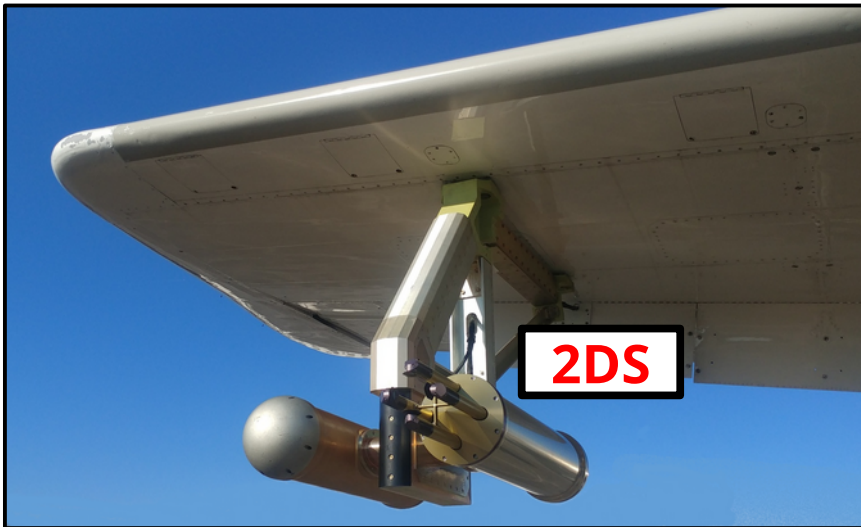
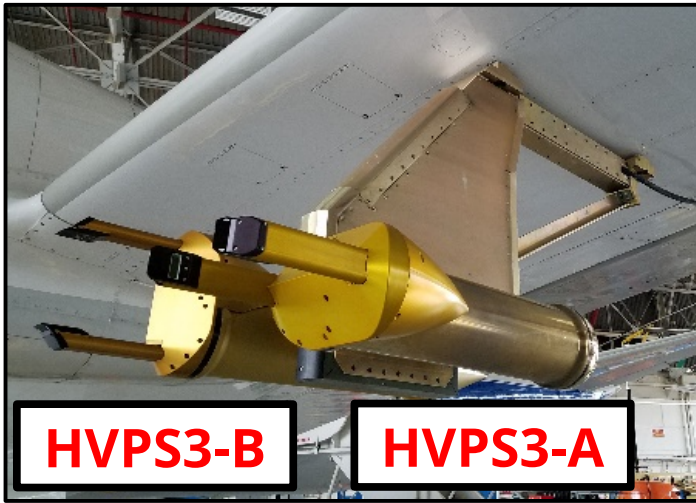


IMPACTS 2022 P-3 Aircraft Cloud Probe Data

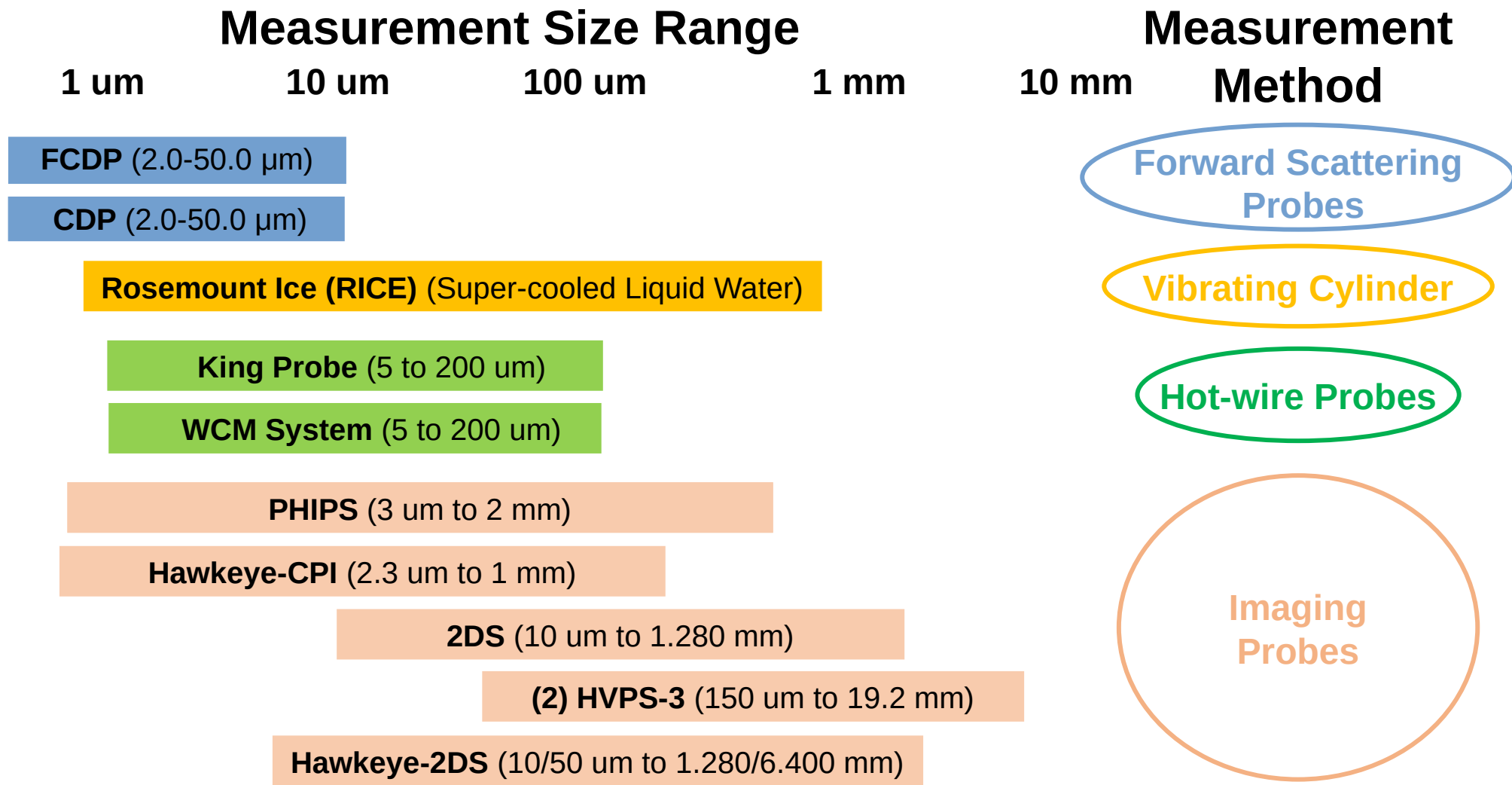
David Delene, Jennifer Moore, Christian Nairy,
Michael Willette, and Marwa Majdi



2022 IMPACTS Cloud Probes



IMPACTS 2022 Cloud Probes



IMPACTS 2022 Cloud Probes

Measurement Size Range

Measurement Method

1 μm

10 μm

100 μm

1 mm

10 mm

FCDP (2.0-50.0 μm)

CDP (2.0-50.0 μm)

Rosemount Ice (RICE) (Super-cooled Liquid Water)

King Probe (5 to 200 μm)

WCM System (5 to 200 μm)

PHIPS (3 μm to 2 mm)

Hawkeye-CPI (2.3 μm to 1 mm)

2DS (10 μm to 1.280 mm)

(2) HVPS-3 (150 μm to 19.2 mm)

Hawkeye-2DS (10/50 μm to 1.280/6.400 mm)

**Forward Scattering
Probes**

Vibrating Cylinder

Hot-wire Probes

**Imaging
Probes**

Water Content and Droplet Measurements

Hotwire Boom

**Water Content Multi-element
(WCM-3000) System**

**Rosemount
Ice (RICE) Probe**

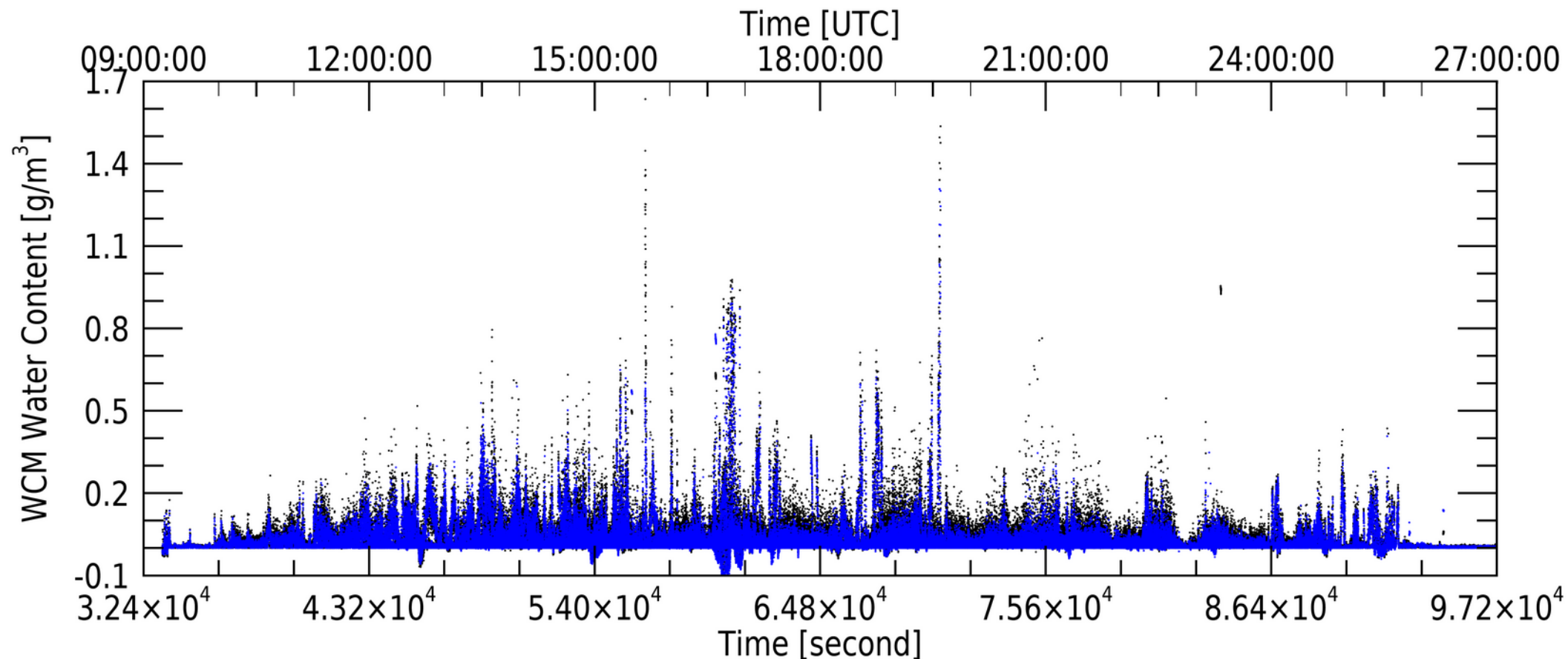
Cloud Droplet Probe (CDP)



2022 IMPACTS WCM Measurements (Quality Assured)

● Total Water Content

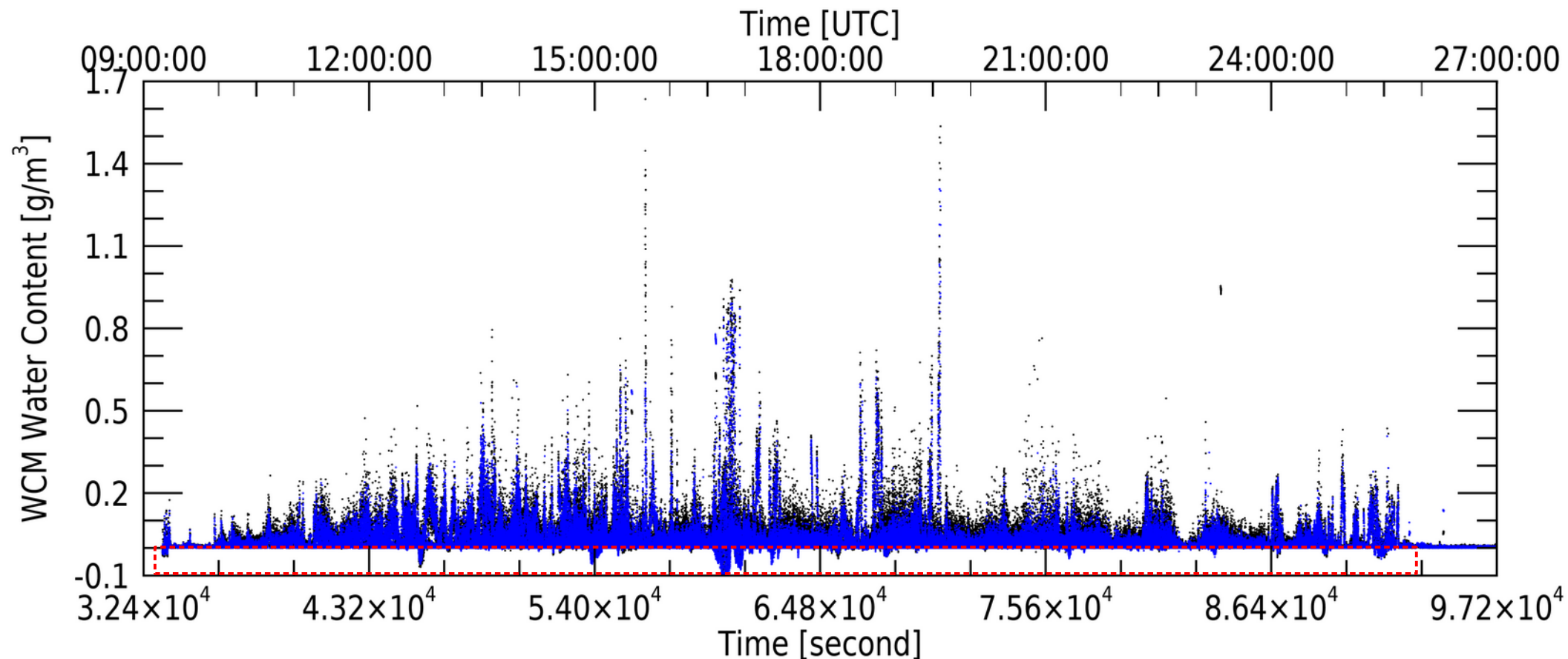
● Liquid Water Content



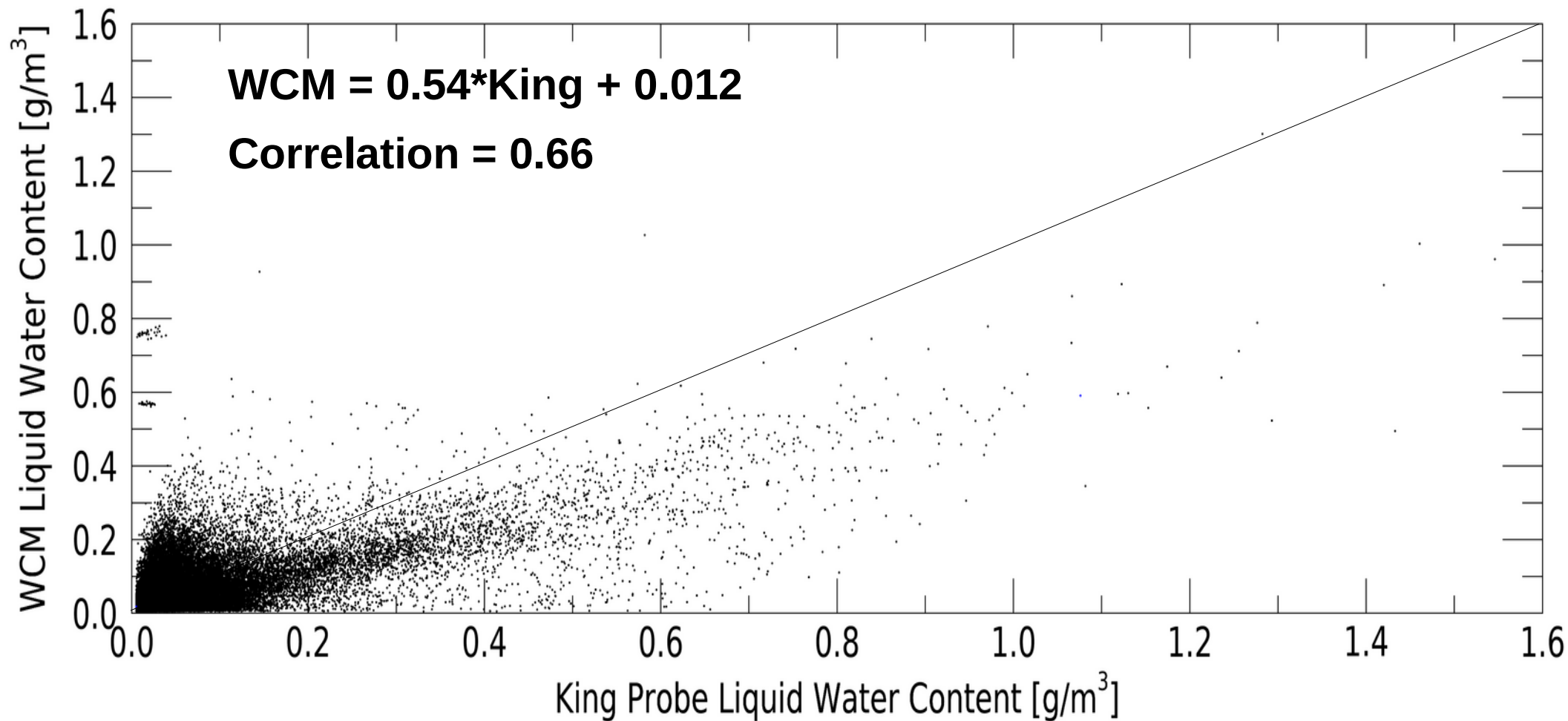
2022 IMPACTS WCM Measurements (Quality Assured)

● Total Water Content

● Liquid Water Content



WCM and King Probe Comparison ($>0.005 \text{ g/m}^3$)



Conclusions

- Flights do not have all measurements due to instrument issues.
- Use Cloud Droplet Probe (CDP) droplet spectrum measurement, instead of the Hawkeye-FCDP measurement.
 - FCDP seems to have shattering issues (working on).
- Use the King Probe liquid water content (LWC) measurement, instead of the WCM LWC measurement (working on WCM processing improvements).
- Work with IMPACTS personnel when using cloud probe measurements.

Open Science Information

- David Delene's Website – <http://aerosol.atmos.und.edu>
- Data is available in the NASA DAAC.
- Software Gateway - <http://aerosol.atmos.und.edu/ADPAA/>
- Open Notebook - <http://wiki.atmos.und.edu>
- Airborne Instrument Class Material
 - http://aerosol.atmos.und.edu/AtSc594_Fall2022/index.html

2022 Deployment Science Flights

	1/14	1/17	1/19	1/28	1/29	2/3	2/4	2/8	2/13	2/17	2/19	2/25
CDP	Failed	NA	NA				PA					
WCM							PA	NA				
King							PA					
RICE							PA					
Hawkeye												
2D-S	NA	NA	NA	Failed	NA	NA	NA					
HVPS-3A		NA	NA									
HVPS-3B												

Notes:

NA - Not Available

PA - Partially Available

1/14 - CDP Failed Upon Take-off

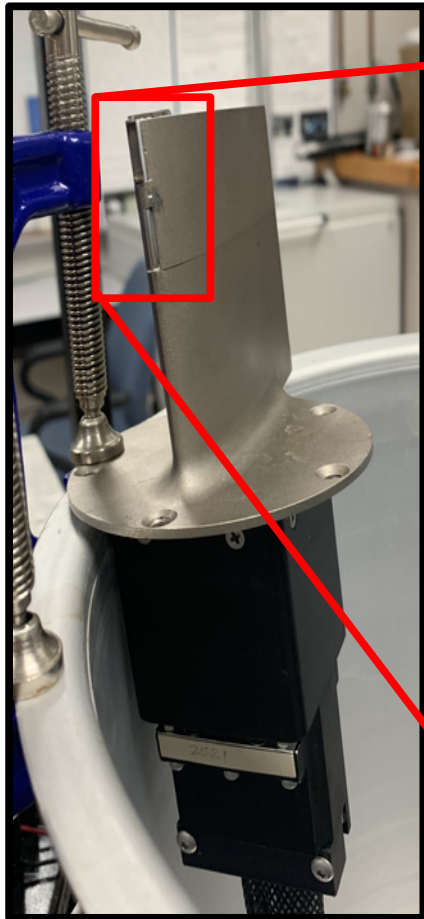
1/29 - 2D-S Failed

2/4 - M300 Data System Failed Mid-flight

2/8 – 2/25 – 2D-S Leak Issue

WCM - Total Water Content System

Science Engineering Associates (SEA) Model WCM-3000



WCM-3000



Strap (Not Compensation Element)

Total Water

Liquid Water



WCM-2000