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Seasonal dynamics of Sea Surface Salinity off Panama: the Far Eastern Pacific Fresh Pool

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The freshest surface waters in the tropical Pacific are located near the south-east border of the Eastern Pacific Warm Pool. In this region, the seasonal migration of the Intertropical Convergence Zone (ITCZ) over the American Cordillera gives rise to monsoon-like wind and rain patterns that deeply imprint the seasonal cycle of Sea Surface Salinity (SSS) and Sea Surface Temperature (SST). Using in situ data from voluntary observing ships, we depict the quasi-permanent presence of the Far Eastern Pacific Fresh Pool (FEPFP, with typical SSS lower than 33) mostly confined between 85°W and the Panama coast in December, but which extend westward until 95°W in March. Another major feature of the FEPFP is the strong and permanent signature in SSS fronts near its edge. We investigate the seasonal dynamics of this FEPFP using complementary satellite wind, rain, sea level and in situ oceanic current data at the air-sea interface, along with hydrographic profiles. The FEPFP appears in June in the Panama Bight due to the strong summer rains associated with the northward migration of the ITCZ over Central America. During the second half of the year, the eastward North Equatorial Counter Current keeps it trapped to the coast and strengthens the SSS front on its western edge. During boreal winter, as the ITCZ moves southward, the north-easterly Panama gap wind creates a south-westward jet-like current in its path with a dipole of Ekman pumping/eddies on its flanks. As a result, upwelling in the Panama Bight brings to the surface cold and salty waters which erode the FEPFP on its eastern side while both the jet current and the enhanced South Equatorial Current stretch the FEPFP westward until it nearly disappears in May. Newly available Soil Moisture Ocean Salinity (SMOS) satellite SSS data proves able to capture the main seasonal features of the FEPFP and monitor its spatial extent.