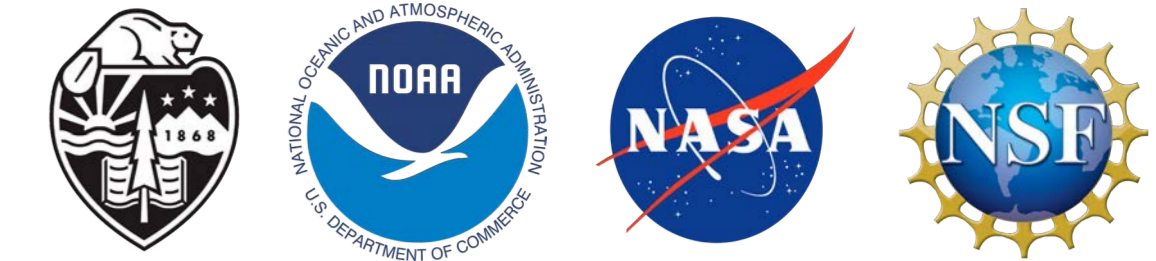


Making Available More Than Two Decades of Mooring and Ship-Based Observations from the Newport Hydrographic Line

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In the Northern California Current System, during spring and summer months, equatorward winds drive the upwelling of cold, nutrient-rich, and oxygen-poor waters from depth onto the shelf, fueling a highly productive marine ecosystem that supports valuable commercial fisheries. Oceanographic conditions in the NCCS vary on temporal scales from hours to decades. While grant-funded projects that are typically 3-5 years in duration can resolve intra-annual and perhaps inter-annual variability, they do not capture decadal scale variability that is critical for climate studies. Here we present two new decadal-scale data products derived from observations taken along the Newport Hydrographic Line (NHL; 44.6°N, 124.1–124.65°W) off Newport, Oregon (Figs. 1, 2 and 3).

The first data product includes 556 gridded, cross-shelf hydrographic sections (Fig 2) of temperature, practical salinity, potential density, spiciness, and dissolved oxygen from data collected biweekly to monthly from March 1997 to July 2021 along the NHL mostly by NOAA programs. We also present monthly climatologies derived from these observations (Fig 4).

The second data product is 25 years (1997–2021) of mooring (Fig 5) temperature (Fig 6), salinity (Fig 7) and velocity (Fig 8) data — collected by five programs (NOPP, GLOBEC, OrCOOS, NANOOS/CMOP, OOI) at NH-10 (44.65°N, 124.30°W), 10 nautical miles west of Newport, Oregon along the NHL on the 80 meter isobath — that we stitched together into one coherent, quality-controlled data set.

Making available such multi-decadal data sets, which we plan to release via public repositories, is essential to enable scientists to characterize natural and anthropogenically-forced variability; resolve cause-and-effect relationships in Earth's climate and marine ecosystems at intra-seasonal, seasonal, inter-annual and decadal time scales; and verify climate models.

These new gridded and concatenated data products show that long-term ocean observing efforts require multi-generational teams with a wide range of skills and a shared vision that is motivated by science and ocean monitoring needs.

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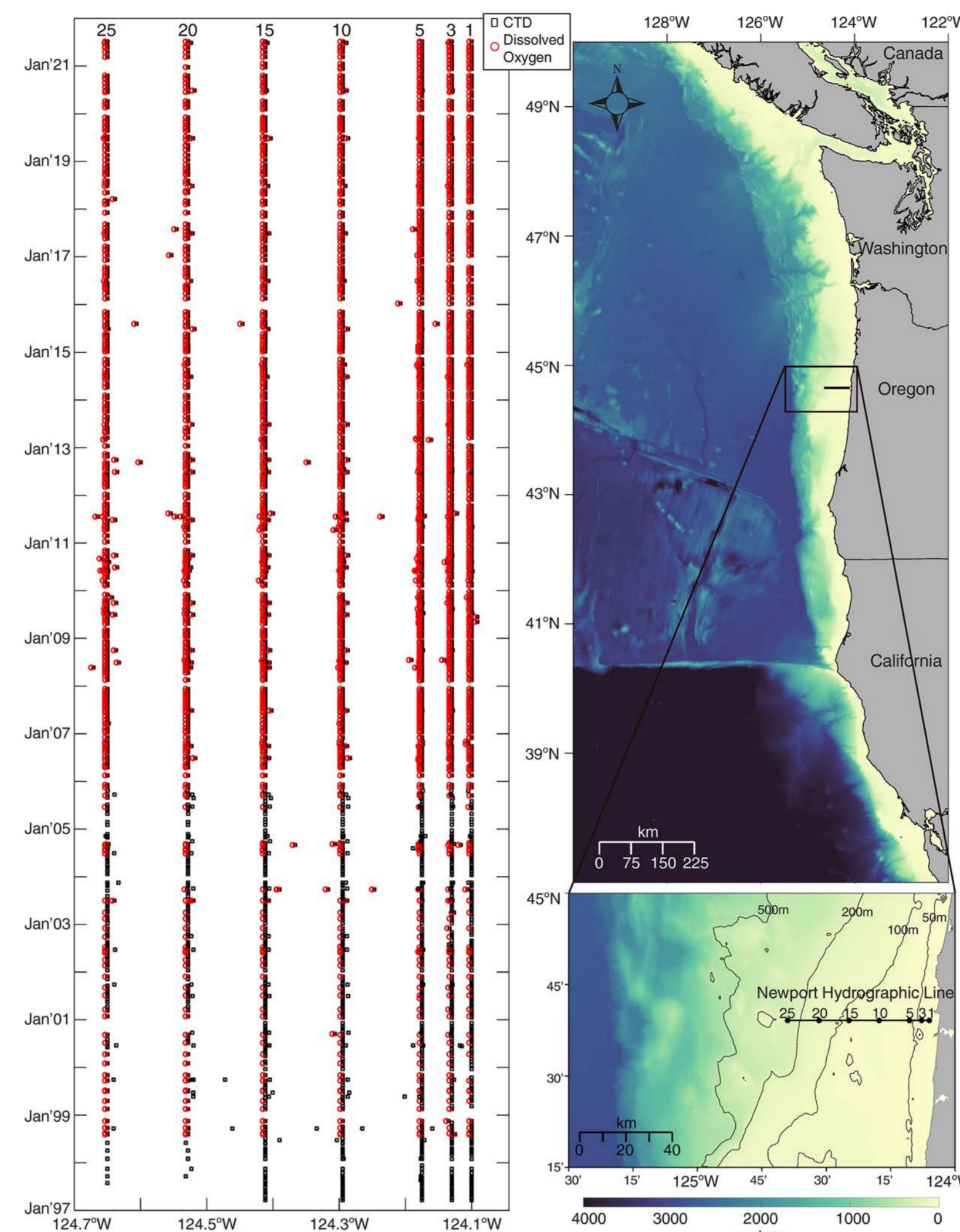


Fig. 1. The left panel shows when CTD (black squares) and dissolved oxygen (red circles) measurements were made at stations NH-01, NH-03, NH-05, NH-10, NH-15, NH-20, and NH-25 between March 1997 and July 2021. The top right panel shows GEBCO bathymetry off the West Coast of North America and the Newport Hydrographic Line (NHL) located west of Newport, Oregon. The lower right panel shows the NHL stations. Station numbers correspond to the station distance from shore, in nautical miles. The 50, 100, 200, and 500 meter isobaths are shown.

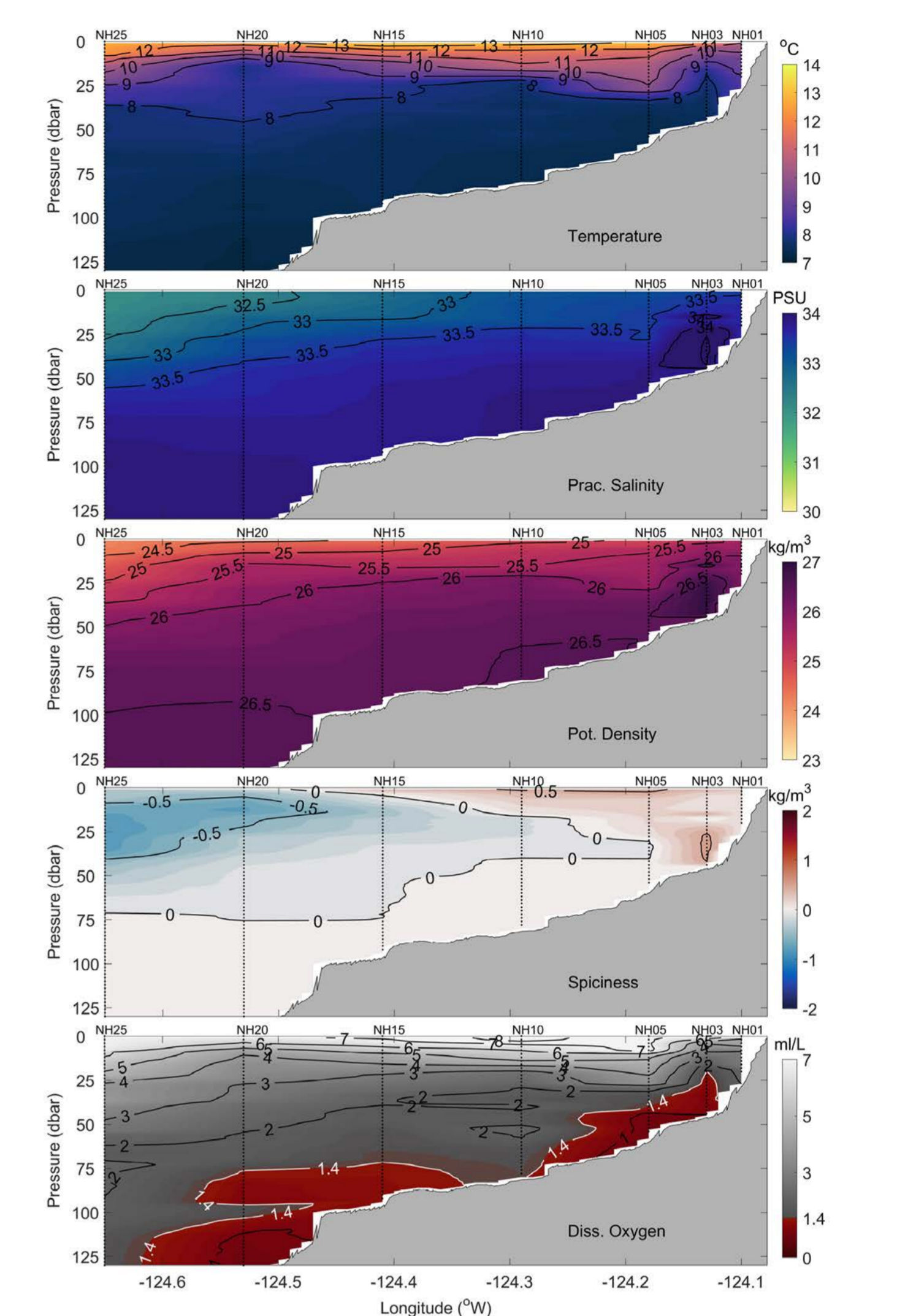


Fig. 2. Example of spatially interpolated cross-shelf hydrographic sections of temperature, practical salinity, potential density, spiciness, and dissolved oxygen (top to bottom panels, respectively) collected along the Newport Hydrographic Line on 8 July 2021. Stations where CTD casts were conducted are shown as vertical dotted lines.



Fig. 3. Researchers on the RV Elakha (top) collecting physical (lower left) and biological (lower right) data along the Newport Hydrographic Line.

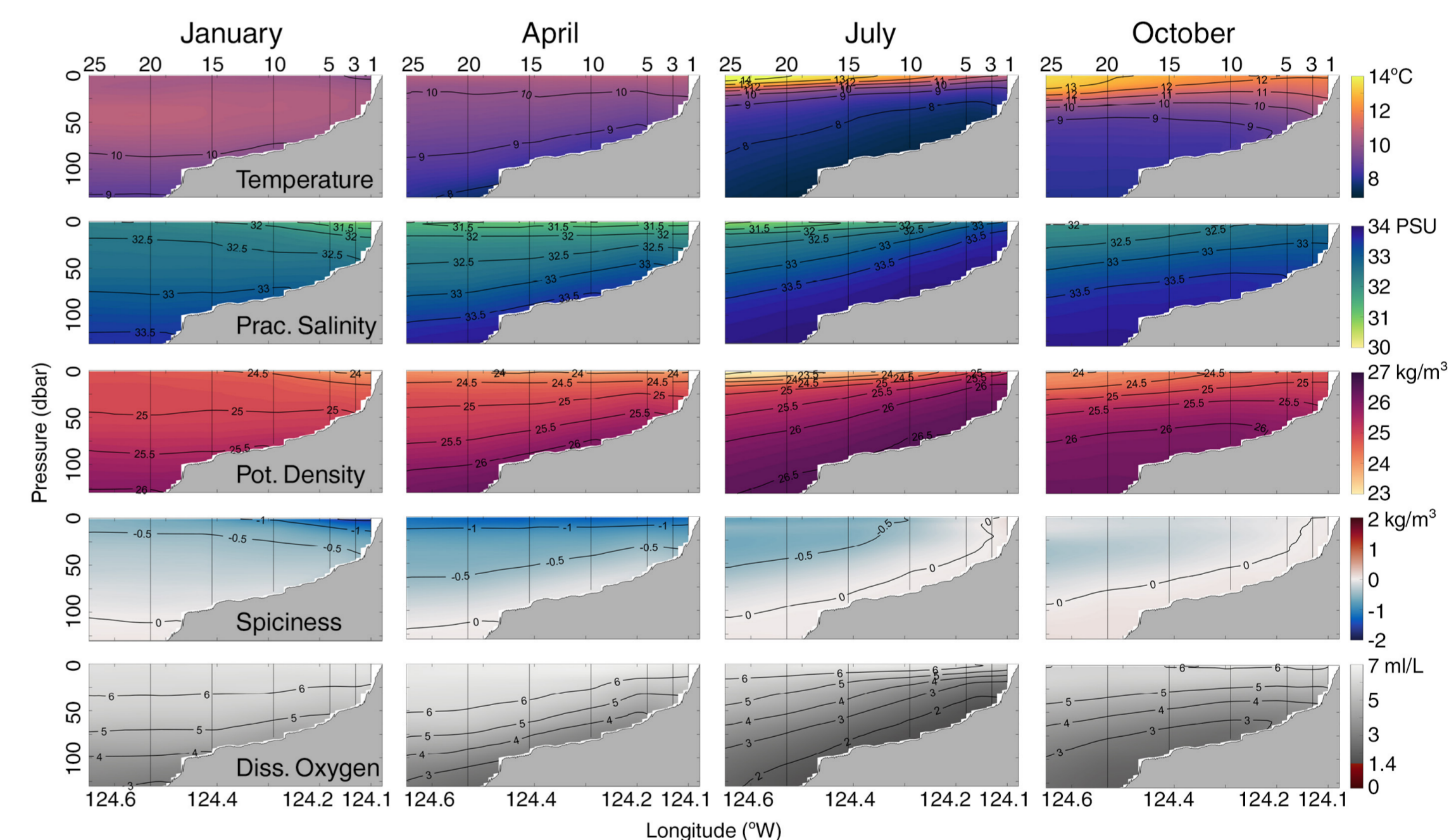


Fig. 4. January, April, July and October temperature, practical salinity, potential density, spiciness and dissolved oxygen climatology transects along the NHL. The temperature, practical salinity, potential density, spiciness climatologies are based on the 24-year period March 1997 to February 2021. The dissolved oxygen climatology is based on the 22.6-year period August 1998 to February 2021. The values shown here are monthly averages of the climatology.

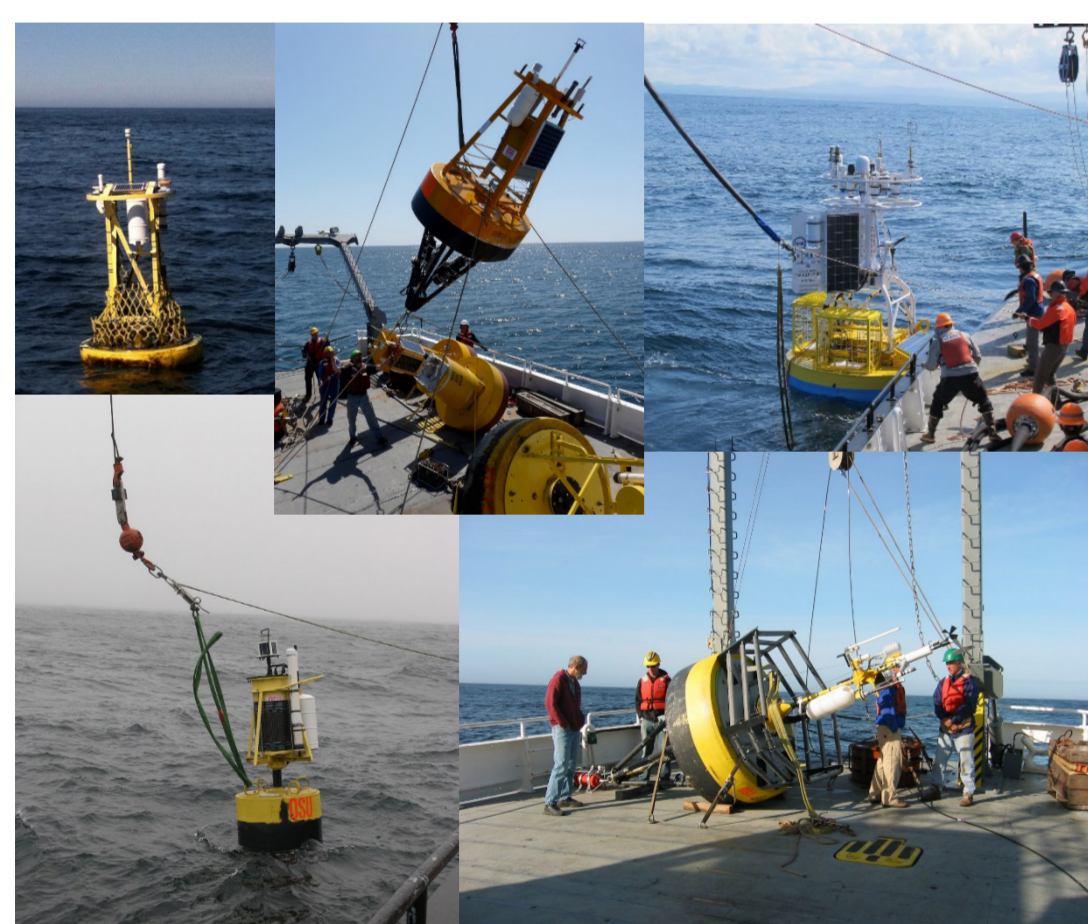


Fig. 5. Photographs of various NH-10 mooring from 2006 - present. The OOI mooring (CE02SHSM) that is currently deployed at NH-10 is shown in the top right.

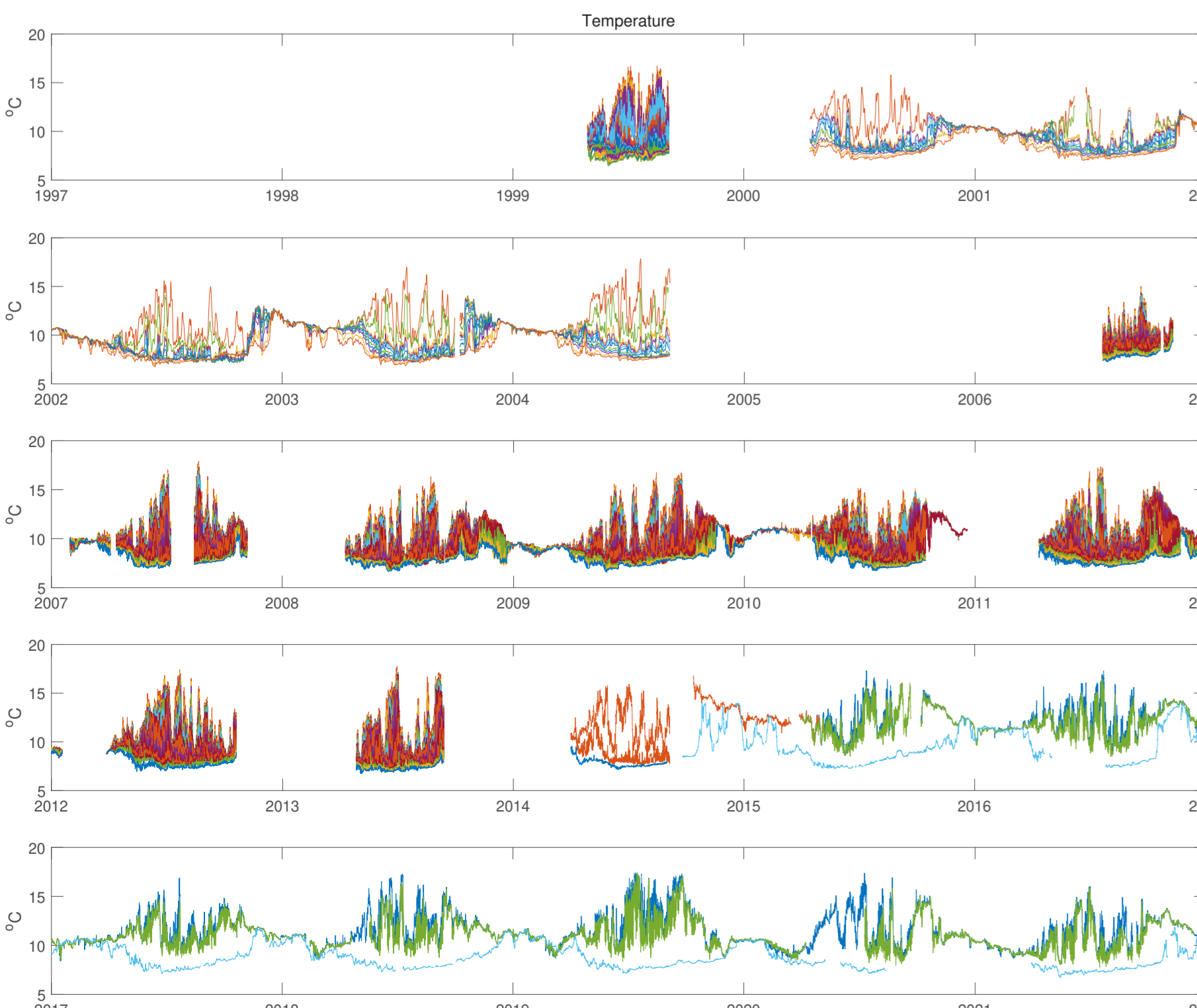
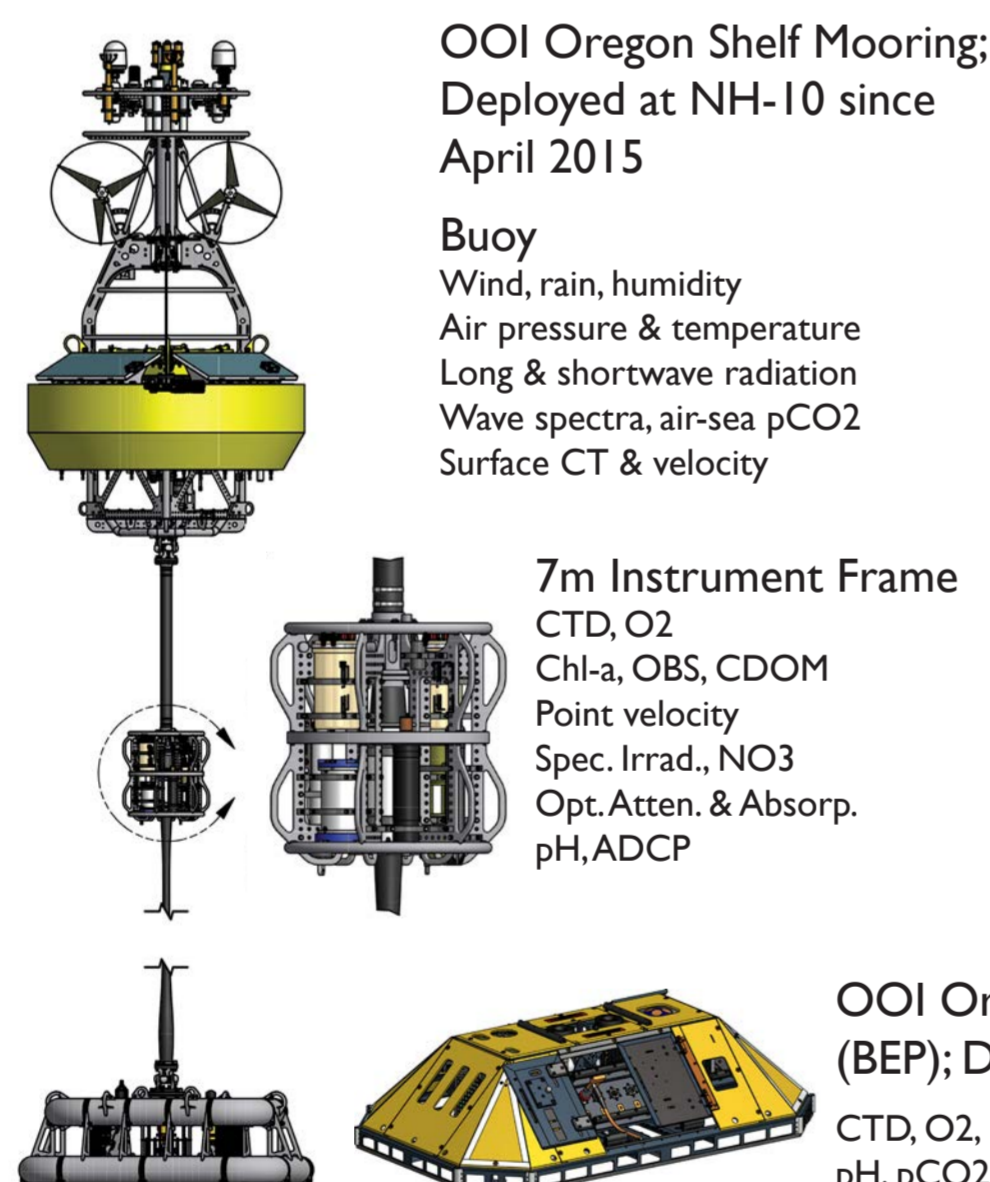


Fig. 6. NH-10 temperature time series (surface to seafloor) for the period 1999-2021.

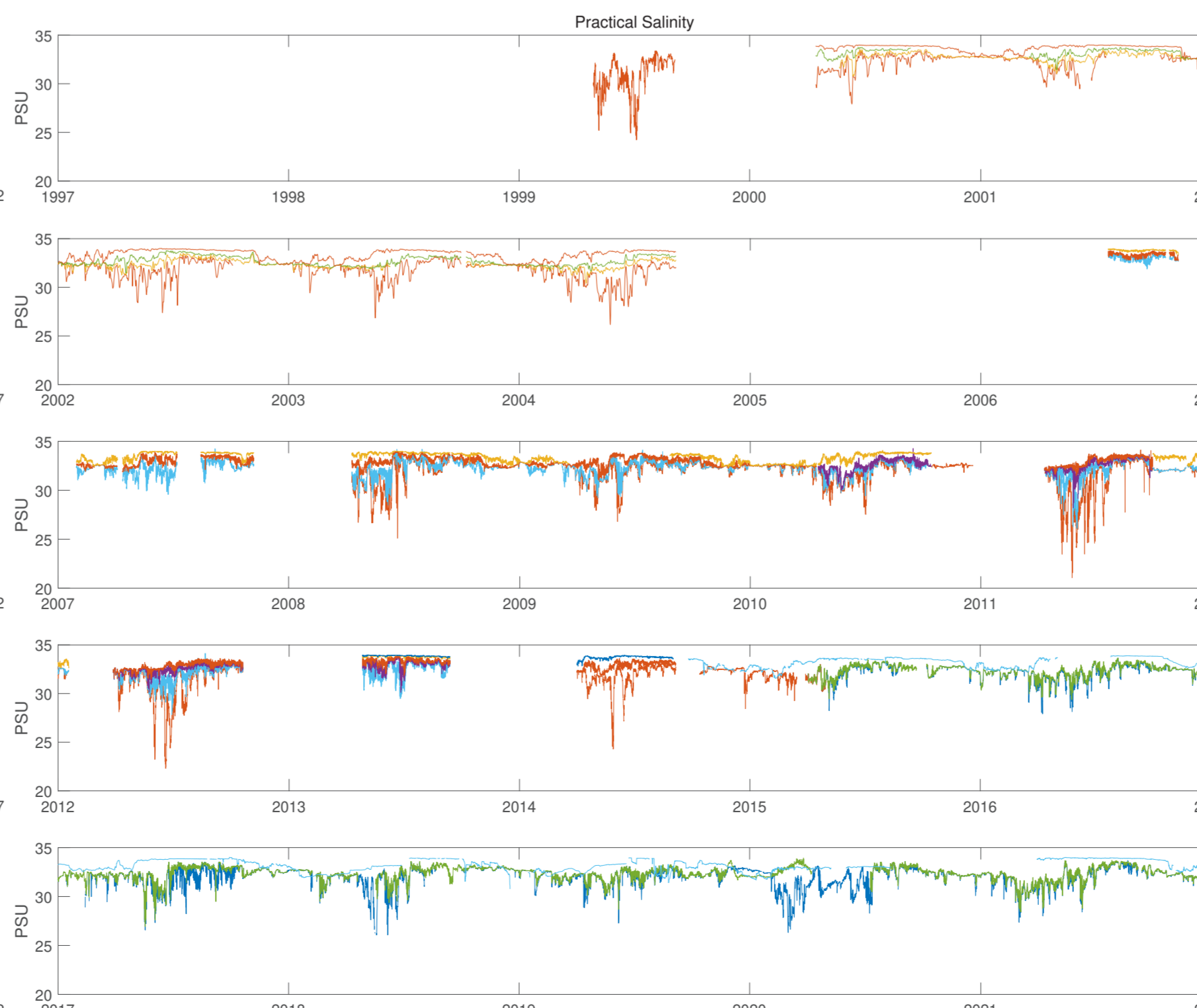


Fig. 7. NH-10 practical salinity time series (surface to seafloor) for the period 1999-2021.

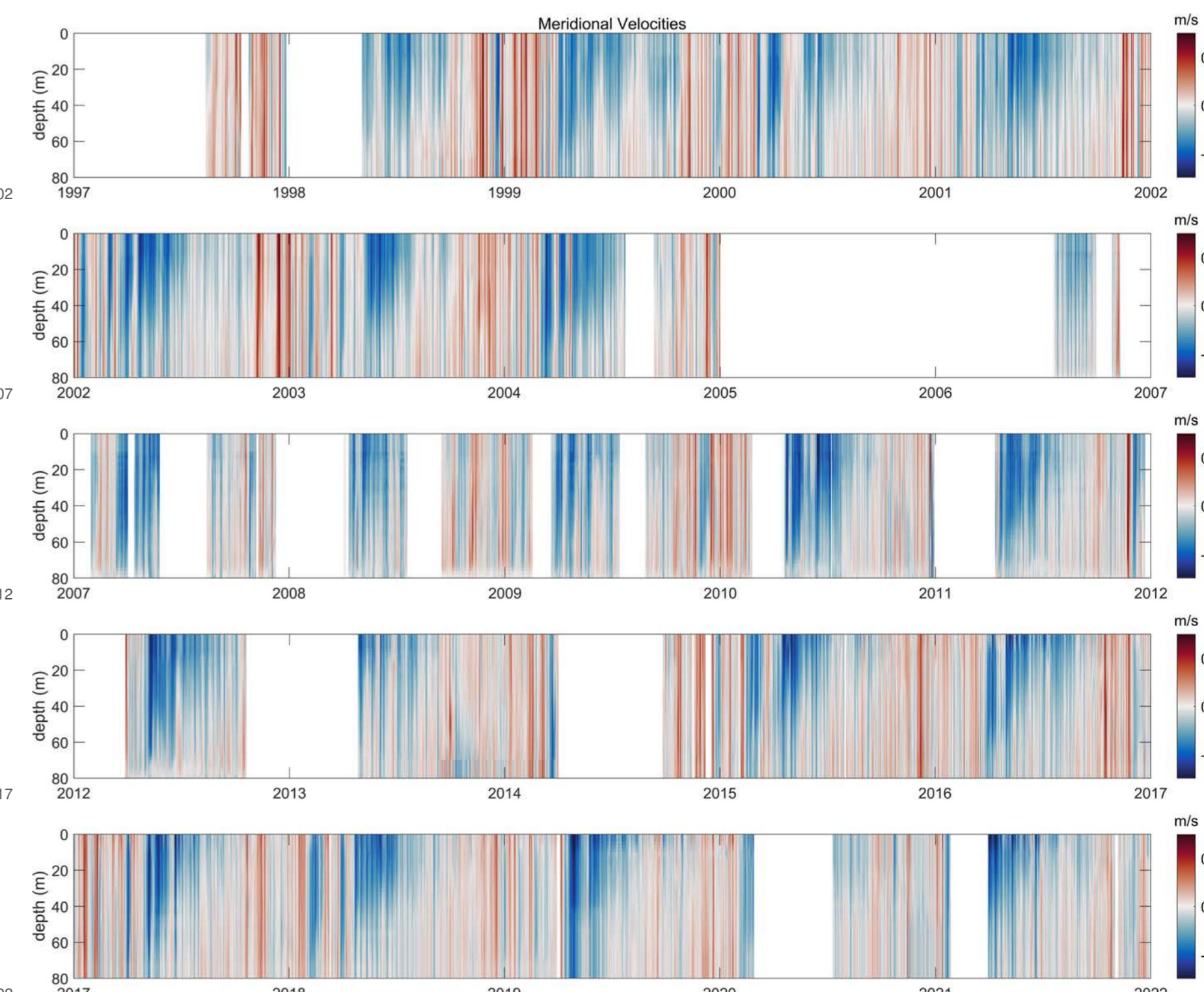


Fig. 8. NH-10 meridional velocities time series (surface to seafloor) for the period 1997-2021.