

## RESEARCH CONFERENCES

ESF-FWF Conference in Partnership with LFUI

# New Challenges in Earthquake Dynamics: Observing and Modelling a Multi-scale System

Universitätszentrum Obergurgl (Ötz Valley, near Innsbruck) • Austria  
18-23 October 2008

**Chair:** Dr. David Marsan, University of Savoie, FR

**Co-Chairs:** Dr. Sebastian Hainzl, University of Potsdam, DE  
Dr. Agnes Helmstetter, LGIT Observatoire de Grenoble, FR  
Dr. Sandy Steacy, University of Ulster, UK

Earthquakes are complex phenomena that result from many intervening processes acting at various spatial and time scales. Recent advances in the observation and modelling of earthquakes have shown that faults interact through elastic stress transfer, but also via the activation of thermal, chemical, hydrological and visco-elastic processes, all occurring in a structurally complex medium.

Our perception of the diversity of mechanisms by which faults accommodate stress is changing rapidly with our growing ability to instrument the crust.

There is an increasing evidence that these interactions are not restricted to the large scales, typical of strong, destructive earthquakes: (i) recent observations have pointed out that small earthquakes can have as strong an influence on stress redistribution as large earthquakes do. Because of their sizes, these small-scale events are difficult to model. However, their influence can be incorporated as a stochastic term, or the errors involved in ignoring them must be estimated. (ii) Frictional models predict that even large earthquake nucleation could take place in very small zones (e.g., ~ 10 m).

This implies that earthquakes are sensitive to mechanical conditions and processes acting at these very small scales, which can be significantly different from those characteristic of the regional tectonics. (iii) During rupture propagation, small-scale variations in pre-stress and / or fault geometry, related to the complexity of fault roughness and fault-zone structure, can control both the rupture speed and its total extent.

The aim of this conference is to discuss the recent advances in earthquake physics, in particular relating to earthquake interactions (observations, models). An emphasis will be given on the role of small scale processes and structures in controlling large scale earthquakes and regional seismicity. It will promote new, exploratory discussions on how to reconcile large scale regional models with small-scale controls on stress and seismicity.

The conference is divided into 8 sessions:

- Session 1: Observation of seismicity patterns.
- Session 2: Stochastic modelling of earthquake interactions.
- Session 3: Earthquake rupture in an heterogeneous crust.
- Session 4: Non-elastic processes at the small scale and how they affect earthquake occurrence at the large scale.
- Session 5: from small to large scales: how to account for largely unresolved small scale processes in seismicity dynamics?
- Session 6: Quality of earthquake catalogues and uncertainties in seismicity modelling.
- Session 7: Measuring and modelling seismic responses to stress changes.
- Session 8: Statistical volcano seismology.



### Invited Speakers will include

Jean-Paul Ampuero, CalTech, US  
Pascal Bernard, IPGP, Paris, FR  
Michel Bouchon, LGIT, OSUG, FR  
Jim Dieterich, UC Riverside, US  
Joan Gomberg, USGS, Seattle, US  
Jean-Robert Grasso, LGIT, OSUG, FR  
Sebastian Hainzl, University Potsdam, DE  
Agnès Helmstetter, CNRS, Observatoire de Grenoble, FR  
David Marsan, Université Savoie, FR

Andy Michael, USGS, Menlo Park, US  
Yosi Ogata, Institute of Statistical Mathematics, JP  
Zhigang Peng, Georgia Institute of Technology, US  
Sandy Steacy, University of Ulster, UK  
Danijel Schorlemmer, USC, US  
Ross Stein, USGS, Menlo Park, US  
John Walsh, University College Dublin, IE  
Stefan Wiemer, ETHZ, Zurich, CH  
Alon Ziv, Ben-Gurion Uni. of the Negev, IL

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**Closing Date for Application 22 June 2008**

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