

Introduction

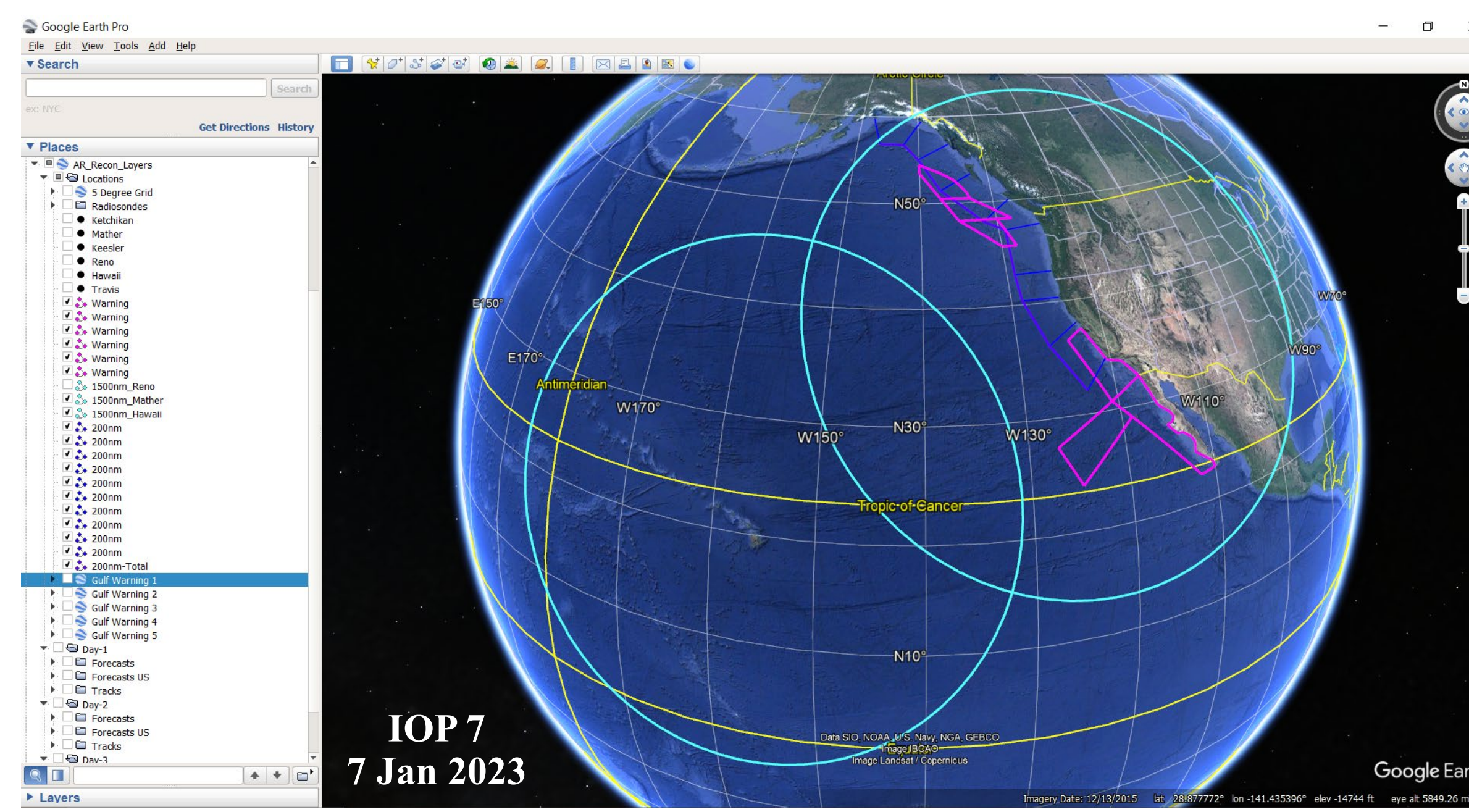
An atmospheric river (AR) is a long, narrow corridor of enhanced atmospheric moisture transport (Ralph et al., 2004) and can be responsible for nearly half of California's annual precipitation while causing flood damages throughout the western U.S. averaging \$1.1 billion annually. Recognizing this, The Center for Western Weather and Water Extremes (CW3E) has been developing the science and tools necessary to improve the prediction of landfalling ARs along the U.S. West Coast. One way this is done is through the Atmospheric River (AR) Reconnaissance (AR Recon) field campaign.

AR Recon goal: Support water management decisions and flood forecasting by developing and testing the potential of targeted airborne and buoy observations over the Northeast Pacific to improve forecasts of landfalling ARs at lead times of 1-5 days. Innovations in targeting methods, data assimilation and regional forecast skill requirements are pursued through collaborative, cross-disciplinary, science-based strategies.

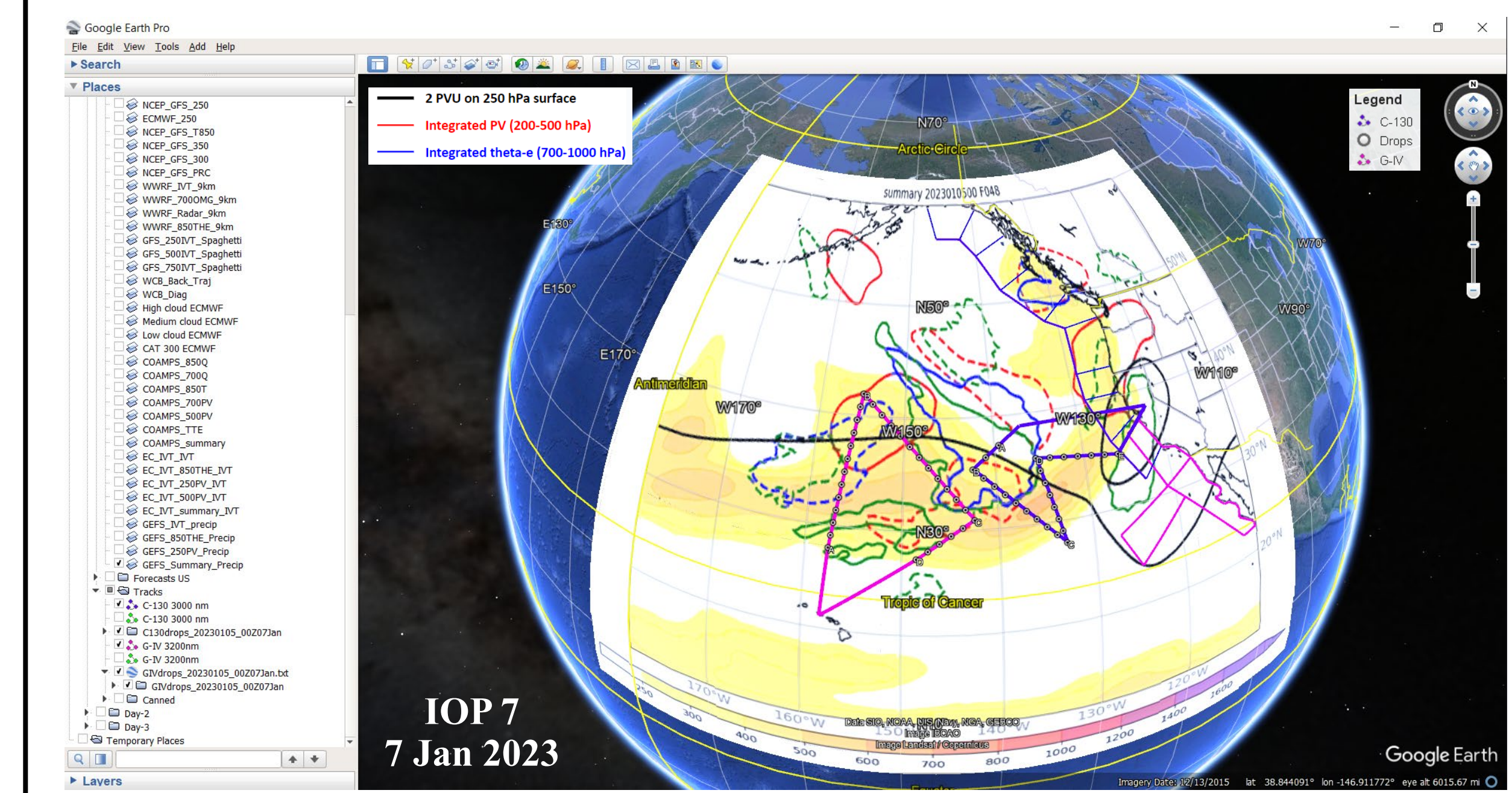
In accordance with the National Winter Season Operations Plan (NWSOP) custom Air Force C-130 and NOAA G-IV flight tracks are designed in the North Pacific with targeted dropsonde locations that sample weather phenomena and atmospheric characteristics in and near ARs to maximize potential forecast improvements.

Preparation of flight tracks and dropsonde locations for an Intensive Observation Period (IOP) mission is done using free Google Earth software to display various CW3E forecast graphics and sensitivity plots. Flight track development occurs before and during CW3E weather briefings that are held when potentially impactful ARs are within flight range. The tool remains a work in progress with continued optimizations for efficiency and automation.

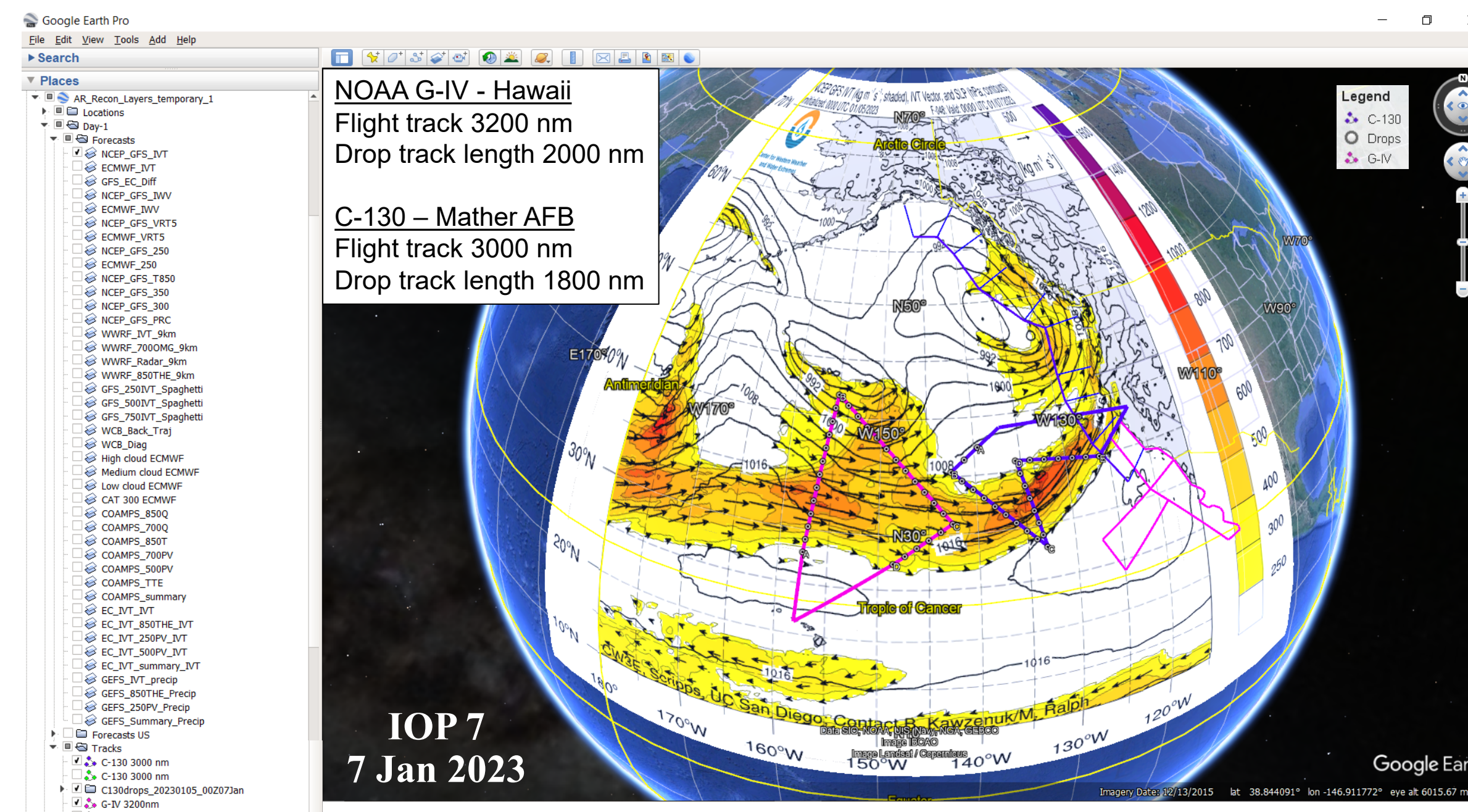
Google Earth Coordination Tool



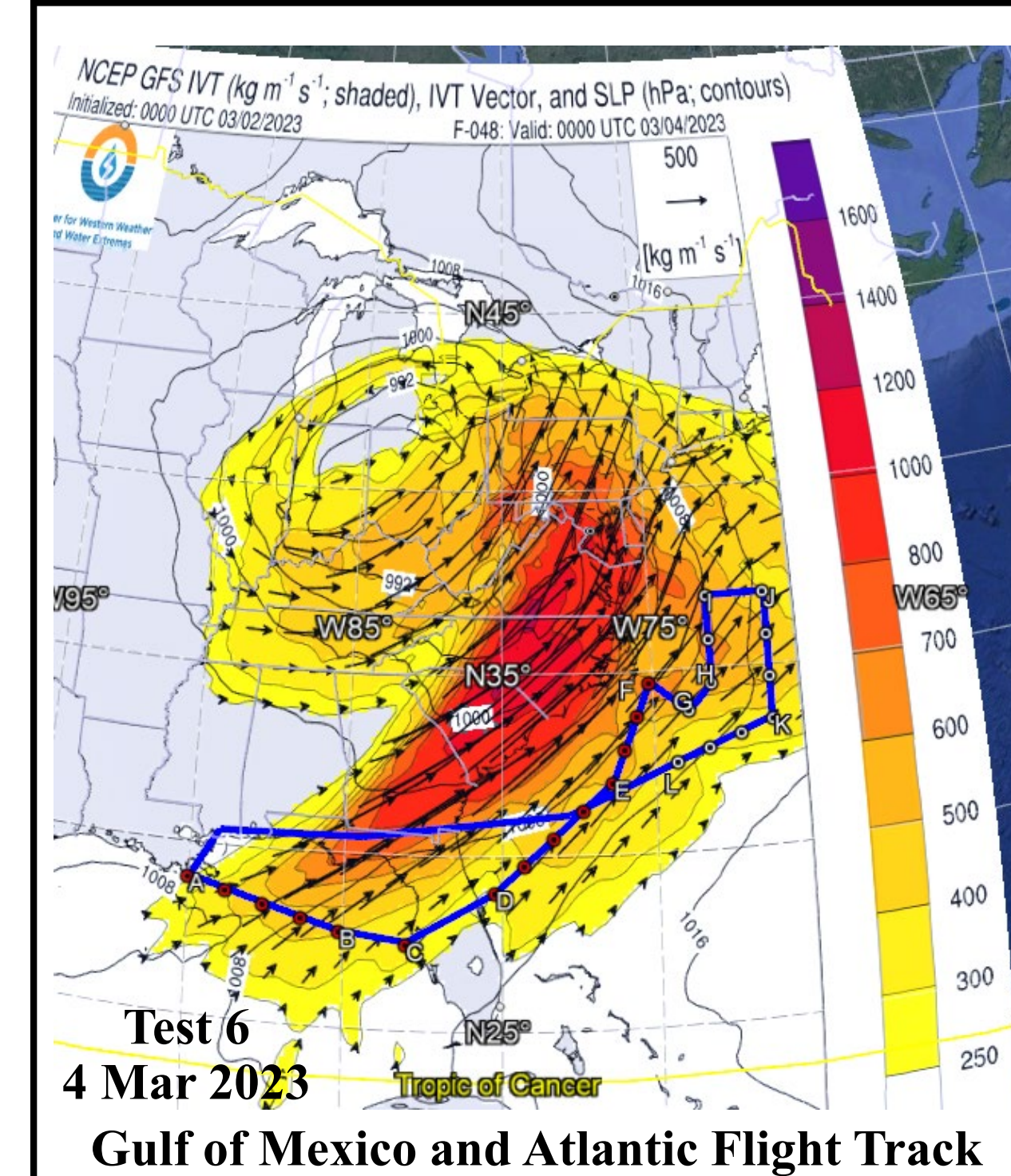
Typical Warning Areas and Flight Distance Rings



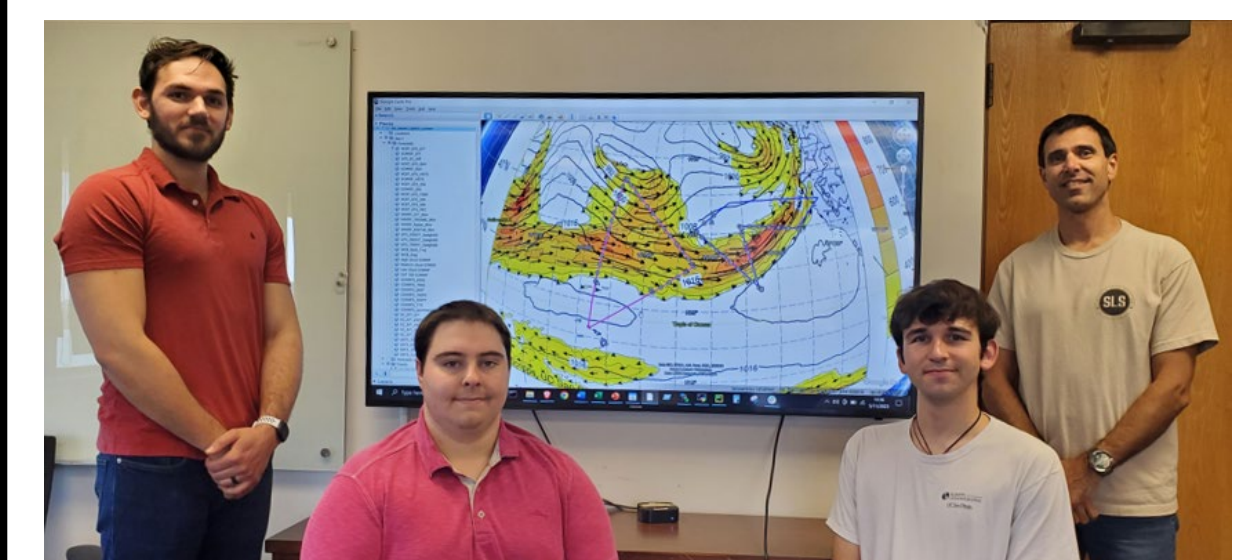
Pacific Flight Track Planning – GEFS and CMC Precipitation Sensitivity Summary



Pacific Flight Track Planning – GFS IVT



Gulf of Mexico and Atlantic Flight Track

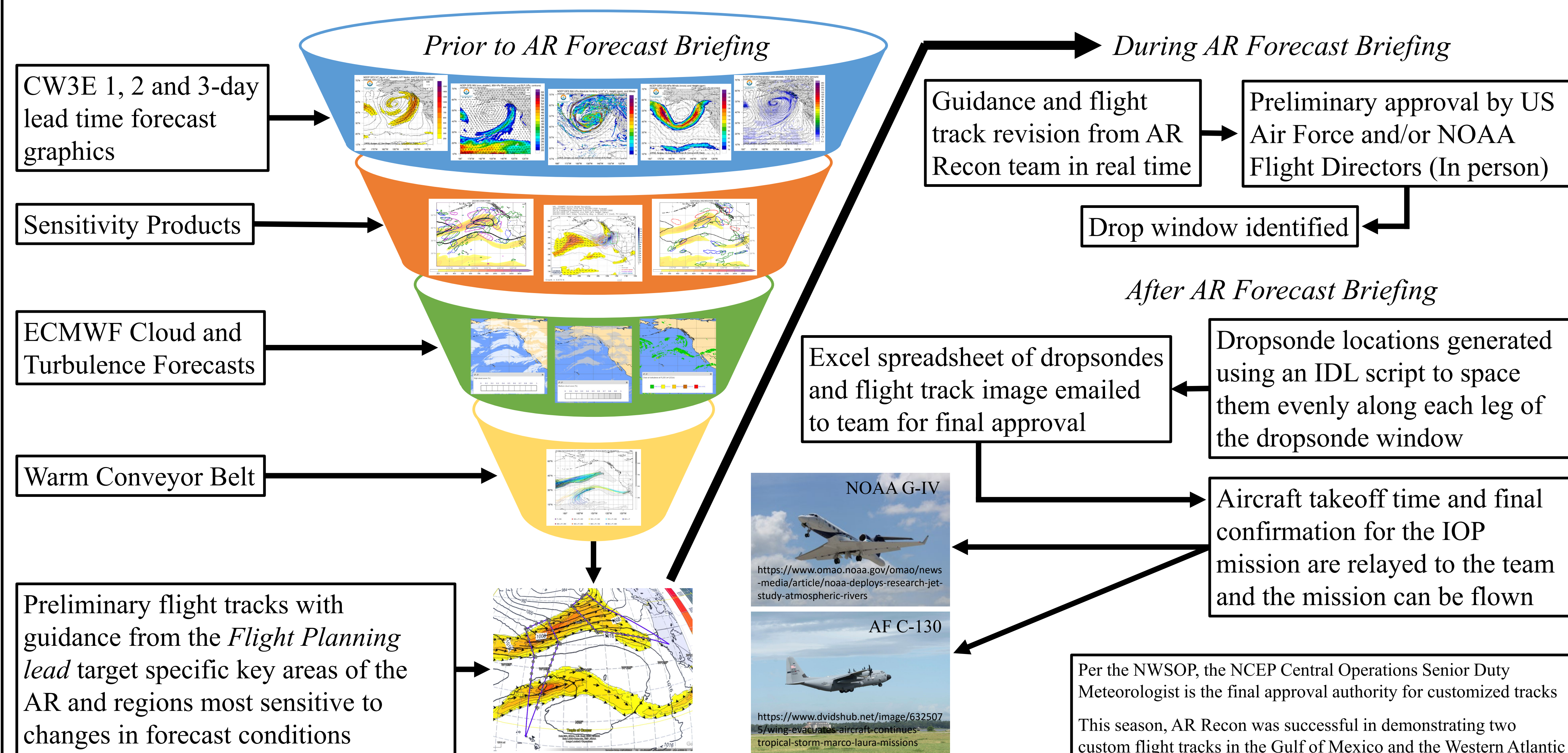


WY 2023 Flight Planning Coordinators
Left to Right: Kyle Hurley, Sam Bartlett, Jackson Ludtke, Shawn Roj



In-Person AR Recon Briefing Room

AR Recon Flight Coordinator Flowchart



WY 2023 Results and Future Work

- 39 Pacific IOPS flown with two test flights in the Gulf of Mexico and W. Atlantic
- 1380 dropsondes released in the Pacific and 39 dropped in the Gulf and W. Atlantic
- Incorporate predicted satellite overpass track and swath information that may tell us where gaps in satellite data retrieval are located
- Improve automatic updates of sensitivity products. These are currently updated in Google Earth manually each AR Recon day
- Improve dropsonde location script for more automation. Spreadsheets are currently created manually
- Save .kmz as a snapshot in time so images do not update after the briefing

References/Acknowledgements

Neiman, P. J., & Wick, G. A. (2004): Satellite and CALJET aircraft observations of atmospheric rivers over the eastern North Pacific Ocean during the winter of 1997/98, *Monthly Weather Review*, 132(7), 1721-1745.

Many thanks go out to the entire CW3E AR Recon team for allowing me to expand upon the Flight Track Coordination Tool during the WY 2023 AR Recon season. This year, we employed two UCSD undergraduate students, Jackson Ludtke and Kyle Hurley, to help lead the tool during AR Recon briefings. Their help in streamlining certain aspects of the tool and willingness to lead under a fast-paced environment proved to be invaluable during this extremely busy season.

In addition, we would like to acknowledge and congratulate Jackson Ludtke for being a 2023 UCSD Student Employee of the Year for his role in AR Recon.