

Shelfal sediment transport by undercurrents forces turbidity current activity during high sea level, Chile continental margin

Anne Bernhardt (1), Dierk Hebbeln (2), Marcus Regenberg (3), Andreas Lückge (4), and Manfred. R. Strecker (1)

(1) University of Potsdam, Geological and Environmental Sciences, Potsdam, Germany (anne.bernhardt@geo.uni-potsdam.de), (2) MARUM-Center for Marine Environmental Sciences, University of Bremen, Germany, (3) Institute of Geosciences, Christian-Albrechts-Universität, Kiel, Germany, (4) Federal Institute for Geosciences and Natural Resources, Hannover, Germany

Understanding the links between terrigenous sediment supply and marine transport and depositional processes along tectonically active margins is essential to decipher turbidite successions as potential archives of climatic and seismic forcings and to comprehend timing and quantity of marine clastic deposition. Sequence stratigraphic models predict coarse-grained terrigenous sediment delivery to deep-marine sites mainly during sea-level fall and lowstand. Marine clastic deposition during periods of transgression and highstand has been attributed to the continued geomorphic connectivity between terrestrial sediment sources and marine sinks (e.g., rivers connected to submarine canyons) often facilitated by narrow shelves, high sediment supply causing delta migration to the shelf edge, and/or abrupt increases in sediment supply due to climatic variability or catastrophic events.

To decipher the controls on Holocene highstand turbidite deposition, we analyzed twelve sediment cores of spatially disparate, coeval Holocene turbidite systems along the Chile margin (29-40°S) with changing climatic and geomorphic characteristics but uniform changes of sea level. Intraslope basins in north-central Chile (29-33°S) offshore a narrow to absent shelf record a shut-off of turbidite activity during the Holocene. In contrast, core sites in south-central Chile (36-40°S) offshore a wide continental shelf have repeatedly experienced turbidite deposition during sea-level highstand conditions, even though most of the depocenters are not connected via canyons to sediment sources. The interplay of stable high sediment supply related to strong onshore precipitation in combination with a wide shelf, over which undercurrents move sediment towards the shelf edge, appears to control Holocene turbidite sedimentation and sediment export to the deep sea.