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Water exchange in Bahia Todos Santos, Baja California, Mexico.

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Over a year of current observations (August 2007 to October 2008) on the two entrances to Bahia de Todos Santos has permitted estimating the water exchange between the Bay and the adjacent Ocean. The measurements were made in the locations of the Punta Banda Canyon, 5 km wide and 400 m deep, and along the section between San Miguel Point and Todos Santos Islands, 11 km wide and 50 m maximum depth. An outward mean transport of 12,000 m3/s is obtained by integrating the mean current vertical profile, below 100 m depth, at the center of the Canyon, implying a mean residence time of only two days for the Canyon waters below this depth. This mean outward flow is likely the response to a tidal pumping flux that introduces the same amount of water at supra-inertial frequencies. The deep outward Canyon flow also presents a marked annual cycle, with a spring minimum and a fall maximum, related to stratification variations in the water column. Integrating the currentmeter measurements along the section between San Miguel Point and Todos Santos Islands, a mean inward flow of 6,000 m3/s is observed. This inward flow must be compensated by an outward flow at the Canyon section above 50 m depth, implying a mean residence time of 12 days for the shallow (<50m) areas within the Bay. The variability of this shallow exchange is well correlated to the upwelling index calculated from measured winds in Todos Santos Islands.