Abstract:

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Seismic stratigraphy of the Southeast Pacific: Identification of bottom-current footprints in the pelagic sediments

The Antarctic Circumpolar Current (ACC) is the largest ocean-current on our planet responsible for exchanging water masses between the three world oceans Pacific, Atlantic and the Indian Ocean. As this transport of water masses and heat affects our climate directly, changes in the global ocean circulation have significant influence on our climate. Hence a reconstruction of altering flow patterns e.g. due to tectonic events can help to understand past climate changes. These changes in flow patterns are documented in sedimentary features and distribution. Unfortunately, empirical data about the dynamics of the ACC up to now mostly originates from measurements in the Indian Sector of the Southern Ocean, Scotia Sea and South of Australia. To complete our picture, two sample regions where chosen to document the influence of the ACC on sedimentation processes. The first is situated near the East Pacific Rise (EPR, 44,5° S) north of the ACC, the second one lies south of the ACC in the Bellingshausen Abyssal Plane (BAP, 60,75° S). High-resolution multichannel seismic reflection profiles are used to analyze the sedimentary structures of these regions. A first data analysis reveals a number of contourite drifts near the EPR while in the BAP mostly pelagic sedimentation prevails. Furthermore, the deposits near the EPR are thinner than in the BAP, the sedimentary load is three times as much as in the EPR region. The missing contourite drifts in the BAP are a sign of little bottom current activity. The contourite drifts near the EPR indicate strong bottom currents suggesting a strong influence of deep water within the ACC. The larger sediment load in the BAP probably comes from the difference in crustal age. With similar sedimentation rates between 7 and 12 mm/a the BAP region has a sediment load of 475 meters, the EPR region the sediment load is between 110 and 160 meters.