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COOL: Crust of the Oman Ophiolite and its Lithosphere – a passive seismic experiment

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Plate tectonics has established a framework for geoscientists to understand most geologic/tectonic processes that shaped our present-day Earth. 'Obduction', the emplacement of young, dense oceanic lithosphere (ophiolites) on top of older lighter continental lithosphere remains, however, a rather odd phenomenon. Some ophiolites are fundamentally similar to young oceanic crust and it is hence assumed that they were obducted as thrust sheets at the onset of continental subduction in a previously intra-oceanic subduction setting.

The Peri-Arabic obduction corresponded to a spectacular, almost synchronous thrust movement along thousands of km from Turkey to Oman. At the eastern margin of the Arabian plate, the world's largest and best preserved ophiolite was emplaced in only a few My during Upper Cretaceous and is exposed today atop the Oman Mountain range. Although being the best studied ophiolite in the world, rather little is still known about the internal structure of the ophiolite and the Oman Mountains. The dimension of the ophiolite is large enough ($\sim$700 km) to be studied with seismological methods, providing thus a rare setting to investigate oceanic crust on land without ocean bottom installations.

We have deployed a network of 40 broadband seismometers across the Oman Mountains in Oct/Nov 2013 for passive seismic registration for a duration of ca. 15 months. The network is complemented by 10 permanent stations in the area operated by the Earthquake Monitoring Center in Oman.
Aims of the project include:
- Seismological imaging of the geometry and internal properties of obducted oceanic, and its underlying continental lithosphere.
- Regional tomographic velocity models will provide constraints on geodynamic processes that led to large scale obduction.
- Investigating the "quiet" Makran subduction zone for local seismicity will improve understanding of seismic hazard on the eastern Arabian plate.