GOAL

Describe and understand monsoonal cloud structure and evolution and their impact on the environment

Through:

- Remote sensing of cloud structure, microphysics
- In-situ measurement of microphysics, thermodynamics
- Modeling of monsoonal cloud systems

Darwin 2006 – The science

Convection “dynamics”

Link to the large scale

Diurnal cycle

Link between boundary layer structure and oceanic convection

Impacts of land on storm and cloud characteristics.

Effects of evaporation/sublimation on near environment.

Collect data to derive entrainment/detrainment rates, hydrometeor advection etc.

Characterize the vertical motion, microphysical structure, wave generation.

Document impact of convective systems on the environment – thermodynamically, radiationally, energetically

Darwin 2006 – The science

Cirrus microphysics-

Characterize the characteristics of cirrus in monsoon environment

How does it differ from coastal and continental cirrus where convection is more organized, often more intense (at least electrically) and has origins in oceanic air mass (different aerosols)?

How does it characteristics change as the clouds age?

Structure and microphysics of thin cirrus

Darwin 2006 – The science

Validation of remote sensors –

Ground, airborne:

in situ measurements of cloud microphysics over ARM site

Space: CloudSat, CALIPSO, AVE, AURA

Modeling aims

Study and improve the representation of the Australian monsoon, in particular the embedded cloud structures, in selected models

- Use a combination of limited area and global NWP, CRM, SCM and climate models

Test ability of Multi-scale Modeling Framework to simulate monsoonal convection

Test cirrus process models for tropical cirrus

NASA goals

Microphysical structure of convectively generated cirrus (as in ARM)

Thin cirrus characteristics and origin (ARM also has an interest)

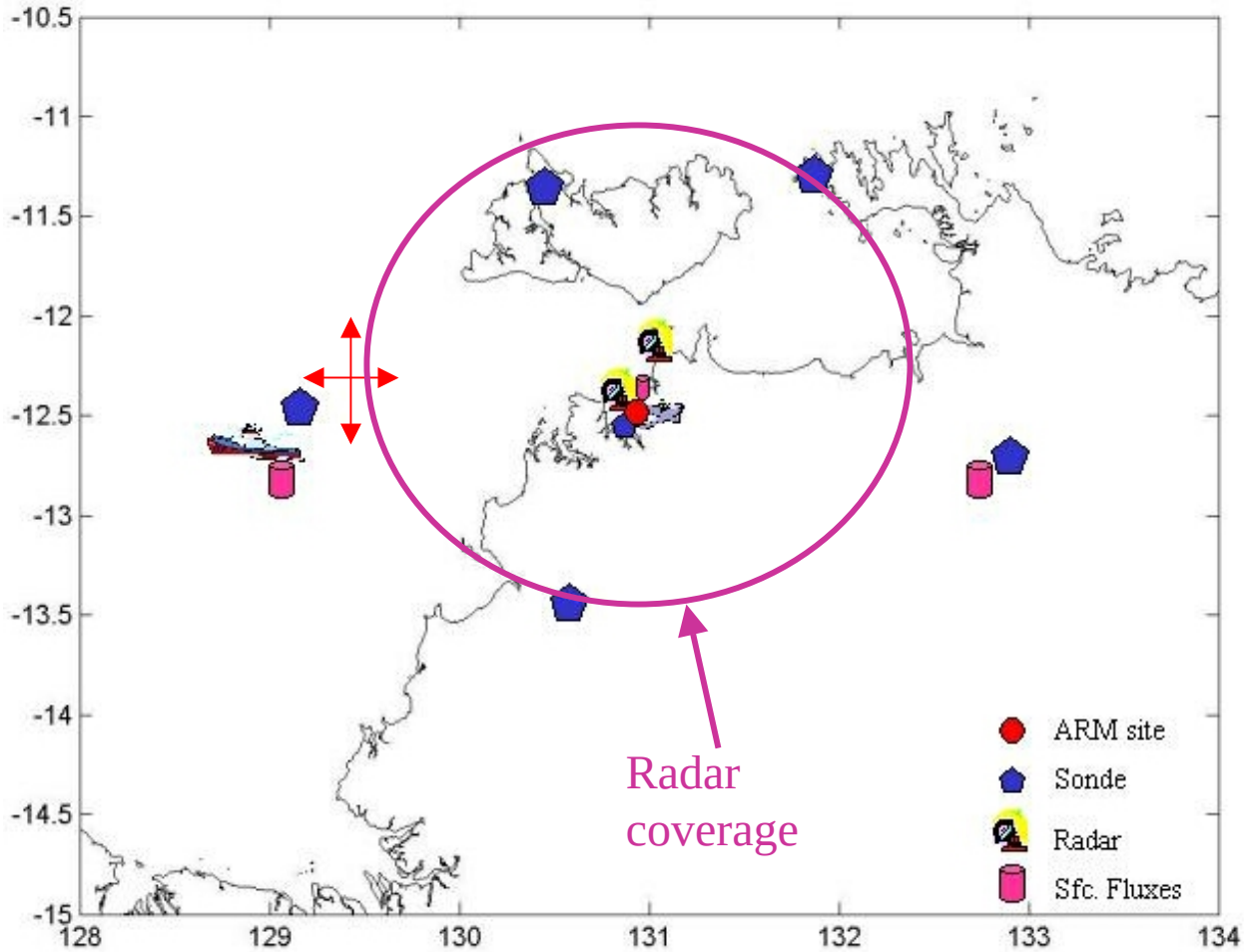
Processing and generation of trace constituents in tropical convection

Stratospheric/tropospheric exchange

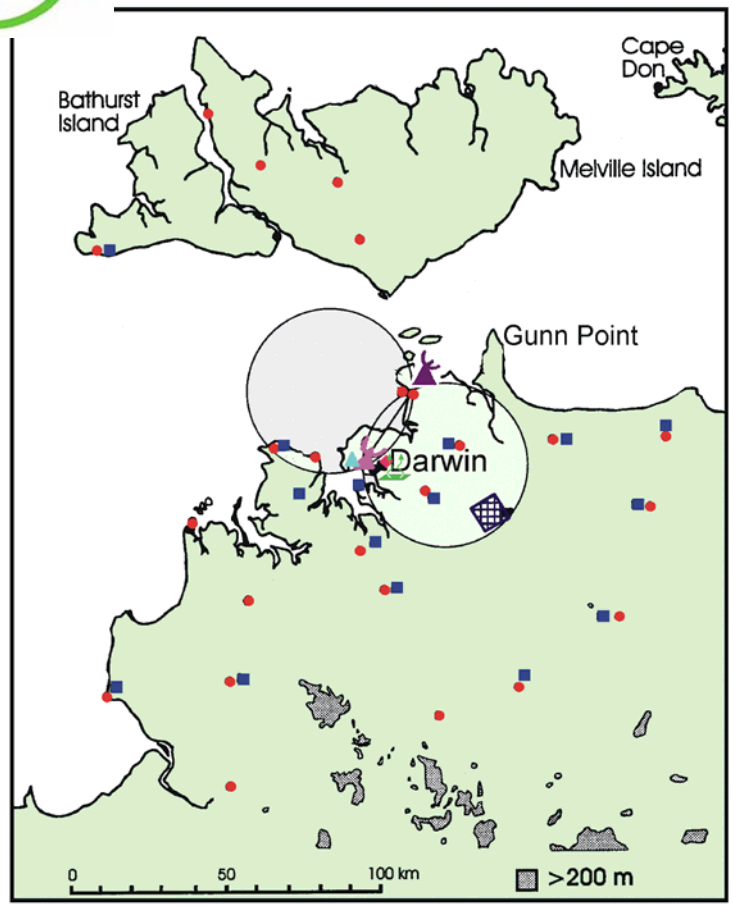
AVE/AURA validation (chemistry)

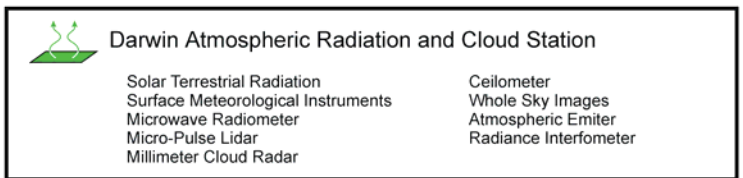
A-train validation (ARM committed to support this)

TWP ICE 2006


-10.5
-11
-11.5
-12
-12.5
-13
-13.5
-14
-14.5
-15
128
129
130
131
132
133
134
Radar coverage
ARM site
Sonde
Radar
Sfc. Fluxes

Instrumentation





ARM operational:

MMCR
MWR
WSI
Surface Met
Ceilometer
SkyRad: PSP/PIR UVB Global PSP
MFRSR IRT
MPL

BoM data sets:

Polarimetric radar (5cm)
Doppler weather radar
Profiler (50 and 920 MHz)
AVHRR, GMS
Radiation
Surface Met
Soundings
NWP

Darwin 2005 - Ship

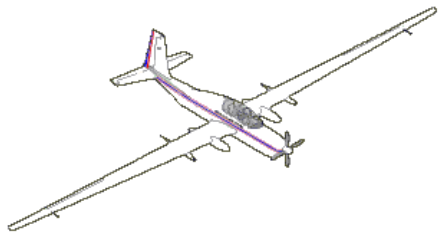
Proposed use of the RV Southern Surveyor

Flux and Radiosonde measurements and possible deployment of mobile radar/lidar (PARSL)

TWP ICE 2006 - Aircraft

18 km — B57 : In situ microphysics, chemistry, state

15 km — Proteus: In-situ, up/downward-looking remote



13 km — Egrett: In-situ, up/downward- looking lidar

5 km — King Air: In-situ, upward-looking remote

PBL — Dimona/Twin Otter/Cessna: Flux measurements, BL structure, chemistry and aerosols

Missions

Flux measurements (BL aircraft only)

Early Convection- mature convection (4 missions – all aircraft)

Mature convection –decaying cirrus (4 missions – all aircraft – extended Proteus?)

Thin Cirrus (2 missions)

Total hrs ~ 50 hrs (more for Proteus?)