The Remote Oceanic Meteorology Information Operational (ROMIO) Demonstration

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Outline

• ROMIO Demonstration Objective
• Oceanic Research History
• Oceanic Products
• Pilot Viewer Demonstration
• Participant Roles / Relationships
• Benefits Assessment
• Questions/Comments
Objective

• Operational demonstration to evaluate the feasibility of uplinking convective storm products to commercial aircraft flying routes over remote and oceanic regions for display on an electronic flight bag (EFB)
  ✦ Identify minimum meteorological information for remote and oceanic regions
  ✦ Conduct benefit assessment for both safety and efficiency
• Demonstrate operational strategies for the use of rapidly updated Cloud Top Height (CTH) and Convective Diagnosis Oceanic (CDO) products by the:
  ✦ Flight deck
  ✦ Oceanic Air Route Traffic Control Centers (ARTCC)
  ✦ Airline Operations Center (AOC) flight dispatch operations
Oceanic Weather Research History

• 1990’s: Various NASA-funded R&D efforts, with early efforts focused on Weather in the Cockpit and Cloud Top Height

• 2001-2006 FAA AWRP Oceanic Weather Product Development Team (OW PDT)
  + Development of CTH and CDO
  + Validation with NASA TRMM satellite and NEXRAD
  + 2005: FAA Aviation Weather Technology Transfer (AWTT) approval of CTH as experimental product
  + 2006: CTH uplinked to United Airlines aircraft between LAX/SFO to Sydney, Australia using ACARS printer
Weather Technology in the Cockpit (WTIC) Program Research

- 2012: Demonstration in the WJHTC Next Generation Integration and Evaluation Research Cockpit Simulator (NIEC RCS):
  - Human factors evaluation of CTH
  - Flew archived cases through ITCZ
  - Successful test, no safety issues identified
- 2014-15: WTIC Oceanic MET planning effort
- 2016-18 WTIC ROMIO Operational Demonstration with airlines
  - Phase 1: Preparation, Project Plan, Safety Review, Pilot and ATC Training
  - Phase 2: Conduct demonstration (9 – 12 Months) – Anticipate Dec 2018 Start
  - Phase 3: Report with Benefit Assessment
- 2019 Validate CTH and CDO for Research to Operations (R-2-O)
GOES-EAST 75 Degrees West / GOES West 137 Degrees West
Creation of Cloud Top Height Product

- Satellite infrared brightness temperature is converted to pressure by comparing to a model sounding.
- Pressure is converted to flight level by comparing to the standard atmosphere.
Cloud Top Height (kft)
Convective Diagnosis Oceanic (CDO)

Description

- Cloud Top Height (CTH)
- Global Convective Diagnosis (GCD)
  - Derived from geo-satellite
  - Channel differencing of WV – IR brightness temps
- GOES-R Overshooting Tops (OTops) algorithm
- Combined lightning interest field
  - Computed from global, ground-based lightning detection network
  - 15 min, 30 min and 60 min strike accumulations calculated and combined
- Convection Diagnosis Oceanic (CDO)
  - Uses a scaled and weighted combination of inputs to create an interest map
  - Convective hazards defined as CDO≥2
- CDO acts as an estimate of storm intensity
  - Limited by low detection efficiency of ground-based lightning detection network
  - GOES-R Geostationary Lightning Mapper (GLM) will be a big improvement
CDO Example Inputs
CDO Computed Over Global Domain
Why Two Products
ROMIO Communications System

CTH

CDO

NCAR

AAtS

SOA Interface

ROMIO Server

BCI

Panasonic

Gogo

ERAU NextGen Testbed

American Airlines

Delta Airlines

United Airlines

FAA

NextGen

FAA
Pilot Viewer Application

- Own-ship Control
- Night Mode Toggle
- Weather Control
- Flight Route Control
- Map
- Time Control

FAA

NextGEN
Concept of Operations

Aircrew

ARTCC

Airline Operations Center
Benefits Assessment

• Virginia Tech will develop a model to assess the safety and efficiency impacts and/or benefits associated with the provision of meteorological information to aircraft operating in remote / oceanic airspace

• Methodology should describe how the safety (cabin management) and efficiency (flight routing, airspace management, and cockpit / ATC communications) impacts and/or benefits will be evaluated and describe all areas where impacts were identified and where benefits can be achieved
Summary

- ROMIO is a feasibility study to identify minimum weather information for pilots in remote / oceanic regions
- ROMIO Demo anticipated to begin in December 2017
- ROMIO Demo will be 9 to 12 Month Operational Demonstration
- Benefits Assessment at the end of demonstration to determine the viability for R-2-O
Thank you

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