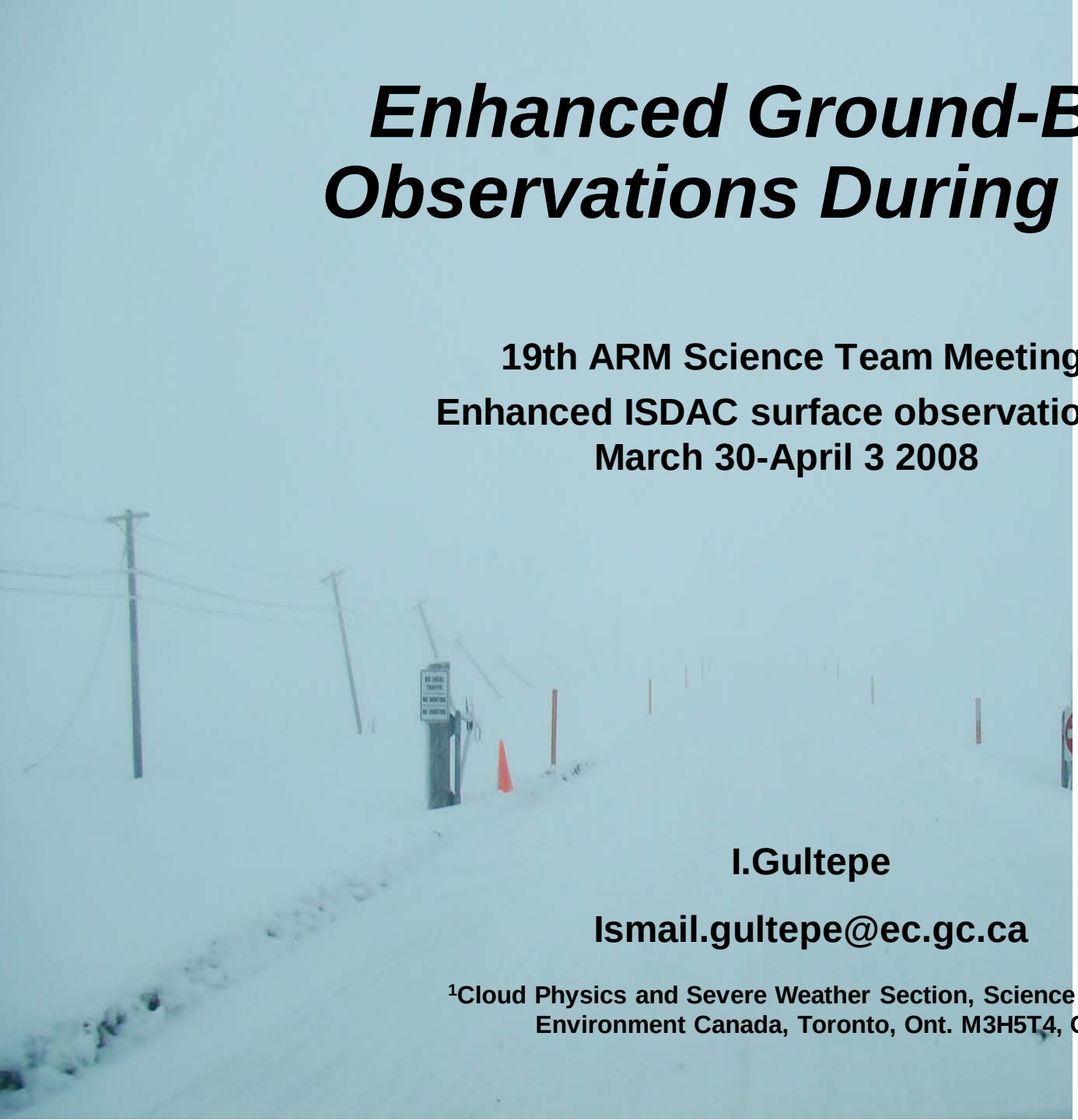
Enhanced Ground-Based Observations During ISDAC

19th ARM Science Team Meeting

Enhanced ISDAC surface observations
March 30-April 3 2008



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Objectives

- Study occurrence of light precipitation intensity
- Study effects of BL processes (e.g. ice fog/blowing snow) on extinction parameter (Visibility)
- Study cloud/fog and aerosol effects on surface radiative fluxes and ice crystal nucleation
- Support in-situ/remote sensing studies
- Study autoconversion processes within the clouds when aircraft above the NSA site

Environment Canada
Cloud Physics and Severe Weather
Research Section, Toronto

BARROW NSA SITE

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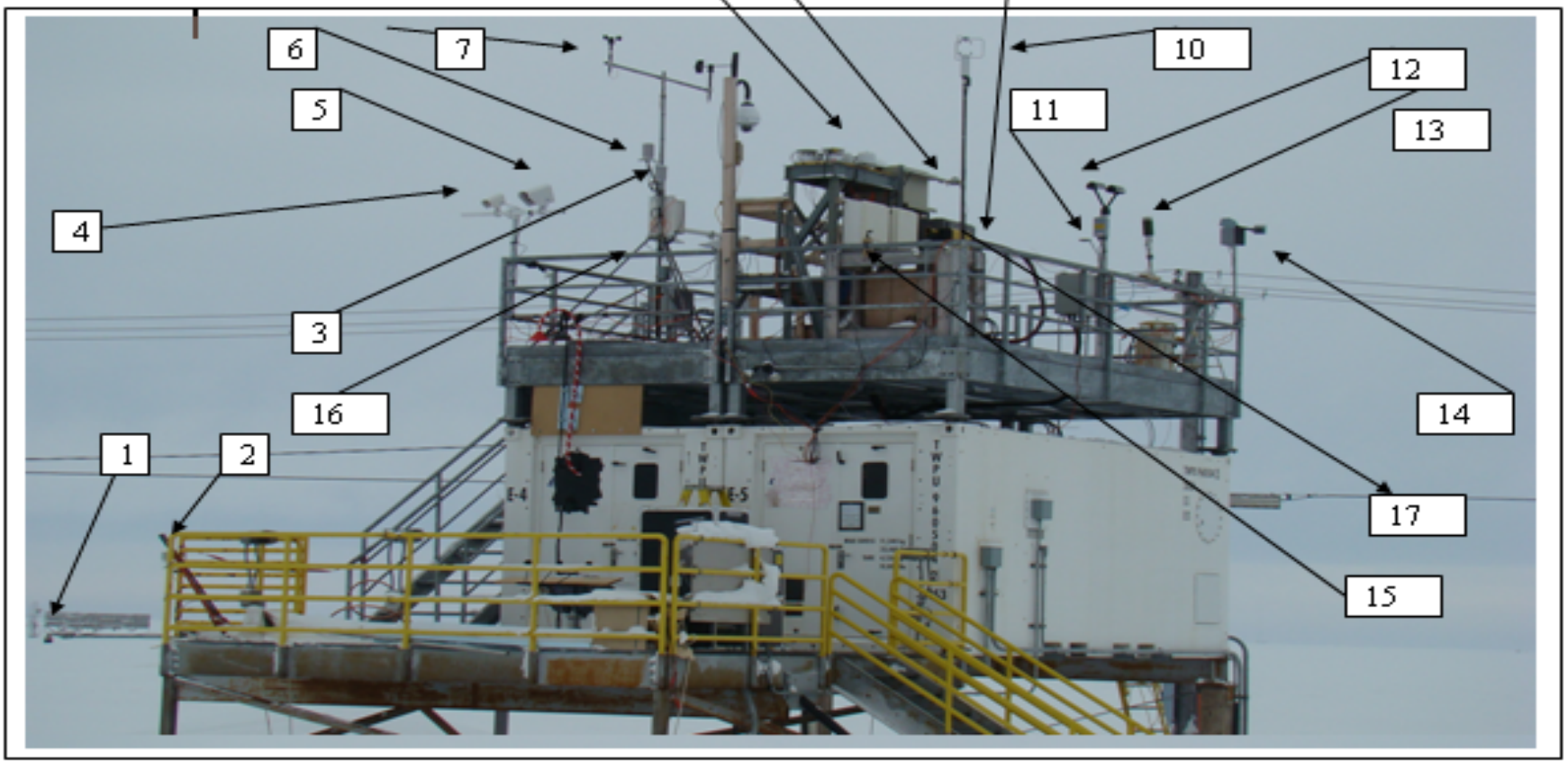
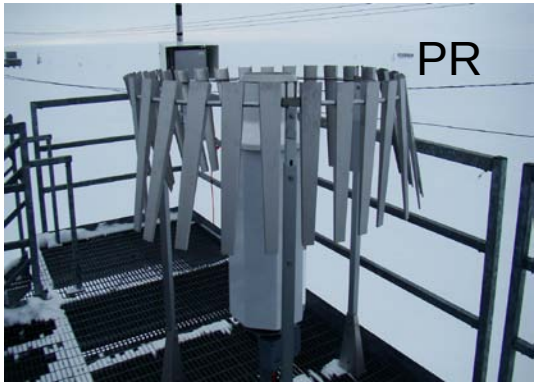


1. Snow depth sensor
2. Temperature sensor
3. RH1 and T
4. Vaisala surface temperature
5. Vaisala water phase sensor
6. RH2 and T
7. Wind speed and direction
8. SW and IR fluxes
9. SPN1; cloud cover, direct and diffuse radiative fluxes
10. Turbulence measurements
11. Hot plate (TPS) precip sensor
12. Distrometer (precip rate/extinction)
13. CAP aerosol measurements
14. Sentry Vis sensor
15. DMIST Vis sensor/camera
16. Ice particle counter (IPC)
17. FMD droplet spectra
18. VRG101 precip instrument
19. FD12P precip and Vis sensor

VISIBILITY



PARTICLE SIZE DISTRIBUTION

ISDAC-FRAM-B ICE FOG PROJECT DAILY SUMMARY

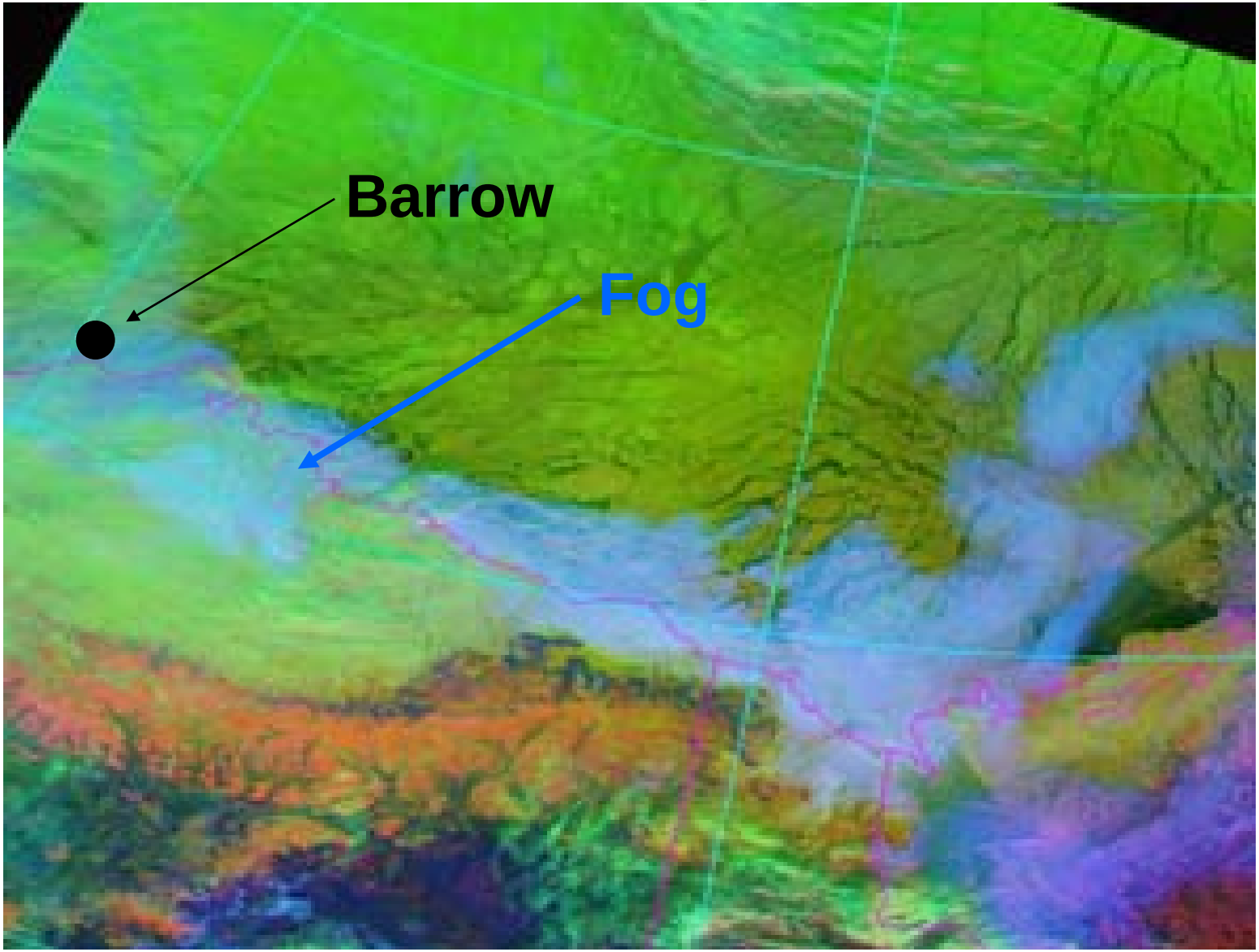
(L GULTEPE- April 30 2008-ismail.gultepe@ec.gc.ca)

Ice fog and blowing snow cases are shown with yellow and light blue colors, respectively. Other cases usually had light snow/small ice crystals. There was only 2 cases for heavy snow conditions. The Convair's summary is prepared using the information available from the NRC flight summary table (Mengistu Wolde). The red colored days indicate the golden days for aircraft. Green checkmarks represent Convair flight days. The last column is for the flights during which Convair took off from Barrow and landed in Barrow before going to Fairbanks. The symbols as LS, IF, HS, BS, CW, and DD represent the light snow, ice fog, heavy snow, blowing snow, clear-weather and diamond dust conditions, respectively.

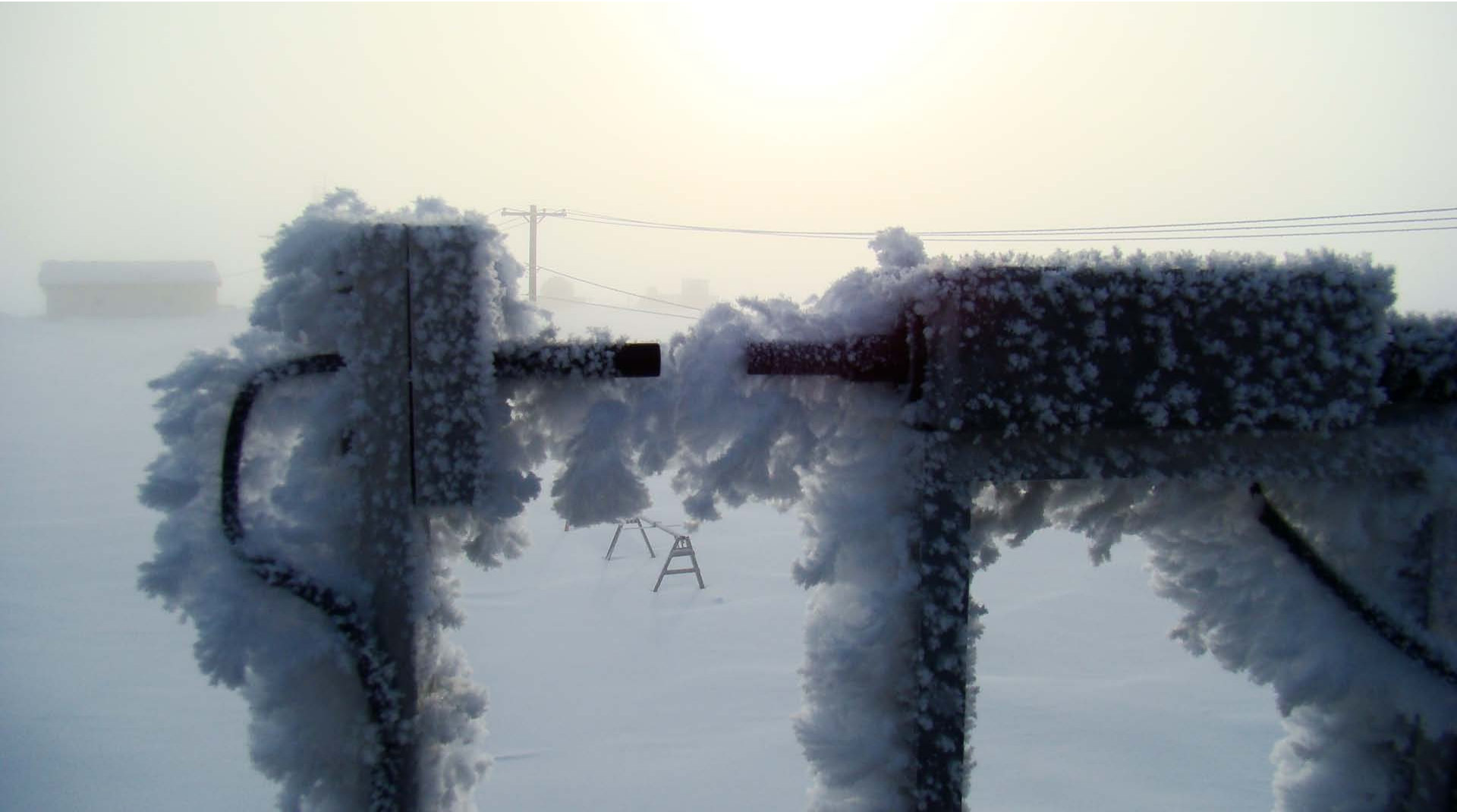
Day	Microphysics at surface	Convair over NSA site	Barrow to Barrow flights
April 1	LS+IF	√ (yes)	x (no)
April 2	HS	x	x
April 3	LS	x	x
April 4	IF	√	x
April 5	HS	√	x
April 6	IF	x	x
April 7	LS	x	x
April 8	LS	√(CL)	√
April 9	IF	x	x
April 10	IF	x	x
April 11	IF	x	x
April 12	IF+LS	x	x
April 13	LS+IF	√	x
April 14	LS	√	x
April 15	LS	x	x
April 16	LS	x	x
April 17	CW	x	x
April18	LS	√	√
April19	LS	√(PL)	x
April 20	LS	x	x
April 21	LS	x	x
April 22	BS	x	x
April 23	BS	x	x
April 24	BS	√	√
April 25	CW	√	x
April 26	LS	√(CL)	√
April 27	LS+IF	x	x
April 28	**LS**	√	x
April 29	DD	x	x
April 30	LS	x	x

- **ICE FOG (IF)**
- **BLOWING SNOW(BS)**
- **DIAMOND DUST(DD)**
- **HEAVY PRECIP (HS)**
- **LIGHT PRECIP(LS)**
- **CLEAR WEATHER (CW)**

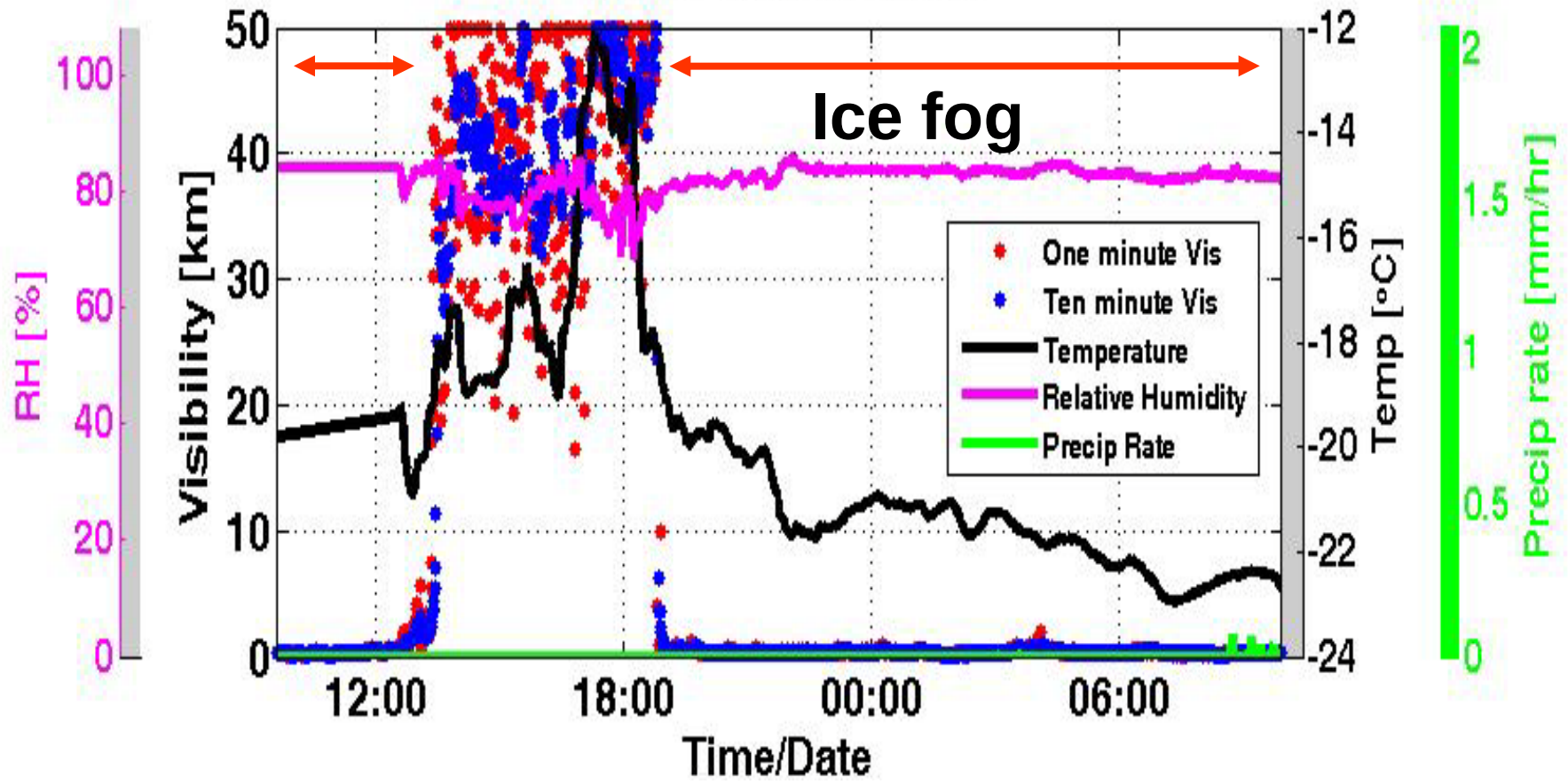
NOAA AVHRR April 10 2008



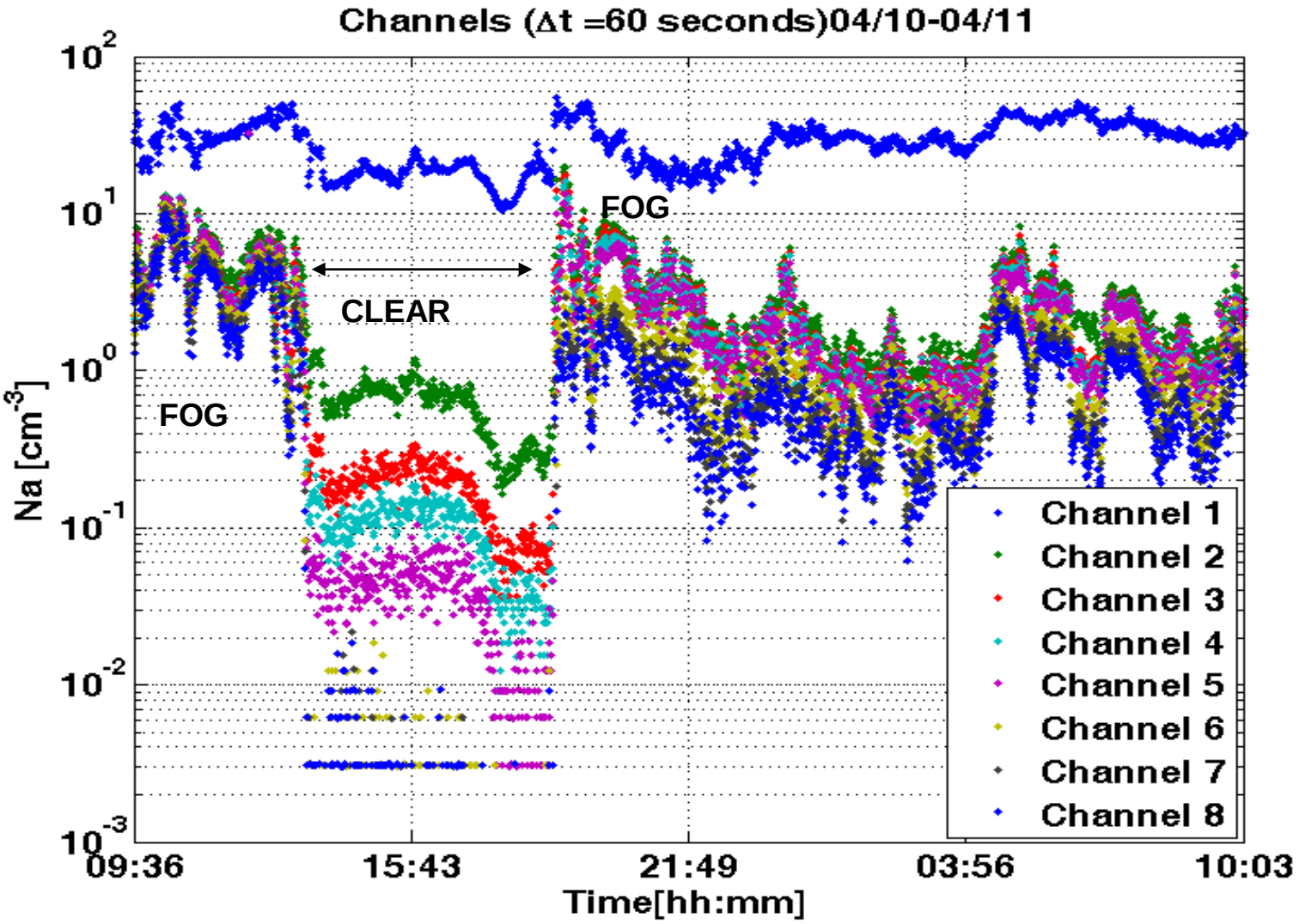
Ice fog/frost during FRAM-B



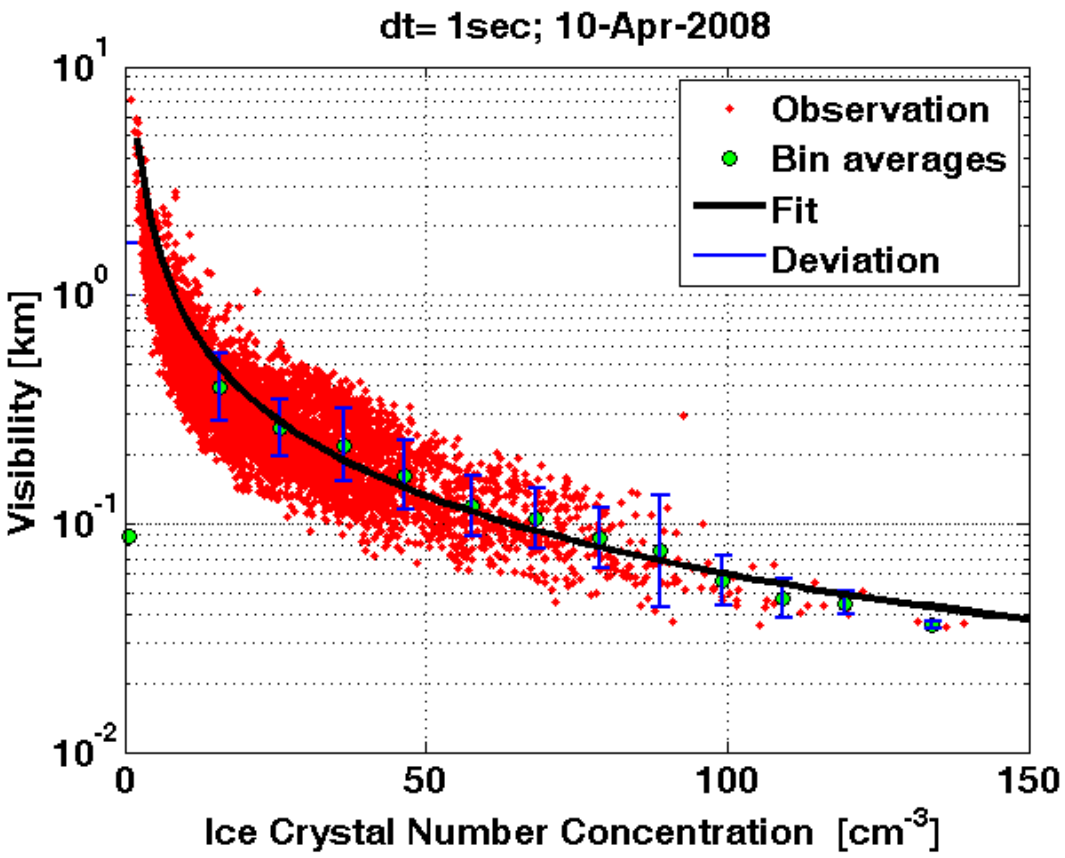
April 10 2008-ice fog

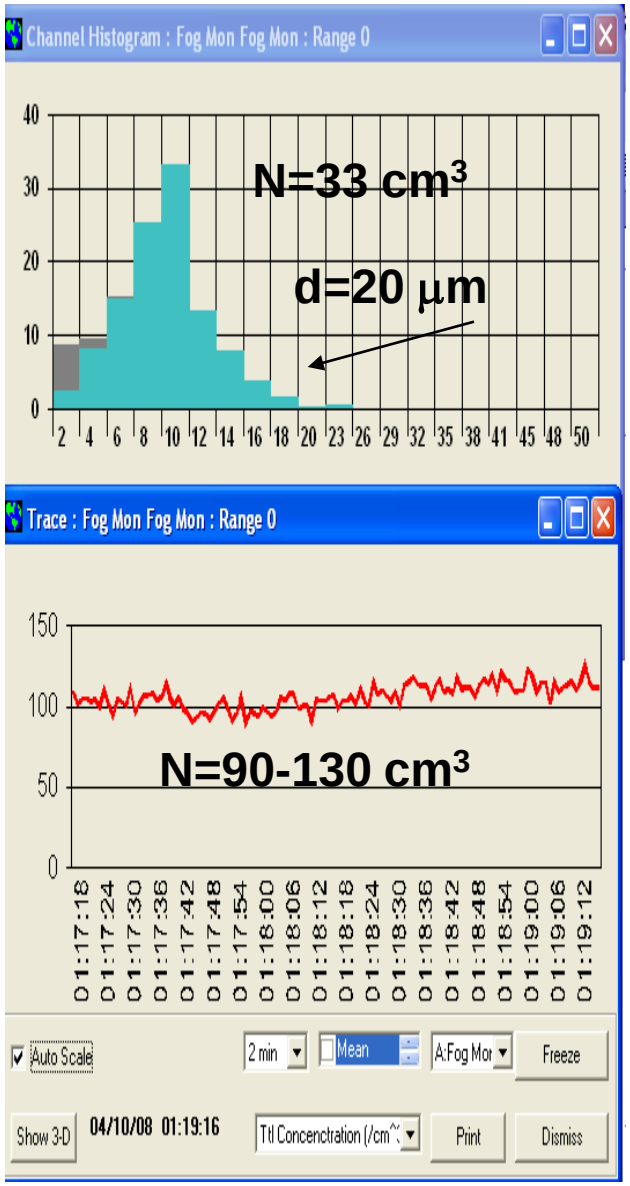


Aerosol spectra

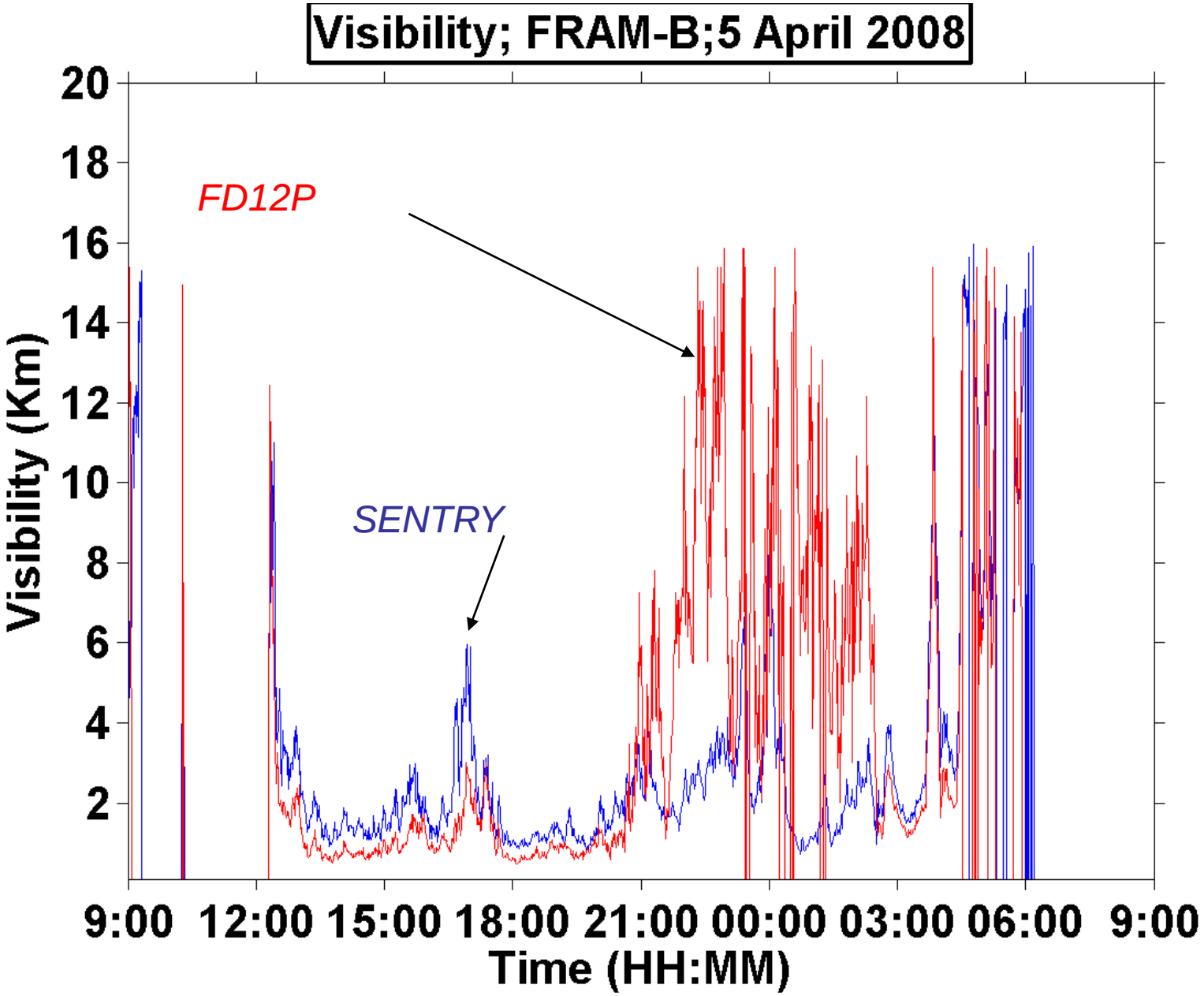


APRIL 10 2008/ICE FOG

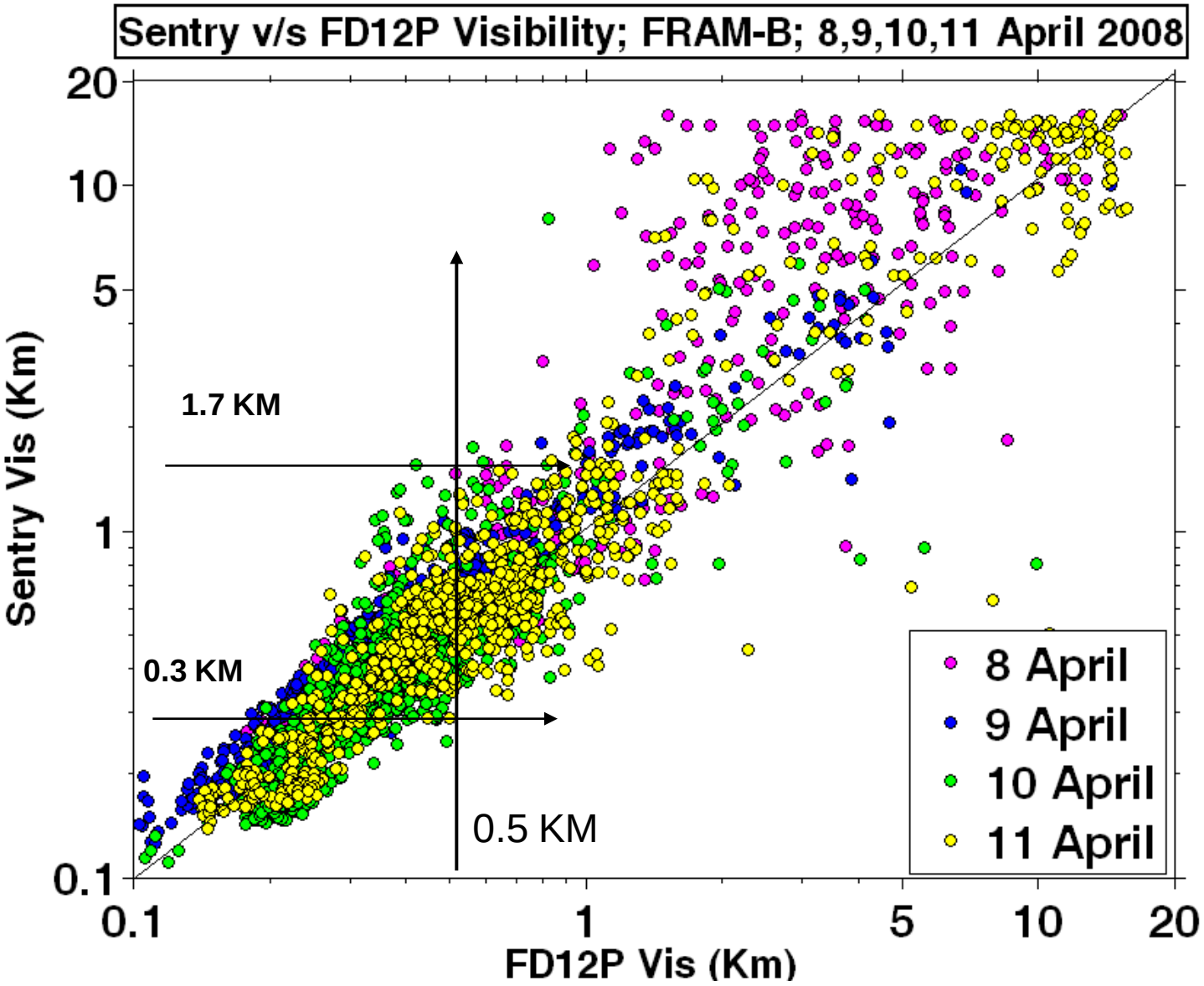




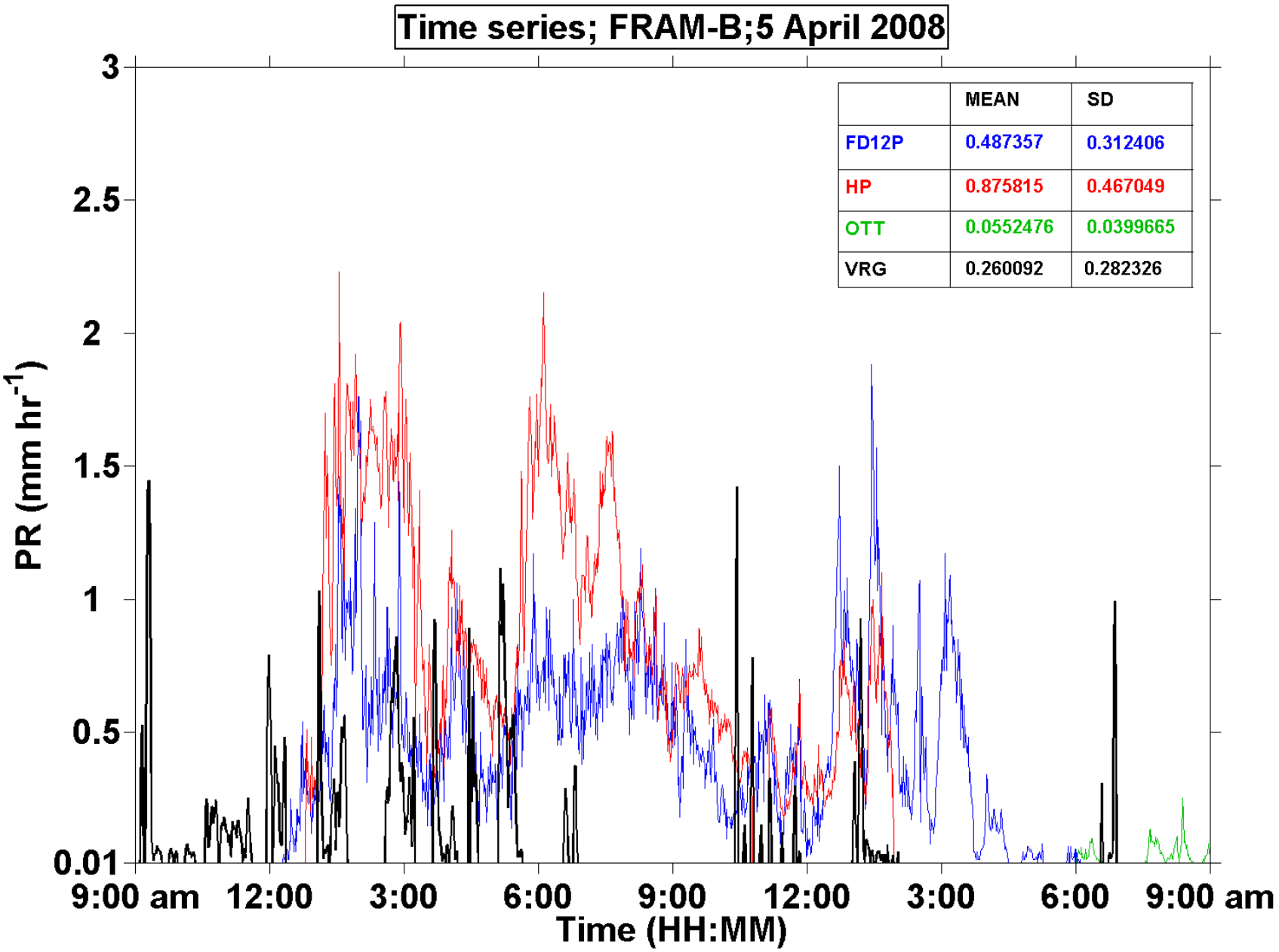
Vis time series (heavy snow case)



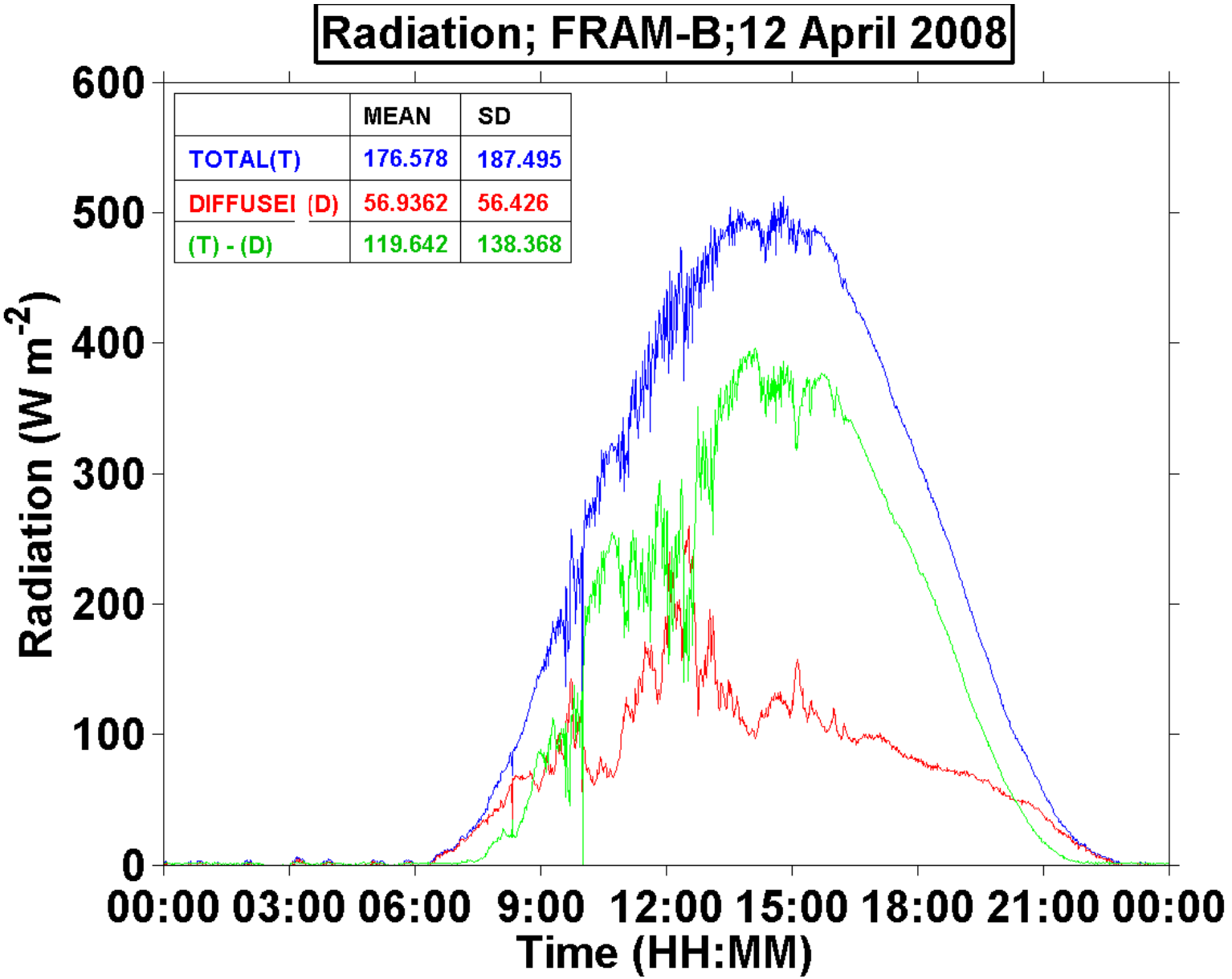
VIS COMPARISONS



PR COMPARISONS DURING A HEAVY SNOW CASE



Ice fog/light snow effects on SW radiative fluxes



GCIP for 7.5-900 micron size range

DIAMOND DUST

CONCLUSIONS

- **Ground based observations can be used for model validations and remote sensing retrieval applications.**
- **Ice fog/blowing snow conditions occurred at least 20% of time and affected local climate/weather.**
- **PR was less than 1 mm/hr for 85-90% of time that was usually not detected by the all precip sensors.**
- **Significant differences exist in precip and extinction values obtained from different instruments.**
- **Multiple sensors are needed to measure same parameters (e.g. precip rate, extinction…) to check the instrument sensitivity and variability.**

SAR FRAM-S APRIL 2009/ARM ALTOS 2010?

FREEZING FOG/DRIZZLE PROJECT AT

ST. JOHN'S INTERNATIONAL AIRPORT

Installation needs

3 technicians for 2 weeks time period

An engineer plus a scientist during project