**Improving the ABI Cloud Layers Product for Multiple Layer Cloud Systems and Aviation Forecast Applications**

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Abstract

We propose to improve the classification and categorization of multilayer cloud scenes viewed by the GOES-R ABI. We are proposing a two-pronged approach:

1) First, we will fuse historic Numerical Weather Prediction (NWP) predictions of layer relative humidity with existing, highly vertically resolved locations of clouds from spaced-based radar and lidar (CloudSat/CALIPSO). This dataset will then be used to train an operational algorithm that can identify cloud layers given NWP predictions of humidity, and ABI observations.

(2) Next, we propose a two-channel ABI-based method of quantifying the location of a lower cloud layer underneath an upper---level ice cloud, which will be particularly useful in clarifying the levels of clouds in the currently ambiguous "multilayered ice" or "overlap" categories. There will be two algorithms, one for day and one for night.

Finally, we will fuse information about cloud bases and tops gleaned through the elements above with our own existing algorithm (already applied to Suomi National Polar-orbiting Partnership [SNPP]/ Joint Polar Satellite System [JPSS] Visible Infrared Imaging Radiometer Suite [VIIRS] and Himawari-8 Advanced Himawari Imager [AHI]) for determination of cloud geometric thickness/cloud base, obtained by statistical analysis of CloudSat/CALIPSO and Aqua MODIS data. The end result will be an improved GOES-R cloud layer product, demonstrated in AWIPS-II, with the ability to flag each pixel as containing any combination of low, middle, or upper level cloud, with accompanying information about the height of these cloud layers. We expect such an improved product to have many practical uses, including for aviation and general weather forecasting.