## NASA IMPACTS Field Project: Introduction to Measurement Systems

**David Delene** 

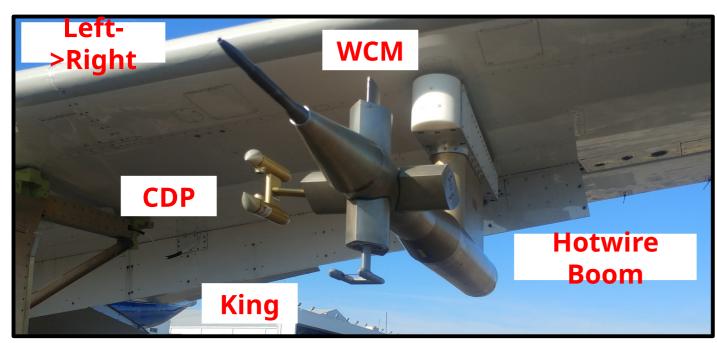


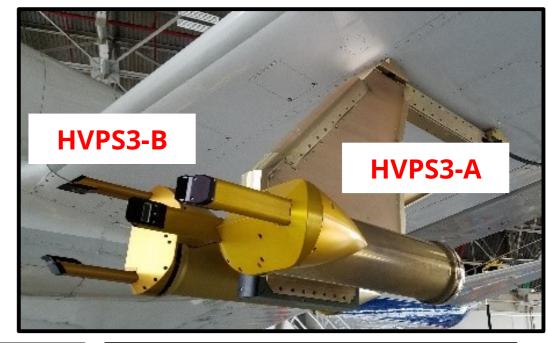
Gerald Heymsfield, Greg McFarquhar, Andrew Heymsfield, Michael Poellot, Aaron Bansemer, Christian Nairy, Jennifer Moore, and Trece Hopp

## **Overview of Cloud Probes on P3 Aircraft**



## **IMPACTS 2022 Cloud Probes**











#### **IMPACTS 2022 Cloud Probes**

#### **Measurement Size Range**

1 um

10 um

100 um

1 mm

10 mm

**CDP** (2.0-50.0 μm)

**FCDP** (2.0-50.0 μm)

**CPI** (2.3 um to 1 mm)

PHIPS (3 um to 2 mm)

**2DS** (10/50 um to 1.280/6.400 mm)

HVPS-3 (150 um to 19.2 mm)

King (wire) (LWC for 5 to 200 um)

**WCM** (wire) (LWC for 5 to 200 um)

Rosemount Ice Detector (RICE) (SLW)

#### Measurement Method

Forward Scattering Probes

Imaging Probes

**Hot-wire Probes** 

Vibrating Cylinder

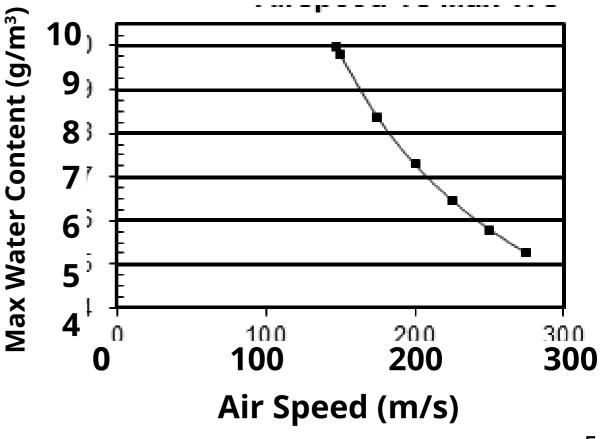
### WCM - Total Water Content System Science Engineering Associates (SEA) Model WCM-3000



**Total Water** 

**Liquid Water** 

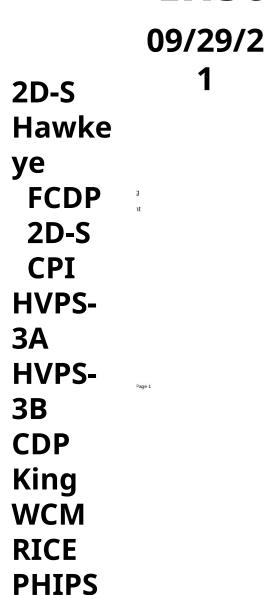
• 140 °C Sensor Temperature



# **Research Flights - 2022**

| O1-11 O1-14 O1-17 O1-19 O1-29 O2-03 O2-04 O2-08 O2-13 O2-17 O2-19 O2-22 O2-25  Cal. Banded Structur e High-Impact Storm st of a Departi ng ng Rapidly-deepeni ng Cyclone off Cape Cod across with a SS State State              | Cal. Banded Structur es High- Impact Storm and Storm and Departi ng Storm and Departi ng Storm and Departi ng Storm and Departi ng Storm and Ster Storm and Departi ng Storm and Ster Ster Ster Ster Ster Ster Ster Ster        |       | I   | I   | T  | I                      | I     | I     |       | Т     |       |       |       | T     |
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| Canad   |   | Cal.  | Structur es Northwe st of a Departi ng Rapidly- deepeni ng Cyclone off Cape Cod with a GPM Overpa | e High-Impact Storm with Freezi ng Rain at Pope and Bandin g across NW New York State and Canad | frontal Bands and Genera ting Cells in an Alberta Clipper in Canad | ng<br>strong<br>nor'ea |       |       |       |       |       |       |       |       |

#### **Instrument Issues and Performance**



Wired Incorrectly, Power Board Failed (both Channels)



Probe Tip Leak

DSP Board Failed, Sent to SPEC for Repair

Capacitor In Probe Head Failed, Used
Replacement CDP
M300 Failed During Flight, Replacement System
Until Repaired

# **Flight Operations**



## **Questions and Comments**

