Weekly Report – January 31, 2025

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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SOCIAL MEDIA AND BLOG POSTS

The Gulf Coast and Southeast Get a Snowy Taste of Winter

Replete with colorful visuals, CISESS Scientist and Satellite Liaison to the National Weather Service Weather and Ocean Prediction Centers Christopher Smith's latest blog post discusses the winter snowstorm that swept across the Gulf Coast and Southeast last week. Thanks to an Arctic blast of frigid air, this part of the U.S. was treated to record snowfall amounts and even thundersnow at times. Eight inches of snow were reported in parts of Louisiana, Alabama, Florida, and North Carolina. Of note, the single-day snowfall record in New Orleans of 2.7 inches set in December 1963 was shattered; eight inches were measured, surely a tough record to beat.

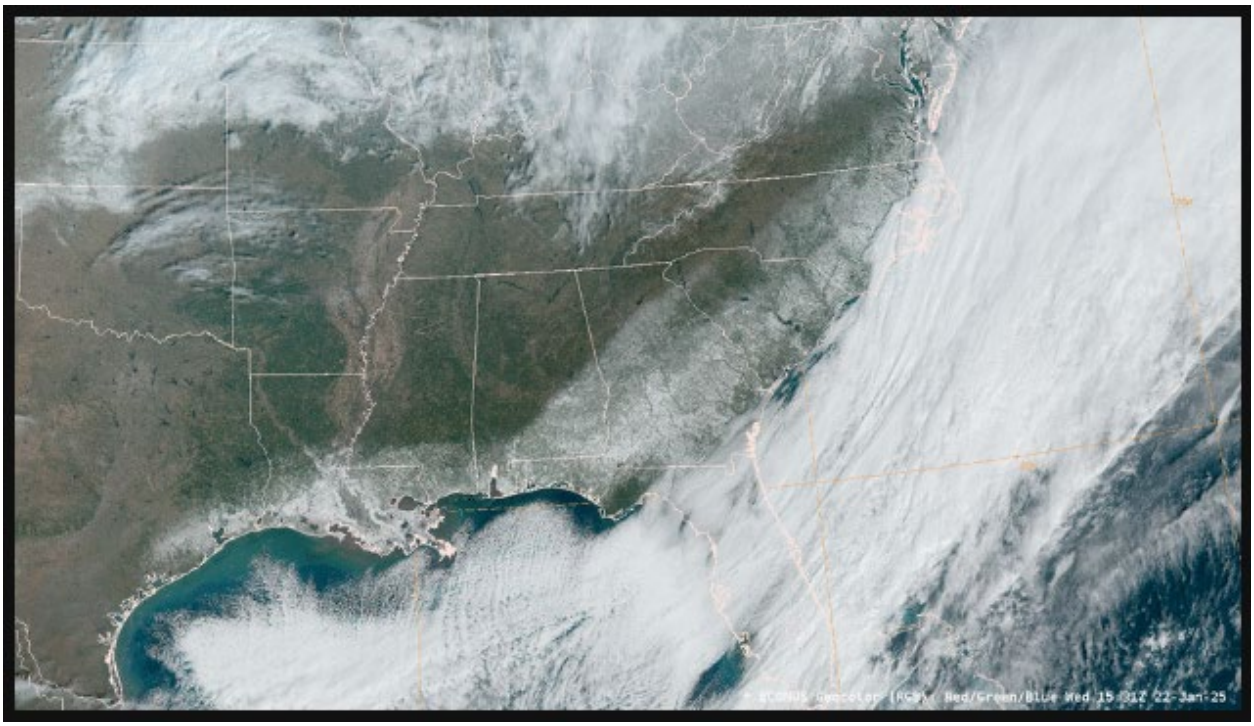

Figure. Image from the GOES-East CONUS Geocolor product on 22 January 2025. A swath of snow is visible from Texas up to North Carolina.

(Christopher Smith, CISESS, csmith70@umd.edu; Funding: GOES-R PGRR)

PUBLICATIONS

Estimating Planetary Boundary Layer Heights from Radio Occultation Measurements
Citation: Ho, Shu-Peng, **Guojun Gu**, and **Xinjia Zhou**, 2024: The Planetary Boundary Layer Height Climatology Over Oceans Using COSMIC-2 and Spire GNSS RO Bending Angles From 2019 to 2023: Comparisons to CALIOP, ERA-5, MERRA2, and CFS Reanalysis. *IEEE Trans. Geosci. Remote Sens*., 62, 5803314, https://doi.org/10.1109/TGRS.2024.3503418.
Summary: Accurately characterizing the planetary boundary layer height (PBLH) is important for air quality prediction and weather forecasting, among others. Radiosondes and lidars can accurately estimate the PBLH, but these measurements are point measurements made at a limited number of locations around the world. Space-borne nadir-viewing sounders have a low vertical resolution near the surface so cannot provide accurate PBLH estimates. Global Navigation Satellite System (GNSS) radio occultation (RO) measurements, with their high vertical resolution in the lower troposphere, offer a means of detecting the PBLH under all-weather conditions over much of the world. Using data from two GNSS RO missions, CISESS Scientists Shu-Peng Ho, Guojun Gu, and Xinjia Zhou developed a global climatology of PBLH over oceans covering the years 2019 to 2023 and compared their RO results with PBLHs from the European Centre for Medium-Range Weather Forecasts Atmospheric Reanalysis Version 5 (ERA-5), the Modern-Era Retrospective Analysis for Research and Applications Version 2 (MERRA-2), and the National Center of Environmental Prediction-Climate Forecast System (CFS). They report noticeable differences between RO PBLHs and reanalysis/model PBLHs. On a promising note, the RO PBLHs are consistent between 45°N and 45°S, heralding the possibility of combining these RO results with those from other RO missions to generate a global PBLH climatology, with polar regions included.

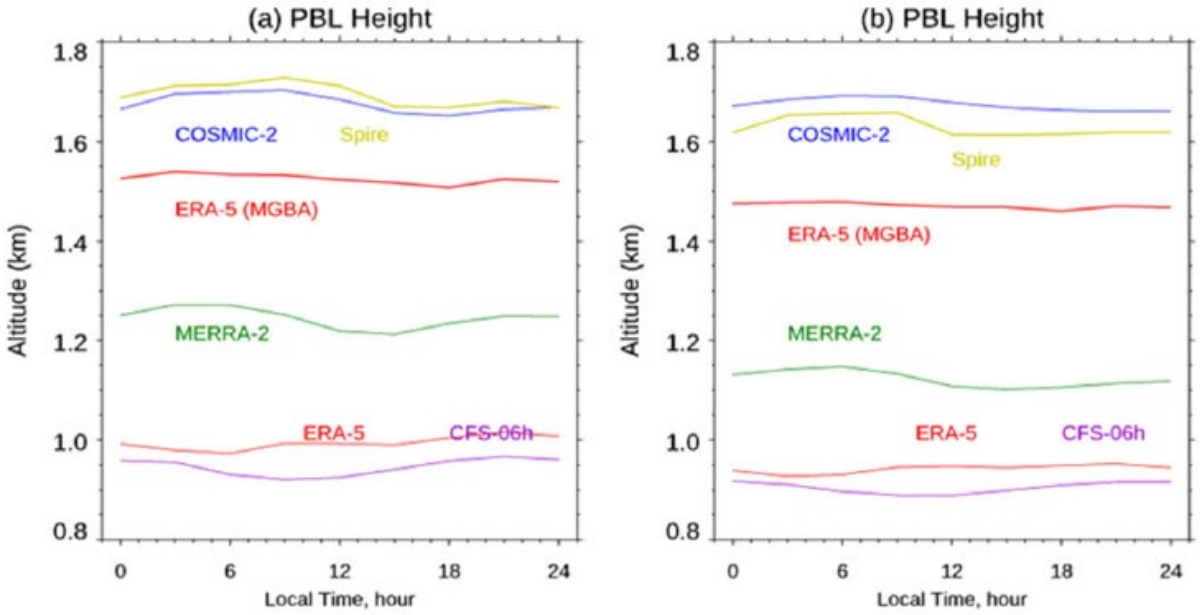

Figure. Diurnal variations of PBLH from COSMIC-2 and Spire (RO missions), ERA-5, MERRA-2, and CFS (a) in three stratocumulus-cloud-dominated ocean basins and (b) over global oceans between 45°N–45°S. A weak but clear diurnal variation in RO PBLHs is seen.

(Shu-Peng Ho, CISESS, shu-peng.ho@noaa.gov, Funding: COSMIC2; Guojun Gu, CISESS, ggu@umd.edu, Funding: COSMIC2; Xinjia Zhou, CISESS, xinjiaz@umd.edu, Funding: COSMIC2)

(Maureen Cribb, CISESS, mcribb@umd.edu, Funding: CISESS Task I)