Sediment characteristics of a fjord transect across the Southern Andes at 53°S

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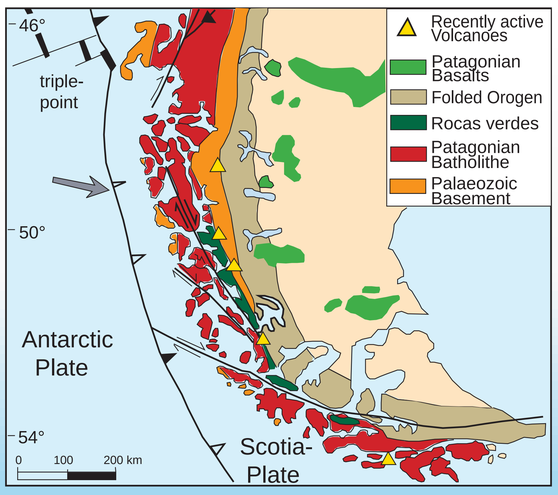

Fig. 1: The area of investigation in the southernmost Andes and its relationsship to the major lithological units (see: Mapa Geologico de Chile 1:10000000).

Introduction

The Southern Andes are characterized by most variable denudation rates which depend on ice coverage, climate, topography and vegetation. Controlled by the erosion process and the terrestrial and aquatic bioproductivity, sediments have most variable compositions (e.g. Silva & Prego, 2002). This study concentrates on a W-E fjord transect across the Andes at 52-53°S, from the proglacial lake Seno Skyring (Figs. 1,2,3) to the island zone of the west coast. Late Glacial to Holocene sediment cores from these fjord basins together with sediment echo sounding profiles are used to constrain sedimentation rates, sediment flux and denudation rates. Well dated tephra layers from this region (Kilian et. al., 2003) and AMS ^{14}C ages of marine shells and plant marco remnants are used for chronological contrail. In the Late Glacial sediment pathways along the fjord system have been more or less open and led to a significant mass transfer towards the eastern foreland and also the continental margin and deep sea. First results indicate that the sediment transport became more restricted at the Late Glacial to Holocene transition, leaving often nearly closed systems for denudation and sediment deposition in intra-Andean fjord basins.

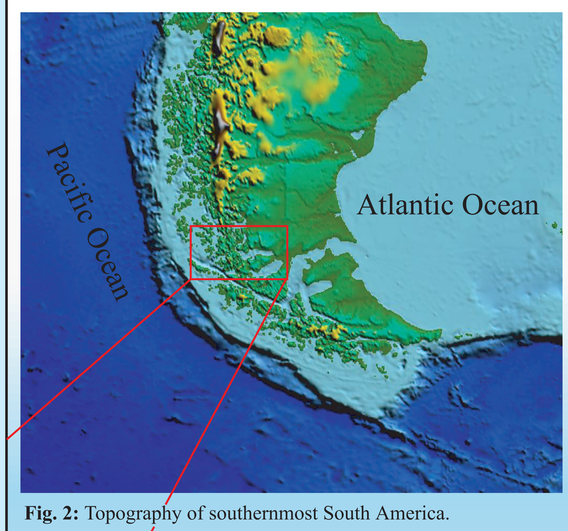

Fig. 2: Topography of southernmost South America.

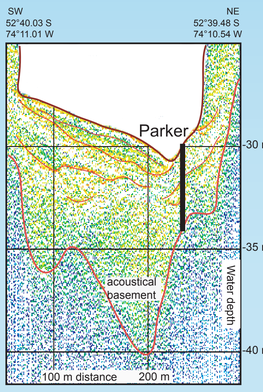

Fig. 8a: Parker core position in an echosounding profile.

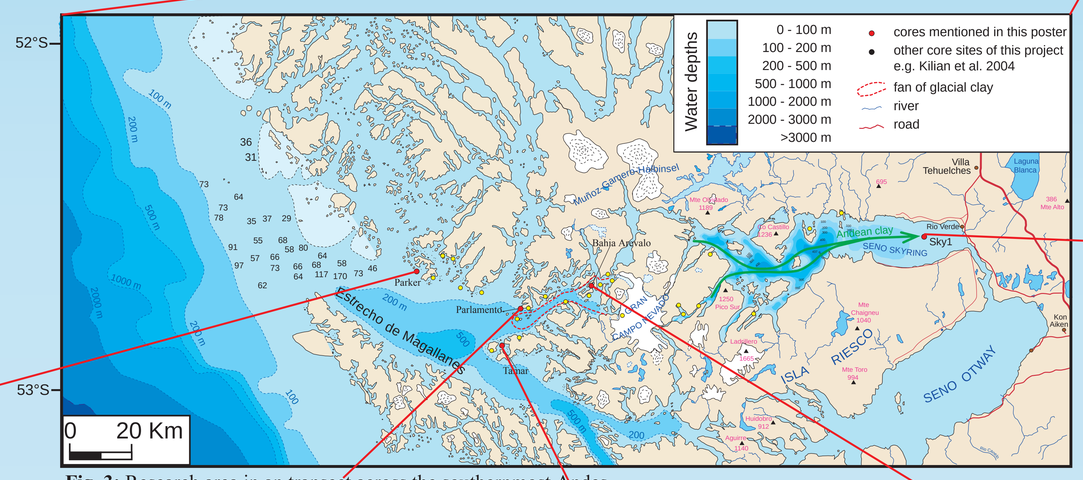

Fig. 3: Research area in an transect across the southernmost Andes.

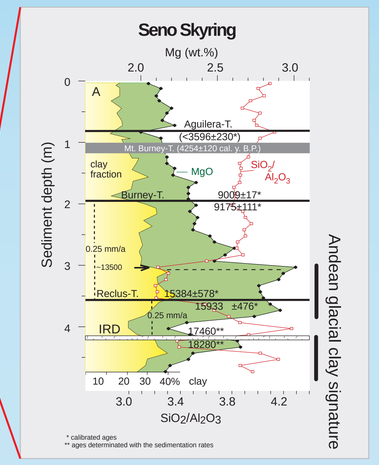

Fig. 4: Chemical pattern and relative clay content of a sediment core. Changes in the contribution Andean chlorite-rich clay since Late the Glacial are evident.

Results

The chemical pattern of a five meter long sediment core from eastern Seno Skyring indicate a systematically decreasing transport of chlorite-rich sediment components (decreasing Mg and increasing SiO_2/Al_2O_3 ratios; (Fig.4) from mafic rock bodies of the central and glaciated part of the mountain range (Fig. 3) during the last 18.000 cal years B.P. (Kilian et al. in press). The sediment core sections has been recovered also from the western Island zone (Tamar and Parker) which are characterized by very low contents of biogenic material (TOC < 0.5 wt.% and CaCO3 < 0.5 wt%; Figs. 5-8, basal sections). Further age determinations and chemical analysis, which are in progress, should help to determine the sediment path ways from the glaciated Gran Campo Nevado towards the west and also to calculate the Late Glacial sediment accumulation rates. Outside of the recent glacier derived debris-fan (Fig. 3), Holocene sediments from small basins in-between the western island zone and fjord inlets show very high contents of organic carbon (5-15 wt %, in the upper part of Parlamento, Tamar, Parker cores, Fig. 6,7,8). Associated with increasing salinity, the sediments recovered near to the western entrance of the Strait of Magellanes show a strong increase in biogenic carbonate (up to 25% $CaCO_3$, Parker, Fig. 8), indicating high marine bioproductivity and also low Holocene sedimentation rates of terrigeneous components.

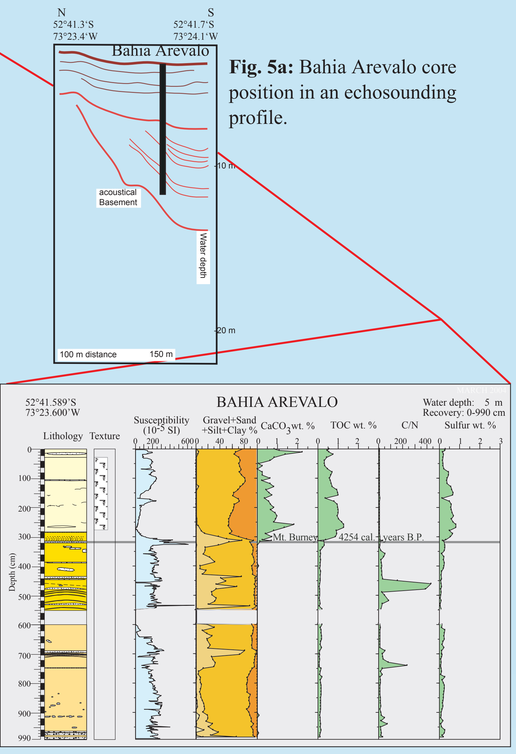

Fig. 5a: Bahia Arevalo core position in an echosounding profile.

Fig. 5b: Chemical and physical properties of a core, taken in the Bahia Arevalo bay near to Gran Campo Nevado Ice Cap.

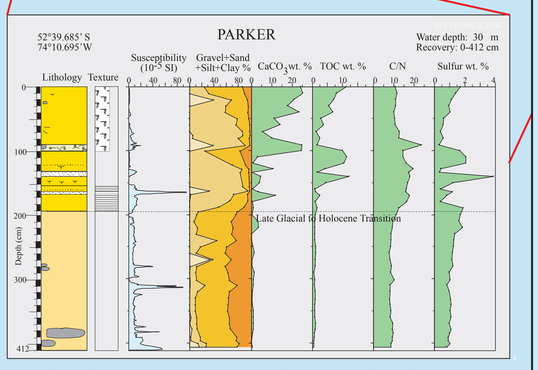

Fig. 8b: Chemical and physical characteristics of a sediment core taken in an marine environment near to Parker Island.

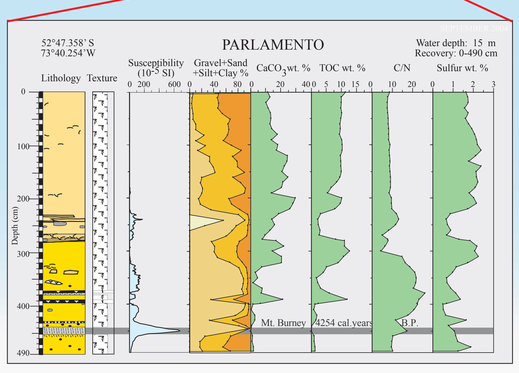

Fig. 7: Chemical and physical characteristics of a sediment core taken in an marine environment near to Parlamento Island.

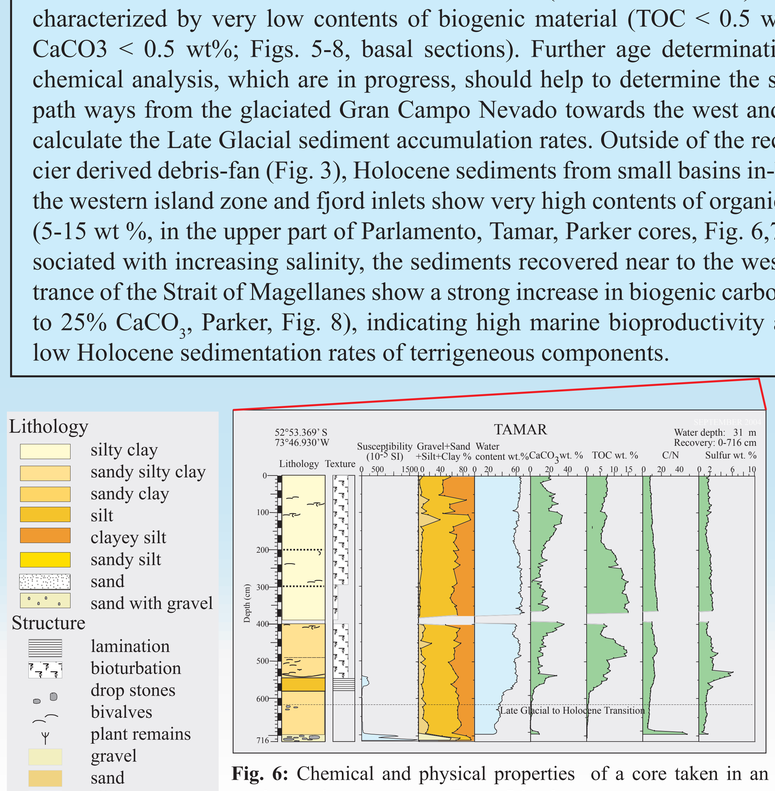

Fig. 6: Chemical and physical properties of a core taken in an marine enviroment near to Tamar Island.

References

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