

Fractal fronts in the Mediterranean Sea

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We study the fractal and statistical properties of surface temperature fronts in the Mediterranean Sea. Temperature isolines have been obtained by satellite measurements and refer to quite different climatological conditions. The principal result is that the temperature isolines display the properties of fractal curves with a fractal dimension of about 1.3. This result is consistent with other analyses of turbulent isolines and isosurfaces both in laboratory flows⁽¹⁾ and in geophysical flows (perimeter and surface area of clouds and rain fields⁽²⁾ and perimeter of plancton patches in the sea). It is interesting to recall that drifter trajectories in large and meso-scale ocean flows display the properties of fractal curves, again with a dimension of about 1.3,^(3,4,5) a fact that suggests the existence of a precise relationship between fluid parcel trajectories and temperature isolines. We briefly discuss some of the possible implications of these results and compare our findings with the results of numerical simulations.

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