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Multiple oscillatory modes of the Argentine Basin

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Recent observations in the Argentine Basin indicate that strong oscillations occur on a time scale of 20-30 days. Here we show that multiple oscillatory modes may be present in the Argentine Basin, reconciling several apparently conflicting estimates of the dominant time scale.

First, results are presented from two statistical techniques applied to a decade of altimetric data. Both the dominant Complex Empirical Orthogonal Functions (CEOFs) and the Principal Oscillation Patterns (POPs) show evidence of distinct rotating modes with periods of 20 and 25 days.

Second, the spectrum of barotropic Rossby basin modes of the Argentine Basin is determined, using a shallow-water model that captures the full bathymetry of the basin. This analysis implies that the 20-day mode detected by recent bottom pressure measurements is a true barotropic mode. However, the 25-day variability, as found in altimeter data, cannot be directly attributed to the excitation of a Rossby basin mode; instead it most likely represents a baroclinic feature.

In a novel approach to extract more information from noisy observations, the dynamically consistent modes are pojected onto the altimeter data. Coherence analysis suggests that several of the basin modes are indeed involved in the observed variability.