Session 11

Mantle degassing and seismic hazard from "cold" subduction in Europe

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Independent recent observations consistently indicate that active collisional orogens could represent an important and hitherto underestimated contribution to the global carbon cycle, not only through volcanism, but also through non-volcanic CO2 degassing from the crust and the upper mantle. At intermediate depths, dehydration reactions can be fast enough to trigger earthquakes. If of high magnitude such as those occurring in the Vrancea region (SE Romania), they generate relevant seismic hazard over quite large areas, with a symmetry that may hamper the current use of asymmetric attenuation relations. We expect that the sources of these earthquakes have a significant volumetric component that can be reliably detected by full moment tensor inversion algorithms, like INPAR, hence supplying an independent proof of the presence of degassing at depth. Earthquakes in cold-subduction settings allow migration of carbon-rich melts and CO2 release from the mantle to the surface favoured by pre-existing deep faults and carbo-fracturing of the host rocks. Decarbonation reactions and/or melting of carbonate-rich lithologies from a subducted lithosphere may explain anomalously high CO2 emissions in different orogenic regions. We seek relevant contributions such as integrated petrological, geochemical, and geophysical models together with geophysical imaging of the Earth mantle that will help elucidate the origin of carbon emissions in active collisional orogens and help quantify their impact on the global climate.