Abstract View

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Satellite Observations and Modeling of Meanders in the California Current System off Oregon and Northern California

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ABSTRACT

Infrared satellite images from the west coasts of Oregon and northern California are used to identify meander patterns in sea surface temperature which appear as large cold tongues extending offshore. Two relatively long series of images from 1982 and a few examples from 1980 and 1983 demonstrate the evolution of the cold tongues from an initial variety of scales (60–200 km), to the fastest growing waves (110–130 km) and then finally to tongues with longer wavelengths (400 km). This is observed to occur over periods of about three months in summer and fall when the coastal circulation is composed of a southward surface current over a northward undercurrent. The initial shorter scale features are believed to be excited by the interaction between the mean current and the coastal topography. Baroclinic instability associated with the vertical shear between the surface current and the undercurrent is found to be responsible for the growth of the features observed in the satellite imagery. A nonlinear numerical model is used to simulate the evolution of these features in summer/fall including the initial excitation, the growth of the dominant waves and the red cascade to longer wavelengths. In winter or spring when the current no longer reverses with depth but flows north or south respectively, the meanders have scales of about 100–120 km consistent with the horizontal scale of features in the bottom topography.