

## Web-based Icing Remote Sensing Product

The NASA Glenn Research Center Icing Branch activated the initial version of its Web-based Icing Remote Sensing Product during 2007. This product represents the first real-time remote measurement of the icing environment capable of displaying the severity and location of icing hazards aloft. While still an experimental system intended for use by the research community, it highlights the potential of web-based products for disseminating icing hazard information to flight crews.

The Web-based Icing Remote Sensing Product is the final output of a processing system that starts with raw sensor data. The sensors currently used for the remote detection of icing conditions are a multi-frequency microwave radiometer, a ceilometer, and an X-band radar. The radiometer makes passive measurements that provide a profile of air temperature above the instrument and the total liquid water content. The X-band radar defines the cloud boundaries. And the ceilometer further refines the lower cloud boundary

The raw sensor data is gathered on individual personal computers and then transferred to a Linux-based computer. Software on the Linux machine processes the data through a series of algorithms to define cloud boundaries, map liquid water into the clouds, and determine altitudes with supercooled liquid water present. Finally, based upon the intensity of the calculated supercooled liquid water environment, the system determines the level of icing hazard at various altitudes using simplified aircraft icing performance degradation estimates. Good agreement has been achieved when comparing the algorithm outputs to data gathered during the Second Alliance Icing Research Study (AIRS II) field test program in 2003.

While the bulk of the work to date has occurred at NASA Glenn, a significant effort has been completed with our research partners. Our major partners are the National Center for Atmospheric Research (NCAR) in the areas of programming and algorithm development support and Radiometrics Corporation for microwave radiometer development.

### Glenn Contacts:

Dr. David Brinker, MS 11-2, (216) 433-2236

Andrew Reehorst, MS 11-2, (216) 433-3938

### References:

The NASA Icing Remote Sensing System ([TM-2005-213591](#))

NASA Icing Remote Sensing System Comparisons from AIRS II ([TM-2005-213592](#))

Progress in the Development of Practical Remote Detection of Icing Conditions ([TM-2006-214242](#))

NASA Icing Remote Sensing Data Website (<http://icebox-esn.grc.nasa.gov/RSDData/index.html>)



Fig 1: The NASA Glenn Icing Remote Sensing Ground Site. In the foreground is the Ka-band vertically staring radar. Behind this is the larger remote sensing trailer with the vertical staring X-band radar (under the white radome). This trailer houses the computers that produce the Web-based Icing Remote Sensing Product. To the left of the frame are the ceilometer (forward) and the multi-frequency microwave radiometer (rear).

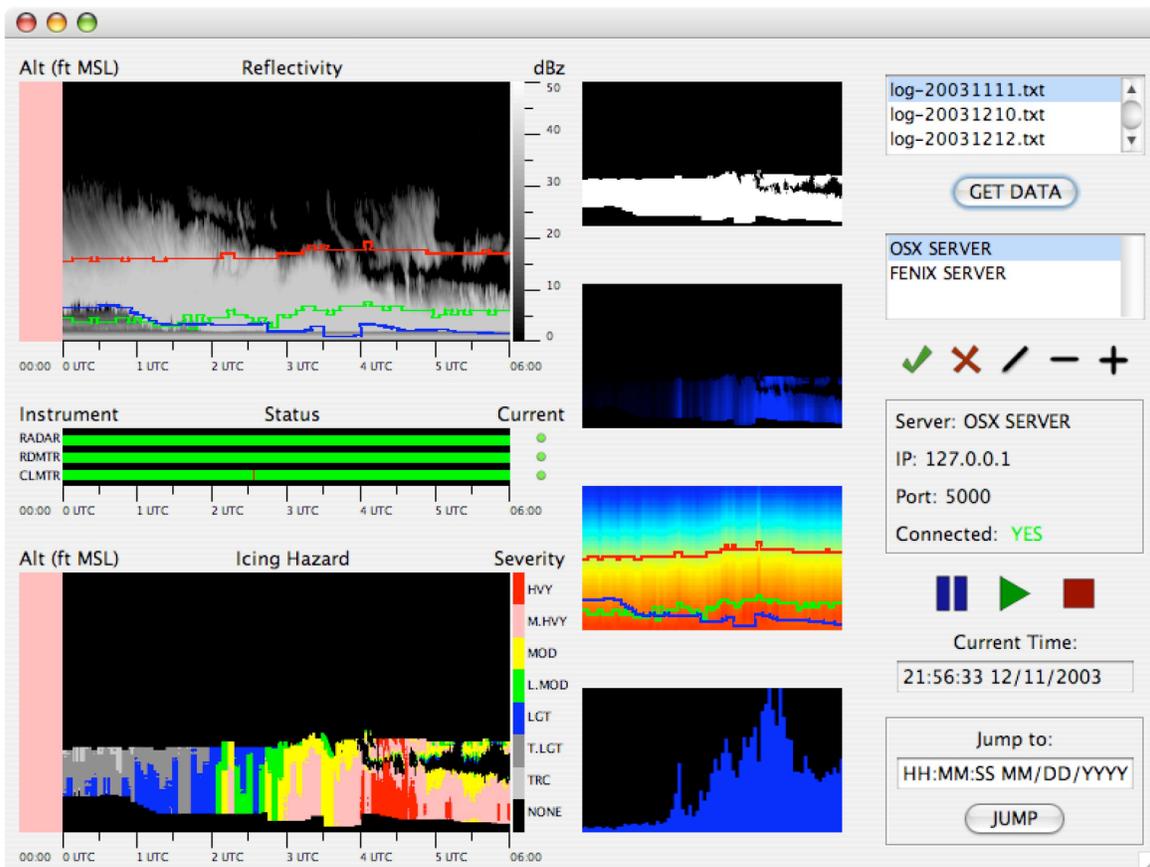


Fig 2: The graphic display for the Web-based Icing Remote Sensing Product. On the top left of the screen is the radar time history, with lines superimposed that represent the upper and lower bounds of possible icing and also the ceilometer measured cloud base. Below the reflectivity display is the instrument status history and current status indicators. At the bottom left is the main output graphic of the Web-based Icing Remote Sensing Product. This graphic represents the history of the icing severity profile above the instrument ground site. The graphics on the right side of the screen are outputs of interim data used in the production of the main icing hazard.