

GOES-R ABI channel differencing used to reveal cloud-free zones of ‘precursors of convective initiation’

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Abstract

Previous GOES-R Risk Reduction funding has been used to allow CIRA to generate real-time synthetic GOES-R ABI data. Imagery for several ABI bands was produced with output from the CONUS domain of the 4 km NSSL WRF-ARW. Brightness temperature differences between band 13 and band 15 were found to exhibit cloud-free zones of ‘precursors of convective initiation’.

GOES-R future baseline products related to convection focus on convective initiation and on the probability of severe convection. Both products require pre-existing cumulus clouds. The main objective of this project is to fill in an important missing piece of the convective timeline: Where are convective clouds expected to form over the next few hours?

Variations of values of clear-sky band differences are due to both the temperature lapse rate and the depth of water vapor in the PBL. A temporal increase of the depth of water vapor in the PBL is responsible for the existence of ‘precursors of convective initiation’. In year 1 of the proposed work, AWIPS-2 will be set up to calculate the observed ABI band 13 minus band 15 difference with the appropriate scaling, configure appropriate color tables, evaluate boundary layer precipitable water (BPW)--in contrast to total precipitable water (TPW), collect and document case studies, and develop training for the National Weather Service (NWS). In years 2 and 3, enhancements to the straight band difference product will be developed. Enhancements include using three IR bands (including band 14) to quantify values of BPW. In addition, special midday soundings will be used to quantify BPW and temperature lapse rates when available. Finally, information from the GOES-R Baseline Clear Sky Mask will be used to locate clear scenes.