

INTERNATIONAL GEOSCIENCE PROGRAMME (IGCP)



Annual Report* of IGCP Project No.495

The scientific information in this report will further be used for publication on the IGCP website under the new electronic version of 'Geological Correlation' (please feel free to attach any additional information you may consider relevant to the assessment of your project).

IGCP project short title: **Quaternary Land-Ocean interactions**

Duration: **5 years 2004 – 2009, continuation year 2009-10**

Project leader(s): **Professor Antony J. Long¹
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Date of submission of report: **December 15th 2009**

Signature of project leader(s):

Guidelines for Annual Report

(August 2009)

Please use the following headlines to report the present status and scientific achievements of your project (write N/A where not applicable) and explain abbreviations you use in your report.

1. Website address(es) related to the project

<http://www.geography.dur.ac.uk/projects/igcp495>

2. Summary of major past achievements of the project

This was the final year for IGCP project 495 and so this represents a “Final Report”. As such, it takes a broader, more reflective look at the achievements of the project in the last 12 months and also over the duration of the project. The project was reviewed by UNESCO in 2008 and was considered “successful” and granted OET status for a sixth year (On Extended Term, without funding) for 2009. In terms of overall achievements, IGCP495 has succeeded in:

- Supporting a major international research programme addressing a scientifically and societally important topic. Over 250 members participated in the project at different times. The project facilitated enhanced collaboration between scientists working across the world, with an emphasis on new partnerships in developed and developing countries.
- Six international conferences and field meetings: USA (04), Indonesia (05), Brazil (06), Australia (07), Portugal (08) and USA (09).
- Two international Tsunami Symposia (Bonaire (06), Italy and Greece (08)).
- Five regional meetings in the UK and NW Europe: France (05), Kent (06), Scotland (07), Northern Ireland (08), The Netherlands (09).
- Seven related project meetings: VI Iberian Quaternary Meeting (05), Status of Coastal Zone Studies and Future Trends, India (06), Sessions at AGU (06, 07), Arctic Palaeoclimate and Its Extremes (08), IGCP495/American Quaternary Union (08), IGC-Oslo Joint Session (2008), Royal Geographical Society, London (08).
- Extensive publications summarized in previous annual reports (selected 09 papers are listed below), as well as four significant special issues in high quality, international journals that summarise the research undertaken in IGCP495:

Scheffers, A., Kelletat, D. (Eds). 2006. Tsunamis, Hurricanes and Neotectonics as Driving Mechanisms in Coastal Evolution. *Zeitschrift für Geomorphologie, Supplementbände*, v.146. 265 pages.

Gehrels, W.R., Long, A.J. (Eds). 2007. Quaternary Land-Ocean Interactions: Sea-Level Change, Sediments and Tsunami. *Marine Geology*, v. 242. 220 pages.

Horton, B.P., Long, A.J., Donnelley, J. (Eds). 2009. Quaternary ice sheet-ocean interactions and landscape responses. *Quaternary Science Reviews*, v. 28, 1370-1572.

Boski, T., Long, A.J. (Eds). In press. Quaternary land-ocean interactions: driving mechanisms and coastal responses. *Quaternary International*.

3. Achievements of the project this year only

*3.1. List of countries involved in the project (please *indicate the countries active this year and make the distinction between:*

Australia*, Bangladesh, Belgium*, Brazil*, Canada*, China, Denmark*, Ecuador, Estonia, Ethiopia, Fiji, Finland*, France*, Germany*, Greece*, Hong Kong*, India*, Indonesia, Ireland*,

Israel*, Jamaica*, Japan*, Kenya, Malaysia, Morocco, Mozambique, Latvia, Lithuania, New Zealand*, Norway, Portugal*, Russia, Singapor*e, South Korea, Spain*, Sweden, Switzerland, Taiwan, Thailand, The Netherlands*, Turkey, Ukraine, United Arab Emirates, United Kingdom*, United States of America*, Venezuela.

3.2. *General scientific achievements and social benefits*

See project summary above. An important achievement of this year was the preparation and submission of a follow-on project to UNESCO.

3.3. *List of meetings with approximate attendance and number of countries*

Meeting	Date	Venue	Delegates	Countries
UK Sea Level IGCP Conference	20 th -24th June 2009	The Netherlands	35	8
Final International Meeting	25 th October – 31 st October 2009	North Carolina	52	18

3.4. *Educational, training or capacity building activities*

The North Carolina (09) international meeting provided an opportunity for training in the collection of sea-level data from a variety of depositional environments, including estuarine, back-barrier and salt marsh settings, as well as an opportunity to explore the link between past coastal change and coastal management issues. IGCP495 has prioritised postgraduate students in its activities and has taken pride in providing a supportive environment for early career scientists.

3.5. *Participation of scientists from developing countries, in particular young and women scientists*

IGCP495 is co-led by Prof. Islam (Bangladesh), who is very aware of the issues relating to sea-level change, coastal evolution and climate change and their impact on developing countries. There were 18 female contributors at the North Carolina final project meeting. A particular highlight of the project was the completion of several PhDs who were active members of the project (e.g. Brooks, Engelhart, Gonzalez, Heyvaert, Hijma, Kemp, Marshall, Massey, Szkornik, Thomson, Vis, Woodroffe), several of whom have gone onto full time academic posts.

3.6. *List of most important publications (all papers in peer-reviewed journals)*

- Antonioli, F. et al., 2009. Holocene relative sea-level changes and vertical movements along the Italian and Istrian coastlines. *Quaternary International*, 206: 102-133.
- Bradley, S.L. et al., 2009. Glacial isostatic adjustment of the British Isles: new constraints from GPS measurements of crustal motion. *Geophysical Journal International*, 178(1): 14-22.
- Delgado, J. et al., 2009. Mine-related pollution in the Guadiana Estuary (SW Iberia). *Geochimica Et Cosmochimica Acta*, 73(13): A276-A276.
- Fettweis, M. et al., 2009. Long-term influence of maritime access works on the distribution of cohesive sediments: analysis of historical and recent data from the Belgian nearshore area (southern North Sea). *Geo-Marine Letters*, 29(5): 321-330.
- Gonzalez, J.L. and Tornqvist, T.E., 2009. A new Late Holocene sea-level record from the Mississippi Delta: evidence for a climate/sea level connection? *Quaternary Science Reviews*, 28(17-18): 1737-1749.
- Hijma, M.P. et al., 2009. From river valley to estuary: the evolution of the Rhine mouth in the early to middle Holocene (western Netherlands, Rhine-Meuse delta). *Netherlands Journal of Geosciences-Geologie En Mijnbouw*, 88(1): 13-53.

- Horton, B.P. et al., 2009. Holocene sea-level changes along the North Carolina Coastline and their implications for glacial isostatic adjustment models. *Quaternary Science Reviews*, 28(17-18): 1725-1736.
- Horton, B.P. et al., 2009. The sedimentary record of the 2005 hurricane season from the Mississippi and Alabama coastlines. *Quaternary International*, 195: 15-30.
- Kemp, A.C. et al., 2009. Distribution of modern salt-marsh foraminifera in the Albemarle-Pamlico estuarine system of North Carolina, USA: Implications for sea-level research. *Marine Micropaleontology*, 72(3-4): 222-238.
- Kemp, A.C. et al., 2009. Timing and magnitude of recent accelerated sea-level rise (North Carolina, United States). *Geology*, 37(11): 1035-1038.
- Leorri, E. et al., 2009. Field experiments on bioturbation in salt marshes (Bombay Hook National Wildlife Refuge, Smyrna, DE, USA): implications for sea-level studies. *Journal of Quaternary Science*, 24(2): 139-149.
- Long, A.J. et al., 2009. Late Holocene relative sea level rise and the Neoglacial history of the Greenland ice sheet. *Journal of Quaternary Science*, 24(4): 345-359.
- Marshall, W.A. et al., 2009. The isotopic record of atmospheric lead fall-out on an Icelandic salt marsh since AD 50. *Science of the Total Environment*, 407(8): 2734-2748.
- Milne, G.A. et al., 2009. Identifying the causes of sea-level change. *Nature Geoscience*, 2(7): 471-478.
- Pignatelli, C. et al., 2009. Evaluation of tsunami flooding using geomorphologic evidence. *Marine Geology*, 260(1-4): 6-18.
- Scheffers, A. et al., 2009. Wave-Emplaced Coarse Debris and Megaclasts in Ireland and Scotland: Boulder Transport in a High-Energy Littoral Environment. *Journal of Geology*, 117(5): 553-573.
- Scheffers, S.R. et al., 2009. Tsunamis, hurricanes, the demise of coral reefs and shifts in prehistoric human populations in the Caribbean. *Quaternary International*, 195: 69-87.
- Shennan, I., 2009. Late Quaternary sea-level changes and palaeoseismology of the Bering Glacier region, Alaska. *Quaternary Science Reviews*, 28(17-18): 1762-1773.
- Shennan, I. et al., 2009. Multi-segment earthquakes and tsunami potential of the Aleutian megathrust. *Quaternary Science Reviews*, 28(1-2): 7-13.
- Simpson, M.J.R. et al., 2009. Calibrating a glaciological model of the Greenland ice sheet from the Last Glacial Maximum to present-day using field observations of relative sea level and ice extent. *Quaternary Science Reviews*, 28(17-18): 1631-1657.
- Teferle, F.N. et al., 2009. Crustal motions in Great Britain: evidence from continuous GPS, absolute gravity and Holocene sea level data. *Geophysical Journal International*, 178(1): 23-46.
- Woodroffe, S.A., 2009. Recognising subtidal foraminiferal assemblages: implications for quantitative sea-level reconstructions using a foraminifera-based transfer function. *Journal of Quaternary Science*, 24(3): 215-223.
- Woodroffe, S.A., 2009. Testing models of mid to late Holocene sea-level change, North Queensland, Australia. *Quaternary Science Reviews*, 28(23-24): 2474-2488.
- Woodroffe, S.A. and Long, A.J., 2009. Salt marshes as archives of recent relative sea level change in West Greenland. *Quaternary Science Reviews*, 28(17-18): 1750-1761.
- Woodworth, P.L. et al., 2009. Trends in UK mean sea level revisited. *Geophysical Journal International*, 176(1): 19-30.
- Woodworth, P.L. et al., 2009. Evidence for the accelerations of sea level on multi-decade and century timescales. *International Journal of Climatology*, 29(6): 777-789.
- Zong, Y. et al., 2009. An evolutionary model for the Holocene formation of the Pearl River delta, China. *Holocene*, 19(1): 129-142.
- Zong, Y. et al., 2009. Late Quaternary environmental changes in the Pearl River mouth region, China. *Quaternary International*, 206: 35-45.

3.7. Activities involving other IGCP projects, UNESCO, IUGS or others

There were none.

4. Activities planned

4.1. General goals

We are in the process of agreeing a publishing contract to produce a manual on the collection and analysis of sea-level data (Editors: Professor Ian Shennan, Professor Antony Long and Professor Roland Gehrels). This will be a key legacy from IGCP495 that will take 18 months to produce. We have 20 contributing authors from the programme, drawn from around the world. Our intention is that the manual will be available on-line to ensure as much access as possible.

4.2. Tentative list of specific meetings and field trips (please list the participating countries)

There are none.

5. Project funding requested

None requested.

6. Request for extension, on-extended-term-status, or intention to propose successor project

A successor project was submitted to UNESCO in October 2009 by Dr Adam Switzer "Preparing for Coastal Change". This project seeks to build on the substantial fundamental knowledge developed in IGCP495 and other previous IGCP sea-level projects, to directly address the challenges of preparing for future sea-level rise and coastal change.

7. Financial statement (\$ USD only)

The IGCP Scientific Board would like to be informed how the IGCP funds were used and if additional funding was obtained from different sources.

No IGCP funds were provided to the project in 2009 because the project was in continuation. One project leader (Long) received financial support from the Geological Society of London IGCP fund to partly support attendance at the international project meeting in North Carolina.

8. Attach any information you may consider relevant

The web site provides a full archive of the project.