ICE-T/ICE-D Workshop 2013

Andy Heymsfield and Paul DeMott

October 17/18, 2013

Agenda

Draft Agenda *(version 12-Sept-2013)*
ICE-T Workshop, October 17-18
Location: NCAR FL-3 2072 + web conference (recorded for later playback)

Thursday, October 17, 2013

MST start time	min	Discussion Topic
8:00 AM	30	Continental Breakfast
8:15		*ReadyTalk web conference start up & phone in*
8:30 AM	30	**1. Introductions/Objectives** - Andy Heymsfield, Paul DeMott, Paul Field, Steve Williams
		web conferencing, wireless internet access, ICE-T web page, BAE 146 ICE-D Plans
		meeting goals & agenda (changes?)
		Data submission (Williams, Steve or Aquino, Janine)
9:00 AM		**2. ICE-T Science Results**
		a. aerosols
9:00	15	Dhaniyala, Suresh
9:15	15	Anderson, Jim
9:30	15	Prather, Kim
9:45	15	Suski, Kaitlyn
10:00 AM	15	**Break**
10:15	15	Hudson, Jim
10:30	15	DeMott, Paul
10:45	15	Snider, Jeff
11:00	15	Toohey, Darin
11:15	15	**Publication discussion - Aerosols**
11:30 AM		**b. Cloud Dynamics & Microphysics (in situ and remote)**
11:30	15	Heymsfield, Andy
11:45	15	Stith, Jeff and Jensen, Jorgen
12:00 PM		**Lunch**
13:00	15	Wang, Zhien
13:15	15	Lawson, Paul
13:30	15	Leon, Dave
13:45	15	Lasher-Trapp, Sonia
2:00 PM	15	**Publication discussion - Dynamics and microphysics**
2:15 PM		**c. Modeling**
14:15	15	Field, Paul
2:30 PM	15	**Publication discussion - Modeling**
2:45 PM	15	**Break**
3:00 PM	15	**d. Final publications list and list of accomplishments**
3:15 PM	90	**3. ICE-D: Overview of 1st submission**
		Summary of reviews, perceived weaknesess, response to reviews, OFAP and NSF decision, open discussion, proposal list revisited, charge to group for Friday breakouts
4:45 PM		**ADJOURN**
6:00 PM		optional group dinner at **Walnut Brewery**

		Friday, October 18, 2013
MST start time	min	Discussion Topic
8:00 AM	30	Continental Breakfast
8:15		*ReadyTalk web conference start up & phone in*
8:30 AM	90	**4. RECONVENE – Breakout groups**
8:30		A: Observations
8:30		B: Modeling
10:00 AM	15	----------BREAK-----
10:15 AM	90	**5. Breakout reports and integrative discussion**
11:45 AM	10	**ADJOURN**

Introductory Comments

- Changes to agenda?
- Web conferencing
- Wireless internet access
- Signup for dinner at Walnut Brewery tonight
- Identify yourself and note affiliation on signup sheet
- Overview of ICE-T Objectives and Flights-Did we meet our goals?
- Publication plans will be discussed at end of each topical area
- ICE-T Data Catalog
- BAE 146 ICE-D Plans

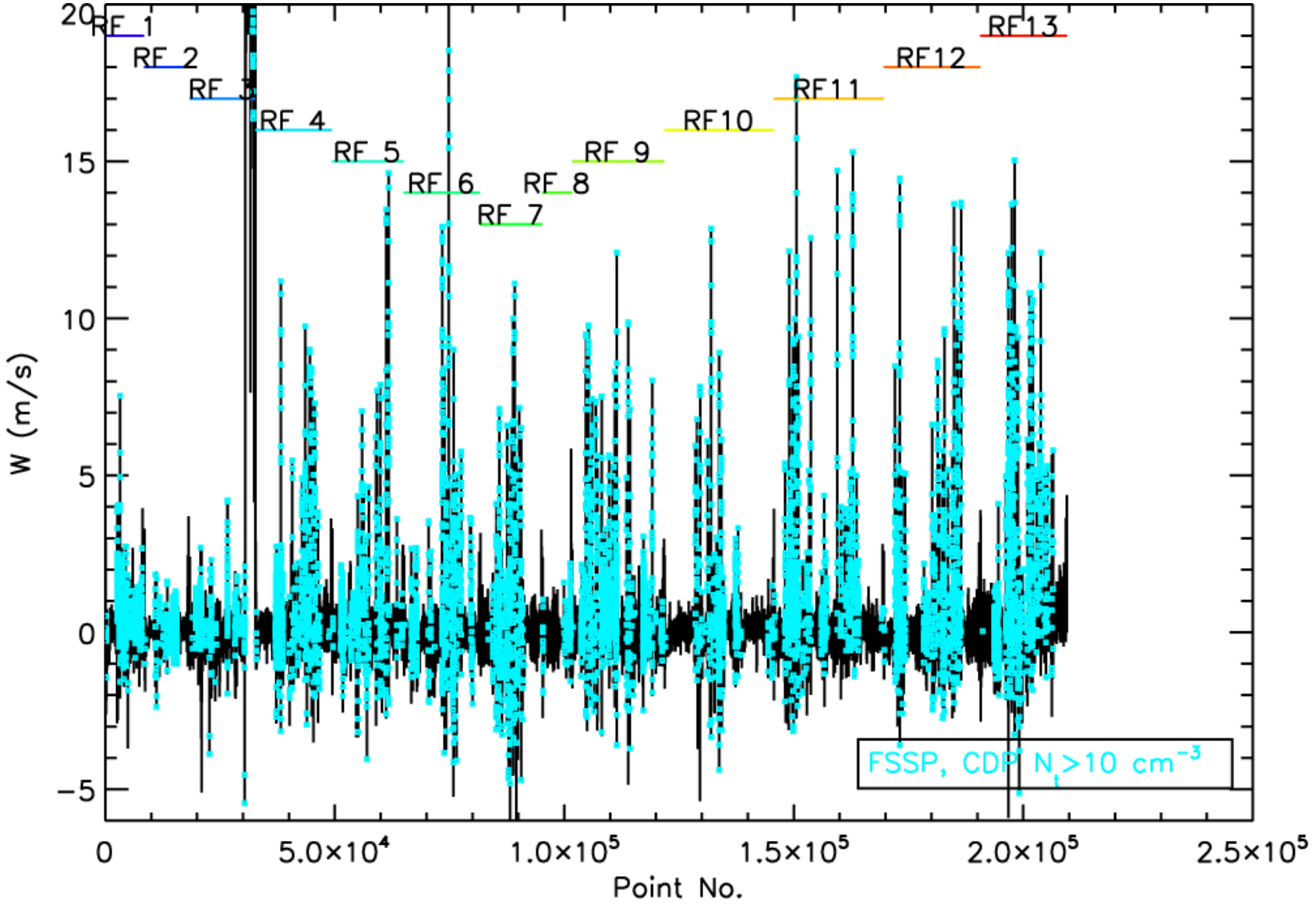
Science Goals of ICE-T

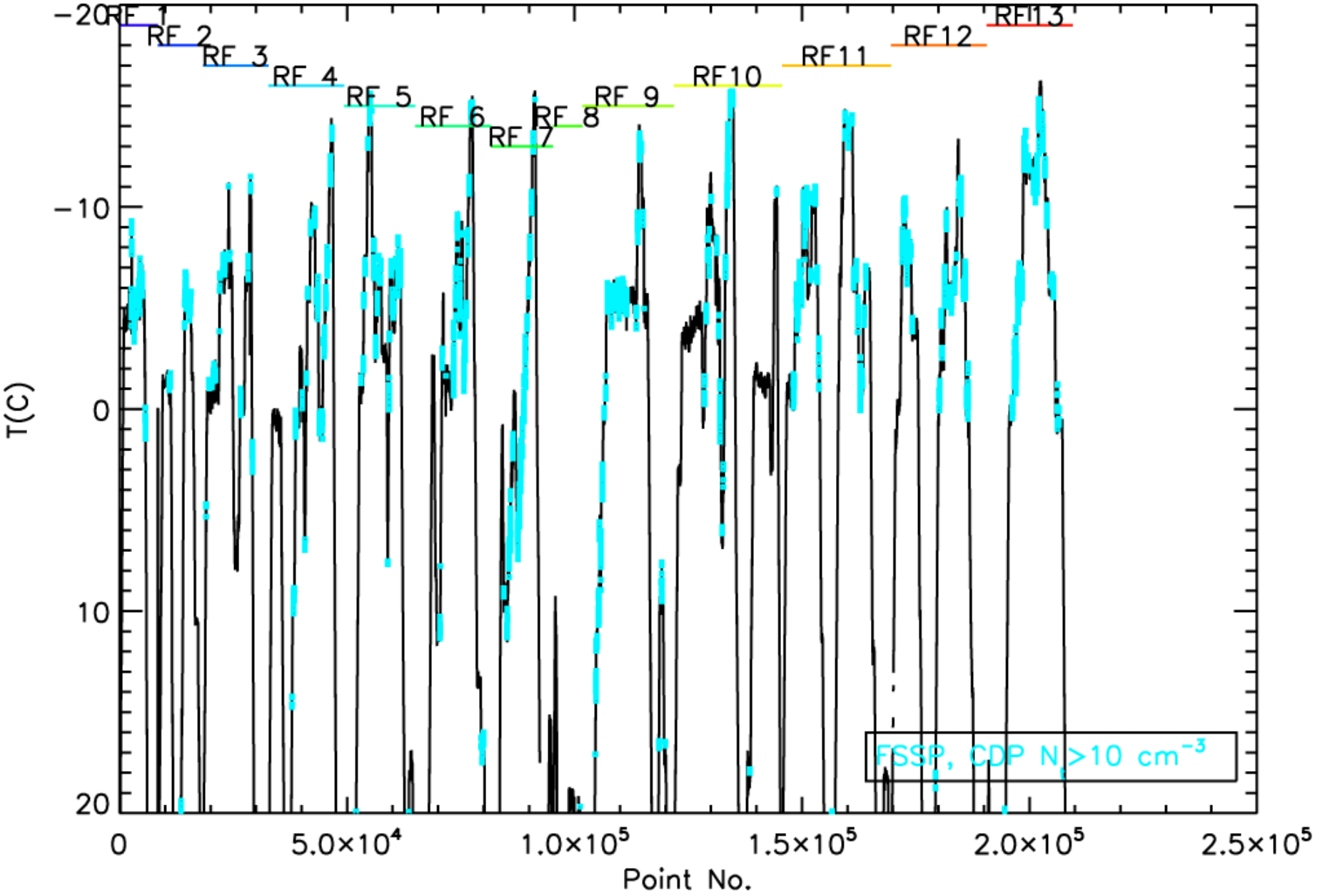
In order to make progress towards the ICE scientific goal stated above ICE-T will:

1. Attempt to observe the conditions leading to glaciation of maritime cumulus with top temperatures warmer than -10°C.
2. Characterize the aerosol as CCN and IN and investigate the dependence on temperature, size and aging (special interest in dust and biological material).
3. Characterize the link between warm rain and primary and secondary ice processes as a function of time and environmental conditions. As part of this characterization, estimate the fraction of vapor flowing into cloud base (the cloud base mixing ratio) that arrives at the 0°C, -5°C and -10°C temperature levels in the form of vapor, supercooled liquid water and ice. How does dust affect these fractions? How does this depend on the cloud lifecycle?
4. Determine if primary ice nucleation can explain the onset and glaciation of maritime cumuli.
5. Determine whether secondary ice formation processes are critical to the glaciation of cumuli. If so, what concentration of primary IN are sufficient to trigger them and how does the process work?
6. Determine whether mid-level entrainment plays a role in feeding CCN and IN into maritime convective clouds.
7. Test primary and secondary ice nucleation schemes in models and evaluate them against observations.

Flight Number	Start Date/Time	End Date/Time	Operations area	Catalog Products	Facilites	Mission summary	Notes
RF01	01 July 1459 UTC	01 July 1716 UTC	Northern Leeward Islands	Operational Model Research	C-130	C-130 Summary C-130 Status	2.5 hour flight. A local test for operations and instrumentation.
RF02	04 July 1555 UTC	04 July 1835 UTC	North of St. Croix	Operational Model Research	C-130 Learjet	C-130 Summary C-130 Status Lear Summary	2.8 hour flight. Objective: statistical sampling of convective towers and APIP generation. Significant dust layer encountered. Terminated due to lack of cloud targets.
RF03	06 July 1554 UTC	06 July 1952 UTC	Northeast of St. Croix and east of Puerto Rico	Operational Model Research	C-130 Learjet	C-130 Summary C-130 Status Lear Summary	Flight to NE of St. Croix to intercept convection. Penetrated nice isolated convective cells from 0 to -10 C. Sustained sampling in clear air (including one in dust layer). Cloud base and subcloud penetrations.
RF04	11 July 1558 UTC	11 July 2033 UTC	South of St. Croix	Operational Model Research	C-130 Learjet	C-130 Summary C-130 Status Lear Summary	Excellent BL and cloud base measurements then penetrated many clouds from 0 to -15C.
RF05	12 July 1606 UTC	12 July 1948 UTC	NNE of St. Croix	Operational Model Research	C-130 Learjet	C-130 Summary C-130 Status Lear Summary	Worked many clouds, parts of clusters early then many penetrations through tops of isolated cells. Penetrated between 0 and -8C.

Flight Number	Start Date/Time	End Date/Time	Operations area	Catalog Products	Facilites	Mission summary	Notes
RF06	15 July 1253 UTC	15 July 1719 UTC	SE and N of St. Croix	Operational Model Research	C-130 Learjet	C-130 Summary C-130 Status Lear Summary	Good dust at start, penetrated cells developing in dust layer. Flew short-lived cells east of St. Croix. Went to target near St. Croix and flew repeated penetrations through cell as developed upwards from 0 to -15C.
RF07	17 July 1552 UTC	17 July 1914 UTC	South of St. Croix	Operational Model Research	C-130	C-130 Summary C-130 Status	Great isolated cloud case.
RF08	22 July 1215 UTC	22 July 2045 UTC	East of Puerto Rico	Operational Model Research	C-130	C-130 Summary C-130 Status	Flew three clear-air aerosol legs upwind of Puerto Rico at 300, 1000 and 4500 ft to support University of Puerto Rico aerosol ground sampling. San Juan stop for outreach.
RF09	23 July 1330 UTC	23 July 1858 UTC	South and West of St. Croix	Operational Model Research	C-130 Lear	C-130 Summary C-130 Status	Followed several clouds from warm cloud regions to -10C. Made good clear air aerosol runs in BL and from UL to BL and flew in a number of clouds a few hundred meters above base.
RF10	24 July 1631 UTC	24 July 2305 UTC	East of Martinique	Operational Model Research	C-130 Lear	C-130 Summary C-130 Status	Flew developing cells E of Antilles. The cells developed into an altocu deck. Some very nice turrets sampled. Lear test flight.
Flight Number	**Start Date/Time**	**End Date/Time**	**Operations area**	**Catalog Products**	**Facilites**	**Mission summary**	**Notes**
RF11	27 July 1430 UTC	27 July 2030 UTC	South of St. Croix	Operational Model Research	C-130 Lear (2 flights)	C-130 Summary C-130 Status	Penetrations in rising bubbles in temp range of 0 to -13C. A couple of strong updraft in separate bubbles. Clouds more sheared than other flights. Clouds better described as "cloud complexes".
RF12	28 July 1430 UTC	28 July 2030 UTC	WSW of St. Croix	Operational Model Research	C-130 Lear	C-130 Summary C-130 Status	Penetrations in ascending towers through 0, -5 and -10C levels often close to cloud top. Later in flight very isolated turrets wind no mid-level cloud contamination. High variability in CCN and 3VCPI worked better than earlier flights.
RF13	30 July 1423 UTC	30 July 1935 UTC	SW of St. Croix	Operational Model Research	C-130 Lear	C-130 Summary	Cloud penetrations in rising bubbles in +2 to -15 C range with 5-15m/s updrafts and 5m/s downdrafts. Some passes near cloud top others had tops well above aircraft. Six passes coordinated with Lear penetrating at lower altitude slightly later.
Flight Number	**Start Date/Time**	**End Date/Time**	**Operations area**	**Catalog Products**	**Facilites**	**Mission summary**	**Notes**


RF 1
RF 2
RF 3
RF 4
RF 5
RF 6
RF 7
RF 8
RF 9
RF10
RF11
RF12
RF13
FSSP, CDP N_t>10 cm^-3
W (m/s)
Point No.
20
15
10
5
0
−5
0
5.0×10^4
1.0×10^5
1.5×10^5
2.0×10^5
2.5×10^5


RF 1
RF 2
RF 3
RF 4
RF 5
RF 6
RF 7
RF 8
RF 9
RF10
RF11
RF12
RF13
−20
−10
0
10
20
T(C)
0
5.0×10⁴
1.0×10⁵
1.5×10⁵
2.0×10⁵
2.5×10⁵
Point No.
FSSP, CDP N>10 cm⁻³