

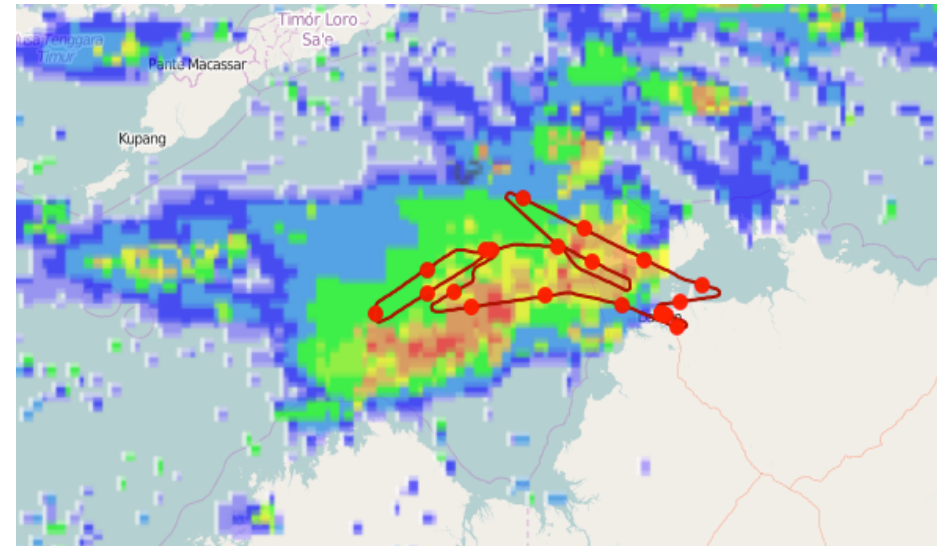
Update on ALPHA Performance for Darwin 2014 Cases

Julie Haggerty, Jennifer Black, Dan Adriaansen

ALPHA development is sponsored by the U.S. Federal Aviation Administration
NCAR is sponsored by the U.S. National Science Foundation

ALPHA Assessment Procedures

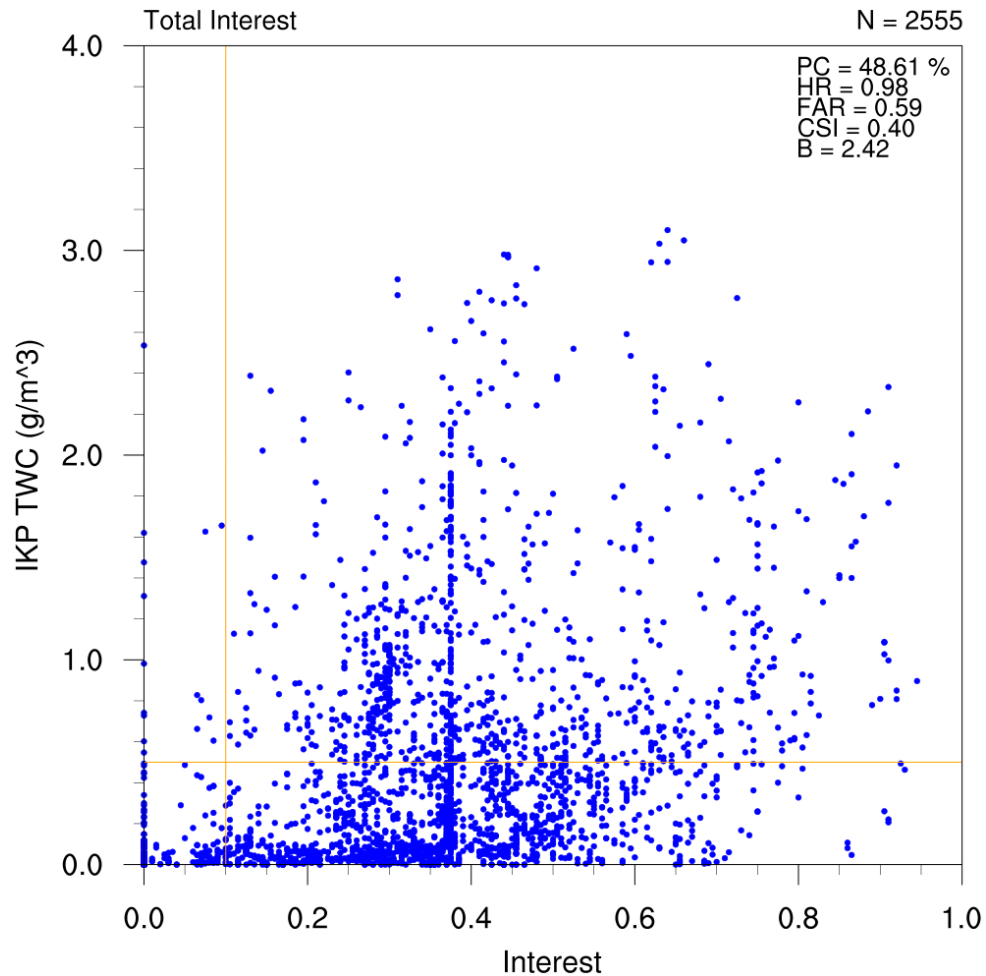
- Ice water content (IWC) from airborne Isokinetic Probe (Darwin and Cayenne flights)
- Extract ALPHA HIWC interest parameter along flight track
- Compare relative trends in time series plots
- Compile probability of detection (POD) statistics
- Correlate IWC observations with individual input fields to evaluate and refine membership functions



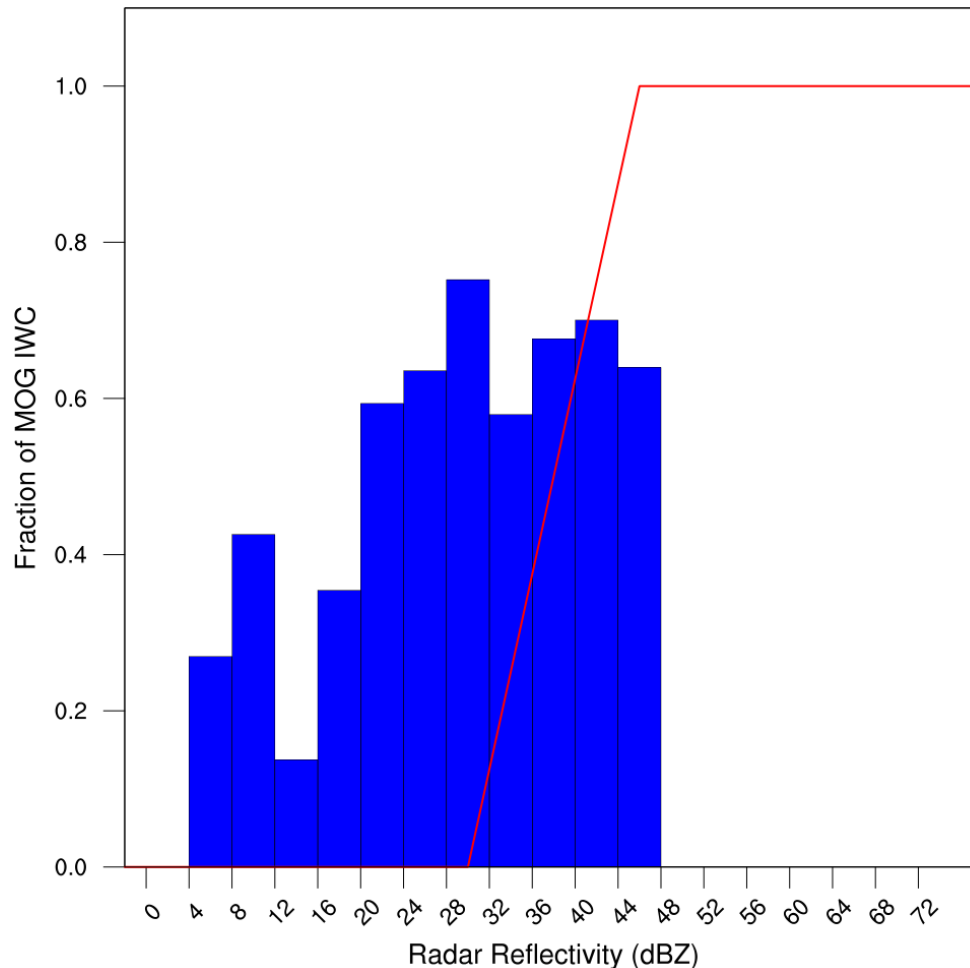
Current Status

- Compile probability of detection (POD) statistics for all flights using thresholds agreed upon with European nowcasting teams
 - Darwin – finished
 - Cayenne – recently received IWC data
 - Florida – awaiting IWC data
- Stratify POD results according to altitude/temperature, day/night, etc.
 - Darwin – partial results available
- Examine variation of each input variable with IWC data; refine membership functions accordingly
 - Darwin – partial results available

IKP TWC vs. ALPHA HIWC Interest: All Darwin flight segments (day/night)

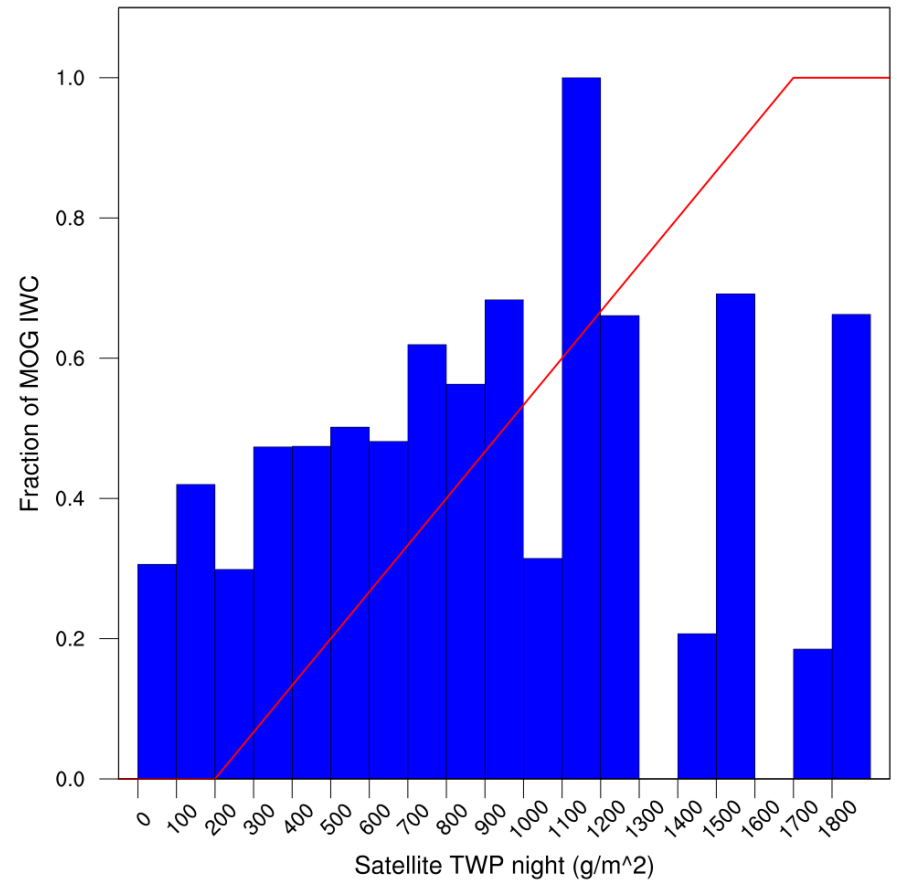
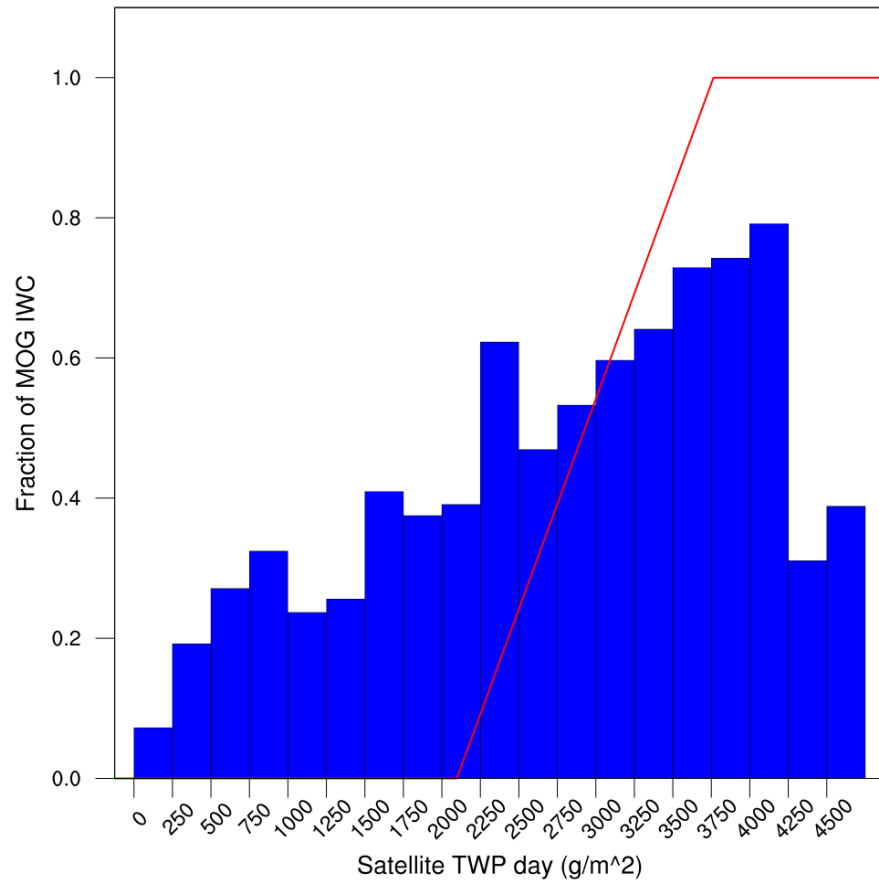


Radar Reflectivity Membership Function compared with measured IWC



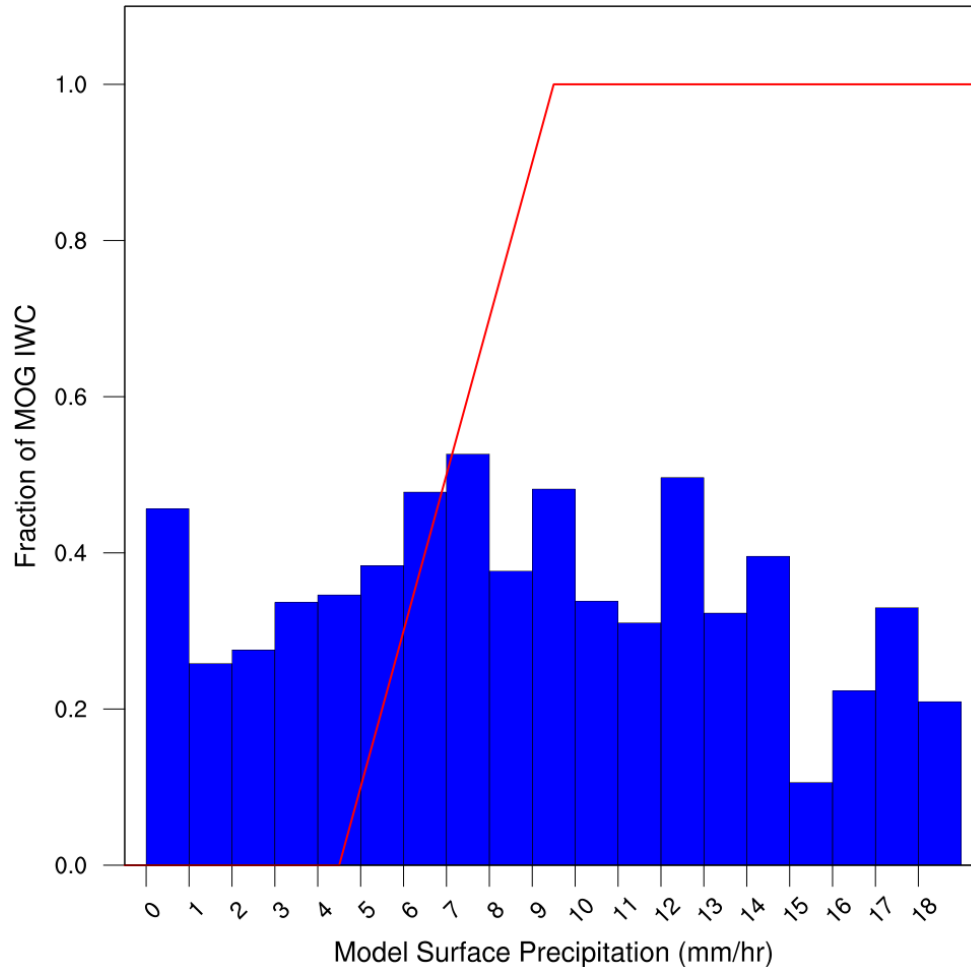
- Fraction of IKP-IWC measurements $> 0.5 \text{ gm}^{-3}$ vs. Radar Reflectivity (max in column)**
- ALPHA Membership Function for Radar Reflectivity Max in Column**

Satellite TWP Membership Functions compared with measured IWC



-  Fraction of IKP-IWC measurements > 0.5 gm⁻³ vs. Satellite Total Water Path
-  ALPHA Membership Function for **Satellite Total Water Path**

Model surface precipitation Membership Function compared with measured IWC



■ Fraction of IKP-IWC measurements > 0.5 gm⁻³ vs. Model Surface Precipitation

— ALPHA Membership Function for **Model Surface Precipitation**

Further Data Analysis with ALPHA

V2.0

- Airborne cloud radar (RASTA) IWC retrievals for comparison with ALPHA vertical variation
- Characterize horizontal variation and time duration of HIWC features in ALPHA products
- Advection of HIWC features using TITAN (Thunderstorm Identification Tracking and Nowcasting)

ALPHA in TITAN

(demonstration of concept)

- Titan setup
 - Threshold 0.3 interest
 - Minimum size 100 km²
- Composite interest field
- TITAN detection – orange polygons
- 1 hour forecast – red polygons
- Motion vectors

