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Surface Expression of the Circulation and Renewal Processes in the Sea of Marmara

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The Sea of Marmara is a small semi-enclosed basin connected to the Black Sea and the Mediterranean by the Bosphorus and the Dardanelles Straits, respectively. The basin is essentially a two-layer stratified system with two-layer hydraulic controls which determine the exchange with the adjacent basins. The Black Sea water enters the (25 meter deep) upper layer of the Sea of Marmara in the form of a jet issuing from the Bosphorus entrance. A rapid evolution of properties occurs in this entrance region, and seasonal changes in the influxes of water volume and salinity lead to the evolution of surface properties with a seasonal delay time. Satellite observations verify these features and indicate seasonal and shorter term changes in the surface features.

The Marmara basin has three deep sub-basin depressions, separated by sills, and is bounded by a wide shelf region on the southern side. The Mediterranean water enters through the Dardanelles (lower layer) and replenishes the subhalocline waters of the Marmara Sea. The depth of penetration of this influence is a function of the seasonal evolution in the Aegean Sea and of the topographic features in the entrance and shelf regions. The renewal process supplies oxygen to the deep waters which are deficient due to the consumption of oxygen by organic decomposition.