Current and Future Opportunities for AR Recon Sampling of Systems with Downstream Impacts Over CONUS

Samuel M. Bartlett[1], Jason Cordeira[1], Brian Kawzenuk[1], Jackson Ludtke[1], & Anna Wilson[1]

[1] Center for Western Weather and Water Extremes, Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA

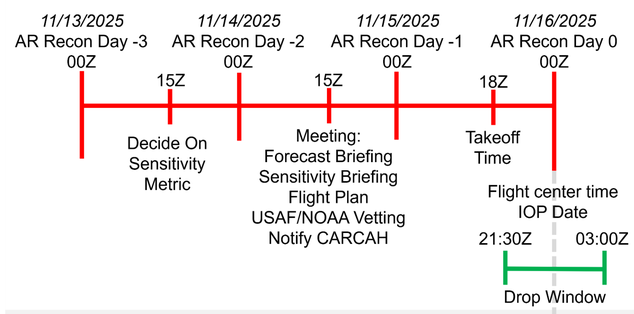
AR Recon PI: F. M. Ralph
AR Recon Co-PI: V. Tallapragada

AR Recon is a Research and Operations Partnership (RAOP) led by CW3E in collaboration with NOAA's Aircraft Operations Center and the US Air Force Reserve Command's 53rd Weather Reconnaissance Squadron. AR Recon collects atmospheric observations using dropsondes for assimilation into global forecast models. These observations are targeted at improving operational weather forecast models, with the data collected serving a secondary benefit through research purposes.

AR Recon operations are outlined in the National Winter Seasons Operations Plan (NWSOP) with missions primarily sampling ARs and their essential atmospheric structures over the Northeast Pacific. In addition to this sampling off the US West Coast, AR Recon teams also help plan weather recon missions in the eastern US over the Gulf and Atlantic. These eastern missions are generally motivated by high-impact winter weather forecast to impact population centers in the southern and eastern US.

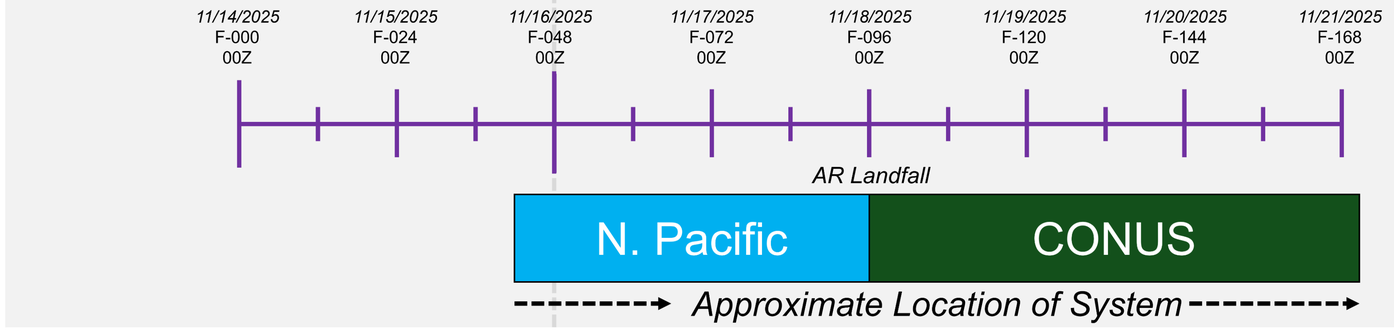
AR Recon teams monitor the forecast for these Eastern US systems and provide targeting guidance, but the ultimate decision to call for flights is with NWS Senior Duty Meteorologist on duty who issues priority levels for these missions.

AR Recon Flight Center Relative Timeline

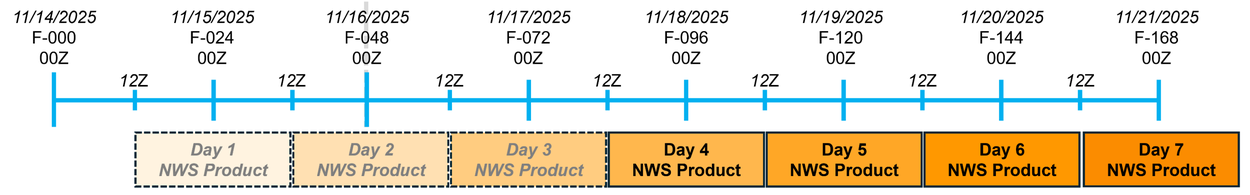


- *The majority of AR Recon planning happens 2 days prior to flight center time, using F-48 graphics from the 00Z models.*
- *AR Recon begins sampling systems northwest of Hawaii 2-3 before they move onshore over the US West Coast. Generally, these systems continue to propagate downstream across the Western and Central US over the succeeding 1-3 days.*
- *When considering impacts over CONUS, AR Recon would most likely be planning with Day 3 or beyond NWS Outlook Products (i.e. convective outlook, ERO)*

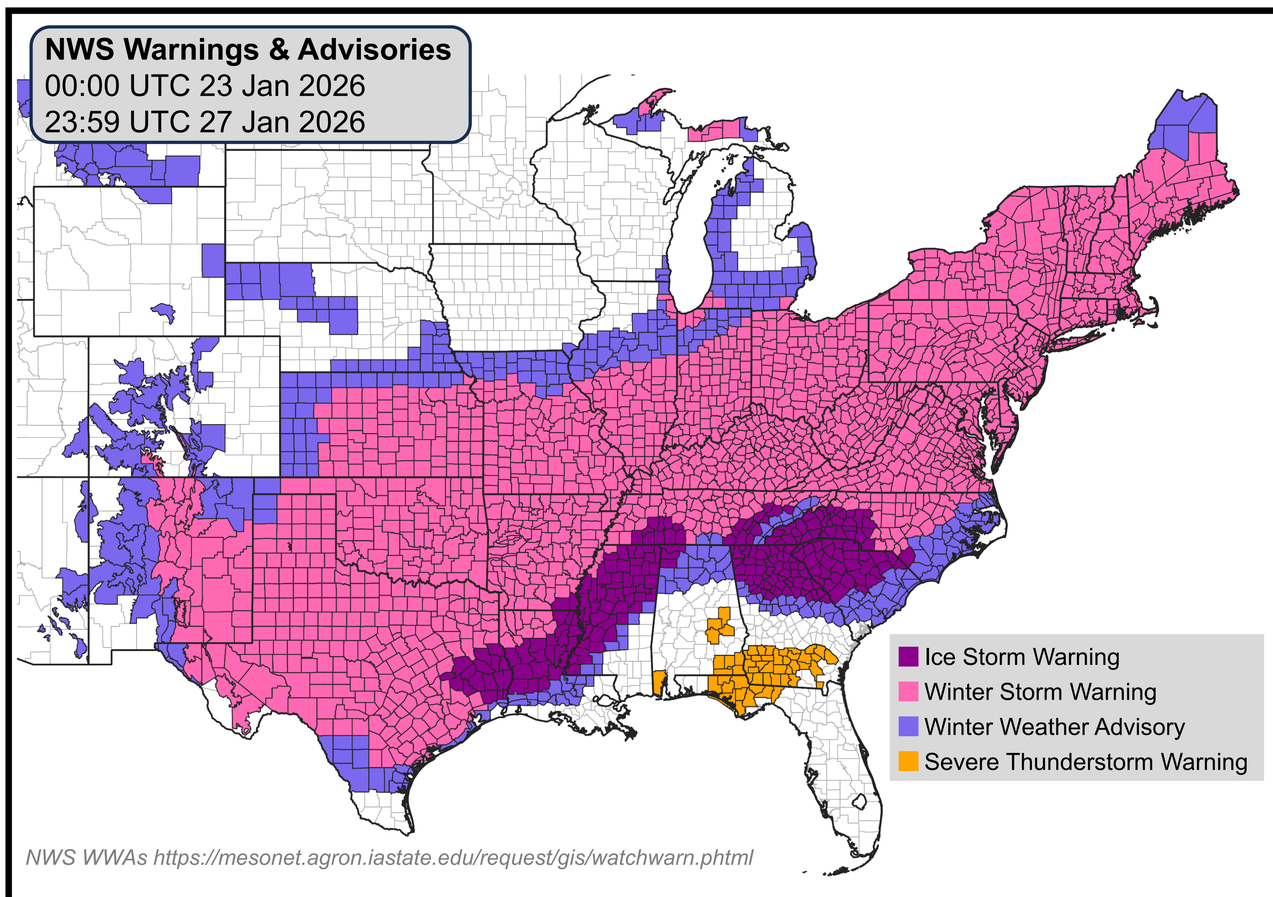
Model Initialization Relative Timeline



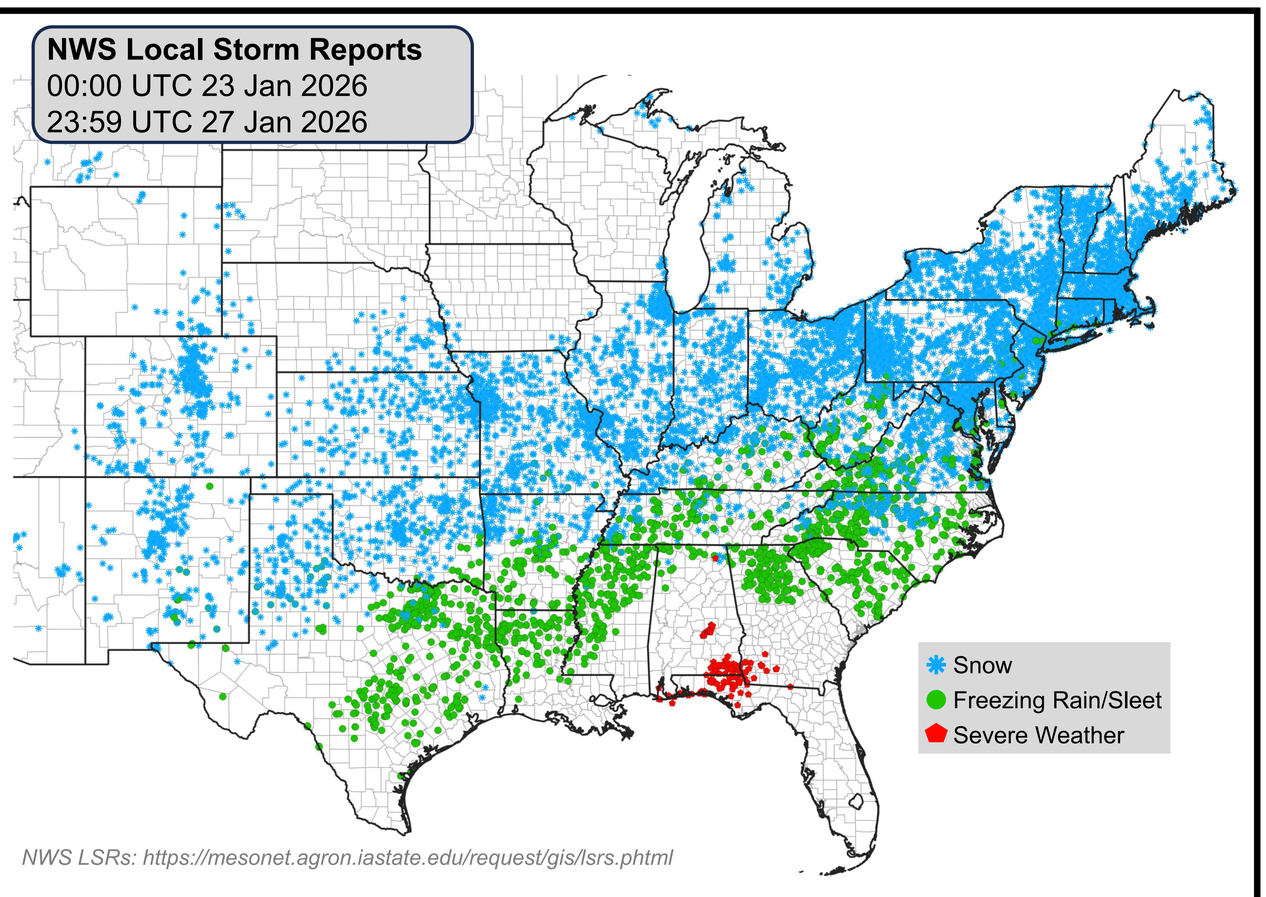
NWS Product Relative Timeline



*Assorted timelines centered around the 00Z AR Recon flight center time (vertical dashed grey line). AR Recon meeting logistics (**top**), model initialization (**center**), and NWS product (**bottom**) timelines.*



NWS WWAs https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml



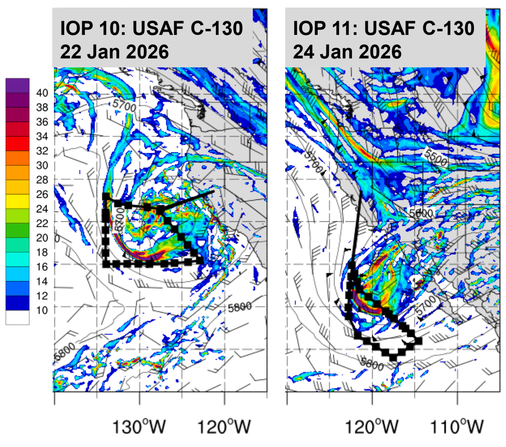
NWS LSRs: https://mesonet.agron.iastate.edu/request/gis/lsrs.phtml

As forecasts began trending towards a high-impact winter storm over the central and eastern US, AR Recon teams began tracking the atmospheric features within range of project aircraft. Forecast and sensitivity analysis indicated sampling would be beneficial within a mid-level trough and moisture plume offshore of California and Mexico. These features transited eastward across the Southwest/Mexico and played a role in the significant winter storm.

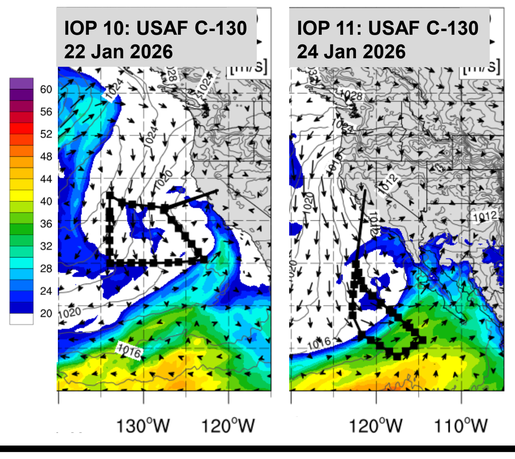
The impacts of this winter storm were wide-reaching across the central and eastern US. Heavy snowfall occurred from the Midwest into the Northeast with sleet and freezing rain across the Southeast and southern Appalachians. In addition to this winter weather and record cold outbreak, there was also severe weather over the Southeast, with tornados reported in Alabama, Georgia, and Florida.

East Pacific Sampling

GFS 500-hPa Abs. Vort., Height, Winds

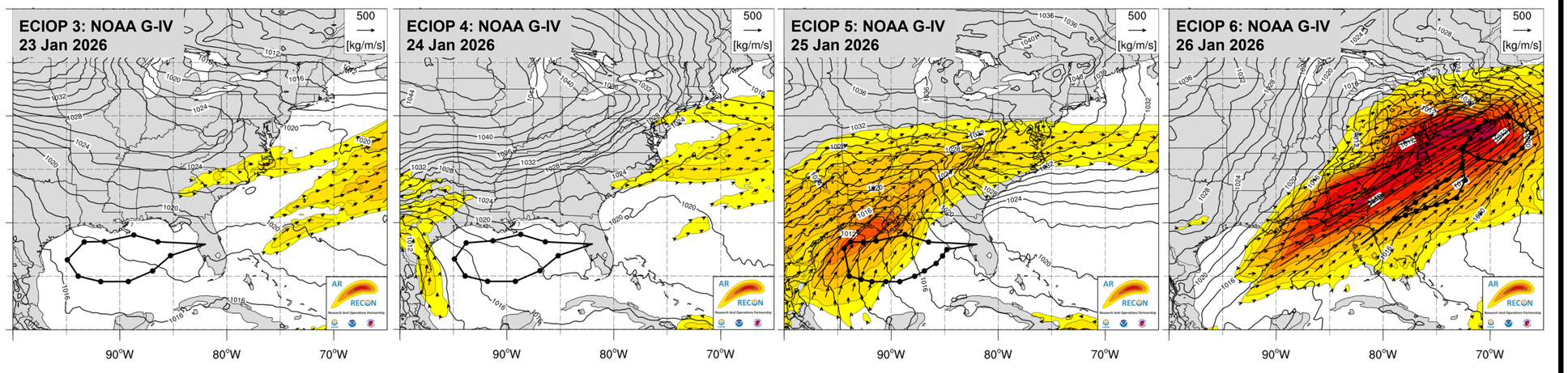


GFS IWV, 850-hPa Winds, SLP



Gulf & Atlantic Sampling

GFS IVT, IVT Vectors, SLP



GFS IWV, 850-hPa Winds, SLP