

Alliance Icing Research Study (AIRS) II

November 2003-February 2004

The Second Alliance Icing Research Study (AIRS II) is being planned for the winter of 2003/2004 to be conducted out of Ottawa, Ontario and Mirabel, Quebec. AIRS II is a project endorsed by the Aircraft Icing Research Alliance (AIRA), which consists of government organizations within North America interested in aircraft icing (see below). Many other institutions have also expressed an interest to be involved (see below) and others, including some in Europe, are considering participation. The First Alliance Icing Research Study (AIRS I) occurred during December 1999 to February 2000 in the same area. This project used 3 aircraft stationed out of Ottawa and remote sensing hardware located at both Ottawa and Mirabel (see <http://airs-icing.org/>) to investigate the remote sensing of aircraft icing and other aircraft icing issues. AIRS II, which builds on the results of AIRS I, will have the following objectives: a) to develop techniques/systems to remotely sense hazardous winter conditions at airports, b) to improve weather forecasts of aircraft icing conditions, c) to collect data for flight validation methodologies, and d) to better characterize the aircraft-icing environment.

It is anticipated that several instrumented research aircraft operating out of Ottawa (e.g. National Research Council Convair 580 and NASA Twin Otter) will be used in this study. These aircraft will fly special flight operations over a network of ground in-situ and remote-sensing meteorological measurement systems. The remote-sensing equipment will consist of ground-based systems, located at Mirabel, as well as satellite borne instrumentation. Microwave radiometers will measure cloud liquid water contents. Cloud and precipitation radars (with Doppler, polarization and dual wavelength capabilities) will be used to remote detect and identify zones of icing, and snow and freezing precipitation. New techniques utilizing instruments, such as lidars, to explore cloud characteristics will be considered. The existing McGill Observatory S-band radar, which is both Dopplerized and has polarization capability, and a new McGill mesonet of ground sites, which measure surface precipitation, winds and temperature, make the Mirabel site very attractive. Some prototype airport weather forecasting systems, which use satellite and surface-based remote sensors, PIREPS, and numerical forecast models, will be evaluated during the project. Using the instrumented aircraft, data will be collected to help develop improved models to predict icing shapes on aircraft, and new standards for certifying aircraft for flying in icing, especially supercooled large drops. The aircraft will also provide data to verify the remote-sensing algorithms, numerical forecast models, and forecast systems, used to detect and predict icing conditions.

The Mirabel airport site is particularly well suited for such a study, because it is next to an area of heavy aviation traffic, and winter weather includes frequent cloud cover and winter storms. Mirabel is also situated near a local North American maximum in frequency of freezing precipitation, and is within the regional coverage of existing McGill University observational systems noted above.

AIRS II is an exciting collaborative effort among many scientists and organizations. It will assist in providing the aviation community better tools to avoid aircraft icing, and to improve the efficiency of airport operations.

Proposed Canadian Agencies	Proposed U.S. Agencies
Meteorological Service of Canada (MSC)* National Research Council of Canada (NRC)* Transport Canada (TC)* National Search and Rescue Secretariat (NSS) Defense Research Establishment Valcartier (DREV) McGill University McMaster University CRESTech	NASA-Glenn* Federal Aviation Administration (FAA)* National Center for Atmospheric Research (NCAR) Cold Regions Research and Engineering Laboratory (CRREL) National Oceanic and Atmospheric Administration (NOAA) University of Massachusetts Desert Research Institute (DRI)

* Member of Aircraft Icing Research Alliance (AIRA)