



Building on success — a pledge for the future

The BGS has published the results of a study by Roger Tym and Partners showing the organisation's contribution to the public good and wealth creation in the national economy. 'The people at the BGS always knew what we did underpinned the nation's wealth and welfare', says Executive Director Dr David Falvey, 'But we wanted to be able to quantify the economic, social and commercial application of our work and learn about our strengths and weaknesses. It is too easy to become complacent and we cannot afford to do that when we have so much to offer.'

The major finding of the report is that the quantifiable output of the BGS considerably exceeds its

annual turnover of £40 million and more importantly makes a key contribution to sectors of the economy, themselves valued in the range of £34 billion to £61 billion or between 5% and 8% of the annual UK economic output.

In the opinion of some customers, the value to them of BGS services and products considerably exceeds what is charged though, of course, the BGS recovers full economic cost in accordance with Treasury guidelines and does not abuse its marketplace position. BGS work underpins every aspect of everyday life at home and in developing nations.

Some high-profile examples of BGS's work that are benefiting the country's economy include:

- The development of an innovative technique that increases the accuracy of drilling for oil, reducing costs.
- Pioneering computer-assisted monitoring of contaminated land (developed in collaboration with other researchers), saving local authority money and increasing environmental safety.
- Management of a website that provides minerals information that is relevant and accessible to industry, contributing to sustainable development and wealth creation.
- An innovative technique for monitoring cliff collapse — a problem that plagues British and European coastlines.
- The provision of information on the potential for ground movement resulting from geological causes for the whole of

Britain — such information is of inestimable value to property owners and investors, insurers, engineering consultants, and planners in the assessment of risk.

BGS work also contributes in many ways that cannot be quantified, for example mapping and monitoring hazards can prevent death or wasted investment; the supply and protection of clean water is priceless, as is access to information for the next generation of scientists.

'The BGS was created as a consequence of the Industrial Revolution', concludes Dr Falvey, 'But we are as dynamic and relevant now as we have ever been. Information from this report will inform our plans for the next decade and we pledge to ensure that the taxpayer's contribution that underpins our work is invested and harvested wisely — for all our futures'. ■

Terrafirma project

The BGS is collaborating with the geological surveys of France, Holland and other countries; with earth observation service providers; and with engineering, economic and legal consultants, under the project leadership of Nigel Press Associates to produce a 'pan-European ground motion risk assessment service in support of policies aimed at protecting the citizen against natural and anthropogenic ground motion hazards'. The development of the service is funded by the European Space Agency (ESA) under its Global Monitoring for Environment

and Security (GMES) initiative. The service will use processed satellite radar data (differential InSAR; Permanent Scatterer InSAR (PSInSAR); site specific InSAR) to detect and monitor ground movements. The service will see the integration of these earth observation capabilities with geological and other spatial data within a geographical information system, where the merged data can be interpreted to produce hazard assessment information for a wide range of users. The whole service will be standardised across Europe and supplied by the geological survey in each country. ■



BGS © NERC

Project partners from across Europe met in November 2003 at BGS Keyworth to discuss progress in the first phase of the project and plan the next phase, starting in early 2004.

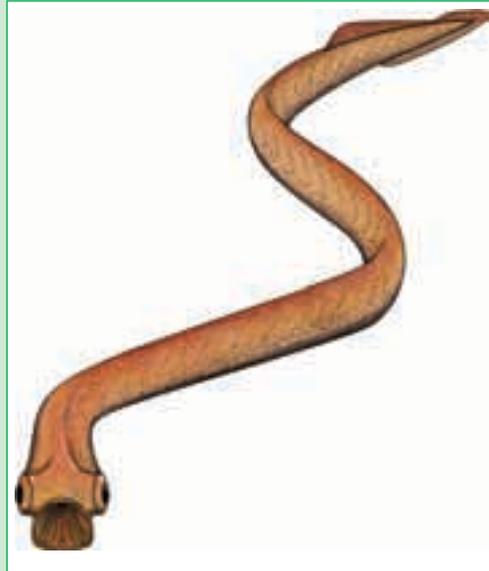


Ancient Scottish skeleton

Conodont 'elements' are the skeletal remains of early marine vertebrates. They are used widely for the correlation and relative dating of rock sequences from the Ordovician to the Triassic. Almost all aspects of the palaeontology of the conodont animal, including their ecology and biology, rely on an understanding of the elements as skeletal apparatuses.

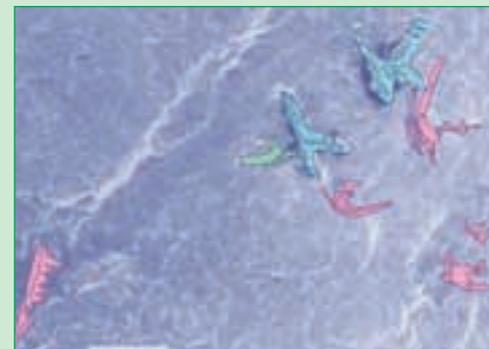
Unfortunately, the conodont fossil record consists almost entirely of disarticulated remains, broken up after the death of the animals, and for the vast majority of conodonts the skeletal apparatus must be reconstructed using indirect methods. The confidence that can be placed in these reconstructions varies, but even the best are nothing more than hypotheses; the ultimate test is the discovery of an articulated skeleton.

The new discovery of a partial skeleton of a prioniodontid conodont in Silurian rocks from southern Scotland has a direct bearing on these uncertainties and is important for reconstructing the evolution of this group of animals. The rare find, made by Mark Williams and Maxine Akhurst during fieldwork undertaken as part of the Southern



Artist's impression of how a conodont would have appeared during life (based on Carboniferous specimens from Granton, Scotland). Images are reproduced courtesy of Dr Mark Purnell, Geology Department, University of Leicester.

Uplands Mapping project, represents the oldest articulated conodont skeleton ever found in the British Isles. Together with Phil Wilby of BGS, a specialist in fossil preservation, the discovery is being documented with Mark Purnell of the University of Leicester, an authority on conodont skeletons. ■



*The partial skeleton of the conodont *Distomodus kentuckyensis*, recently discovered in the Lower Palaeozoic rocks of southern Scotland (left). The different elements of the conodont formed a complex feeding apparatus. Cutting across the rock slab is a graptolite fossil. Camera lucida drawing (right) of the specimen (counterpart of specimen shown left) showing the elements preserved in the assemblage.*

The Earth could move for you

The BGS is launching GeoSure, a new ground stability advice service designed to help reduce the risks associated with development on potentially unstable land.

A team of BGS geologists found a new way to identify natural subsidence hazard and as a result developed new digital datasets for England, Scotland and Wales. The high-resolution data will help construction professionals to know where and how it is safe to build. This is especially relevant to planners, builders, developers, house-buyers, insurance brokers and service providers.

This service will enable marginal land to be brought into productive use by identifying where appropriate and often modest precautions will avoid the activation of potential geohazards. GeoSure can help you to reduce the human and financial risks inherent in developing on unstable land.

Different rock types may cause problems if circumstances change — e.g. if steep slopes become very wet, or roads are built across certain rock structures. GeoSure is designed to help prevent incidents such as the Holbeck Hall Hotel sliding into the sea or large holes appearing beside new houses in Ripon.

GeoSure is based on a computerised geology map of Britain into which up-to-date information has been incorporated to create the most comprehensive and accurate nation-wide natural subsidence information available. ■

Newsline

Recent events and initiatives from the British Geological Survey



BGS © NERC

New magnetic observatory

The BGS, in collaboration with Sperry-Sun Drilling Services (SSDS), a Halliburton Company, has developed a technique to aid drilling for oil, which depends on using the Earth's magnetic field as a directional reference to 'navigate' well bores. This technique, Interpolation In-Field Referencing (IIFR), makes use of data from magnetic observatories to account for the effects of short-term fluctuations in the geomagnetic field at drilling sites caused by solar activity. IIFR has been employed successfully around the UK, reducing drilling costs substantially.

In May 1999, the BGS and SSDS established a magnetic observatory on Sable Island, offshore Nova Scotia, to provide data to assist in oil production drilling close to the island. SSDS also set up a prototype station in Prudhoe Bay, Alaska to demonstrate the value of the technique there. The prototype station was successful, and SSDS and the BGS decided to build on this success by establishing a standard high-quality magnetic observatory in Prudhoe Bay. The observatory was commissioned in October 2003 and is now providing data in real-time, which is particularly significant at the northerly latitude of Prudhoe Bay where magnetic field changes are frequently severe, with swings of many degrees in compass direction often observed within a few minutes. The observatory data are helping to ensure accurate and safe drilling in the Alaskan oil province. ■



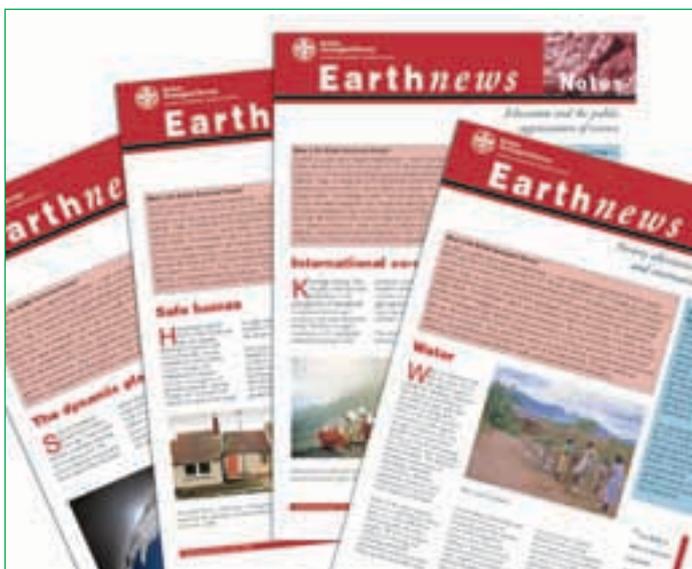
BGS © NERC

Prudhoe Bay installation from the new instrument housings (top); the building below the antenna houses the observatory electronics. Jim Carrigan making absolute magnetic observations (left), the tent is to protect the observer and shield the fluxgate theodolite and gyroscope from wind buffeting.

UGGH in Sunderland

A multidisciplinary team of BGS scientists from Keyworth, Edinburgh and Wallingford were jointly involved in presenting the activities of the Urban Geoscience and Geological Hazards

programme in the north-east of England. A wide range of guests from local Authorities, Consultancies and Universities attended this daylong seminar held at Sunderland University on 24 June 2003. ■



BGS © NERC

Earthnews Notes

The BGS has launched a series of briefing papers under the title of *Earthnews Notes*. These notes set out, for the benefit of all interested parties, an overview of what the BGS does. Titles in the series include: *The ground beneath our feet; Energy — powering the nation; Poverty alleviation, wealth creation and international development; Water, droughts and floods; Earth science information; Engineering, building and planning; Sustainable waste management; Education and the public appreciation of science; Global climate*

change; and Sustainable minerals and quality of life.

Dr David Falvey, Executive Director says, 'We receive more than half our annual £40 million budget from the public purse and take issues of transparency and accountability very seriously. The BGS is Britain's main earth science expert body and these briefing will help explain how its work supports and informs our daily life.'

Earthnews Notes were launched in the Houses of Parliament by the Rt Hon Dr Jack Cunningham MP. They can be downloaded from the BGS website. ■



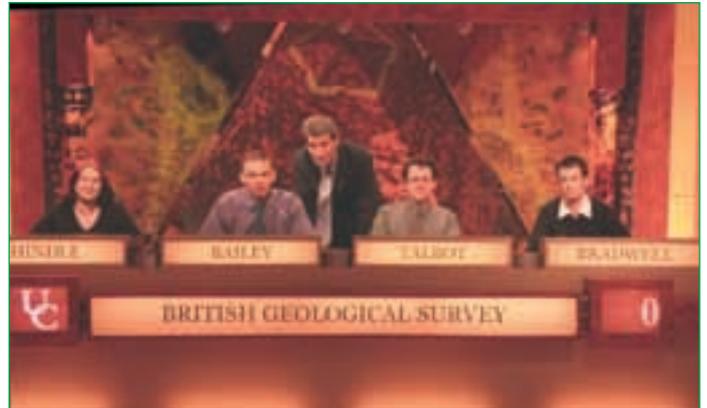
Recognition for the work of BGS scientists

Professor Jane Plant has been awarded an Honorary Doctorate of Science by Kingston University. Professor Plant was awarded a CBE in 1997 for her services to earth sciences and is a Freeman of the City of London. Now Chief Scientist at the BGS and Professor of Geochemistry at Imperial College, London, Professor Plant has strong links with Kingston University. She helped to establish its Centre for Earth and Environmental Science Research and sits on its advisory board.

Dr Richard Scrivener has been awarded an Honorary Doctorate of Science by the University of Plymouth. Dr Jim Riding has been awarded a Doctorate of Science from the University of Leicester for his research on Mesozoic and Cainozoic palynology and stratigraphy.

Dr Doug Holliday, BGS Honorary Research Associate, was awarded the Sorby Medal by the Yorkshire Geological Society at the December AGM, in recognition of his distinguished contributions to geological knowledge, particularly his research on the geology of Yorkshire and the north of England.

Dr Nick Riley was awarded an MBE in the Queen's Birthday Honours for services to UK geosciences. ■



© Granada Television

The BGS University Challenge team with quizmaster Jeremy Paxman (l to r) Jacqueline Hindle, David Bailey, David Talbot (captain), and Tom Bradwell.

Professionally challenged

A BGS team was one of 22 entrants, selected from among over 200 teams representing professional organisations, to take part in *University Challenge: The Professionals*. The BGS faced the RAF in a first round match screened on BBC2 in 2003. It was an exciting contest in which the

BGS team made a nervous start, allowing their opponents to open up an impressive lead. However, the BGS showed their resilience, fighting back to draw level twice, only to be beaten on the final question. While disappointed to lose so narrowly, the team were somewhat relieved to be spared another grilling by Jeremy Paxman! ■



A Cooper, BGS © NERC

Digging a hole? Scientists want to look into it

Geologists from the BGS are returning to the Vale of York to continue their quest to understand the evolution of the landscape during the last ice age. They are keen to know of any pit, road cutting, or trench revealing the rocks and soils in the area between York, Pocklington, Malton and Easingwold.

When a geologist is in the area he or she will arrange a visit to the site and in return

readers will receive an 'on the spot' geological assessment.

Executive Director Dr David Falvey says, 'Your finding might be the missing piece in a jigsaw which explains what happened here 12 000 years ago. If the site turns out to be really important, your farm, locality or town could even become the official name for this geological formation.' Readers are invited to send a short description of the site and its location to Holger Kessler at BGS Keyworth. ■



BGS co-leads expedition to core near the North Pole

In October 2003 the Integrated Ocean Drilling Program (IODP) was formed to replace the longstanding Ocean Drilling Program, which has been exploring beneath the world's ocean floors since 1985. IODP will be one of the largest global scientific programs, capable of exploring the rocks beneath the Earth's oceans. The USA and Japan are providing the IODP with vessels capable of undertaking drilling in deep parts of the Earth's oceans. Previously, ODP boreholes could not be drilled safely in water of less than 200 metres depth, nor in polar oceans covered in ice sheets. The NERC has joined the IODP as

part of the European Consortium for Ocean Research Drilling (ECORD), a group of 13 nations who wish to actively participate in collecting rock cores. To do this, the BGS has joined marine earth science institutes from around Europe to form the ECORD Science Operator (ESO) to drill those parts of the world's oceans previously inaccessible to drilling.

Our ESO partners have years of experience in collecting and handling samples and data for ODP. The University of Bremen hosts one of the largest stores of ODP core and have managed their curation, storage and distribution. The European Petrophysical

Consortium (Universities in Leicester, Montpellier, Aachen and Amsterdam) have performed the same task for the ODP geophysical borehole data. So why is the BGS doing this? For 40 years we have been coring the seabed around the UK using small research and supply vessels with mining and civil engineering drilling equipment to recover the cores. That has given us unique expertise on drilling from non-standard drilling vessels.

Lomonosov Ridge

ESO is close to contracting ice-breakers to allow the first serious attempts to drill the Arctic Ocean floor, within 200 miles of the North Pole.

The aim is to core the sediments on the Lomonosov Ridge, an uplifted submarine ridge that has been subsiding for millennia and now has a set of continuous climate records dating back 50 million years. These start in the Eocene 'greenhouse', one of the warmest periods of the Earth history, and then pass through a phase of gradual cooling, and finally through the beginning of the ice age to the present day. No one is really sure why these changes occurred. The Lomonosov Ridge drilling should give us another key part of the jigsaw of how Earth's systems change and interact.

Fleet of ice-breakers

A conventional drilling rig would be rapidly crushed in the ice, so an ice breaker, specially adapted to carry a drill rig capable of drilling to nearly two kilometres below sea level, is being chartered to drill the cores. In addition, a supporting fleet of ice breakers is being prepared to keep the sea ice away from the delicate drill string long enough for the cores to be collected. Drilling on the Lomonosov Ridge will be a huge technical challenge and an extraordinary adventure. It just possibly could also be the point when we begin to read the warning signs from Earth's history and start trying to change our future. It is difficult to imagine a more important activity and the skills of BGS drilling team are one of the keys to making this happen. ■



A Skinner, BGS © NERC

Swedish ice-breaker Oden, to be used as part of ESO's fleet in the Arctic.