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The Production of National Scale Models for Natural Geohazards in Great Britain

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Although Great Britain (GB), is untroubled by large-magnitude earthquakes or tsunamis, there is a growing financial and health threat from geohazards affecting both people and property (principally from flooding, shrink-swell clays, landslides, coastal erosion, radon and soluble rocks). This is both in terms of direct costs for remediation and indirectly from higher insurance premiums. For example, the Association of British Insurers reported that the 2007 summer floods cost Britain approximately £3billion; a figure which is predicted to triple every decade due to the increasing value of assets and potential increase in flood occurrence due to environmental change. Remediation from damage caused by shrink-swell clays alone is estimated to cost the insurance industry an average of over £300 million per year an amount that will inevitably increase given current predictions for future climate it is therefore essential that we are able to quantify and strategically assess the occurrence of geohazards in GB as a whole. This will enable us to understand their relationship to critical infrastructure (hospitals, utilities and major transportation routes), industry and major urban centres and provide an understanding of the environmental impacts that an increase in any one of these geohazards might have on, the lives of the British people, for example, flooding and associated landslides can affect the mobilisation of confined contaminants and subsequently the character and use of available land in the future.

Since 2002 the British Geological Survey (BGS) has been developing national-scale models of natural geohazards in GB for just this purpose. These include, to date, landslides, shrink-swell, soluble rocks, compressible and collapsible deposits, groundwater flooding, geological indicators of flooding, radon potential, potentially harmful elements in soil, and mining hazards. The models have been created using a combination of expert knowledge (from both within BGS and from outside bodies such as the Health Protection Agency), national databases (which contain data collected over the past 175 years), multi-criteria analysis within Geographical information systems and a flexible rule–based approach for each individual geohazard. By using GIS in this way, the distribution and degree of geohazards has been modelled across the whole of Britain. This approach also allows for many assessments to be updated automatically following a revision of the geological mapping, an improved understanding of the geohazard process or the inclusion of refinements based on local knowledge of an individual area or the availability of new data e.g. new radon measurements, and soil geochemical data etc. A further advantage of such a system is that there is a fully auditable trail leading to the final classification of each geohazard. In this paper we will provide an overview of the methods and best practice used to develop these national datasets. The most significant development necessary for the production of these national hazard datasets was the development and release in 2001 of the 1:50 000 scale digital geological map of GB (DiGMapGB). With the development of the OneGeology Europe project (www.onegeology.org) and the seamless digital geological map for Europe it is likely that similar datasets could be developed for the whole of Europe. We will look briefly at the possibilities for using the techniques and methodologies described in this presentation at a European level.