGeology serve more downstream geoscience data – and spread the best practice in advanced applied or thematic information delivery in national geological surveys, for example, geohazards, or mineral resources? The simple goal of OneGeology is to unlock an existing science resource and make it shareable. To some OneGeology may not seem very ambitious and, in a research sense, its achievements rather mundane. However, to draw that conclusion would be to fail to comprehend the scale of the technical, logistical, cultural and political challenges of a project that attempts deployment internationally and especially into the developing world. Perhaps also it would seriously underestimate the importance of sharing, applying and disseminating our science and taking a pragmatic approach to developing and promulgating the standards to do that.

## 7. ACKNOWLEDGEMENTS

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