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Interaction between intermediate/deep-water masses and the sedimentation in a mid-slope canyon (off Argentina/Uruguay, 38°S) during the last 25 kyr

Warratz, G.[1], Henrich, R.[1], Voigt, I.[1], Chiessi, C.M.[2], Schwenk, T.[1], Krastel, S.[3]

[1]MARUM – Center for Marine Environmental Sciences and Faculty of Geosciences, University of Bremen, Bremen, Germany, warratz@uni-bremen.de
[2]School of Arts, Sciences and Humanities, University of São Paulo, São Paulo, Brazil
[3]Institute of Geosciences, University of Kiel, Kiel, Germany

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The understanding of submarine canyons as a major player shaping continental margins and guiding sediment transport from shallow to deep waters is usually lacking and requires more integrated research. Especially decoding the interaction between contour currents and canyon deposition is crucial to utilize sediments from the canyon floor as paleo(oceanographic) archive. The Mar del Plata Canyon is well suited, since the canyon head is situated at a mid-slope position. Its downslope track crosses all intermediate and deep water masses shaping the continental slope off Argentina (Fig. 1). Despite its location close to the mouth of the La Plata River (Argentina/Uruguay, SW Atlantic), the canyon has no direct connection neither to the shelf nor to the La Plata River. The sedimentary record from three gravity cores taken during RV Meteor Cruise M78/3 (2009) inside the canyon notably demonstrates a co-existence of periodic turbiditic intercalations as well as contouritic silty sediments delivered from northward flowing Antarctic Intermediate Water (AAIW).

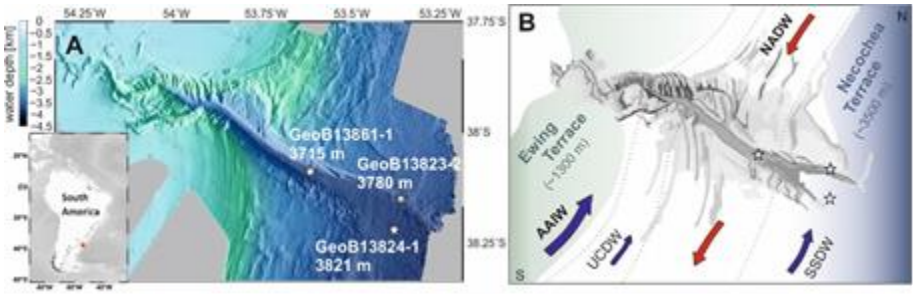

Figure 1: A: Bathymetric map of the Mar del Plata Canyon off Argentina. B: Schematic illustration of the water masses influencing the slope around the canyon (AAIW - Antarctic Intermediate Water, UCDW - Upper Circumpolar Water, NADW - North Atlantic Deep Water, SSDW - southern sourced Deep Waters). White stars show the location of the three sediment cores investigated in this study.

Despite the influence of the corrosive southern sourced Deep Waters (SSDW) deeper than 3000 m water depth we were able to produce a high temporal resolution Holocene to last Glacial record using 8 AMS-^{14}C ages based on marine carbonates. Ca/Fe XRF down core records are used to stratigraphically correlate the sediment cores collected along the canyon axis. For identification of down- and along-slope sedimentation processes a spectrum of sedimentological approaches are used, e.g. X-radiographs, elemental ratios, magnetic susceptibility and grain size distribution. For the latter, we focus on the terrigenous sortable silt (SS) mean grain size and percentage of the background sediments to assess relative bottom current strength.

In general, SS values support magnetic susceptibility and Zr/Al down core ratios. Comparing the results along the canyon axis, at the more proximal canyon position (GeoB13861-1, Fig. 1) relatively higher (lower) SS values and Zr/Al ratios occur during the last deglaciation (Holocene) and are accompanied by several turbidite intercalations. It indicates a turbidite initiation due to stronger AAIW flow and thus, enhanced sediment mobilization at the southern flank of the canyon head as a possible source area. The temporal distribution of the turbidites indicates two pulses, i. e. last Last Glacial Maximum (LGM) and the last deglaciation. No turbidites are present in the Holocene sections. Along the thalweg the thickness of the turbidites decreases downward. During the LGM, they are identified on the northern canyon levee in form of over-spill turbidites (GeoB13823-2, Fig. 1). Regarding lower (higher) SS values and Zr/Al ratios during last deglaciation (Holocene), we support a supplementary water mass influence at the distal canyon position. Hence, the SSDW controls the sedimentation on the Necochea Terrace shifting the suspended sediment cloud in flow direction.