Observation campaign workshop 2026

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Evaluation Section

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Why are we here?

Campaign workshop in 2019

Possible field campaign targets

Consensus was achieved that future observational campaigns, or better exploitation of existing datasets, could help to improve the representation of several important processes in ECMWF's Integrated Forecasting System over the coming years:

- **The coupling of the lower atmosphere with the underlying surface**, which is key for the prediction of near-surface weather. Specific issues need to be tackled over land, ocean and snow/sea-ice, e.g. the strength of land–atmosphere coupling, the impact of land heterogeneity on surface fluxes, the partition between latent and sensible heat flux over bare soil and vegetated areas, the thermodynamic coupling over sea ice, the coupling of ocean currents, waves and the atmosphere, and atmosphere–ocean coupling over boundary currents (e.g. the Gulf Stream). Efforts to improve the coupling of the lower atmosphere with the underlying surface would benefit from gathering collocated observations through the atmosphere–surface interface (e.g. in the atmosphere, at the surface, and in the ocean mixed layer/soil/snow) during future observational campaigns as well as from observations along a path across various surfaces ('observational transects'), e.g. across the snow line, from bare soil to vegetated areas, and from flat terrain to mountain ridges.
- **Low-level clouds, in particular maritime stratocumulus and low-level mixed-phase clouds at high latitudes.** As the resolution of global models increases towards resolutions at which deep convection becomes resolved, the need for observational constraints for microphysical processes will increase as these processes will play an increasingly important role.
- **Momentum transport and wind profiles in the boundary layer.** A better representation of boundary-layer winds is key for predictions of near-surface and wind turbine height winds and of heat, momentum and moisture exchange at the interface between the atmosphere, ocean, land and ice. It is also important for the large-scale circulation forecast skill, which crucially depends on surface friction (or drag).
- **Temperature, moisture and trace gases (ozone) in the stratosphere**, for which very few independent observations with high vertical resolution exist.
- **Temporal and spatial variability.** As the resolution of global NWP models increases, it is becoming important to deploy observations with high temporal and spatial frequency to be able to verify the ability of NWP models to represent mesoscale variability in both the atmosphere and the ocean and particularly over boundary currents.

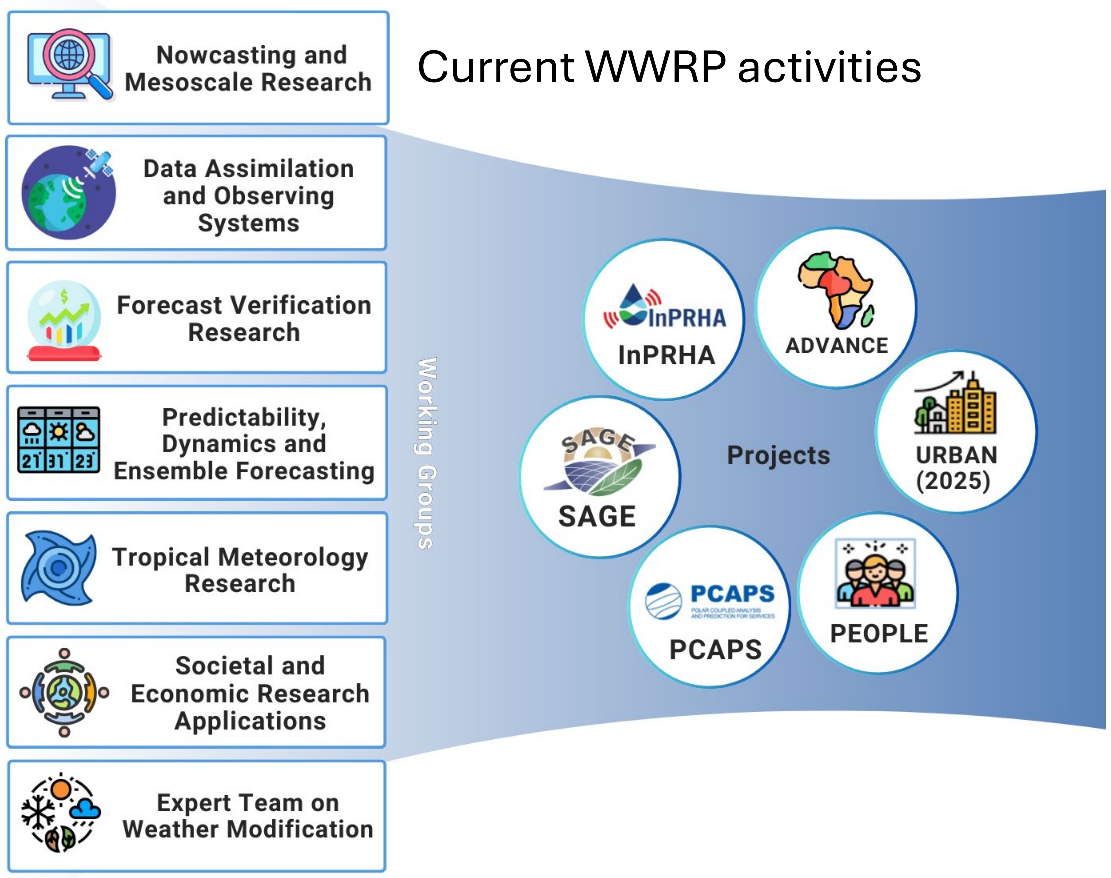
https://www.ecmwf.int/en/newsletter/161/news/experts-review-synergies-between-observational-campaigns-and-weather

Activities in WMO World Weather Research Programme

THORPEX
A World Weather Research Programme

2005-2014

Current WWRP activities



Endorsed projects in WWRP with campaign element:

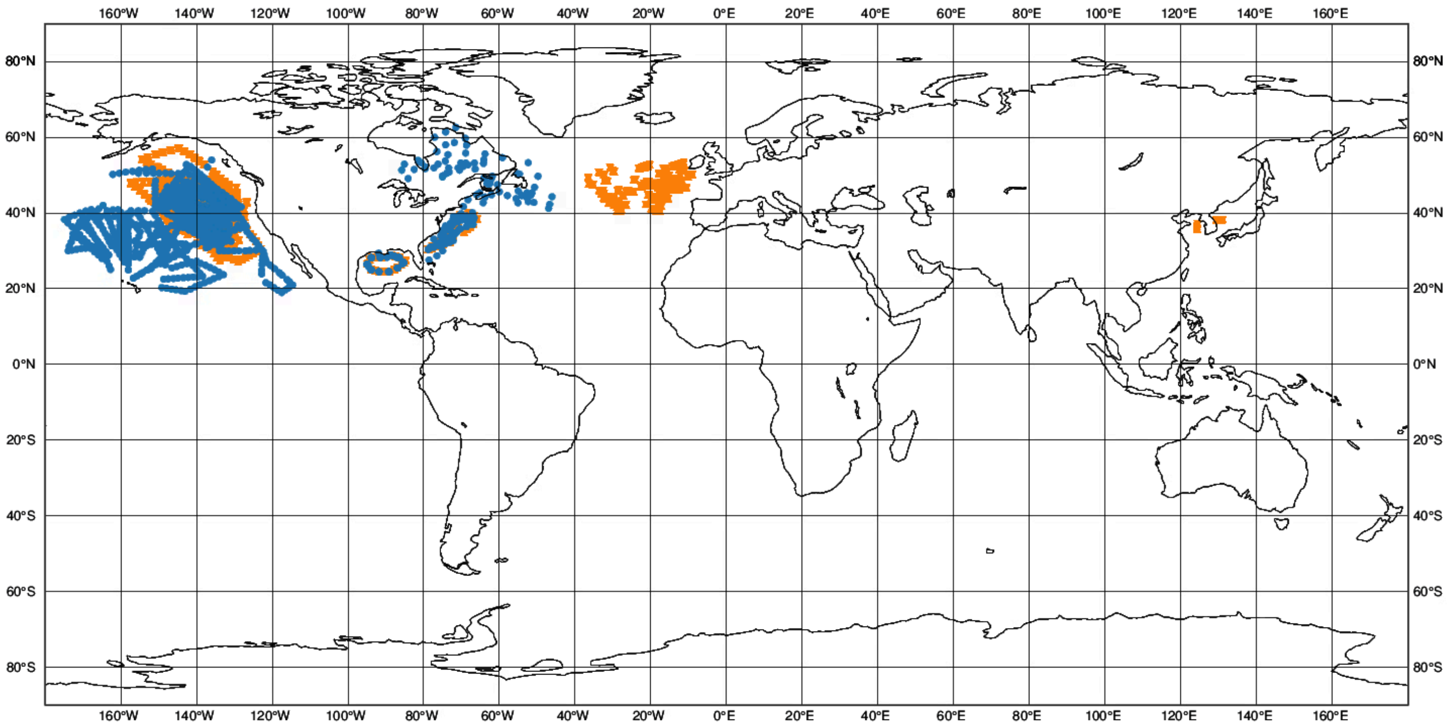
- AR-Recon
- NAWDIC
- NURTURE
- SAFARI
- PONEX
- M3E
- TEAMx
- Canada-Sweden Arctic Ocean Exp.
- The Global Drifter Program

GARRP

Informal working group to discuss synergies between campaigns during winter 2026

Outcome – according to the ECMWF observation monitoring

Dropsondes in ECMWF data assimilation January-February 2026



Thanks to Mohamed Dahoui

"Circle of life"

Campaign planning

Data collection

Data analysis

Hypothesis testing (research models)

Increased physical understanding

(Operational) forecast system development

Pre-implementation testing

Operationalisation

Forecast evaluation

Documenting known forecast issues

Documentation of ECMWF forecast issues

Known IFS forecasting issues

Created by Tim Hewson, last updated on May 13, 2026 • 45 minute read

Please note that numbering/ordering does ***not*** indicate/imply any sort of priority. Recent entries/changes/updates are shown in **green**, with slightly older in **olive**. Newer entries relating to issues that are no longer current are shown in **maroon**. Older issues that are no longer current are greyed out. Issues shown in grey or maroon can be relevant when examining archived forecasts.
Any enquiries related to the content of this page should be emailed to servicedesk@ecmwf.int (mentioning the "Known IFS forecasting issues web page").

Topic / title	Description	Related activities / comments
2m Temperature		
T1. 2m temperature in the presence of inversions	In common with all models, 2m temperature forecasts from the IFS tend to have much larger errors, on average, during low level inversion situations, which are particularly common at high latitudes in winter. The basic physical explanation is that a set change in atmospheric energy content has a much larger impact on screen temperature in inversion situations than in unstable situations, because the energy change is commuted through a much smaller depth of the atmosphere (e.g. metres rather than kilometres). The lower the inversion, the larger is the potential error. There is also sensitivity here to the method we use to interpolate between air temperature at the lowest model level (~10m) and skin temperature (2m temperature is a diagnostic, not direct model output).	New reporting practices for radiosonde data ("BUFR" messages), slowly being introduced around the world, may alleviate this problem slightly, by providing model analyses with a much more detailed representation of the near surface layers. In regions with snow cover, where issues are often most apparent, a change in IFS formulation, from using a single-layer to a multi-layer snow scheme in June 2023 helped a bit (see also item S5 below). In Nov 2024 (cycle 49r1) the way the IFS calculates 2m temperature using the skin temperature changed slightly; previously it was skin temperature over "low vegetation" tiles within a gridbox, and now it is the gridbox-wide skin temperature. This should deliver more coherence in 2m temperature fields, but will change behaviour in certain regions, particularly under difficult-to-forecast conditions such as inversions. Another IFS change in Nov 2024 was to start assimilating screen temperatures. This can have a small positive impact on forecast quality (e.g. in short range forecasts when the background fields are in error, as in some inversion situations). …ade on 12 May 2026 (50r1) more screen temperatures are being assimilated. This has a further …ct on this issue.
T2. City temperatures too low	Due to the urban heat island effect not being represented, screen temperatures in large… problem can be accentuated in winter by snow cover.	…ntroduced ir… …roduced in … …eases (e.g. … …hort of wha… …%), which … …such …ted,
T3. Screen temperatures fall too much near coasts	As a consequence of the radiation grid being larger than the model grid (due to compu… rapid. This is because cooling progresses according to T^4, and at near-coast points T i… temperatures drop too much - related errors can sometimes exceed 10C. The problem … convex shape (land-relative).	…to radiation … the …nges has b… …ger

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RESEARCH ARTICLE

Forecast evaluation of the North Pacific jet stream using AR Recon dropwindsondes

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Abstract
The term jet stream generally refers to a narrow region of intense winds near the top of the midlatitude or subtropical troposphere. It is in the midlatitude jet stream where instabilities and waves may develop into synoptic-scale systems, which in turn makes accurately resolving the structure of the jet stream and associated features critical for atmospheric development, predictability, and impacts, such as extreme precipitation and winds. Using dropwindsonde observations collected during the Atmospheric River Reconnaissance (AR Recon) campaign from 2020 to 2022, this study assesses the North Pacific jet stream structure in the European Centre for Medium-Range Weather Forecasts (ECMWF) Integrated Forecasting System (IFS). Results show that the IFS has a slow-wind bias on the lead times assessed, with the strongest winds ($\geq$50 m·s^{-1}) having a bias of up to -1.88 m·s^{-1} on forecast day 4. Also, the IFS cannot resolve the sharp potential vorticity (PV) gradient across the jet stream and tropopause, and this PV gradient weakens with forecast lead time. Cases with larger wind biases are characterized by higher PV biases and PV biases tend to be larger for cases with a higher horizontal PV gradient. These results suggest that further model-based experiments are needed to identify and address these biases, which could ultimately yield increased forecast accuracy.

KEYWORDS
diagnostics, ECMWF forecasts, jet stream, northern Pacific Ocean, observational campaigns

Technical Memo

ECMWF
European Centre for Medium-Range Weather Forecasts

891

Summary of the UGROW subproject on tropospheric temperature bias during JJA over the northern hemisphere

L. Magnusson, M. Alonso-Balmaseda, M. Dahoui, R. Forbes, T. Haiden, D. Lavers, I. Sandu, S. Tietsche

March 2022

Key questions during this workshop

- Have we managed to improve the forecast system based on past campaigns?
- How to get the best synergies between campaigns and forecast system development?
- What role will campaign data play in data-driven forecast models?
- What are the remaining gaps needed to be filled by campaigns?

Discussion session on Thursday about data exchange

We will discuss:

- Past campaigns and programmes and future campaign opportunities
- Data exchange
- Observation impact in the data assimilation
- Interaction with model development
- Diagnostic studies and improved process understanding
- Role of campaign output in data-driven forecast models

Panel discussion on Friday, please put your questions to discuss in the box!