Universiteit Utrecht

Faculty of Geosciences

# *autumn* FEST

# Friday Earth Sciences Talk

*drinks afterwards*

## Dr. Rob Govers

*Associate Professor,*
Tectonophysics

**11-11-2016, 16h-17h,**
**V.J. Koningsberger - Cosmos**

## The signature of the earthquake cycle at subduction zones

Recent megathrust events taught us a lot about the dominant physical processes, particularly about re-locking, afterslip, and mantle relaxation. The observations show complex spatial and temporal patterns in crustal deformation and displacement, and significant differences between different margins. The main question is what causes these differences.

I use geodynamic models to isolate the geodetic and geological signature of the megathrust cycle. A global review of pre-, co- and post-seismic geodetic observations, and of their fit to the model predictions, indicates that similar physical processes are active at different margins, and differences in the observations are controlled by their stage in the earthquake cycle.

The model results provide a possible explanation for puzzling observations, of normal faulting aftershocks and tensile cracking of the overriding plate. The ratio of the loading and relaxation time scales exerts a critical control on post-seismic relaxation. The Tohoku and Sumatra margins therefore undergo a protracted post-seismic relaxation period. The Chilean margin has a short post-seismic relaxation period even if the mantle viscosity is similar to other regions. I find that geodetic observations may deceitfully suggest weak locking of some margins, e.g., the west Alaska margin.

FEST committee: **fest.aw@uu.nl**