Subduction of aseismic ridges at the Andean margin: a major factor in the sedimentological and structural evolution of forearc basins

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The coast of northern Chile comprises Mesozoic magmatic rocks and Cenozoic - Recent shallow marine and alluvial fan/fan-delta sediments. The structure, landform development and sedimentary response of the coast between Antofagasta in the south and Arica (600 km to the north) have been investigated to evaluate the influence of Nazca plate subduction on sea level changes over Quaternary to Recent times. At Arica the coastal range is in net extension, characterised by extensional normal faulting and subsidence, in common with much of Chile.
South of Arica uplift is recorded by marine terrace development and incision of alluvial fan surfaces; uplift reaches a maximum south of Iquique. The boundary between regions in net subsidence and net uplift is marked by north-facing neotectonic normal fault scarps. Variations in apparent uplift and subsidence are consistent with recently published oceanographic records on relative sea level changes over a 30 year period. Our data suggest that these regionally variable patterns of coastal uplift along the north Chilean coast are controlled by the subduction of an aseismic ridge, which overprints the effect of eustatic sea level fluctuations.
Subduction of oceanic plate heterogeneities may provide a mechanism for producing cyclicity in sedimentary sequences at a frequency equal to or higher than glacio-eustacy in fore-arc and possibly back-arc sedimentary basins. These sequences will be neither of global extent nor of global synchroneity.