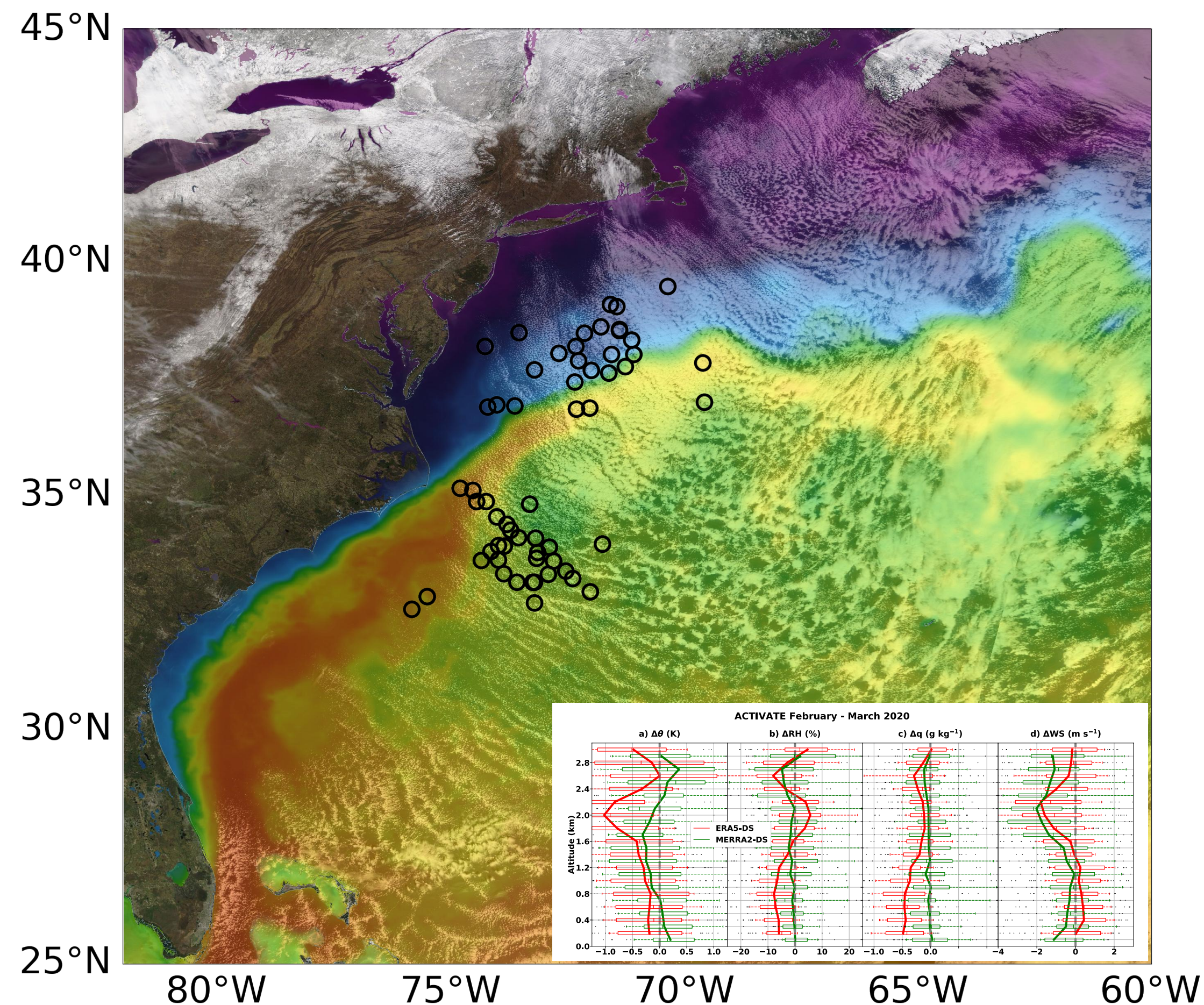# On assessing ERA5 and MERRA2 representations of cold-air outbreaks across the Gulf Stream

Seethala, C., Zuidema, P., Edson, J., Brunke, M., Chen, G., Li, X., Painemal, D., Robinson, C., Shingler, T., Shook, M., Sorooshian, A., Thornhill, L., Tornow, F., Wang, H., Zeng, X., and Ziemba, L.

Figure: Dropsondes, from the NASA ACTIVATE winter 2020 campaign, assess reanalyses representations (reanalysis - dropsonde profiles with ERA5 in red and MERRA2 in green) of cold-air outbreaks across the warm Gulf Stream current. (*Terra MODIS visible imagery and high-resolution sea surface temperatures (GHRSST) for 1 March 2020 from NASA Worldview. Dropsonde data available through doi:https://doi.org/10.5067/ASDC/ACTIVATE_MetNav_AircraftInSitu_KingAir_Data_1.*)

Key Findings:
- Reanalysis surface fluxes and boundary layers are representative of observations to first-order, sufficient for higher-resolution model initialization.
- Reanalyses represent the Gulf Stream more broadly than is seen in nature, contributing to turbulent flux and boundary layer biases.
- Previously-noted thermodynamic and dynamic biases reinforce (ERA5) or compensate (MERRA2) surface fluxes but support realistic winter boundary layer heights.