HIWC Nowcasting Trial

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HAIC – HIWC Program

An international research program to characterize clouds with high ice water content that are responsible for power-loss events in jet engines [and pitot tube events] due to icing.

- HIWC – FAA, NASA, Boeing, Environment Canada, Transport Canada, SEA, NCAR, BoM, JMA, …

- HAIC [European consortium] – EASA, EC, Airbus, Safire, MeteoFrance, CNRS, LAMP, …

- Flight campaigns with instrumented research aircraft in Darwin (Jan – Feb 2014), Cayenne (May 2015), Florida (2015), Darwin / La Reunion (2016)

Regulatory Objectives:

- Characterize HIWC environment
  - Develop statistical data base on IWC levels
  - Collect information on ice particle size/shape, concentration, location in cloud and associated spatial scale.
  - Utilize Cloud Radar and Cloud Resolving Models to extend the statistics from in-situ data
  - Link field campaign data to in-service engine event data
- Develop detection methods for High IWC
  - Flight crew visual/aural identification methods
  - Onboard weather radar, cloud radar
  - Onboard instruments
- Develop diagnostic and forecast tools for HIWC environment
- Investigate HIWC effects on engine parameters

Science Objectives:

- Characterize microphysical properties (ice water content, particle size distributions, shape, physical scale) of deep convective clouds

- Determine small ice particle formation mechanisms

- Determine the temporal and spatial evolution of mixed phase (supercooled liquid and ice crystals) in deep convection

- Improve understanding of precipitation formation mechanisms and precipitation efficiency

- Validate radar remote sensing of microphysical properties of deep convection using ground based radar and aircraft mounted cloud-radar

- Validate satellite-remote sensing of cloud properties and HIWC regions in deep convection

- Improve simulations of deep convection using Cloud Resolving Models

HAIC – HIWC Field Campaign Objectives

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Objectives

- To provide aviation industry stakeholders in the region, including airlines and Bureau of Meteorology forecasters, with experimental HIWC nowcasting products for evaluation.

- To provide feedback on the ALPHA performance in a region with frequent convection and ICI events.

- To inform further improvements to the ALPHA detection algorithm.

- To inform a decision on provision of a fully operational HIWC nowcasting product.

Objectives … cont

- To progress the development of an international capability for HIWC detection and prediction that may be required by ICAO in the future.

International Civil Aviation Organization (ICAO)

Australian Government
Bureau of Meteorology

- Convention on International Civil Aviation (Chicago, 1944)

- Standards and Recommended Practices

- Annex 3 – Meteorological Service for International Air Navigation

- The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.

- Currently there is no formal ICAO requirement for ICI guidance products