MOTIVATION

The South Pacific (150°-70°W) has been identified as a primary site of mode/intermediate water formation. At day, it is widely accepted the major role that mode/intermediate water has in the climate regulation, where the amount and type of mode/intermediate water formed in the Southern Hemisphere affects climate through heat transport/transfer, sequestering atmospheric gases and/or influencing the physical and chemical properties of the upper ocean and equatorial thermocline.

BACKGROUND

The Subantarctic Mode water (SAMW) is a homogenous layer with a at 26.5 -27.1 extending from near to surface to depths of more than 600 m on the equatorward side of the Subantarctic Front (SAF). The coldest and fresher (denser) variety of SAMW (Antarctic Intermediate Water, AAIW) characterized by a subsurface salinity minimum between 600-1100 m is formed in the southeast Pacific being exported to the Atlantic and the Subtropical gyre of the South Pacific (Hanawa and Talley 2001). As a consequence of their formation process SAMW and AAIW can sequester significant quantities of atmospheric gases (Sainine et al., 2004).

CORE-OP

PROXY ASSESSMENT

The foraminiferal Mg/Ca signal is affected by calcite dissolution, which causes the selective removal of Mg2+ from the biogenic calcite, lowers Mg/Ca and decreases SST/Mg/Ca (Regenberg et al., 2006; Dekens et al., 2002). In order to evaluate the reliability of the South Pacific Mg/Ca signal for paleotemperature reconstructions, we defined the effect of the calcite saturation state (CSH, Al2CO3(-1) = 0) on foraminiferal Mg/Ca for selected planktonic species. The total Mg/Ca values preserved in the foraminiferal calcite from the core top samples ranged from ~2 to 3.3 mmol/mol. Notably, only G. truncatuloides Mg/Ca ratios with increasing water depth.

DOWN-CORE RECONSTRUCTION

TEMPERATURE

The sea surface temperature record (G. bulloides) from the East Pacific Rise: 0213-59-2 (3164 m) ranged from ~12° to ~8°C similar in absolute values with other record comparable southern latitudes: MD92-2120 (1210 m; Pahnke et al., 2003) and DOP 1123 (3290 m; Greaves, 2008) from Chatham Rise; DOP Site 1172A from East Tasman Rise (2600 m; Nürnberg & Groeneveld, 2006), RC11-120 from the subantarctic Indian Ocean (3135 m; Mashiotta et al., 1999). In the other hand, the subsurface temperatures record derived from G. inflata (green) and G. truncatuloides (blue) ranged from 7° to 11°C and 5 to 8°C, respectively.

SALINITY

A general scenario of glacial low-salinity versus interglacial high-salinity conditions can be observed along the water column in comparison with modern values. Both, G. bulloides (red circles) and G. inflata (green squares) show a maximum in salinity in MIS 5 and two peaks of low salinity during MIS 2 and MIS 6; in G. truncatuloides (blue triangles) a low salinity peak in MIS 6 is not clearly defined.

CONCLUSION

Our results with an increase in the production of AAIW during glacial is consistent with some model simulations (Liu et al., 2002) and observations in the Eastern South Pacific (Muratli et al., 2010). However, this results are not consistent with a glacial decrease in production of AAIW inferred from sediments records recovered in the western Pacific.

The difference in severity during MIS 2 (colder/fresher) and MIS 6 (warmer/saltier) recorded in our deeper monitors suggest a relevant change in advection process and/or formation areas of the water feeding the middle depth circulation in the South Pacific.

REFERENCES