A LAGRANGIAN ANALYSIS OF VARIABILITY IN THE EQUATORIAL UNDERCURRENT

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Method

A Lagrangian framework, the Connectivity Modelling System (CMS, Paris et al. (2013)), is applied to an eddy resolving (1/12°) ocean simulation, Ocean Forecasting Australia v3 (OFAMv3, Oke et al. (2012)), to identify changes in the EUC source distributions and changes in properties along these pathways. Daily outputs over a period of 17 years is used. Particles are released within the eastern-flowing EUC at 165°E, 170°W and 140°W and backtracked until they reach one of the sections shown in Fig. 1. Temperature, salinity and nutrient concentrations are then interpolated onto the trajectories.

Future Work?

Interpolation of Iron

Iron is a limiting micronutrient for primary productivity in the equatorial Pacific (Martin, 1990). The majority of iron is sourced from the islands in the west Pacific and brought to the east by the EUC. Iron concentrations can be interpolated onto the Lagrangian trajectories. This can then be used to investigate how and why iron concentrations change along circulation pathways and how iron sources in the west Pacific change seasonally and on interannual timescales.

Figure 4. Mean particle position map multiplied by the corresponding nitrate concentration. Vitiaz Strait.

Future Work?

Eddies and biogeochemistry

Eddies play an important role for vertical and horizontal transport of oxygen and nutrients to the eastern tropical Pacific ocean (Mahadevan, 2014). These eddies can trap nutrient rich waters for several months and sustain microorganisms. The eddies off the west coasts in the Equatorial Pacific can be seeded with Lagrangian particles and properties such as nutrients and oxygen can be interrogated onto the trajectories. Primary production within the eddies and impacts on the large scale circulation can be inferred from the changes in these properties along the eddy trajectories.