Weekly Report – January 03, 2025
Cooperative Institute for Satellite Earth System Studies (CISESS)
NOAA/NESDIS/STAR

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SOCIAL MEDIA AND BLOG POSTS

Powerful Low Works Its way Across the Pacific

In his final 2024 blog post, CISESS Scientist and Satellite Liaison to the National Weather Service Weather and Ocean Prediction Centers Christopher Smith analyzed the mid-December hurricane-force low that developed in the North Pacific, forecasted well in advance by the Ocean Prediction Center. As it headed toward the Alaskan Aleutian Islands, much lightning was seen from space. A stratospheric intrusion of air with elevated levels of potential vorticity was identified, and ocean surface wind speeds on the southern side of the low were clocked at up to a rollicking eighty knots. Altimeter-measured wave heights even reached over twenty-eight feet at one location. Overall, December 2024 proved to be a highly active cyclone season in the North Pacific, a harbinger of what is in store for the new year.

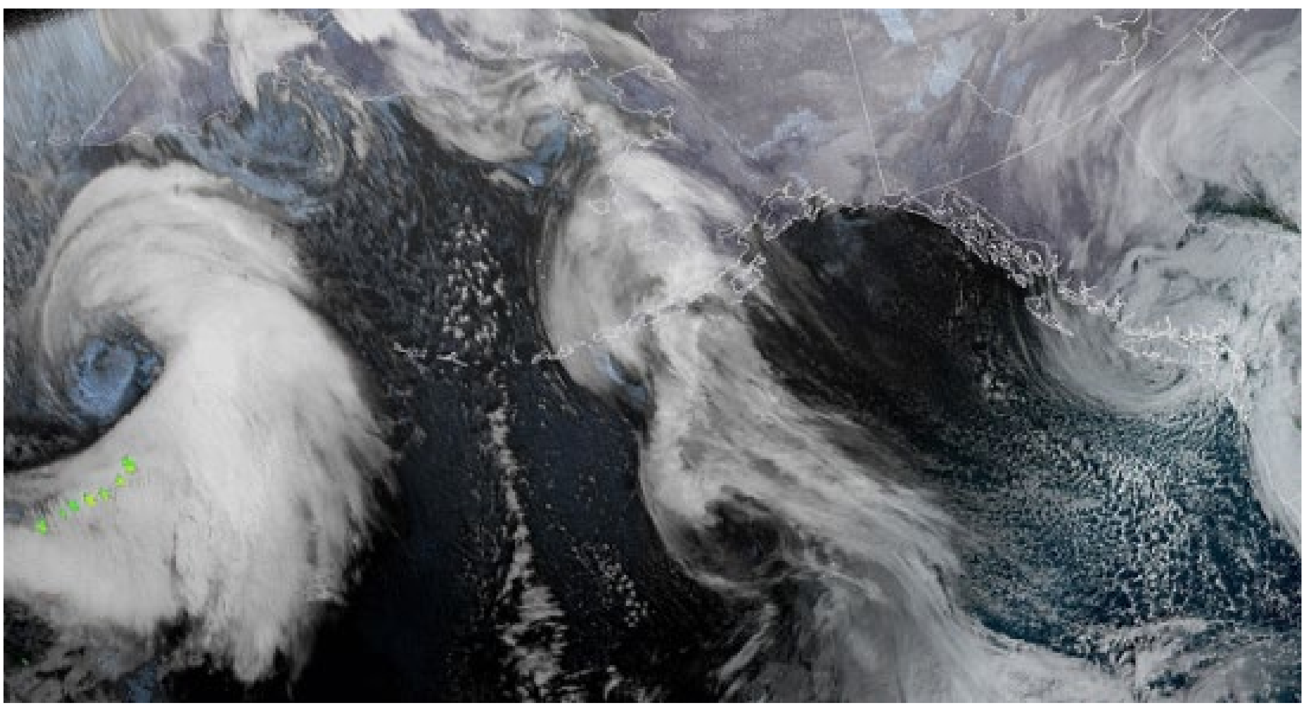

Figure. Lightning (green dots) detected along the cold front of the powerful low-pressure system on 14 December 2024.

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

PUBLICATION(S)

Tackling the M1 Striping Problem of the NOAA-20 VIIRS
Citation: Wang, Wenhui, Changyong Cao, Slawomir Blonski, and **Xi Shao**, 2025: A study of NOAA-20 VIIRS band M1 (0.41 µm) striping over clear-sky ocean. Remote Sens., 17, 74, https://doi.org/10.3390/rs17010074.
Summary: Launched in November 2017, the NOAA-20 satellite carries the Visible Infrared Imaging Radiometer Suite (VIIRS). Sensor data records from its visible and near-infrared bands have remained stable over the years. However, operational M1 (a band with a center wavelength of 0.41 µm) sensor data records have shown persistent scene-dependent striping over the clear-sky ocean since the beginning of the mission. CISESS Scientists Wenhui Wang and Xi Shao and colleagues investigate reasons why this has been happening in their recent paper published in the journal *Remote Sensing*. One potential factor examined was polarization, given the sensitivity of M1 to polarized light. Another potential factor considered was flawed on-orbit radiometric calibration-induced striping. Correcting for polarization using radiative transfer simulations and a methodology like the one used by the NOAA ocean color team revealed that there may be half-angle mirror-side and detector-dependent striping, in part caused by on-orbit radiometric calibration errors. Different calibrations are performed on-orbit, including a calibration involving very bright deep convective cloud (DCC) observations. Wang and Shao looked at many cases, finally showing that applying the DCC-based striping correction and the polarization correction can reduce the striping over the clear-sky ocean from 1.5–3.4% to 0.6–1.2%. The methodologies that they developed for the M1 band can be useful for other VIIRS visible and near-infrared bands that show noticeable striping over the clear-sky ocean.

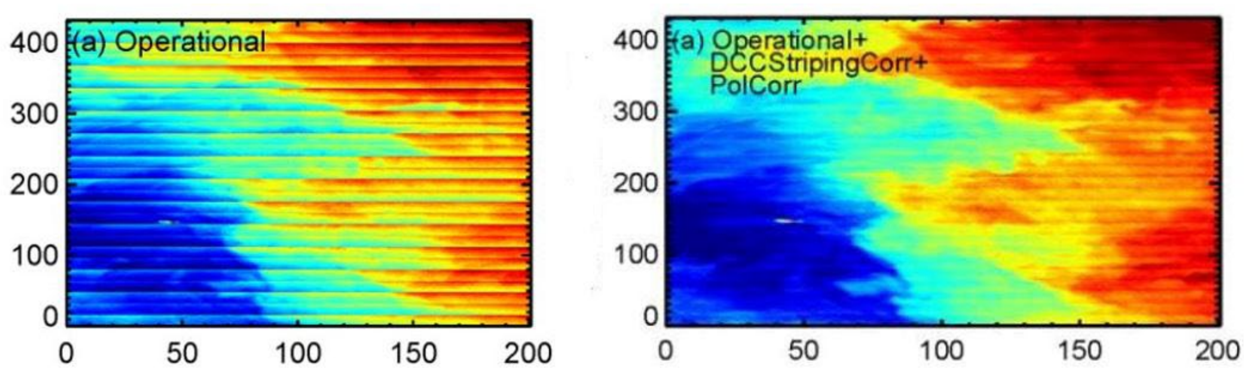

Figure. NOAA-20 M1 striping over a clear-sky ocean scene on 9 January 2024 at 20:36 UTC. The left panel shows the operational sensor data record image, and the right panel shows the same image after application of polarization and DCC-based striping corrections. Reduced striping is evident. Reflectances shown range from ~0.142 (deep blues) to ~0.154 (deep reds).

(Wenhui Wang, CISESS, whwang1@umd.edu, Funding: JSTAR, METOP-SG, OCIO; Xi Shao, CISESS, xshao@umd.edu, Funding: COSMIC2, DACS, JSTAR)

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