Weekly Report

CISESS
Cooperative Research Program Division (CoRP)
STAR/NESDIS
National Oceanic and Atmospheric Administration (NOAA)

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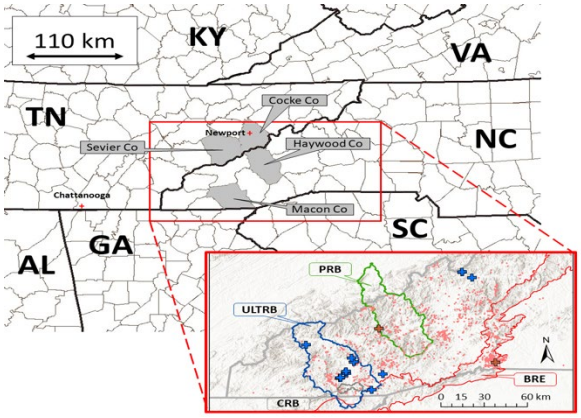
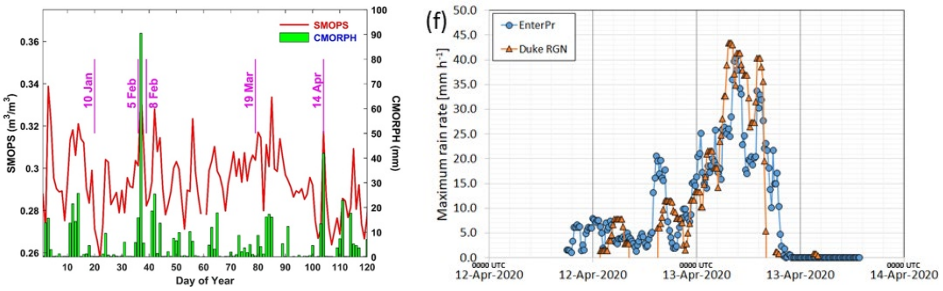
Publications

A Study of two Impactful Heavy Rainfall Events: Led by Dr. Miller from University of North Carolina, co-authored by four CISESS scientists – Jifu Yin, Malarvizhi Arulraj, Chris Grassotti and Veljko Petković, a two-part study on two impactful heavy rainfall events occurring in early 2020 in the Appalachian Mountains is published in the Journal or Remote Sensing. The study examines two atmospheric river-influenced events, qualified as extreme (top 2.5%) rain events in the archives of two research-grade rain gauge networks located in two different river basins, characterized by flooding, flash flooding, strong winds, landslides and tornadoes. Performed analyses revealed the large-scale and local atmospheric conditions contributing to a rather unusual surface response to the short duration of heavy rainfall. To illuminate some of the conditions unique to these events, the investigation gears towards the utility of several satellite-based algorithms. Considered are NOAA precipitation (GPROF, MiRS, SCaMPR CMORPH), soil moisture and vertical atmospheric profile products. Collocated observations suggest antecedent soil moisture conditioned by rainfall of the first [longer] event made the widespread triggering of landslides possible during the higher intensity rains occurring during the [shorter] event that followed. The contrast in the number of triggered landslides – [2 vs. 21],



Landslide locations related to the two impactful rainfall events in February (red crosses) and April (blue crosses) 2020. Colored outlines denote river basins of interest.



Left: Average daily SMOPS and CMORPH estimates for the period January – April 2020 for the domain extending from 34.25°N, 85.00°W to 37.25°N, 80.00°W. Right: Corresponding region maximum rain rate over the 1° x 1° landslide focus area for April 2020 event, estimated by SCaMPR (blue-circle) enterprise product and ground gauge network (orange-triangle).

emphasizes the importance of conditioning of the mid- and lower-soil layer moisture. Satellite-borne observations offered broad areal and temporal contexts of this conditioning, typically not available from *in situ* instrumentation in landslide prone regions such as southern Appalachians.

The two-part publication came as a result of collaboration between CISESS, STAR (R. Ferraro, B. Kuligowski, X. Zhan, P. Xie), CPC (S.Wu), CIRA (S. Kusselson, J. Forsythe and S. Liu) and SSEC (W. Straka) teams.

- Miller, D.; Forsythe, J.; Kusselson, S.; Straka III, W.; **Yin**, J.; Zhan, X.; Ferraro, R. A Study of Two Impactful Heavy Rainfall Events in the Southern Appalachian Mountains during Early 2020, Part I; Societal Impacts, Synoptic Overview, and Historical Context. *Remote Sens.* **2021**, *13*, 2452. https://doi.org/10.3390/rs13132452

- Miller, D.; **Arulraj**, M.; Ferraro, R.; **Grassotti**, C.; Kuligowski, B.; Liu, S.; **Petkovic**, V.; Wu, S.; Xie, P. A Study of Two Impactful Heavy Rainfall Events in the Southern Appalachian Mountains during Early 2020, Part II; Regional Overview, Rainfall Evolution, and Satellite QPE Utility. *Remote Sens.* **2021**, *13*, 2500. https://doi.org/10.3390/rs13132500

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Reprocessed VIIRS Enterprise Cloud Mask Product: In the July-1 issue of *Remote Sensing*, CISESS Scientists Lin Lin and Bin Zhang (STAR/SMCD) and Consortium Scientist Xianjun Hao (GMU) have a new article on the reprocessed Suomi-NPP Visible/Infrared Imager Radiometer Suite (VIIRS). The article documents the assessment of the operational VIIRS Enterprise Cloud Mask (ECM) with the one based on the reprocessed data. Overall, they found the differences were small. Most of the discrepancies occur between neighboring types at the cloud edge as shown in the figure below.

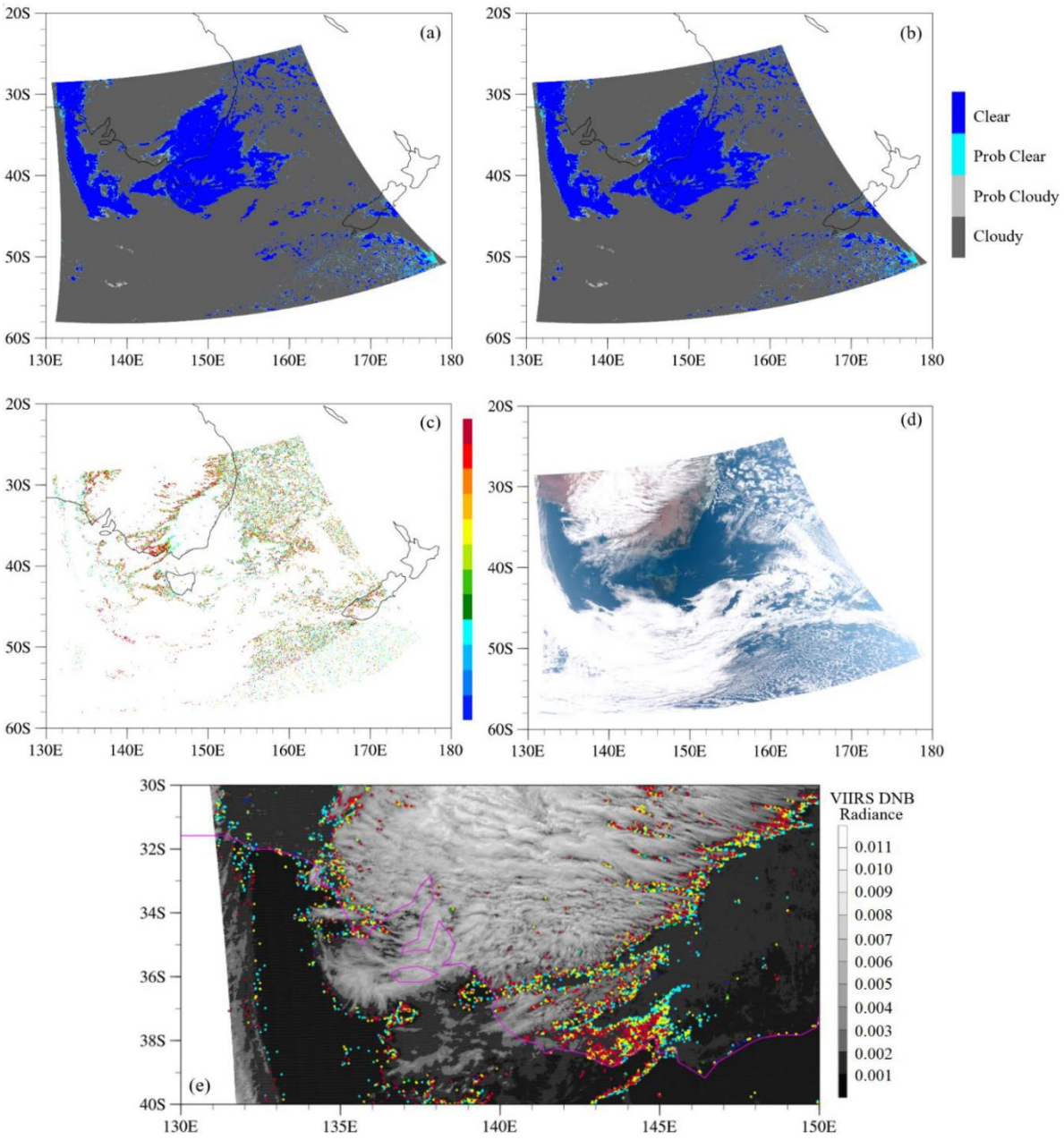

***Figure**: This is a retrieval from 1 May 2018: (a) operational cloud mask; (b) reprocessed cloud mask; (c) differences between a and b; (d) true-color image, and (e) the differences superimposed on the VIIRS Day-Night Band radiances.*

The reprocessed product has better consistency and stability, which will be useful for the use community. The Cloud Mask is essential for many other VIIRS Environmental Data Records (EDRs), such as aerosols, ocean color, and active fire.

Lin, Lin, Xianjun Hao, Bin Zhang, Cheng-Zhi Zou, and Changyong Cao. 2021. Assessment of the Reprocessed Suomi NPP VIIRS Enterprise Cloud Mask Product. *Remote Sens*., **13**, 2502. https://doi.org/10.3390/rs13132502.

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