



The observing framework – *an integrated approach*

Moorings (a): Mooring infrastructure deployed at strategic locations around the Islands are equipped with ADCPs to monitor Atlantic inflows towards the Arctic and overflows as part of international climate monitoring programmes (FARMON, Blue-Action NAACLIM).

Hydrographic and biogeochemical Sections (a): Temperature, salinity, oxygen and fluorescence sensors are used to monitor water mass properties across repeat hydrographic sections. Designated biogeochemistry stations embedded in hydrographic sections monitor carbonate chemistry (OSPAR), nutrients and phytoplankton biomass.

Buoys (a): Temperature sensors are mounted on wave-rider buoys to describe vertical hydrographic structure and fluxes from ocean to shelf environments across the tidal front. Wave heights used for forecasting operable conditions for shipping and commercial vessels (*Landsverk*).

Remote-Sensing: Chlorophyll data retrieved from remote-sensing data products to examine large-scale variability of bloom dynamics and interactions between shelf and oceanic waters.

Models: Real-time predictions of current speed and direction (*University of Faroe Islands*).

Coastal Time-Series (a): Temperature, salinity, inorganic nutrients, chlorophyll, phytoplankton and zooplankton taxonomy are monitored weekly to follow bloom dynamics in shelf waters.

Genomic Observatory (a): A component of the coastal time-series. Sterivex filters collected for eDNA extraction and bio-archiving. Survey includes bacteria (16S), phytoplankton (18S) and community metabarcoding (COI, 12S).

Research Vessel (a,b): Annual 0-group survey (125 stations): juvenile fish, zooplankton, temperature, salinity, nutrients, chlorophyll. Annual biological survey (50 stations): temperature, salinity, nutrients, chlorophyll, zooplankton, fish eggs, fish larvae, *Calanus* spp. egg production rates.

Ferry-Box (a): RV *Norröna* conducts weekly transects from Denmark-Faroe Islands-Iceland-Faroe Islands-Denmark. Current parameters include salinity, temperature, oxygen, turbidity, chlorophyll, CDOM, Meteorological variables (Met Norway), continuous plankton recorder (SAHFOS). Planned parameters: pH and CO₂, automated nutrient analysis, underway eDNA sampling.

Pelagic Trawl and Acoustic Surveys (c): Temperature, salinity, chlorophyll, zooplankton biomass. Acoustic and pelagic trawl surveys of Blue whiting, Norwegian spring-spawning herring, Atlantic Mackerel. Contributes to following ICES surveys: International Blue Whiting Spawning Stock Survey (IBWSS), International Ecosystem Survey in the Nordic Seas (IESNS), International Ecosystem Summer Survey in the Nordic Seas (IESSNS).

Demersal Surveys (b): Bi-annual (spring and summer) ground-fish trawl surveys (<200m, 200 stations). Annual deep-sea (>400m, 70 stations) surveys. Ground-fish survey includes otolith sampling, sex, maturity, stomach content analysis. Atlantic cod tagging programme. Contributes to ICES working groups.

Seabirds (b): Decadal population-size estimates of Guillemot, Black-legged kittiwakes and gannets. Colony counts and migration studies of Arctic Tern, Northern Fulmar, common Guillemot, Black-legged kittiwake, Atlantic puffin. Additional migration studies on Great black-backed gulls, Eiders and Manx shearwaters, Arctic Skua. Stomach analysis for Guillemots, Razorbills, Puffins, Shags, Fulmar, Gannet chicks, Manx shearwater chicks (plastics for Fulmar).