



## UNRAVELING ATMOSPHERIC DYNAMICS THROUGH LAGRANGIAN COHERENT STRUCTURES

Monday, June 12, 2023 | 2 pm

Room 3400  
Atlantic Building



*Speaker*

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### ABSTRACT

Understanding dynamic instabilities and turbulence is of capital importance to improve predictability on many environmental processes. Transport and mixing are key to the dynamics, chemistry, and predictability of the circulation of the stratosphere and upper troposphere including features such as the stratospheric polar vortex (SPV) and the subtropical jets. Our aim is to characterize the atmospheric transport in the stratospheric region following a dynamical system approach in the Lagrangian framework. The stratosphere exhibits large variations on multiple space and time scales, therefore, the study of transport processes there brings into the discussion additional complexities of Lagrangian structures. A full understanding of any transitional fluid flow requires analyzing and computing the underlying coherent structures that govern the dynamics, and the description of atmospheric transport is challenging due to its complex nature.

Following a dynamical system approach, in this talk we show several examples of transport and mixing processes in the stratosphere and upper troposphere where, aided by Lagrangian tools, we identify Lagrangian coherent structures which determine the deformation of the fluid, simplify the atmospheric dynamical description and make possible the characterization of the parcel's evolution and transport pathways in the region.

### BIO

Dr. Jezabel Curbelo is a Ramon y Cajal Research Fellow at the Department of Mathematics at the Universitat Politècnica de Catalunya, and currently visiting the Department of Earth and Planetary Sciences at Harvard University as an Associate. She has previously held positions at various universities, including the Department of Atmospheric and Oceanic Sciences at UCLA and the Laboratoire de Géologie de Lyon. Her PhD thesis (Universidad Autónoma de Madrid, 2014) was awarded with the "2015 Donald L. Turcotte Award" (American Geophysical Union). She has received several awards for her research in geophysical fluid dynamics including the "Leonardo Fellowships 2022" (BBVA Foundation) and the "2021 L'Oréal-UNESCO For Women in Science" award (L'Oréal Spain). Her research focuses on the simulation and modeling of nonlinear fluid processes in the atmosphere and ocean and the analysis of convective motions in planetary mantles. Her webpage is [web.mat.upc.edu/jezabel.curbelo/](http://web.mat.upc.edu/jezabel.curbelo/).

