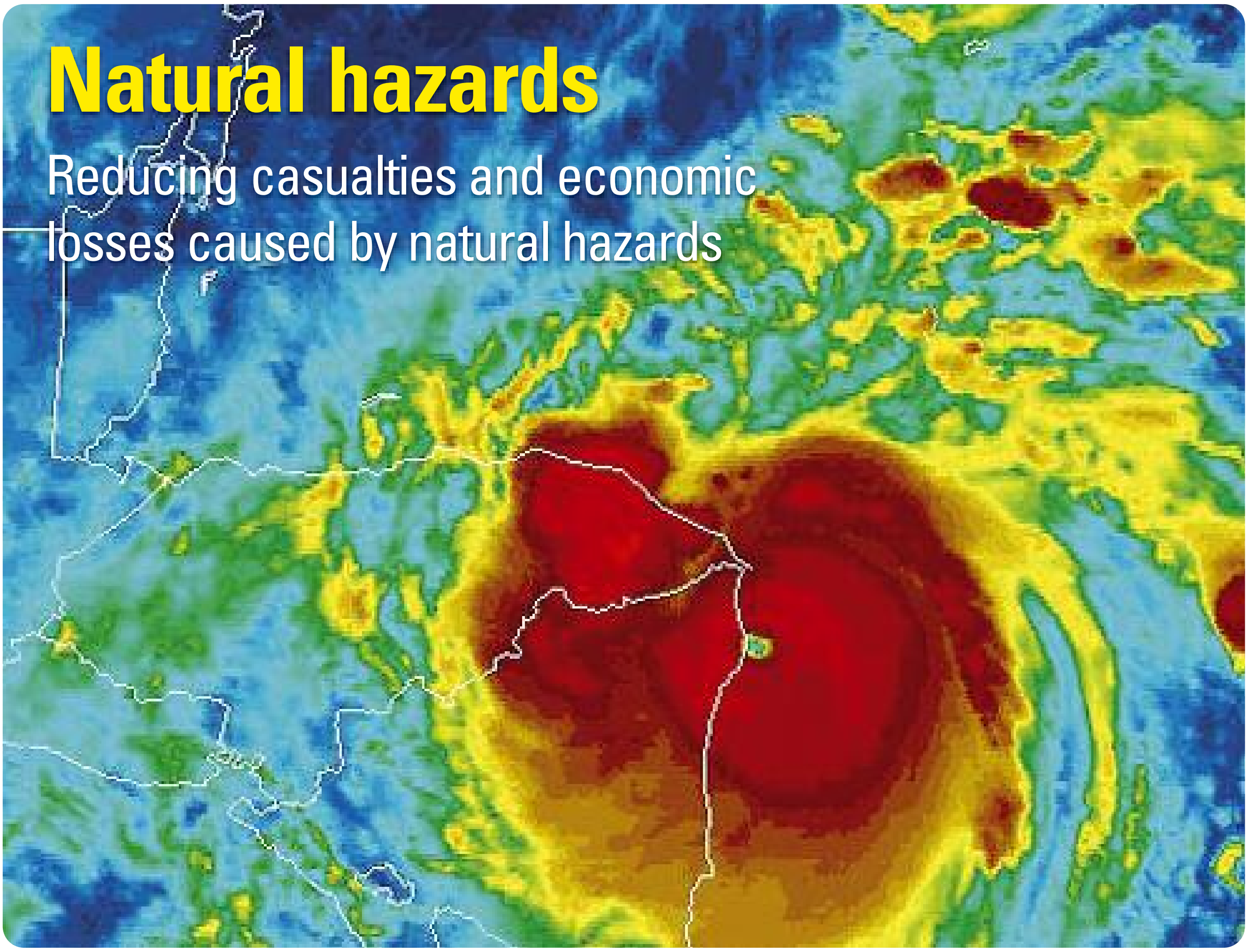
Natural hazards

Reducing casualties and economic losses caused by natural hazards



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Massive landslip off Africa

A giant underwater landslide caused the longest single flow of sand and mud ever documented on Earth, according to Peter Talling at the University of Bristol and colleagues at the National Oceanography Centre, Southampton (NOCS) and the universities of Aberdeen and Bremen.

The landslide occurred off the coast of north-west Africa 60,000 years ago and caused a slip that travelled 1500 kilometres – the distance from London to Rome.

Understanding how these flows erode the seafloor and deposit sandy sediments is important to the oil and gas industry. Russell Wynn from NOCS said, 'Many of the world's largest oil and gas reservoirs are found in deep-sea sands deposited by giant submarine flows. Our data are revealing that seabed erosion and subtle changes in seafloor gradient strongly affect the quality and extent of these sands.'

■ Onset of submarine debris flow deposition far from original giant landslide. *Nature*, 2007.

Eruptions linked to sea-level rise and fall

Volcanic eruptions cause sea levels to rise by around nine millimetres in the first year after eruption. The rise is followed by a seven millimetre fall. Sea level eventually returns to normal after about three years, say researchers from Proudman Oceanographic Laboratory and colleagues from the University of Lapland.

'Contrary to model results, we showed that five major eruptions in the last 150 years caused a significant rise followed by a dip in sea level,' says Svetlana Jevrejeva from the Proudman laboratory.

The team suggests the eruptions disturb the global water cycle, upsetting the balance between ocean evaporation and worldwide rainfall, snowfall and river run-off.

■ Observational evidence for volcanic impact on sea level and the global water cycle. *Proceedings of the National Academy of Sciences*, 2007.

Stronger tropical storms coming

As the global climate changes, the number of tropical storms is likely to reduce slightly in the future but their strength will increase, say researchers from the Environmental Systems Science Centre and colleagues from the Max Planck Institute and the Leibniz Institute of Marine Sciences in Germany.

'Modern climate models such as the Max Planck Institute's ECHAM5 model, run at high spatial resolution, can produce credible simulations of the distribution, structure and behaviour of tropical cyclones. But we need to increase the model's resolution to capture the correct intensities of the storms,' says Lennart Bengtsson from the centre.

■ How may tropical cyclones change in a warmer climate? *Dynamic meteorology and oceanography, Tellus* 2007.

Mediterranean tsunami

A tsunami similar in size to the one that devastated the Egyptian city of Alexandria in 365 AD could strike the eastern Mediterranean on average every 800 years, according to researchers writing in *Nature Geoscience*.

The team, led by scientists from the Universities of Cambridge and Oxford, located the source of the ancient tsunami – an earthquake off the coast of western Crete. By carbon-dating coral around Crete, the researchers showed that the ground suddenly rose an astonishing ten metres at the time of the 365 earthquake.

GPS measurements suggest that similar earthquakes are generated around the southern Aegean about once every 800 years. 'This result is important,' says lead author Beth Shaw, 'because the most recent such devastating earthquake was in 1303.'

■ Eastern Mediterranean tectonics and tsunami hazard inferred from the AD 365 earthquake. *Nature Geoscience*, 2008.

Tsunami from volcanic collapse

UK scientists were on hand to measure a flank of a volcano as it collapsed into the sea. The major lava dome collapse – the largest of its kind in the historical record – occurred on the volcanic island of Montserrat.

An international team of researchers used instruments in the borehole observatory on the Caribbean island to measure and monitor over 200 million cubic metres of lava collapsing over five hours.

This is the first time scientists have had the opportunity to document a huge volcanic landslide so close to the sea in such detail.

The researchers used the borehole instruments, funded by NERC and the National Science Foundation in the US, to correlate the volume of molten debris from the eruption with the subsequent tsunami wave height.

The UK contingent included Steve Sparks and Peter Talling from the University of Bristol and scientists from the British Geological Survey and the British Antarctic Survey.

Tsunami risk to the UK

Following the 2004 Indian Ocean tsunami, the Department for Environment, Food and Rural Affairs commissioned Proudman Oceanographic Laboratory (POL) to analyse the risk to the UK of an Atlantic Ocean tsunami caused by an earthquake.

With help from geologists from the British Geological Survey, the researchers examined the tsunami of 1755 that destroyed Lisbon and generated three-metre-high waves along the Cornish coast.

They found that only one in six earthquake simulations produced waves as high as in 1755.

Chris Wilson from the Proudman Oceanographic Laboratory said, 'Under certain conditions, the shape of the seafloor can focus tsunami waves into patterns which have similar run-up heights to those observed in 1755. Fortunately, the UK is at quite low risk thanks to strong sea defences and being far from tsunami generation regions, allowing time for early warnings to be issued.'

Human population survived super-eruption

Tools discovered in southern India dating from before and after one of the largest volcanic eruptions in human history indicate modern humans had settled the area much earlier than previously thought. The research also suggests that populations may not have crashed irreparably following the explosion.

The Toba super-eruption 74,000 years ago left Indonesia and much of southern Asia under a layer of ash 2.5 metres thick.

Lead author Michael Petraglia from the University of Cambridge said, 'The ash blanketed the landscape. It would have affected plants and animals as well as human populations. We think it would have polluted freshwater sources, such as rivers and lakes.'

Researchers believe it could have all but wiped out early human populations in the region. But the team working on NERC's Environmental Factors in the Chronology of Human Evolution and Dispersal programme found that the tools above and below the ash bore remarkable similarities, indicating related populations inhabited the region either side of the eruption, and that these populations were widespread. The equipment – mainly scrapers on flakes and blades – shows a surprising level of sophistication for that time in southern India.

■ Middle Paleolithic Assemblages from the Indian Subcontinent Before and After the Toba Super-Eruption. *Science*, 2007.