Natural Hazards and Earth System Sciences (2004) 4: 533–533
SRef-ID: 1684-9981/nhess/2004-4-533

Natural Hazards and Earth System Sciences

Book Review of "Coastal Chalk Cliff Instability"

F. Guzzetti

CNR IRPI, Perugia, Italy

COASTAL CHALK CLIFF INSTABILITY, EDITED BY R. N. MORTIMORE AND A. DUPERRET, THE GEOLOGICAL SOCIETY, LONDON, GEOLOGICAL SOCIETY ENGINEERING GEOLOGY SPECIAL PUBLICATION NO. 20, 2004, 180 PAGES, PRICE: £ 50.00, ISBN 1-86239-150-5, ISSN 0267-9914.

The Geological Society (of London) has published several volumes related to Environmental and Engineering Geology, on various topics including mapping in engineering geology, geophysical methods, land surface evaluation techniques and geohazard evaluation. The latest addition to the collection is a volume on the instability of coastal chalk cliffs. The volume contains eleven papers that address the nature, origin, occurrence, geographical distribution, mechanisms and effects of chalk cliff collapses, and the related issues of where, when and how chalk cliffs erode and the coast retreats. A total of 26 scientists contributed to the volume, most of them from the United Kingdom and France. This is no surprise, because coastal cliffs are abundant on both sides of the English Channel (la Rives Manche), and research on these coastlines has been active for more than four decades.

In the introduction, the two Editors tell the reader that the volume is the result of several years of research on the engineering geology of chalk and related coastal processes, but mostly it summarizes the outcome of the Risk of Cliff Collapse (ROCC) project, a multi-disciplinary research project funded by the European Union within the Interreg II programme. The project was initiated by a French and English team, and was aimed at a better understanding of cliff collapse mechanisms in the Upper Normandy and Picardy regions in France, and in East Sussex in the UK.

The book is organized in three sections. In the first section, five papers describe the geological features controlling cliff instability and associated hazards, including a classification of failure types, the quantification of coastal retreat, the analysis of fracture types and patterns at various scales, and a discussion of the physical (geotechnical) properties controlling chalk instability. In the second section, four papers describe the marine processes driving coastal erosion, including the role of wave energy investigated by numerical analysis and flume tests, the analysis of the effects of wave impact-induced pressure into chalk fractures, and the quantitative evaluation of the durability of flint pebbles through laboratory abrasion experiments. In the last section, two papers describe the assessment of the hazards associated with rapid coastal retreat in Normandy and Picardy, including a quantification of chalk cliff retreat obtained through photogrammetric analysis, and the application of an empirical ten-parameter erosion vulnerability diagram (and index) to determine hazard along the coast of the Baie des Chaleurs, in Québec (Canada).

Although the main driving forces and the triggering mechanisms producing the retreat of high cliffs have long been known, systematic studies quantifying the processes and their effects at various temporal and spatial scales are scarce. With this respect, the volume is a good example of how a multi-disciplinary approach can help investigating complex geological problems. Papers in the book describe analyses carried out at scales ranging from a few centimetres (during laboratory tests on individual rock samples) to tens of kilometres (when investigating the geological causes and geographical distribution of coastal retreat). Techniques used in the multi-disciplinary study include: geological and geomorphological investigations, stratigraphy, analysis of historical information, qualitative interpretation of aerial photographs, quantitative photogrammetry, laboratory tests, and numerical and physical modelling.

The papers published in the book were originally presented at the international conference on "Coastal Rock Slope Instability: Geohazard and Risk Analysis", held at Les Havre in May 2001. The volume was published less than three years later. Those of us who have edited conference proceedings know that this is a reasonably fast time, which guarantees that the content of the book is up to date. Erosion of chalk cliffs by sea-driven collapse is a serious hazard for local communities along the English Channel, and elsewhere in the World. As someone interested in the hazards posed by natural phenomena, I would have liked to have seen more discussion of the hazards posed by coastal retreat, and the associated risk.

In the tradition of the Geological Society, the volume is well produced and clearly illustrated. "Coastal Chalk Cliff Instability" provides new information and recent discoveries on the engineering geology of chalk cliffs and the hazard posed by their failure. For this reason, it represents a useful addition to the literature.

Correspondence to: F. Guzzetti (fausto.guzzetti@irpi.cnr.it)

Natural Hazards and Earth. System Sciences. Book Review of â€œCoastal Chalk Cliff Instabilityâ€. F. Guzzetti CNR IRPI, Perugia, Italy. Coastal chalk cliff instability, edited by r. n. mortimore and a. duperret, the geo-logical society, london, geological soci-ety engineering geology special publica-tion no. 20, 2004, 180 pages, price: Â£ 50.00, ISBN 1-86239-150-5, ISSN 0267-9914.Â The papers published in the book were originally pre-sented at the international conference on â€œCoastal Rock Slope Instability: Geohazard and Risk Analysisâ€, held at Les Havre in May 2001. The volume was published less than three years later. Coastal chalk cliff retreat rates during the Holocene, inferred from submarine platform morphology and cosmogenic exposure along the Normandy coast (NW France). Article. Full-text available.Â (2004) reported that the instantaneous collapses observed in Upper Normandy and Picardy, France, were caused by the instability of coastal chalk cliffs. Bruun (1962) generated the Bruun rule model to simulate the effect of the rate of sea-level rise on coastline erosion. Modelling Coastal Cliff Recession Based on the GIMâ€“DDD Method. Chalk exposures in coastal cliff faces extend from Yorkshire to Devon in England and from Boulonnais to Normandy in France. The failure of chalk cliffs is a long-recognised hazard along parts of...Â Duperret A, Genter A, Martinez A, Mortimore RN (2004) Coastal chalk cliff instability in NW France: role of lithology, fracture pattern and rainfall. In: Mortimore RN, Duperret A (eds) Coastal chalk cliff instability, vol 20. Engineering Geology Special Publications, Geological Society of London, London, pp 33â€“55Google Scholar.Â Reviews in engineering geology. Geological Society of America, Boulder, Colorado, pp 257â€“302CrossRefGoogle Scholar. Hutchinson JN, Bromhead EN, Lupini JF (1980) Additional observations on the Folkesone Warren landslides. Coastal Chalk Cliff Instability EDITED BY R.N. M O R T I M O R E University of Brighton, UK and A. D U P E R R E T Universit6 du Havre, France. 2004 Published by The Geological Society London. THE GEOLOGICAL SOCIETY The Geological Society of London (GSL) was founded in 1807.Â In addition, Hutchinson (2002) had completed a review of major cliff collapses in the northwest European chalk and this and his previous work formed a further foundation to the ROCC studies. ROCC has been concerned with more than just the geology or the mechanics of cliff failure. In these cliffs, sub-aerial processes can contribute more to erosion than marine processes, leading to mass movements such as sliding, slumping and falls.The diagram below illustrates this:/**/Reasons for cliff erosion at Holderness:The cliffs at Holderness have an average speed of retreat of 2m per year. Cliffs are made of soft glacial till. Till is easily eroded at base by waves, resulting in instability. Rainwater from above enters the till easily, adding to its weight and instability. Massive slumps and slides occur. /**/A similar situation exists at Baton on sea in Hampshire and Beachy He