Abstract View

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Mass, Heat, Salt and Nutrient Fluxes in the South Pacific Ocean

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ABSTRACT

An inverse method has been applied to the *Scorpio* sections spanning the subtropical gyre of the South Pacific. In addition to constraints upon geostrophic fluxes of mass and salt, constraints were written for silica, oxygen and "PO", and the Ekman fluxes and divergence were accounted for explicitly. Nutrient constraints contribute significantly to the system information with oxygen containing information independent of "PO". Attention is focussed on zonally integrated quantities that are insensitive to differences in modeling assumptions. Overall interior flows are dominated by an equatorward flux of Bottom Water (12×10^9 kg s^{-1}), a poleward return flow at mid-depths, equatorward flow of Circumpolar Intermediate Water, and a convergence of surface waters. The zonal average vertical velocity appears to be everywhere downward with the Bottom Water entraining fluid from above. The net meridional fluxes of silica, phosphate, oxygen and

water are indistinguishable from zero. Production/consumption of the nutrients and oxygen as functions of depth are biologically and chemically reasonable. As a consequence of the "multi-cellular" nature of the flows the meridional beat flux across both sections is very small, typically less than 10% of the North Atlantic values. The best estimate shows weak poleward heat fluxes at 28 and 43°S, but both are formally indistinguishable from zero. Bulk formula results are in conflict with these estimates and their error bars. The models demonstrate, for regions the size of the box defined by the two sections, that three-dimensional advection and biological/chemical processes are adequate to account for the observed property distributions, with interior mixingg at or below the noise level

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