Summary of DAY 2

Global Storm-Resolving Models and DYAMOND w GV

Process analysis/modeling

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Science Targets with ECare instruments

CPR : vertical motion of precipitating particles
ATLID: aerosol (CCN, IN, absorbing matter, non-spherical ice)
MSI : reflectance, emissivity, cloud fraction, horizontal inhomogeneity
BBR : convective strength, water vapor in clear sky

- Sc➔Cu, POCs(open-close cells), Life-cycle of aerosol-cloud-rain with **CPR, ATLID**, and geo-stationary satellite (Graham)

- Low-thin liquid clouds with **MSI, CPR, ATLID, and BBR** (Jean-Louis)
  ➔Similarly, high-thin cirrus

- Convective organization and its effect on the energy budget (radiation/momentum/MSE) with **BBR, CPR**, other satellites, and reanalysis (Bjorn, Ann, Silke, Hiro)

- Microphysics: accretion of graupel just above the freezing level and self-collection and evaporation of rain under the melting layer with **CPR** (Woosub)

- Thermal plumes in convective clouds with aerosol effects with **CPR and ATLID** (Toshi)

Possible other targets

Tropical cyclones (issue of full attenuation) and extra-tropical cyclones
Polar clouds and Arctic sea-ice

Complementary and supporting projects/tools

- Global Storm Resolving Models in the DYAMOND project [summer(agcm)/winter(aogcm)]
  Data is available (contact the ESiWACE coordination team).

- Satellite simulators [COSP (Alejandro), SDSU(Hiro), J-Sim(Tempei, Woosub)]
  Packages are available.

- Air-craft measurements over the tropical/extra-tropical Atlantic ocean (Bjorn, Silke)
  Data availability ?

- Ground measurements [Germany/Barbados-island/Cape Verde (Silke), Tokyo (Masaki)]
  Data availability ?

- Other new satellites (ACCP?)

ISSUES

- Determining the behaviors of individual cloud microphysical processes in the multi parameter-space (Graham)
  - ➔ New observable parameters produce the additional dimensions to the space
    Cloud Albedo, COT, AOT, cloud fraction, βext, Ze, Nc, LWC, re, w, ut, ice habits
  - ➢ How can we use vertical information from Ecare? (use of the vertical gradient?)

- Dynamical regimes determined by the time-lag composite using multi-satellites (Hiro), geo-stationary satellite (Graham), or percentiles of physical parameters (Ann, Jean-Louis)
  - ✓ 2-D param: OLR, column water vapor, relative humidity @ specific level, cloud reflectance, precipitation rate, column integrated moist static energy
  - ✓ 3-D param: Relative humidity

- Synergetic use of satellite, air-craft measurements, ground observations, and models to constraining cloud microphysics (Silke, Woosub, Tempei (DAY1))
  - ➔Different spatio-temporal resolution among datasets (foot-print sizes of CPR, ATLID, MSI)

- Spatial inhomogeneity, fine-scale structure (Jean-Louis, Toshi, Tempei(DAY1))
  - ➔Understanding what is going on in the natural world or in fine-scale cloud systems

- Model evaluation/development (Ann, Woosub)
  - ➔1M or 2M, PSD, and assumed D-ut relationship (ice habits).
  - ➔What is detectable ? (Woosub, Tempei(DAY1))
  - ➢ Vd is clear (Ze is likely to suffer from attenuation) ➔ Vd is available for model evaluation

TODO

•Sharing tools and settings

Satellite simulators (but, it is hard to get used to them all)

•Sharing dataset

collocated satellite products [e.g., GOCCP, EarthCARE Research A-train Product Monitor by JAXA, and other collocated satellite products]

➔ A suit of process-oriented analyses, model evaluation

Synchronized dataset for “satellite-air craft observations” or “satellite-ground observations”

➔ A suit of model inter-comparison

•Practice using Single-Column-Model/LES with satellite simulators that take realistic noises into account

➔determining the cloud microphysical processes that are detectable

➔check whether signals are real or false (validation of retrieval algorithms)

Towards the goals (scientific goal and social contribution)

- Visibility of the contribution of ECare to climate issues.