The Critical Role for Satellite Data in a Fused Capability to Diagnose the Flight Icing Threat to Aircraft

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William L. Smith, Jr.[1], Patrick Minnis[1], Frank McDonough[2], Cecilia Fleeger[3], Douglas A. Spangenberg[3]

[1]NASA Langley Research Center, Hampton, VA
[2]NCAR Research Applications Laboratory, Boulder, CO
[3]Science Systems and Applications, Inc. Hampton, VA

It's well known and documented that current numerical weather analyses do not prescribe cloud characteristics and effects with the accuracy and scale needed to adequately identify potential weather hazards such as the flight icing threat to aircraft. This is partly due to the paucity of information on cloud properties being assimilated in current weather analyses and shortcomings in the model physics needed to balance the current state of the atmosphere generated from the models 'first guess', among other reasons. Thus, observations of cloud parameters associated with icing conditions either directly or remotely are critically important to any system designed to infer the potential for aircraft icing in a particular area. Direct observations, by way of Pilot reports, are of first order importance when and where they are available (i.e. over the CONUS), but are relatively sparse. Cloud parameters derived at high spatial and temporal resolution from satellite observations have proven useful to diagnose aircraft icing conditions in many cloud conditions, and form the basis of a standalone algorithm designed to estimate the FIT from Geostationary Operational Environmental Satellite (GOES) data. Current icing information available to forecasters at the Aviation Weather Center (AWC) include the Current and Forecast Icing Products (CIP and FIP), which blends relevant data from multiple sources, such as satellite, surface, radar, lightning, and routine Pilot Reports (PIREPs), with model forecasts of temperature, relative humidity, SLW, and vertical velocity. Currently, satellite data are only used in a rudimentary way to help identify the vertical location of cloud tops in the operational system. This poster will describe the important role satellite---derived cloud products can play to improve icing analyses relative to current operational products. Examples of the products are provided in various icing conditions, including a recent case that led to a fatal aviation accident. Preliminary experimental work to incorporate satellite---derived cloud products into the CIP, which are not currently used in the operational system, will be presented. The results indicate that the satellite data can make a substantial positive impact, but much more work is needed to fully exploit the information content in the satellite products. We propose a path forward to maximize the utility of current and future satellite data in a fused capability to improve the characterization of the flight icing threat to aircraft.