Anuário do Instituto de Geociências - UFRJ
ISSN 0101-9759 Vol. 29 - 1 / 2006 p. 441-442

FORAMS 2006

Foraminiferal evidence for land movements associated with interplate earthquakes in eastern Hokkaido, Japan

Katie H. Thomson[1]; Benjamin P. Horton[2]; Antony J. Long[1] & Yuki Sawai[3]

[1]Department of Geography, University of Durham, Science Laboratories, Durham, DH1 3LE, U.K. k.h.thomson@durham.ac.uk
[2]Department of Earth and Environmental Science, University of Pennsylvania, 240 South 33rd Street, Philadelphia, PA 19104-6316, U.S.A.
[3]Fault Research Center, Geological Survey of Japan, AIST, Tsukuba 305-8567, Japan

Characterising patterns of earth motion (uplift and subsidence) associated with great earthquakes is an important first step for assessing seismic hazard. Research in the Pacific Northwest has recently used paleoecological and lithostratigraphical evidence derived from estuarine sediments to reconstruct rapid sea-level changes and associated land motions linked to major plate-boundary earthquakes. Our research uses foraminifera to reconstruct past earthquakes from Hokkaido, Japan. Intertidal sediments from this area provide evidence for repeated emergence events over the mid to late Holocene, which have recently been attributed to land movements associated with interplate earthquakes at the Kuril subduction zone. The overarching aim of our research is to use foraminiferal and chronostratigraphical techniques to quantify land movements along the coast of eastern Hokkaido to improve our understanding of past earthquakes in Hokkaido. The novelty of our research centres on the application of quantitative estimates of land-level changes derived from statistical modeling to directly test and constrain a recently developed elastic dislocation model for eastern Hokkaido. Therefore, quantitative land movements predicted by foraminiferal transfer functions offer the potential to develop an understanding of the processes culminating in an earthquake, which may help modellers better assess rupture length and origin.

A critical first step of using such quantitative predictions (e.g. transfer functions), is to assess the extent to which a high-resolution fossil core may reveal decadal changes in sea-level as shown in a tidal gauge record. Two long tidal gauge records spanning 100 years are available on the eastern Hokkaido coastline, at Hanasaki and Kushiro which record interseismic subsidence. Biostratigraphical analysis was undertaken on three transects at Mochiruppu to investigate intrasite differences in microfossil assemblage composition and transfer function development. The transfer functions were then applied to a short fossil core at Mochiruppu, and the tide-gauge record

used to validate the reconstructions. This research builds on previous studies of modern marsh agglutinated foraminifera in Hokkaido by incorporating information on temporal and spatial variability. We rigorously evaluate the foraminiferal zonation to improve transfer function predictions and the use of foraminifera in paleoseismic research.

Understanding the frequency and size of earthquakes is important for seismic hazard awareness. At present, our knowledge is only partial given the short-term observational data which is available. Recognising land movements within the pattern of relative sea-level change recorded in estuarine sediments provide an important method of extending the record into the mid to late Holocene.

Anuário do Instituto de Geociências - UFRJ
ISSN 0101-9759 - Vol. 29 - 1 / 2006 p. 441-442