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THEMATIC SECTION

An Introduction to IGCP Project 367 "Late Quaternary Coastal Records of Rapid Change: Application to Present and Future Conditions"

The papers in this issue of the *Journal of Coastal Research* are the result of the inaugural meeting of International Geological Correlation Programme (IGCP) Project 367, held from 13 to 20 September 1994 in Dunblane and Fort William, Scotland. This project, "Late Quaternary Coastal Records of Rapid Change: Application to Present and Future Conditions" is the fourth IGCP project involving various aspects of sea-level and coastal changes. The aims of the four sea-level projects reflect the change in ideas that have influenced sea-level workers during the past quarter of a century. IGCP Project 61 "Sea-Level Changes During the Last Deglacial Hemicycle (about 15,000 years)" started in 1973 with Arthur Bloom as leader and was aimed at constructing a 'eustatic' sea-level curve depicting the world-wide late-glacial and postglacial rise in sea level. This goal soon became obsolete as it was realised that tectonic, isostatic and gravitational influences associated with global variations in ice and water masses rule out the possibility of a globally applicable sea-level curve. Seminal papers in the 1970's that greatly influenced this paradigm shift in sea-level studies include the works by WALCOTT (1972), CHAPPELL (1974), PELTIER and ANDREWS (1976) and FARRELL and CLARK (1976). MÖRNER (1976) argued that changes in the shape of the earth's geoid cause regional differences in the pattern of postglacial sea-level change, and proposed (MÖRNER, 1980) that each sea-level 'region' could be represented by a postglacial sea-level curve with a characteristic shape (CLARK *et al.*, 1978), the concept of 'regional eustasy'. Subsequently, the aim of IGCP Project 200, initiated in 1983 under the leadership of Paolo Pirazzoli, was to analyse and correlate local sea-level studies for tectonic, climatic, tidal, and oceanographic influences. A major result of Projects 61 and 200 was a standardised methodology of sea-level research (VAN DE PLASSCHE, 1986).

During the 1980's concerns were raised about projected global sea-level rise resulting from the increase of atmospheric greenhouse gasses. Its potential impact on coastlines resulted in a focus on past coastal changes in response to sea-level changes and between 1988 and 1993 many sea-level studies were conducted as part of IGCP-Project 274 "Quaternary Coastal Evolution: Case Studies, Models, and Regional Patterns", led by Orson van de Plassche.

Project 274 was concluded with a meeting in Oostduinkerke, Belgium, in September 1993. In this meeting David Scott was elected as the leader of a group to formulate the proposal for a new IGCP project. The proposal was again directed by current trends in Quaternary Science. The high time resolution and rapidity of changes in ice cores and deep-sea cores had revealed the potential instability of interglacial climate and the possibility of catastrophic events. The new project, with the full title "Late Quaternary Coastal Records of Rapid Change: Application to Present and Future Conditions", was designated IGCP Project 367 and formally approved by the International Board of IGCP in mid 1994.

The first meeting, in the fall of 1994, comprised four days of field excursion (SHENNAN, 1994) visiting sites on the North Sea and Atlantic coasts of Scotland, and two days of scientific presentations and business meetings. The overall aims of Project 367, even more so than Project 274, emphasise the application of sea-level studies to 'real' problems. The project proposal summarised the three main objectives:

(1) To document and explain rapid changes (events that occur on the scale of seconds to 1,000's of years) in the late Quaternary coastal zone. High resolution studies will be used to assess the impact of short term events on global and regional coastal change. These data will be used to suggest scenarios for future coastal changes and help in planning for possible coastline problems.

(2) To provide, in final volumes and national reports, a set of reference material that documents regional and global short-term coastal events, and explain how these events relate to present and possible events in the near future.

(3) To develop and prepare, through international meetings, newsletters, common data banks etc., a common approach to these studies that allows comparison of data on a world-wide basis.

In order to reach these aims participants at Fort William established six working groups, with a seventh added later: (i) seismic events and tsunamis; (ii) tidal amplitude changes; (iii) storm surge history and change; (iv) rapid sea-level change and response; (v) changes in sedimentation rate and response; (vi) new high resolution geochronological techniques; and (vii) human impacts on coastal systems.

The following nine papers reflect both the wide international participation in IGCP 367 and the range of science within the project. Two papers, by BARUSSEAU and RADAKOVITCH and MÖRNER, address methodological issues of separating factors which operate over different time-scales, illustrating their arguments with examples from a range of

locations. Their approaches provide challenging contrasts to the classic geomorphological paper by SCHUMM and LICHTY (1965), later discussed in the context of sea-level and coastal changes (PETHICK, 1984; SHENNAN, 1987). The range of time-scales considered is seen in the contributions of RAUKAS and PARK *et al.,* RAUKAS describes the evolution of the Baltic, including the rapid changes in waterlevel at the end of the Baltic Ice Lake and Ancylus Lake stages, around 10,300 BP and 8,500 BP, respectively. Conversely, PARK *et al.* evaluate the forcing parameters of storms and typhoons on the morphological changes during the last 30 years on a chenier ridge in western Korea.

A number of papers specifically contrast the roles of processes operating over the time scale of the Holocene with those of shorter duration. SELIVANOV argues that an understanding of their relative importance, with reference to the beach/dune shorelines of Russia on the White Sea and the Sea of Japan, allows the Holocene changes to be used for predicting future changes. BRYANT *et al.* contend that a change in emphasis is needed in current thinking within the coastal geomorphology community regarding the processes responsible for coastal evolution to include the impact of repetitive, rapid, catastrophic tsunami in both coastal erosion and accretion. They assert, focusing on examples from Australia, that such tsunami are capable of dramatically modifying a landscape irrevocably over very short periods of time. In contrast, MORHANGE *et al.,* describing evidence from the Marseilles area, conclude that coastal sediments and palaeoenvironments record relative sea-level change over the last 4,000 years generally dominated by a steady rise, but with periods of more rapid change due to tectonic activity and sediment compaction.

The final two papers show how high resolution techniques can be used to address the objectives of Project 367. SCOTT *et al.* describe foraminifera assemblages from marshes in Japan, Canada, U.S.A, Chile and New Zealand. They illustrate how high marsh assemblages provide excellent stratigraphic markers in palaeoenvironmental reconstructions which can be addressed to specific applications such as rapid coastal changes resulting from large earthquakes. Lastly SHENNAN *et al.,* using data from sites in western Scotland and visited during the field excursion, demonstrate a link between the oceanic record of major climate and oceanic circulation changes with the terrestrial biostratigraphic record at the last glacial-interglacial transition. They also argue for a relative fall in sea level in the area throughout the period, rather than the rapid changes in rate and direction described for other sites in Scotland.

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LITERATURE CITED

CHAPPELL, J., 1974. Late Quaternary glacio- and hydro-isostasty, on a layered Earth. *Quaternary Research,* 4, 405–428.

CLARK, J.A.; FARRELL, W.E., and PELTIER, W.R., 1978. Global changes in postglacial sea level: A numerical calculation. *Quaternary Research,* 9, 265–278.

FARRELL, W.E. and CLARK, J.A., 1976. On postglacial sea level. *Geophysical Journal of the Royal Astronomical Society,* 46, 647–667.

MÖRNER, N.-A., 1976. Eustasy and geoid changes. *Journal of Geology,* 84, 123–151.

MÖRNER, N.-A., 1980. The northwest European "sea-level laboratory" and regional Holocene eustasy. *Palaeogeography, Palaeoclimatology, Palaeoecology,* 29, 281–300.

PELTIER, W.R. and ANDREWS, J.T. 1976. Glacial isostatic adjustment, I: The forward problem. *Geophysical Journal of the Royal Astronomical Society,* 46, 605–646.

PETHICK, J.S., 1984. *An Introduction to Coastal Geomorphology.* London: Arnold.

SCHUMM, S.A. and LICHTY, R.W., 1965. Time, space and casuality in geomorphology. *American Journal of Science,* 263, 110–119.

SHENNAN, I., (ed.), 1994. IGCP *Project 367 Late Quaternary Coastal Records of Rapid Change, Field Guide.* Durham: Environmental Research Centre, University of Durham, 66p.

SHENNAN, I., 1987. Global analysis and correlation of sea-level data. *In:* DEVOY, R.J.N. (ed.), *Sea Surface Studies: A Global View.* London: Croom Helm, pp. 198–230.

VAN DE PLASSCHE, O., 1986. Introduction. *In:* VAN DE PLASSCHE, O., (ed.), *Sea-Level Research: A Manual for the Collection and Evaluation of Data.* Norwich: Geo Books, pp. 1–26.

WALCOTT, R.I., 1972. Past sea levels, eustasy, and deformation of the earth. *Quaternary Research,* 2, 1–14.