# Increased density of isotope observations in the European storm track region

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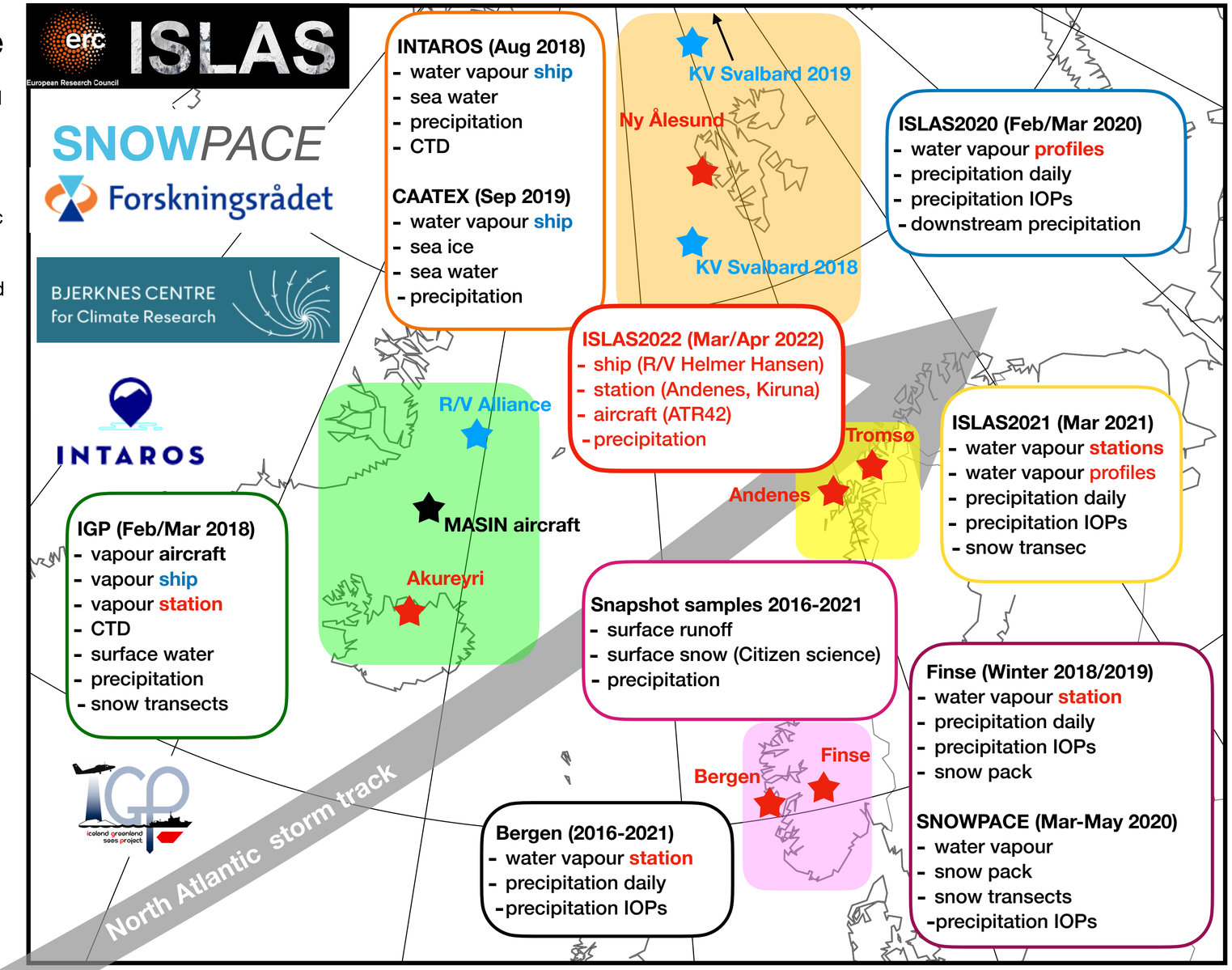
Since 2018, Norway and the Norwegian sea are becoming a global hot-spot of (paired) water isotope observations

## Motivation and Objective

The water cycle in atmospheric and coupled models is a major contributor to model uncertainty, in particular at high-latitudes, where contrasts between ice-covered regions and the open ocean fuel intense heat fluxes. However, observed atmospheric vapour concentrations do not allow to fully disentangle the contributions of different processes, such as evaporation, mixing, and cloud microphysics, to the overall moisture budget. As a natural tracer, stable water isotopes provide access to the moisture sources and phase change history of atmospheric water vapour and precipitation. This work compiles currently available observations of the isotope composition in water vapour, precipitation, ocean, and land surface waters in the European storm track region, with a focus on Norway.

## Future Perspectives

Recently increased spatial coverage, multi-platform measurements, and inclusion both of water vapour and precipitation make the region particularly well-suited for future data-model comparison studies with isotope-enabled models. In addition, there is a large potential for better understanding of water cycle processes and the role of diabatic processes in the storm track on different time scales, from weather to climate to paleoclimate. Synergies and collaboration with past and overlapping projects, such as MOSAiC need to be explored and developed further.




## Data processing and data provision

- Quince tool for live QC and calibration https://quince.bcdc.no
- FaVaCal tool for vapour calibration
- FLIIMP tool for liquid sample processing and calibration
- ERDDAP server for data provision https://erddap.bcdc.no

## Data analysis tools

- FLEXPART Lagrangian particle dispersion model for source-receptor relationships
- FLEXPART-AROME based on operational weather foreasts
- COSMOiso regional model with detailed isotope fractionation
- COSMOtag regional model with water vapour tracers
- WaterSip moisture source and transport diagnostic
- Below-cloud interaction model BCIM (Graf et al., 2019)
- Linear model for orographic precipitation (Barstad et al., 2017)

Graf, P., Wernli, H., Pfahl, S., and Sodemann, H.: A new interpretative framework for below-cloud effects on stable water isotopes in vapour and rain, Atmos. Chem. Phys., 19, 747–765, https://doi.org/10.5194/acp-19-747-2019, 2019.

Durán L, Barstad I. Multi-scale evaluation of a linear model of orographic precipitation over Sierra de Guadarrama (Iberian Central System). Int J Climatol. 38:4127–4141. https:// doi.org/10.1002/joc.5557, 2018.