
Barcelona Analysis Seminar 2021–2022

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Online streaming (Zoom). [Click here to join.](#)

Coherent structures in geophysical flows, from observation to theory

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In this talk I will discuss the emergence of large scale long-lived ordered structures in two-dimensional turbulent flows with high Reynolds number. Their formation is connected to the vortex merging through a long range potential leading to a cluster of large scale vortices. There is abundant literature devoted to the explanation of this phenomenon using statistical mechanics. In my presentation, I will analyze another approach directly based on the deterministic PDE model and show the existence of a large family of coherent structures using different analytical tools. The first class can be constructed by a desingularization of the relative equilibria in the point vortex system. The second one is generated by bifurcation from stationary radial shapes. However, the last family deals with time quasi-periodic solutions whose construction is more involved and related to KAM theory in infinite dimensional spaces.