OneArgo-Mat/R: MATLAB and R toolboxes for accessing and visualizing Argo data

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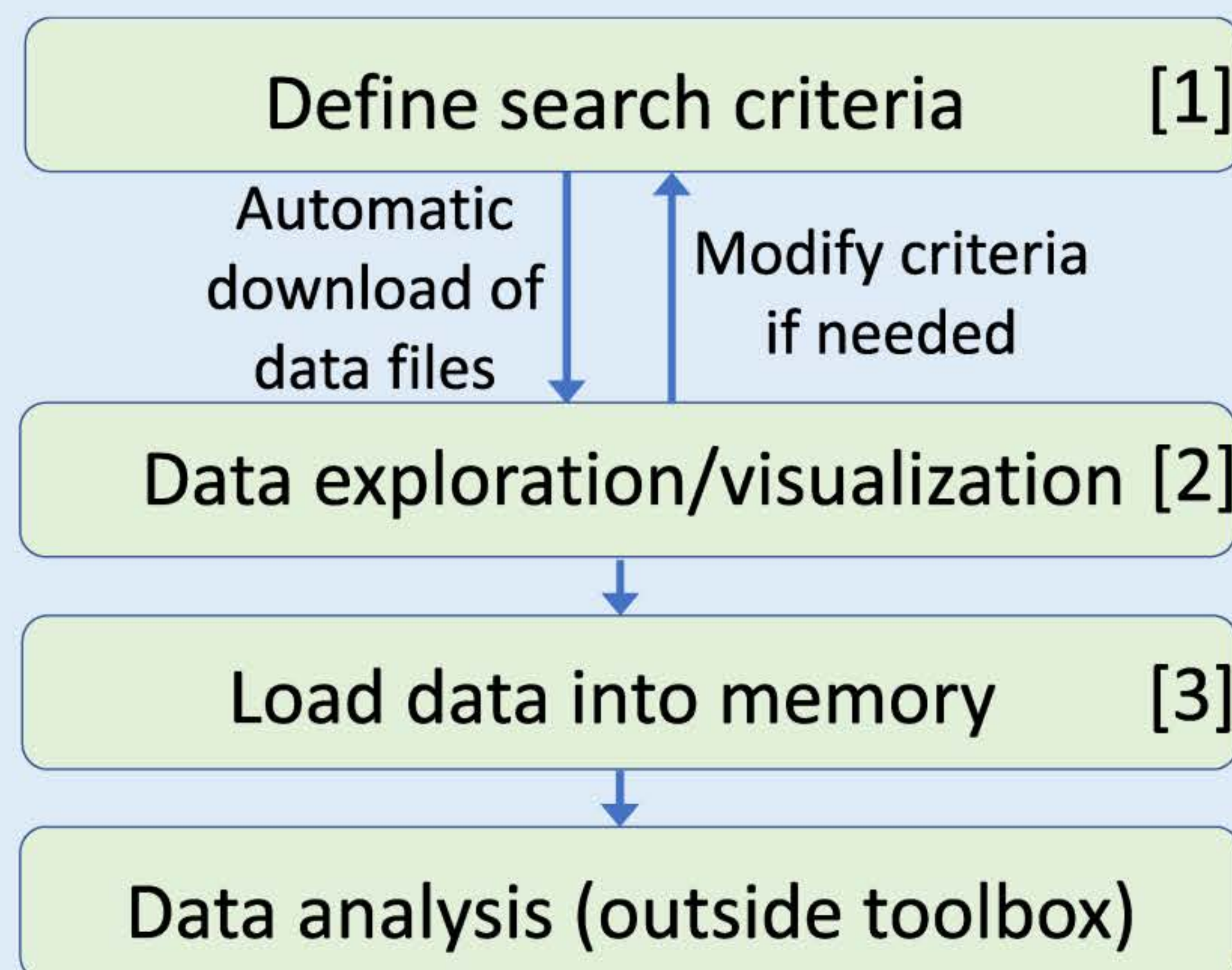
Overview

Argo is an international program coordinating the deployment of autonomous ocean profiling floats.

The OneArgo toolbox makes it easy to find Argo floats that match a variety of user-selected criteria, download data files from the Global Data Assembly Center, visualize the data, and load them for further analysis. It is publicly available in MATLAB and R languages. It is intended to increase user access to all floats from the OneArgo mission (Core, Deep, Biogeochemical).

Workflow

Define search criteria   [1]

Automatic download of data files

Modify criteria if needed

Data exploration/visualization [2]

Load data into memory   [3]

Data analysis (outside toolbox)

Search criteria

Any combination of:

- Geographic area (longitude/latitude)
- Time period
- Ocean basin
- Argo parameter type (TEMP, DOXY etc.)
- Float type (Core/Deep or Biogeochemical)
- Data mode (real-time, adjusted, delayed)
- Maximum profile depth
- Argo Data Assembly Center
- WMO IDs of floats
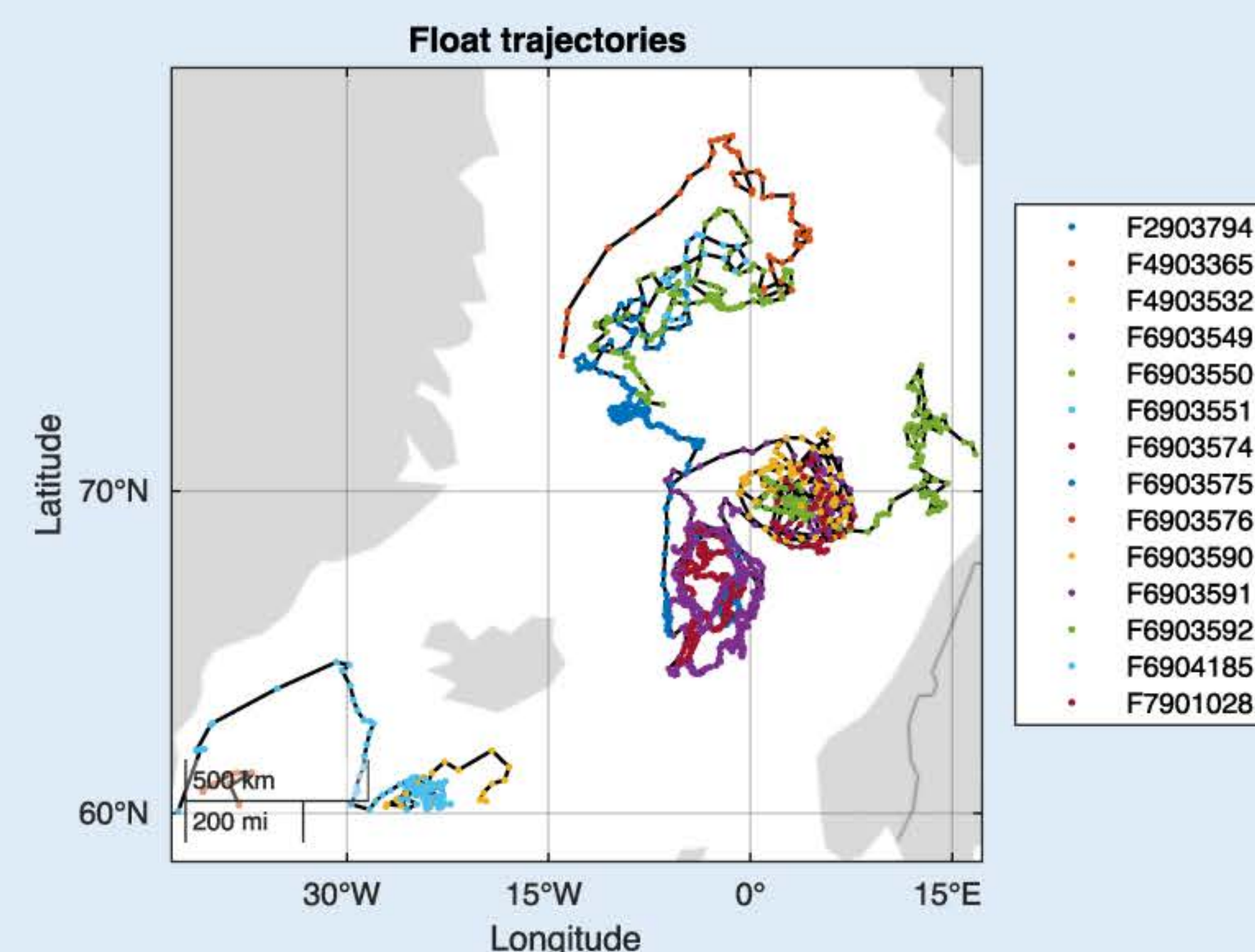- Minimum number of profiles for a given float that match all other criteria

Repositories for the toolbox

MATLAB: https://github.com/NOAA-PMEL/OneArgo-Mat

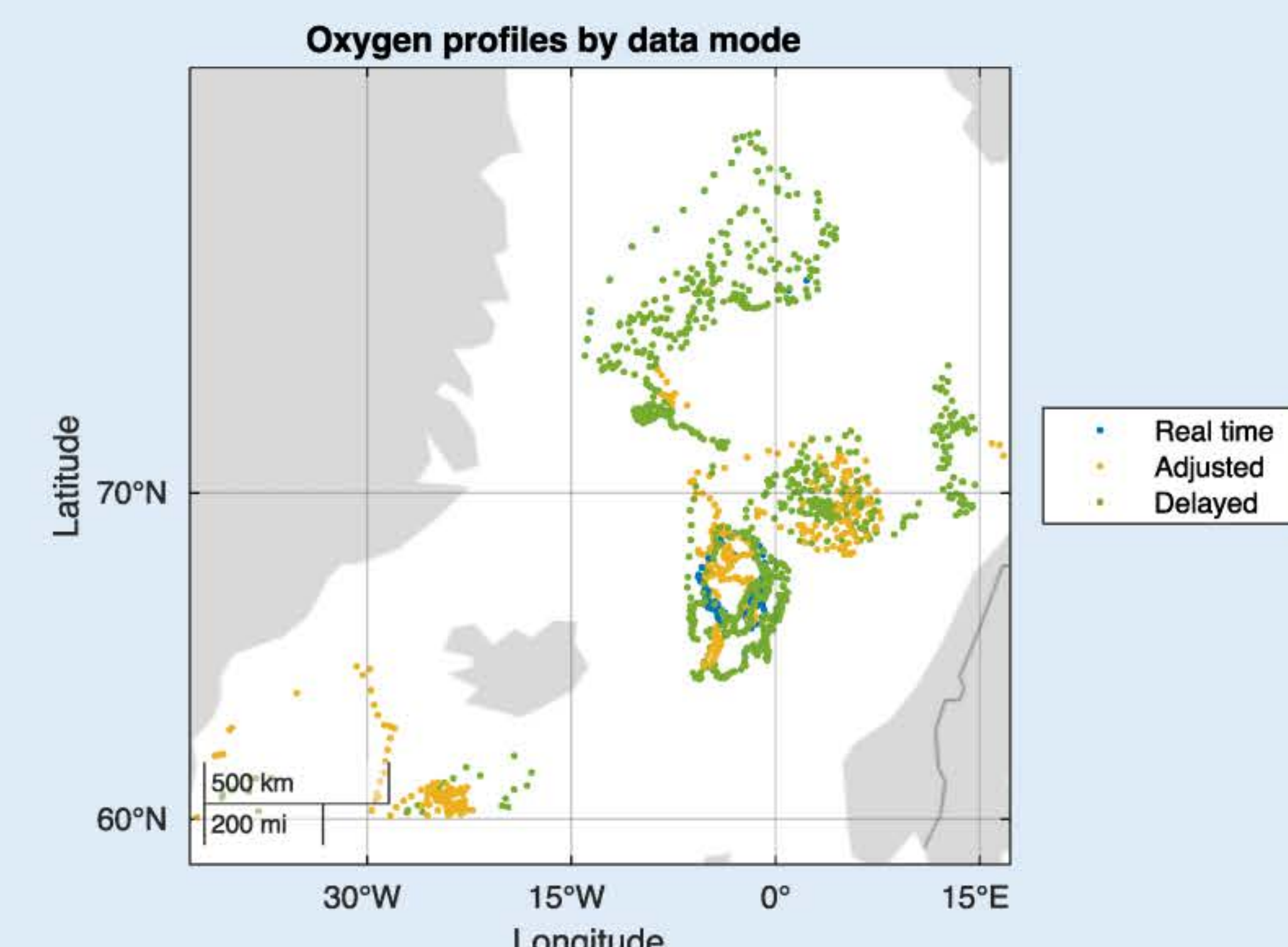**R:** https://github.com/NOAA-PMEL/OneArgo-R

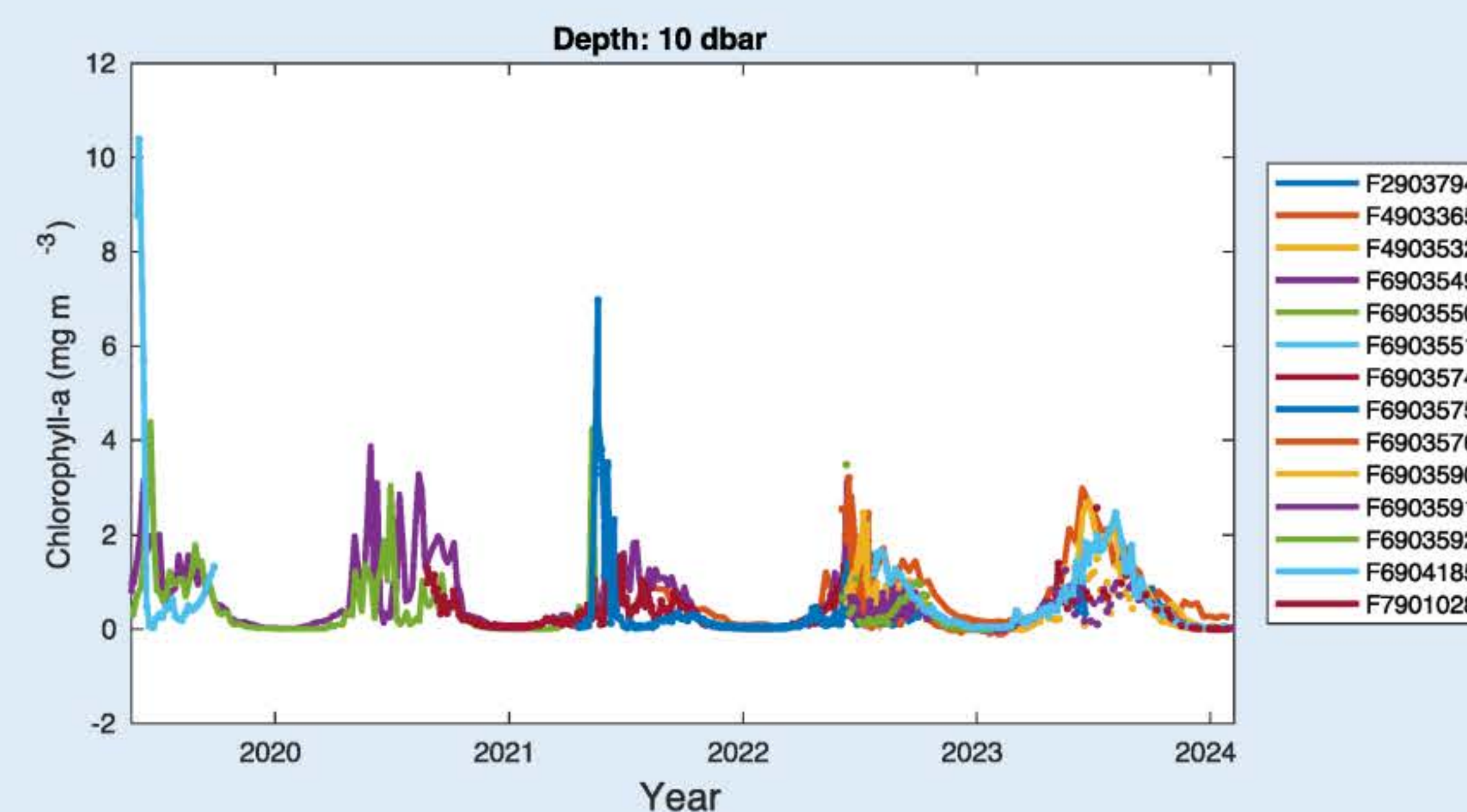**Python: Coming in Summer 2024 (EPP internship)**

Example: 5-sensor BGC floats in Greenland and Norwegian Seas
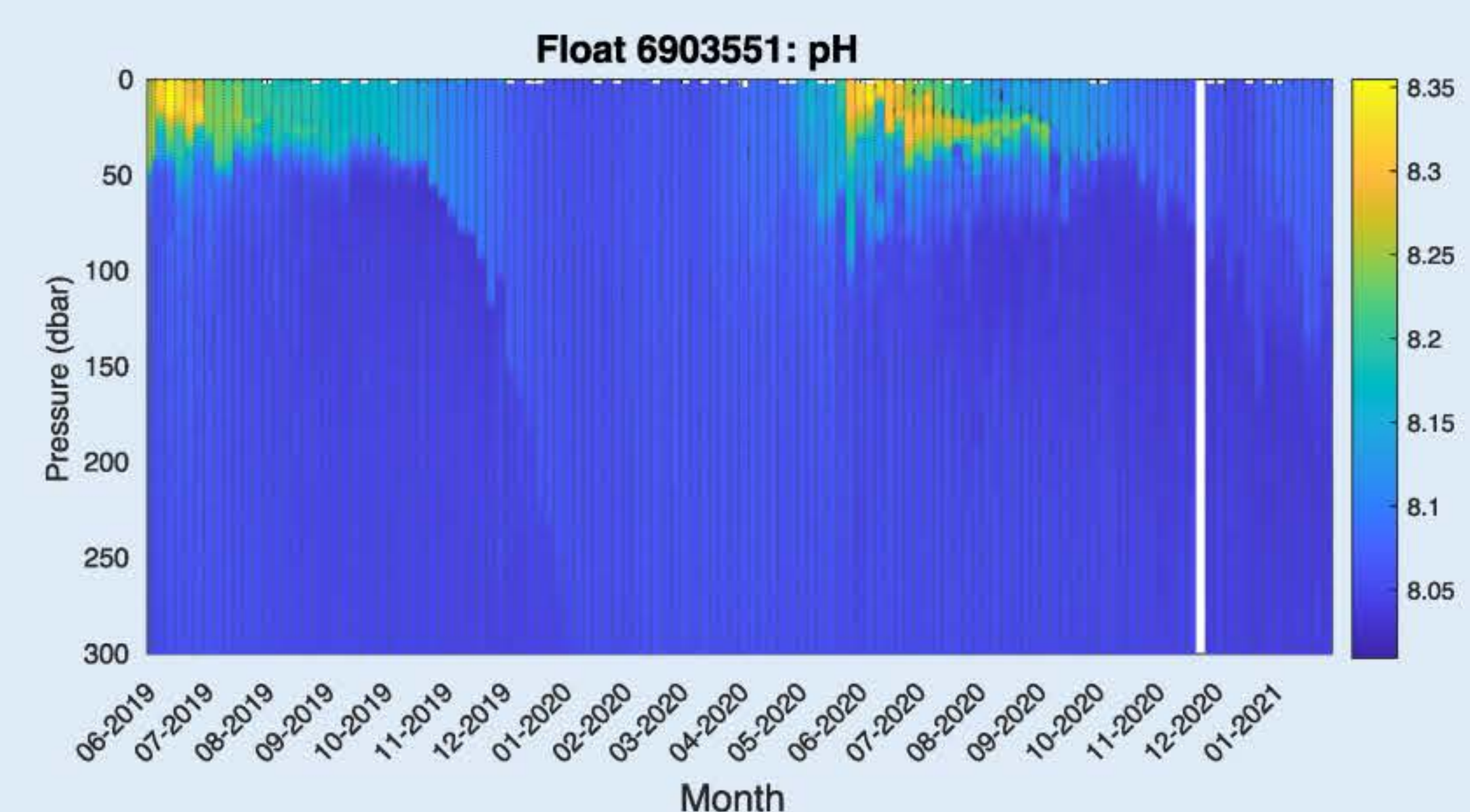
Trajectories of 14 floats matching the search criteria
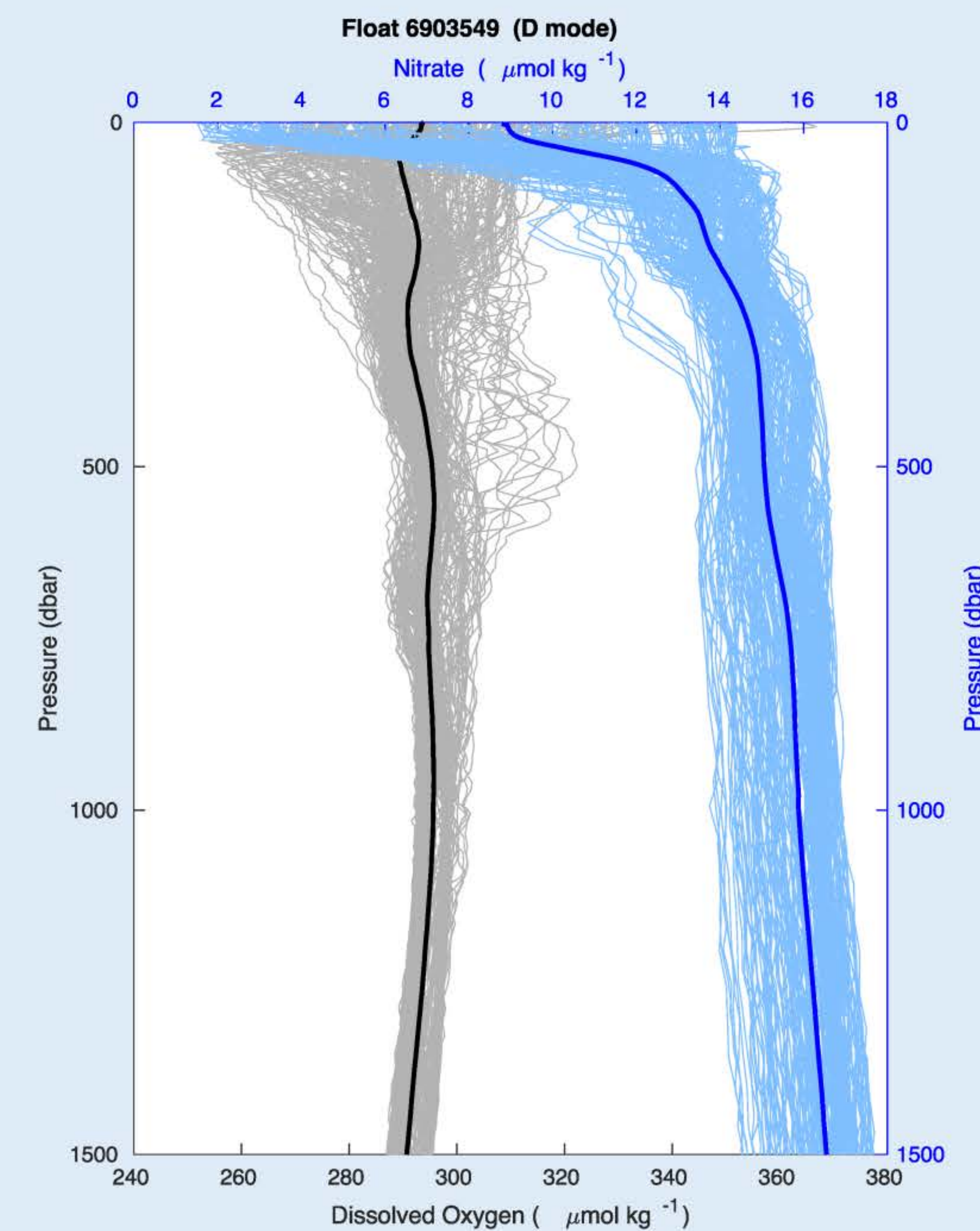
Profile locations by data mode of oxygen for 14 floats

Time series of near-surface chlorophyll-a for all 14 floats

pH in the upper 300 m along one float track

Profiles of oxygen (gray) and nitrate (light blue) for one float, mean profile values are in black (oxygen) and dark blue (nitrate); only profiles in delayed mode are considered

Full MATLAB code for this example:

```
[1] [floats, float_profs] = select_profiles([-44 23],[60 90],[],[], 'ocean', 'A', 'sensor', {'DOXY';'NITRATE';'PH_IN_SITU_TOTAL';'CHLA';'BBP700'});
[2] show_trajectories(floats, 'color', 'multiple', 'float_profs', float_profs, 'lines', 'yes', 'png', 'traj.png');
[2] show_trajectories(floats, 'color', 'mode', 'float_profs', float_profs, 'sensor', 'DOXY', 'png', 'traj_mode.png', ...
       'title', 'Oxygen profiles by data mode');
[2] show_timeseries(floats, 'CHLA', 10, 'per_float', 0, 'png', 'all_floats');
[2] show_sections(floats(6), 'PH_IN_SITU_TOTAL', 'time_label', 'm', 'depth', [0 300], 'isopyc', 0, 'png', 'F');
[1] [~,flp] = select_profiles([],[],[],[], 'floats', floats(4), 'mode', 'D', 'sensor', {'DOXY'; 'NITRATE'});
[2] show_profiles(floats(4), 'DOXY', 'var2', 'NITRATE', 'depth', [0 1500], 'float_profs', flp, 'png', 'Dmode', ...
       'title_add', ' (D mode)');
[3] Data = load_float_data(floats, 'ALL', float_profs);
```

MATLAB

R