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Attenuation tomography in the rupture area of the 2010 M8.8 Maule, Chile, earthquake

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In recent years several seismological studies have developed a detailed image of the megathrust interface between the subducting Nazca plate and and the overriding South American plate in the rupture area of the 2010 M8.8 Maule, Chile, earthquake. Hicks et al. (2014) have published a high resolution 3D seismic tomography model and characterised the different regimes acting along the interface based on their seismic properties. A more detailed study by Moreno et al. (2014) showed that the seismic Vp/Vs ratio and inter-seismic locking determined from GPS measurements are correlated. Together these observations open up the possibility to map the rupture potential of possible future earthquakes, although the underlying processes are yet not fully understood and a more in depth analysis of other physical properties is needed.
3D seismic attenuation structure as well as seismic stress-drop distribution based on the aftershock seismicity are providing independent data sets to better constrain the physical processes acting along the subduction zone interface. As seismic attenuation is particularly sensitive to fluid saturation it opens up the possibility to study more directly the influence of fluids on aftershock activity as compared to standard velocity tomography studies. Based on our event catalogue of approximately 30,000 aftershocks we are currently selecting the most appropriate data set for the staggered 3D attenuation tomography. The inverted attenuation model will then be used to calculate seismic stress drop values for the complete aftershock catalogue. We will present our preliminary 3D attenuation model together with our stress drop estimates and compare our finding to the 3D velocity structure and slip distribution.