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Monitoring the regional ocean circulation around New Caledonia from a combination of repeated glider measurements and other in situ observing systems

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The South-West Pacific basin is a key region for the ocean circulation and the climate system of the tropical Pacific. First it is the region where a broad westward-flowing current – the South Equatorial Current – encounters a large number of islands and subdivides into multiple intense zonal jets. Second it is the region where thermocline waters of subtropical origin transit in their route towards the equator, giving to this area a potential role for the low-frequency modulation of El Niño – Southern Oscillation (ENSO).
The main objective of the present poster is to describe a multi-observational program (AltiGlidEx) to monitor two major currents of the South-West Pacific ocean – the East Caledonian Current and the South Caledonian Jet - that flow respectively along the East coast of New Caledonia (167°E-168°E, 22°S-17°S) and South of New Caledonia (27°S-23°S). One expected achievement of the AltiGlidEx program is to provide a platform of multiple in situ observations, including repeated sections with SLOCUM and SPRAY gliders, a long-term subsurface current mooring and dedicated cruises, to ultimately assess the performance of the new AltiKa altimeter – that will be embarked on the SARAL satellite in 2013 – to observe swift boundary currents near the coast of New Caledonia in 2013-2014. This program takes full advantage of the potential of gliders to estimate (i) the geostrophic component of the velocity from the surface down to 1000 meters from hydrological measurements and (ii) the depth-averaged currents during each dive through the GPS-derived dead-reckoning of the vehicle (based on the comparison of the total horizontal distance during each dive that can be computed from the GPS positions of the diving/surfacing points with the one that would be expected in the absence of ocean currents from a flight model, once an adequate flight model is known for the glider).
In this presentation, the preliminary results of the first 3 glider experiments (2010, 2011, 2012) and one-year-long mooring time series of currents (2010-2011) are presented. An intense time variability of the East Caledonian Current intensity is found, from intra-seasonal to seasonal timescales, both in glider and moored current-meter observations. The sensitivity of the high-frequency / small-scale variability filtering for the estimation of geostrophic velocities and transports is discussed, along with the impact of the flight model (dead-reckoning algorithm) used to retrieve depth-averaged currents.