Clouddrift: Making Lagrangian Data More Accessible to Everyone

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GitHub Repo

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Introduction:

Lagrangian data pose challenges in the Earth sciences due to the diversity of data sets and the complexity of their structures, which complicate data integration and analysis across multiple sources.

The *Clouddrift* library addresses these challenges by offering specialized adapters for selected data sets, converting them into standardized ragged array formats and offering tools for scientific analysis.

Acknowledgements:

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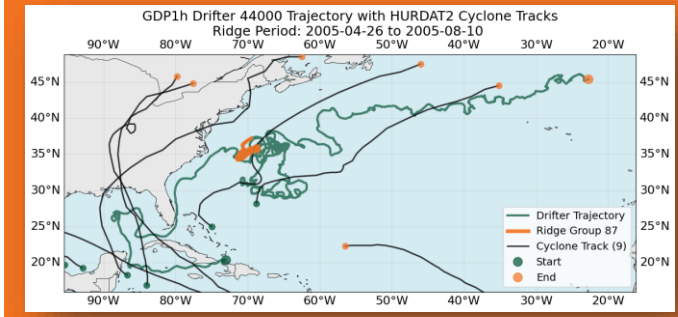

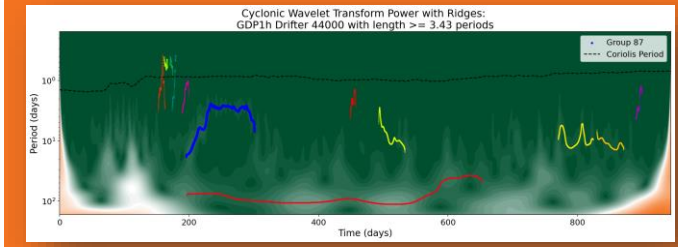

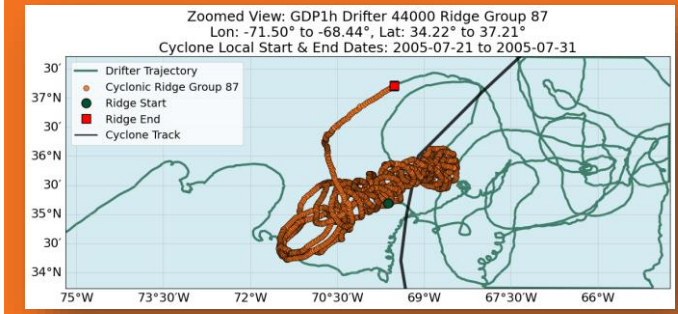

From Data...

Clouddrift offers a growing collection of Lagrangian data sets that include atmospheric cyclones (HURDAT2, IBTrACS), ocean surface drifters, (NOAA GDP, GLAD, ...), ocean subsurface floats (Argo displacements), and ice drift (MOSAiC).

... To Data Analysis

Clouddrift currently supports tools to perform scientific analysis on Lagrangian data. The subjects include:

- Signal Processing
- Wavelet Time-Frequency Analysis
- Kinematics
- Spherical
- Geometry
- Wind Stress to Ocean Velocity Transfer Functions

An Example: Wavelet Ridge Analysis

Performing a time-frequency analysis on Lagrangian data can reveal the physical forces that contribute to the trajectory of the object being tracked.

The top plot shows a GDP hourly drifter trajectory and HURDAT2 cyclones that occurred during the same time. In the plot on the middle, the ridge starting at ~(400,4900) tells us the drifter was in an eddy current during that time. The bottom plot shows the region of the drifter trajectory when the drifter was caught in an eddy.

With plotting the drifter and cyclones together, we can begin to probe the relationship between the cyclone and the eddy the drifter was caught in.