



Subduction of an aseismic ridge under an active margin: 1) topographic evolution and effects of slab density.

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At the western continental margin of South America the Andean mountain range has formed as a response to subduction of oceanic lithosphere beneath the South American Plate. The Nazca Ridge is located on the subducting oceanic lithosphere. This aseismic rock body has a mainly gabbroic composition and is thought to have been sourced from the Easter Island hot spot.

At about 15° south the Nazca Ridge enters the subduction zone. In this region we can observe prominent geological and geophysical features such as a shallower deep sea trench, a volcanic gap and more active seismicity. Assuming that ridge subduction is responsible for the development of these features we used a coupled petrological-thermomechanical computer code I2VIS based on finite-differences and marker-in-cell techniques to perform 2-D numerical experiments simulating this process. Furthermore we studied the impact of changes in the lithospheric density in order to understand how this particular parameter affects geodynamics of subduction zones.

After the quantification of our modelling results we are able to conclude that:

1. The subduction of an aseismic ridge affects geodynamics in terms of flattening slab angles, a delayed magma production and a delayed extension in the overriding plate. Furthermore, ridge subduction seems to have a systematic impact on the topographic development of the overriding plate in terms of producing a higher topography for a definitive time interval at a location which is slightly shifted with respect to the original position of the ridge itself.

2. A higher lithospheric density of the subducting plate results in steeper subduction angles, larger amount of magma produced within the mantle wedge, lesser initial shortening and stronger subsequent extension of the overriding plate resulting in low or negative topography (due to the slab pull).

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