



## Abstract View

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# On the Dynamics of Equatorial Subsurface Countercurrents

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### ABSTRACT

The equatorial subsurface countercurrents (SSCC) are strong, steady, geostrophically balanced eastward flows situated below the high speed core of the Equatorial Undercurrent (EUC) at  $\sim 3\text{--}5^\circ\text{N}$  and S. The dynamics of these currents are explored using a continuously stratified, vertically diffusive, linear, steady state ocean model forced by zonal winds with effectively no wind stress curl. Model results agree favorably with observations in that both EUC- and SSCC-like structures are generated.

A diagnosis of the model momentum, vorticity and continuity balances at various depths and latitudes reveals that the SSCC lie outside a vertically diffusive equatorial momentum boundary layer so that both components of velocity are geostrophically balanced. They are, however, located at the poleward of a broader diffusive equatorial vorticity boundary layer. Within this boundary layer, cyclonic vorticity associated with the EUC diffuses to the level of the SSCC where it is balanced by poleward advection of planetary vorticity. Outside this boundary layer, the induced planetary vorticity advection is balanced by vortex stretching that weakens the temperature stratification to generate a thermostad-like structure. The SSCC are in turn geostrophically balanced by the meridional pressure gradients associated with this structure.

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