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Three dimensional Lagrangian structures in the Antarctic Polar Vortex.

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Dynamical systems theory has supported the description of transport processes in fluid dynamics. For understanding trajectory patterns in chaotic advection the geometrical approach by Poincaré seeks for spatial structures that separate regions corresponding to qualitatively different types of trajectories. These structures have been referred to as Lagrangian Coherent Structures (LCS), which typically in geophysical flows are well described under the approach of incompressible 2D flows. Different tools have been used to visualize LCS. In this presentation we use Lagrangian Descriptors [1,2,3,4] (function M) for visualizing 3D Lagrangian structures in the atmosphere, in particular in the Antarctic Polar Vortex. The function M is computed in a fully 3D incompressible flow obtained from data provided by the European Centre for Medium-Range Weather Forecast and it is represented in 2D surfaces. We discuss the findings during the final warming that took place in the spring of 1979 [5].

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