Christoph Sens-Schonfelder

The time dependency of elastic rock properties

4-5 pm Wed February 20th
Coolbaugh Hall, Room 209

Reception 3-4
GRLA Annex

Abstract: When seismic methods are used to investigate Earth's structure we usually assume that the elastic properties of the subsurface are stationary. An exception are time lapse studies of variations in response to reservoir operations. But also in the natural environment Earth materials form a dynamic system that responds to the constant excitation by tidal forces, seismic waves and pore pressure changes. I will give a short overview of the elastic nonlinearity of heterogeneous Earth's materials and present and a rather simple model for the processes at the origin of the complex mechanical behavior. Focusing on field observations at a particular site in the Atacama desert I will show that insitu observations of seismic velocity changes in response to earthquake shaking and tidal deformation can be used to constrain parameters of the material nonlinearity. Used in simple empirical models we can infer the sensitivity of velocity to static stress changes and the susceptibility to material damage by dynamic shaking. Knowledge of these parameters allows to use observations of wave velocities changes as a tool for remote monitoring of stress and pore pressure changes.

Christoph Sens-Schönfelder obtained a masters degree and PhD in geophysics from the University of Leipzig, Germany with research visits in Reykjavik and Grenoble. Since 2011 he is senior scientist at German Research Centre for Geosciences in Potsdam.
His research is focused on the observation and interpretation of temporal variations of the elastic properties of Earth materials. This is facilitated by the use of the ambient seismic field with interferometric methods and scattering theory. He was awarded a Feodor Lynen research scholarship from the Alexander von Humboldt Stiftung for a research visit at the Colorado School of Mines in 2019.