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On the temperature, salinity, velocity and potential vorticity of a cold filament off the southern tip of Sicily

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Thermal satellite images relative to the years 1997-2000, analyzed by Bignami et al. (2006), identify the sites of higher frequency in cold filaments in the Mediterranean Sea. The main zones in which these phenomena are seen to occur are characterised by the funnelling of strong cold winds by an irregular coastal orography. Intense air-sea interaction in the coastal zone is indeed known to generate a particularly strong input of potential vorticity into the sea, and this in turn gives origin to cold filaments and jets. These propagate offshore, often driven by the local currents. We therefore analyze thermal satellite images and CTD casts from the SYMPLEX 99 cruise (21 October – 6 November 1999), across a cold filament off Cape Passero, in the Sicily Channel. The filament width is $\approx$ 20 km; the thermal anomaly is $\approx$ 2 °C; geostrophic and ADCP velocity data reveal that the filament is moving southward with velocities up to 60 cm s-1. Its salinity field has low values in the centre of the filament (about 37.4 psu at 40-60 m depth), while its temperature has classical outcropping isothermals (about 22-23.5 °C) along the centre of the filament. All this suggests the interest of a generalized analysis of temperature, SST, salinty, density, velocity and potential vorticity along-flow evolution of this filament, seen as a set of potential vorticity stream-tubes. The analysis of these jets' evolution gives further insight into the characteristics of their detachment from the coast, alongflow warming, thickening, time-evolution of their velocity and other offshore properties.