Two full-time PhD Macquarie University Research Excellence Scholarships (MQRES) are available in the Department of Earth and Planetary Sciences associated with successful ARC Future Fellowship FT130101220 for a suitably qualified applicant to work with Dr Yingjie Yang.

**Project Area:** Developing and applying a novel seismological approach to map the small-scale dynamics of the upper mantle

**Project Description:**

The concept of small-scale convection currents (SSC) from about 100-400 km below the Earth’s surface is a model proposed to explain intraplate volcanism and uplift of topography in continental interiors, which are believed to be triggered either by edge-driven convection or by another model involving Rayleigh-Taylor (gravity) instability of a thickened lithosphere. So far, most of evidence for small-scale upper mantle convection is derived purely from isotropic seismic tomographic models with low velocity and high velocity anomalies interpreted as the upwelling and downwelling limbs of small-scale upper mantle convections, respectively. However, isotropic seismic velocities can only reveal information about the temperature and composition of upper mantle rocks. High velocity anomalies interpreted as downwelling drips could be simply residues of eroded lithosphere and low velocity anomalies could reflect compositional and thermal anomalies rather than downwelling or upwelling upper-mantle rocks. The direct evidence for small-scale convection must come from studies of seismic anisotropy, which provides direct constraints on deformation and flow related to SSC within the Earth’s interior.

The PhD candidate are expected to develop and apply innovative methods to map seismic anisotropy in the upper mantle in order to understand the nature of small-scale convection and its roles in shaping intraplate geological phenomena. Understanding SSC could help to fill the gap in the plate tectonic paradigm left by its inability to resolve the mechanisms responsible for intraplate geological activity such as volcanism, mountain building and earthquakes. Direct observational evidence for SSC will provide fundamental constraints on the use of dynamic modelling to understand the origin and evolution of intraplate geological features.

Application can be submitted anytime. Those applicant who can start in 2014 are especially encouraged, however all applicants will be considered.

Initial inquiries should be directed to Dr Yingjie Yang email: yingjie.yang@mq.edu.au

The 2014 MQRES full-time stipend rate is $25,392 per annum with tax free for 3 years. Research support is $6000 per year. Additional international conference/research travel support up to $4000 is available through the Macquarie University Postgraduate Research Fund.
Prospective PhD applicants should have completed the equivalent of Macquarie University’s Master of Research (MRes) degree, MPhil or other 2 year Masters degree with a major research component with excellent results. Refer to the HDR Entry Criteria webpage for more information.

To be eligible for a PhD scholarship applicants are expected to have a record of excellent academic performance, especially in the research Masters degree, and additional relevant research experience and/or peer-reviewed research activity, awards and/or prizes in line with the University’s scholarship rating guidelines. Refer to the HDR Scholarship Requirements webpage for more information.

Applicants will need to complete a candidature/scholarship application form and arrange for two academic referee reports to be submitted to the Higher Degree Research Office. Refer to the HDR Applications webpage for further application instructions. Macquarie University will advise the successful applicant of entitlements at the time of scholarship offer.