

Earth Observations for rapid response to large earthquakes

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Earthquakes, together with landslides that they trigger, represent a significant proportion of the natural hazards faced by human societies. Independently of their societal impact, earthquakes are central to our basic understanding of the earth system; they are messengers of the fundamental processes that shape the surface of the Earth.

It is believed that earthquake hazards are growing: there were 65 large earthquakes ($M_w > 6.5$) in 2010 alone, and many earthquakes occur in densely populated areas. Because survival times for victims can be short in the absence of rescue, it is vital that relief teams be directed to the areas of greatest damage. Proximity to the causative fault is the primary factor determining the location of damage. Using satellite radar data (SAR) we can pinpoint areas of greatest probable damage, map deformation, and determine earthquake mechanisms, but intensive expert interpretation and interaction are currently required. The ESA Sentinel-1 radar satellites to be launched in 2013 are expected to provide global coverage in 6 days (Europe and Canada in less than 2 days) and radar data will be delivered within an hour of acquisition. Together with other SAR systems, these will make rapid responses to earthquake hazards possible in the near future using satellite radar and expert system interpretation.

This study will look at global large continental earthquakes ($M_w > 6.5$) occurring in the next 3 years, but emphasis will be given to south-eastern Asia. Global (or regional) observations are necessary because of the time scales of the processes. The earthquake cycle on any one fault may take hundreds to thousands of years. But on a global basis these events occur frequently, and understanding gained in one location can then be applied generally.

What the project involves

The principal aims of this project are:

- (1) to optimize interferometric processing procedures (e.g. automatic remote fetching of data, rapid estimation of deformation, and robust data uncertainty assessment).
- (2) to adapt the modelling software we have already developed to parallel processing so as to reduce processing times.
- (3) to enable source mechanisms to be derived for large continental earthquakes from deformation data and models of these to be disseminated rapidly via the WEB.
- (4) to understand the trend of recent earthquake hazards.

Training

The student will receive training in space geodesy techniques, in particular the handling of satellite radar data, and in modelling the mechanics of earthquakes. Training in a wide range of generic skills to prepare the student for life as a PhD student and afterwards is provided by the College of Science and Engineering Graduate School. The student will join the School's Earth Systems Research Group and will be a member of the Dynamic Earth and Geohazards research group in the UK's National Centre for Earth Observation. S/he will thus benefit from the shared expertise of Geosciences staff in several university departments, and will attend regular meetings where the research of these various groups is presented and discussed.

For more details, please contact zhenhong.li@glasgow.ac.uk

Application procedure and deadlines

To be considered for PhD studentships to be held in the School of Geographical and Earth Sciences (GES), suitably qualified candidates should apply via the website of the College of Science and Engineering (<http://www.gla.ac.uk/colleges/scienceengineering/graduateschool/prospectivestudents/essentialinformation/>). Closing dates for University and research council funded studentships will be in early in the new year, as stated on the GES studentships page: <http://www.gla.ac.uk/schools/ges/research/postgraduate/>.

Non- English speakers must meet the University's English language requirements. Candidates for NERC studentships should also meet the NERC's requirements for both academic qualifications and residential eligibility. For more information go to <http://www.nerc.ac.uk/funding/application/studentships> and please note that *non-UK European Union citizens will be awarded fees only by NERC.*

For informal enquiries about the research projects please contact the relevant supervisors. Information on the GES graduate school and the application process can be obtained from Mrs Jean McPartland, the assistant to head of the School (Jean.McPartland@glasgow.ac.uk).