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Prominent submarine mass wasting structures at the Southern Central Chilean continental margin: the Roca Slide

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Offshore Southern Central Chile (35°S-42°S), morphological expressions of voluminous submarine mass-wasting events are documented in swath bathymetry data. The variety in shape, water depth, runout direction and volume of these landslides points to a number of different processes at different phases of the evolution of the Chilean continental margin.

A blocky Olistolith deposited in the Chile Trench, probably of Holocene age was targeted during RRS JAMES COOK Cruise JC23. The size of this feature, which was termed Roca Slide, as well as properties such as the very steep and high headscarp, the large runout distance and the cohesive nature of the slumped masses make it interesting in terms of the geotechnical issue of the continental lower slope stability and tsunami hazard.

These questions are adressed by a morphometrical description of the Roca Slide as well as calculations of the volumes of both the missing and the dumped slump masses. Single channel seimic reflection profiles are used to elucidate the internal structure. Gravity core samples were retrieved in order to better date the mass wasting event, and relate it to the subduction dynamics and climate history of this particular segment of the Chilean continental margin. In particular, we discuss ideas regarding the nature of the possible weak layer which formed the gliding plane of this slump.

Another, much larger and apparently older structure is observed at the middle continental slope. This arcuate depression is interpreted as a huge rotational slide. Remarkably, there is no present-day surface expression of slumped masses visible in the sediment-filled trench. However, a distinct change in the reflection character of the trench fill, observed in seismic reflection profiles across the trench may be explained by the sudden input of a very large sediment volume, possibly due to the slump event which caused the described mid-slope depression.