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Multiparametric analysis of water masses across Drake Passage during austral summer 2006

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A multiparametric analysis is applied on the ANT XXIII-3 expedition data to determine the spreading and mixing of water masses across Drake Passage during January-February 2006, focusing our interest on the flow of the deep water masses. The method utilizes all information from the hydrographical data set including temperature, salinity, dissolved oxygen, nutrients, and^{3}He fields. Mixing proportions are quantified along both the southward and northward journeys between the tip of South America and the Antarctic Peninsula. The method is sensitive enough to detect a marked variability of the flow pathway of the Circumpolar Deep Waters, the Southeast Pacific Deep Waters and the Weddell Sea Deep Waters at the intersection of the Shackleton Fracture Zone (SFZ) and the West Scotia Ridge (WSR) between the outward and inward journeys. Indeed seamounts of the SFZ and off the southern flank of the WSR probably induce a strong sporadic perturbation in the flow field preventing a normal vertical stacking of water masses as it was the case during the outward journey. An enhanced δ^3He signature is confined to north of the Polar Front between 55.5˚S and 56.5˚S in the 1500-2200 m depth range. It clearly indicates the signature of the core of the Southeast Pacific Deep Slope Waters. This high δ^3He signal was observed very close to the South American slope during the WOCE A21 expedition in 1990. During the ANT XXIII-3 expedition, the SPDSW followed an entry pathway in the ACC more detached from the continental slope of South America.