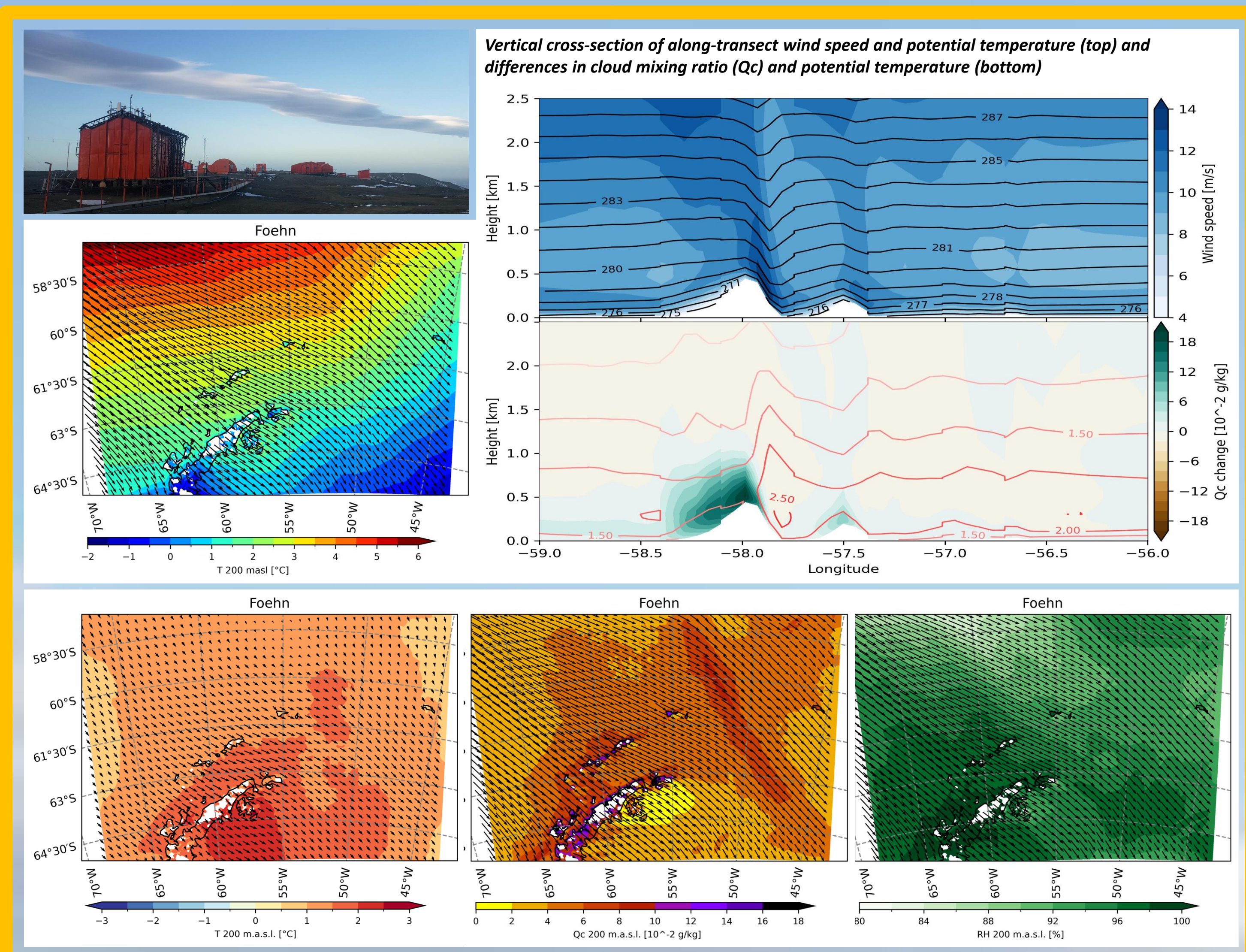
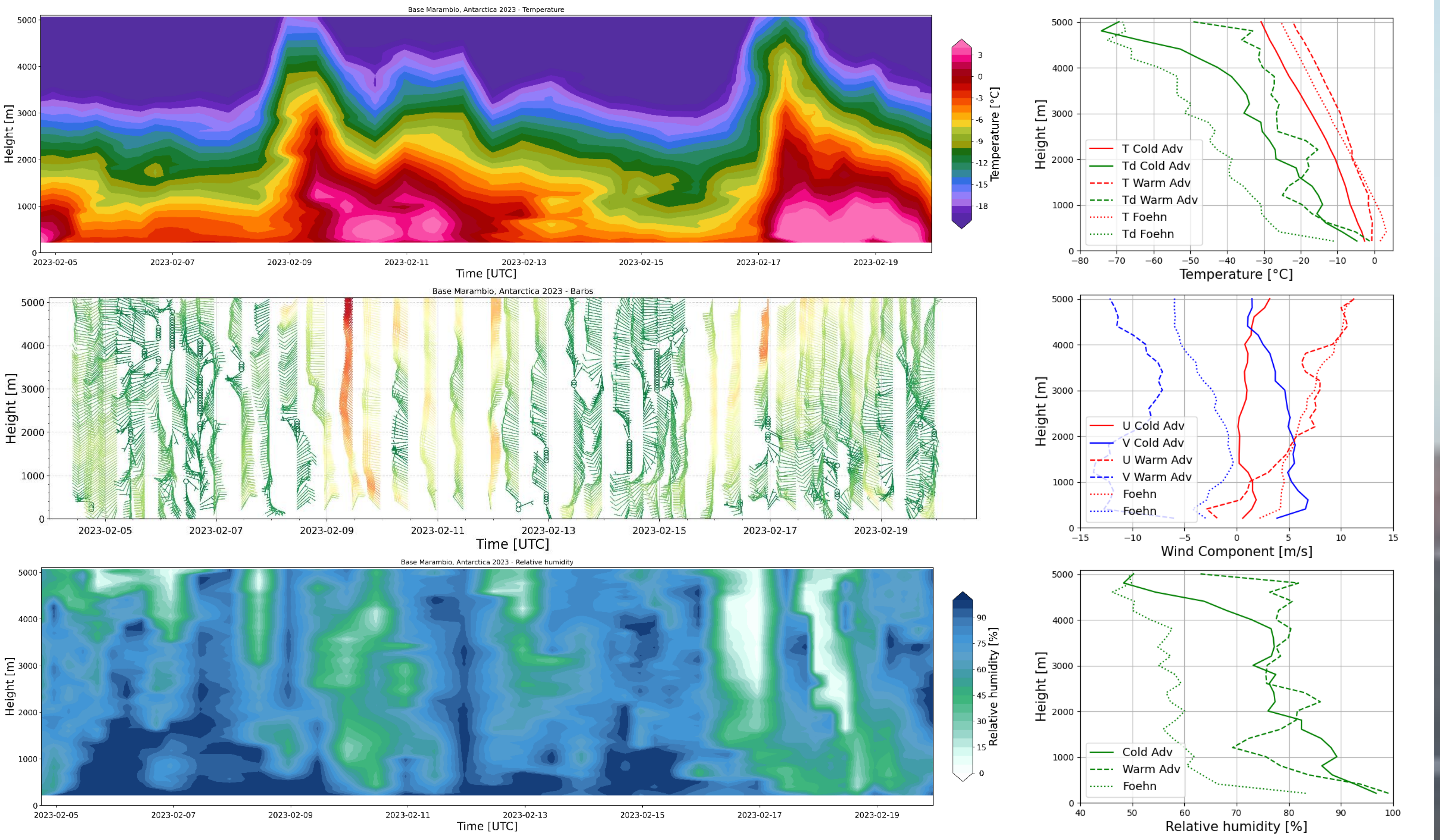
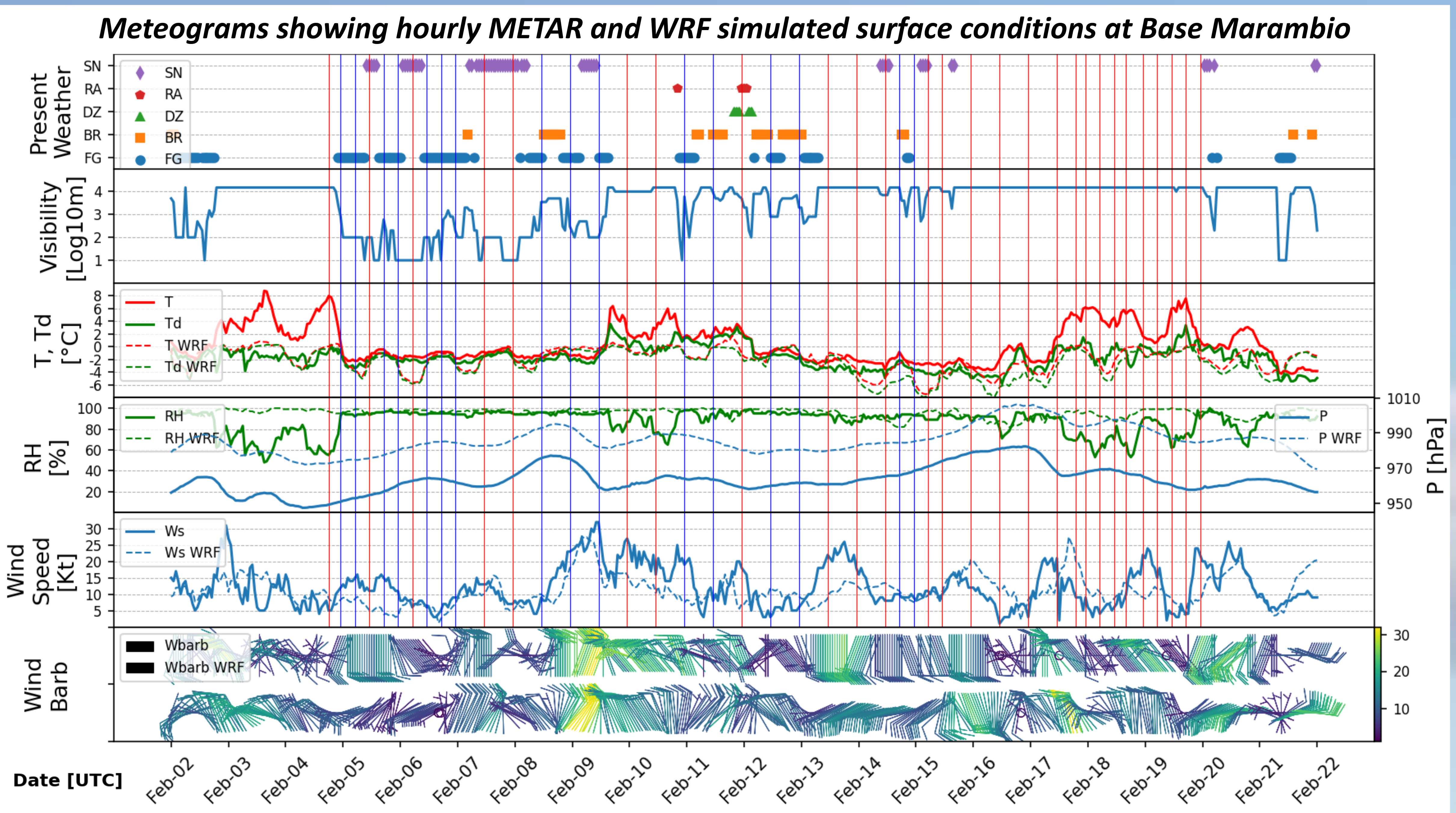


Visibility and Fog Synoptic and Mesoscale Variability over Marambio Base, Antarctic Peninsula

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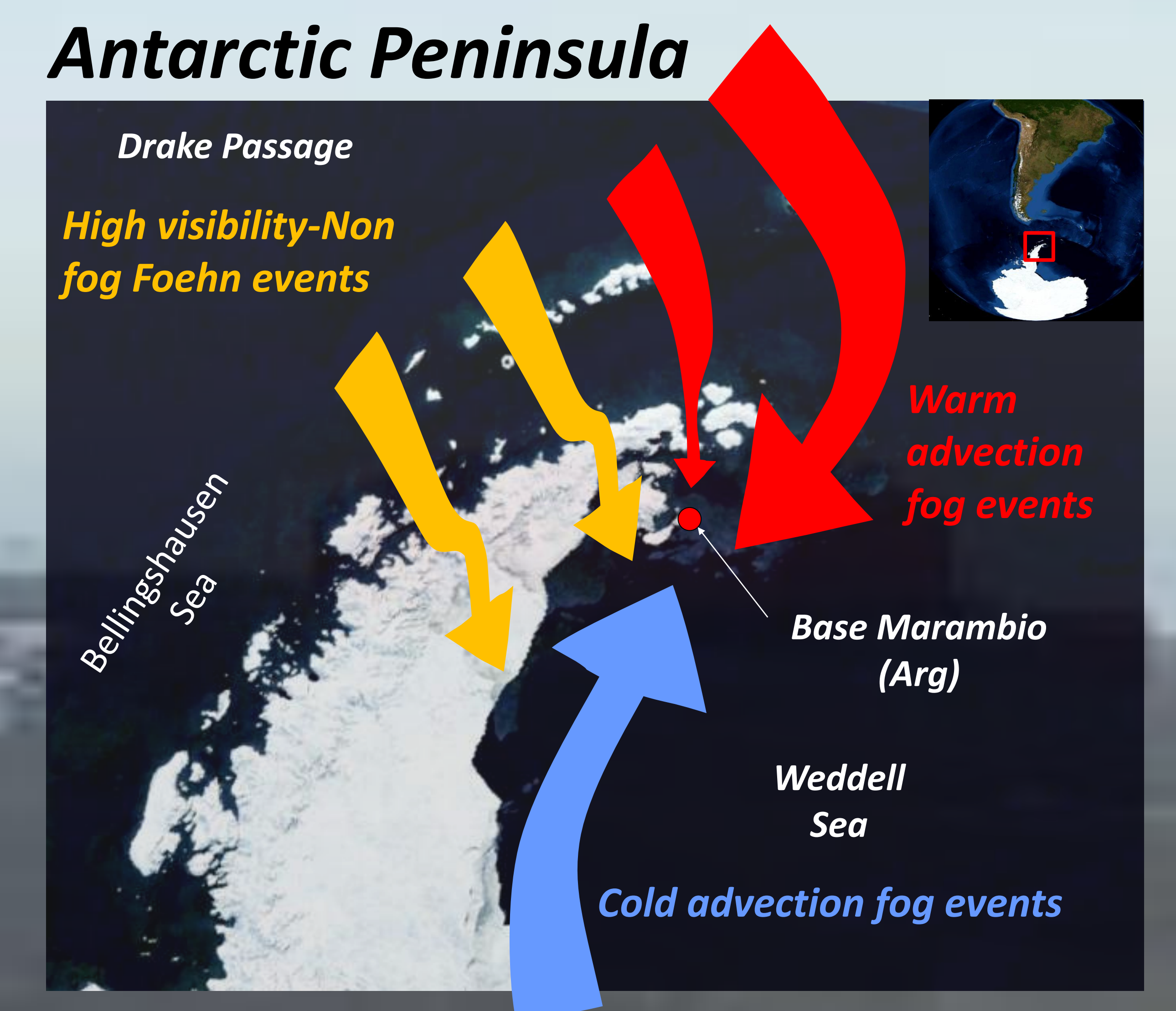
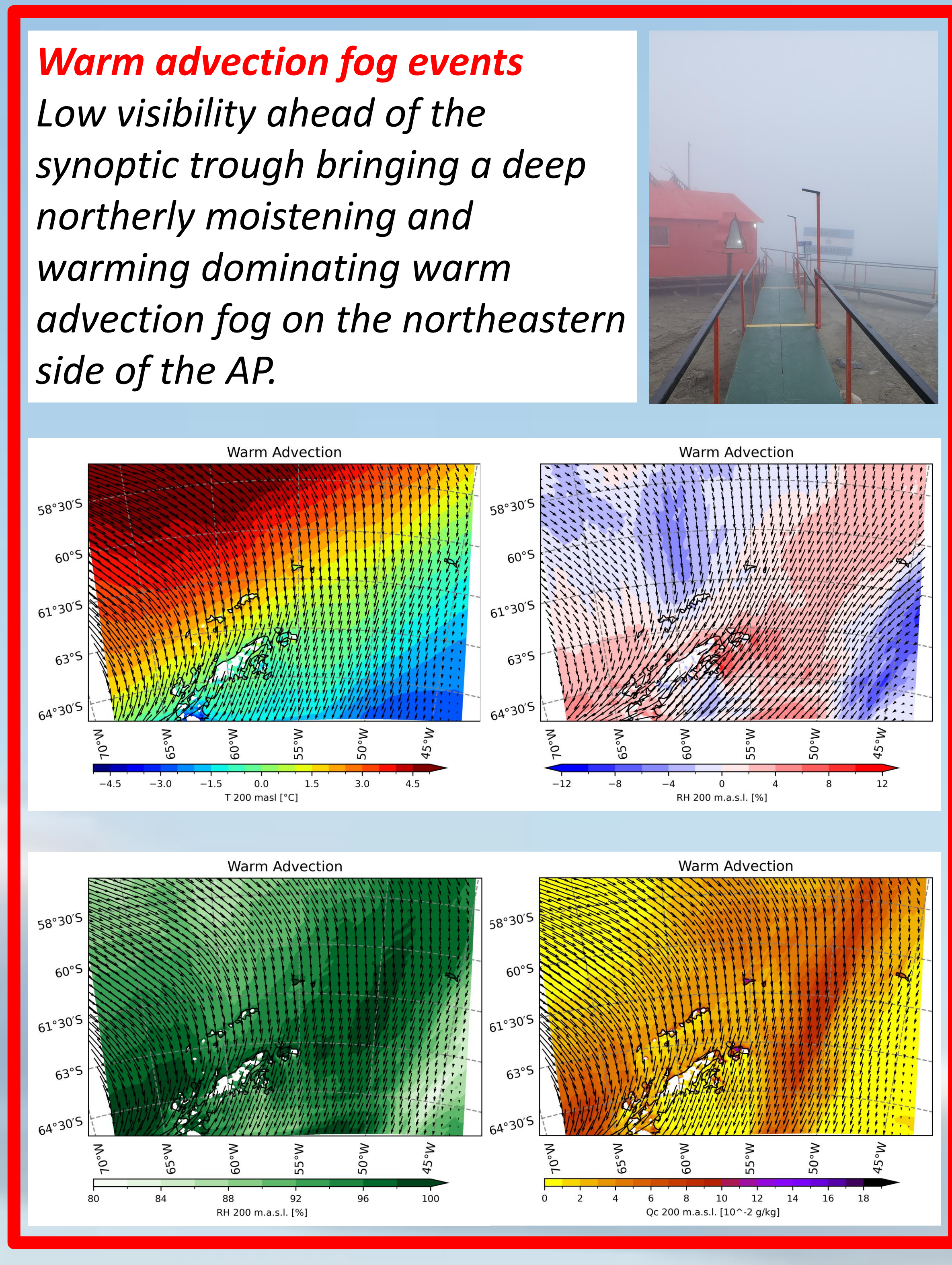
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3. Servicio Meteorológico Nacional, Argentina.

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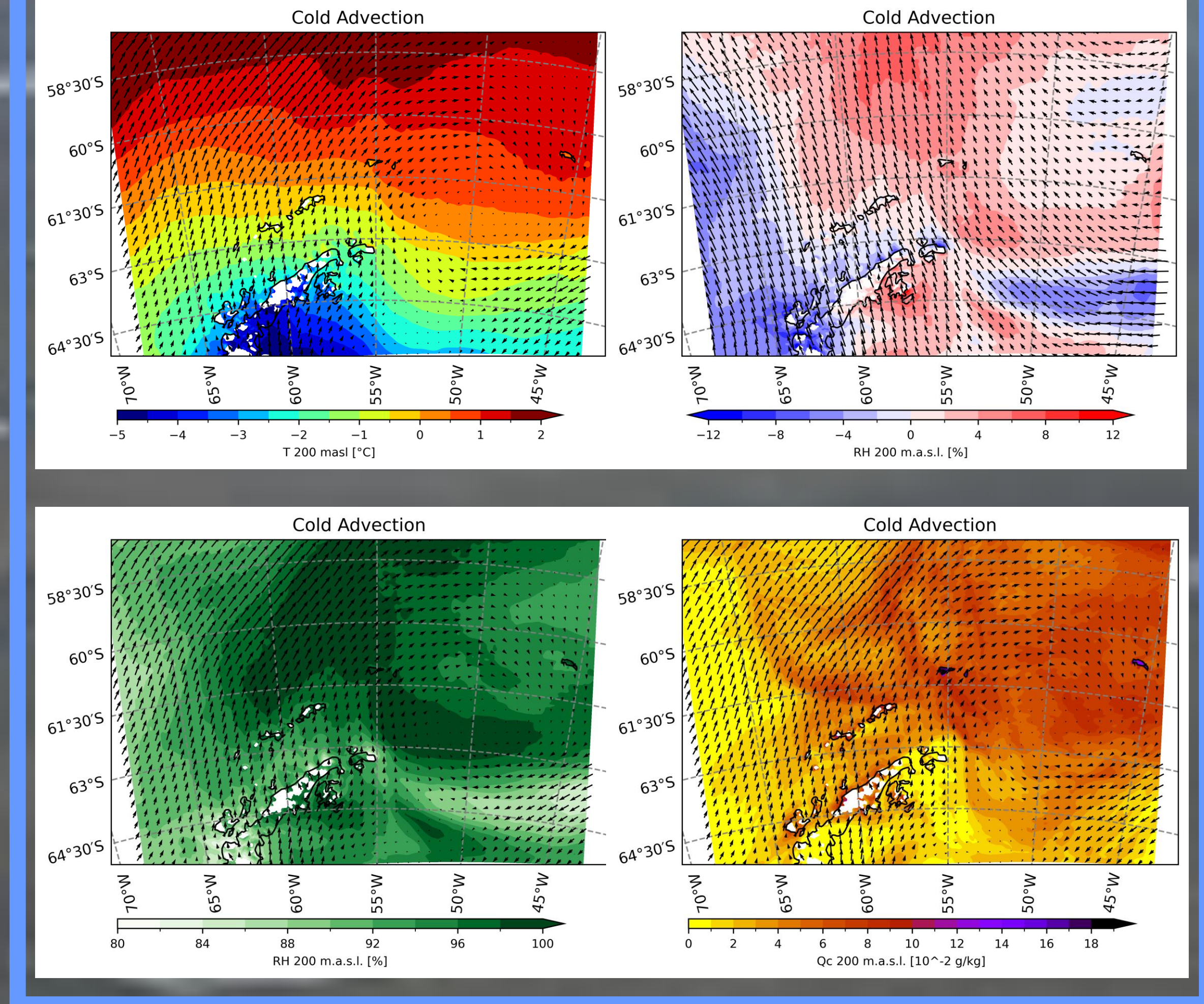


High visibility-Non fog Foehn events
 Observed three multiday Foehn events, mostly driven by stable and strong NW flow to the Antarctic Peninsula

- Warm and moist airmasses on the windward side
- Warmer and dryer air masses on the lee side (consistent with the Foehn phenomenon)
- Relatively good visibility and reduced likelihood of fog



Cold advection fog events
 A meso-low (heat-low) formed on the lee side of the Peninsula, later moved eastward with the synoptic trough, bringing cooler southerly air that lower visibility and favoring cold advection fog. Cooling is also maintained ahead of the synoptic ridge sustaining cold advection fog.



The Objectives and Field Campaign

- The Colombian Air Force (FAC) spearheaded a collaborative effort with DRI, the Argentine Air Force, and the Antarctic Institute to conduct intensive upper-air observations at Base Marambio.
- Investigate day-to-day variability of visibility (critical aviation and research exploration hazard).
- From Feb 02 to Feb 22, 2023, launch 2-4 soundings per day (46 soundings overall) observing highly fluctuating visibility conditions (improving the usual 1 per week upper-air observation in the area).
- This data facilitates a deeper understanding of the synoptic-to-mesoscale processes governing visibility in the region. Moreover, it provides invaluable insights for refining operational numerical weather predictions and advancing climate studies through stringent model constraints and evaluations.

Remarks and lessons learned

- High latitude cyclones and related troughs help modulate fog and low visibility in Base Marambio from mesoscale to synoptic timescales.
- Observations, in combination with WRF simulations, help examine the mechanisms favoring fog.
- Foehn wind settings drive good visibility conditions.
- A new 2024 field campaign will add more events.
- A model intercomparison will help add confidence in operational models used in the area (MPAS, PWRP, FAC-WRF).