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Hydrographic structure in the Northwest Pacific Ocean in stream function space

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Historical hydrographic data in the northwest Pacific Ocean are projected into baroclinic stream function space parameterized by geopotential height and pressure in order to remove temporal variability associated with mesoscale eddies and meandering fronts such as the Kuroshio and Oyashio. Geopotential height at 100 dbar referenced to 1200 dbar is used to avoid the highly variable near surface layer.
Monthly fields of temperature, salinity, potential density, and potential vorticity reveal the subtropical mode water (STMW) in the subtropical gyre evidenced by a thermostad lying in the upper permanent thermocline and the ventilation associated with the late wintertime formation of the STMW. The potential vorticity of the STMW is shown to be set at the surface during formation and increases slightly with time.
The axis of the subsurface salinity minimum corresponding to the North Pacific Intermediate Water (NPIW) slops downward as the geopotential height increases. Salinity of the NPIW increases with geopotential height within the interfrontal zone between the Kuroshio Extension (KE) and the subarctic front, while high salinity of the NPIW is found just south of the KE which is probably associated with the old NPIW. The surface density within the interfrontal zone in winter is higher than that of the NPIW, which suggests that the NPIW does not outcrop, and the NPIW is not formed by wintertime deep convection.