ICE-T Workshop
March 24/25
NCAR Foothills Lab

Buccaneer Hotel

Introductions

- http://www.eol.ucar.edu/projects/ice-t/
- **U.S. & Canada: 866.740.1260**
- **Access Code: 4978220 (today, tomorrow)**
- **Today's Web Login<web2.gif>https://cc.readytalk.com/r 2p7we2f2le6d (different tomorrow)**
- **Is it okay for everyone here and dialing/web in to record the web conference for later playback? It will be password-protected.**
- **Lets go around the room and on the web and identify each of us**
- **Reservations tonight at Walnut Brewery 1123 Walnut 6:30**
  - **Pass around sign up sheet**

Meeting Goals:

Move forward with the ICE-T planning for the investigators and the project in general

- Identify the full list of investigators, including students
- Identify additional resources to meet the investigator needs
- Fine tune the flight planning, especially with two aircraft involved
- Review logistics for field program
- Internet
- Hotel
- Staffing
- Travel arrangements
- Student involvement
- People not going to St. Croix?
- Who wants to fly on C130 and dates?
- Who need not fly on C130?
- Define data policy
- Follow up science meeting dates?
- Others?

Science Goals

- Establish which primary heterogeneous ice nucleation modes are active and important by measuring ice formation in tropical maritime cumulus clouds:
- Identify ice nuclei
- Characterize secondary ice production processes
- Determine the likely influence of aircraft produced ice on the ICE-T measurements

ICE-T Proposals
Funded

- Hudson (CCN)
- Demott (IN) Ice nuclei and ice formation processes in tropical cumulus clouds
- Lasher-Trapp: Ice Initiation in Maritime Cumuli: Considering Dynamical and Microphysical Interactions"
- Leon, Wang (WCR, WCL) Exploiting synergies between remote sensing and in situ measurements during ICE-T to better understand ice generation in tropical clouds
- Suresh, Clarkson ICE-T: Accurate aerosol sampling and size distribution measurements inside and outside cloud systems

Pending

- DMT (CPSD) ICE-T: In-cloud BC, dust, CCN and cloud droplet size and ice particle shapes over the Caribbean Sea

Prather (AMS)

Not Funded for ICE-T but Participating

[Mayol: Ground-based measurements of dust aerosols from Puerto Rico]

- [Toohey/Twohy/Noone: CVI, UHSAS, PICARRO]
- Van den Heever (Modeling)
- Anderson (Composition of single, cloud active particles)

Action Item List
"ICE-T Steering Committee Meeting
January 5-6 (half day), 2011. FL1, Room 2198, EOL Atrium"

1	all	"Daily forecasting support -- define needs, formats, people & procedures"
2	RAF	"ensure C130 cloud probes have anti-splash tips; add heaters on tips to prevent icing (FSSP-100 and 2DC)"
3	Paul D	explore impinger sampling at Olga's site in Puerto Rico
4	Jeff S	HOLODEC2 - discuss using it in ICE-T & Raymond Shaw's participation
5	RAF	"provide C130 climb rates vs altitude, to help define flight plans. Reply: 500 fpm for 15000 - 24000 ft portion of ICE-T profiles. "
6	Dave	"generate draft version tables for each flight pattern (time, altitude, pass#, temperature)"
7		"RAF SPEC" meet with pilots to discuss options for coordinating flights of SPEC Lear Jet and C-130
8	Paul D	contact U. Frankfurt or Zev Levin to see if they can do freezing tests at T > -10°C for sample collections

9 RAF ask to borrow UWyo heated inlet for use on C-130
10 RAF "software: derive & display in real-time LCL, hodograph.
derive SLWC from RICE using Mazin method."
11 Sonia "education & outreach: Determine which investigators will have students involved, identify mentors, tour hosts, handouts, # of students, which ones will fly on aircraft. Note EOL has on-line survey form; ask Steve Williams"
12 EOL "generate project web page and Field Catalog, similar to ICE-L.
create mail list for participants"
13 all "Decide if we want high resolution GTS sounding data.
Ask Julie Haggerty's impressions of data set.
Reply: Julie says these are not as good as real raobs but help to fill in gaps."
14 all define information to send by satcom between C-130 & ops center
15 all Create working group to identify needs for field catalog wx products (observations & model output). Include Steve Williams.
16 all Project planning workshop: select dates (28-Feb to 1-Mar or 24-25 March or week of 4-Apr)
17 Andy + Dave Project planning workshop: generate a draft agenda.

Aircraft Operations

Daily Project Schedule

- Alan Schanot will provide details of the ICE-T upload schedule, etc.
- Aircraft status report, research forecast, summary of flight from the day before, status reports from instrument investigators, etc.

Stable layer at -10C

Figure 3.3 TRMM precipitation radar observations (above a minimum detectable reflectivity of 18 dBZ during one overpass during the month of July, for (top) 5 km, and (bottom) 6 km levels.

Flight Patterns

Clear Air Sampling

- aircraft sounding once “on station” up to 7.5 km (25 kft or higher?).
- Sample CCN/giant particles/IN beneath cloud base, document updraft speeds
- sounding upon exiting region

Stair-Step Patterns: Ascending and Descending

Statistical Sampling

APIP Studies

-What specific flight patterns are desirable for the radar/lidar goals?

-We should attempt to use remote sensing to identify APIP signatures.

Sample just below cloud base (CCN, giant particles, IN)
Sampling as cloud rises through -5, -10, -15C
Sampling over cloud top with remote sensors to document ice production

Sample sub-cloud base environment

Stair-stepped descending flight pattern

Statistical Sampling

- 1. Transit to operating area
- 2. Profile descent to below cloud to provide an environmental profile.
- 3. Fly straight and level legs 100 m above the ocean surface to characterize below-cloud aerosol and chemistry
- 4. Fly at least one leg through cloud at 100 m above cloud base to characterize the cloud droplet spectrum and to characterize the properties of the aerosols as derived from the CVI residuals. The height of the cloud base, the aerosol concentration just below base, and the cloud spectra just above the base are critical parameters for understanding the microphysics of these clouds and the role of dust.
- 5. Ascend to -10°C level and perform series of runs through different cumulus clouds.
- 6. Descend to -5°C level and perform a series of runs through different cumulus clouds.
- 7. Fly at 0C level to document warm rain process
- 8. If cloud top is well defined then characterize aerosol and chemistry just above. Perform downward looking remote sensing runs.

Statistical sampling flight pattern

APIP Investigations

Other Considerations

Fuel for 6 hour flights

Time to reach 23000 feet is about 25 minutes

Barbados-1 ½ hour transit

Clearances needed with foreign locations-which ones?

Will get sounding from C130 on climbout and descent

We should develop likely case profiles for each flight pattern including time, temperature, # of cloud passes and put this information into a spreadsheet

Low altitude sampling ~500 feet above sfc is planned during transits to and from study areas. Sampling in those regions near target clouds is desirable

Low altitude sampling should be coordinated with Olga's ground aerosol station In Puerto Rico

For flight planning, episodes of Saharan dust will have emphasis

What are the preferred sampling strategies for WCR and WCL?

Desirable to sample in areas with surveilance radar and avoiding lower altitudes Near islands because of clearance issues.

Single-cloud APIP studies:

Descending pattern: Fly over CT with WCR looking down to document microphysical stage, then later passes at warmer T within cloud (minimizes APIPs?)

No penetration pattern: Fly over CT with WCR looking down to document microphysical stage, then later passes above CT when at lower temperatures with WCR looking down (no APIPs)

Single penetration pattern: Penetrate cloud at -5 °C, then later passes over ascending top of cloud to track subsequent evolution with WCR (allows APIPs).

Statistical sampling of APIPs:

Seeding pattern: Cloud penetration at -5 °C or -10 °C within line of developing Cu. Use WCR/WCL to document cloud top height for each cloud penetrated. Some cells penetrated; others not. Fly pass above all cloud tops; use WCR to discern ice development differences