Visible channel vicarious calibration technique using DCC target

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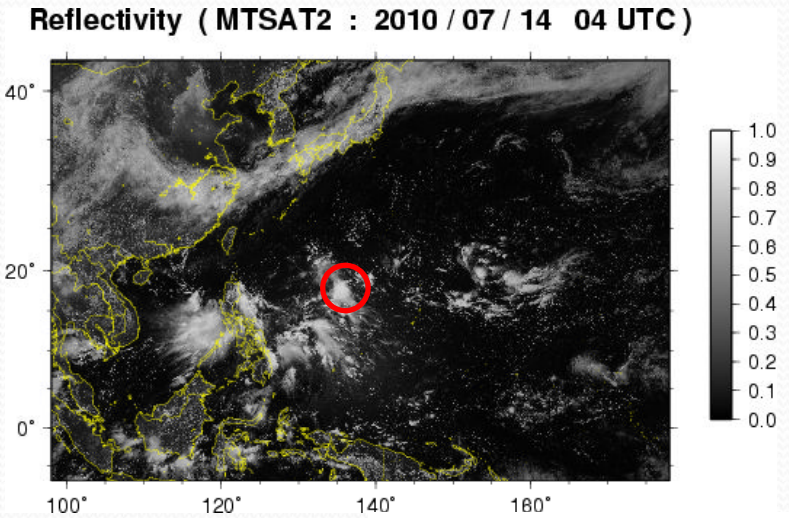
Background

- Visible channel vicarious calibration technique is developed by JMA through the collaborative research with AORI (University of Tokyo) and CEReS (Chiba University).
- As for radiative transfer (RT) code, RSTAR, developed by AORI, is used.
  - http://www.ccsr.u-tokyo.ac.jp/~clastr/
- DCC will be adopted as calibration target together with sea, land, water cloud.
  - Optical parameter of DCC is retrieved from MODIS-L1B data.

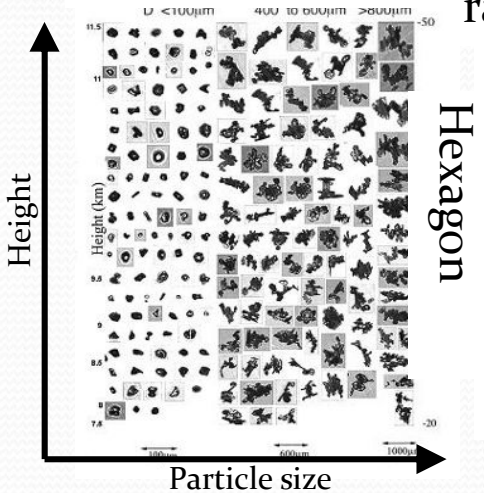
Target selection and RT calculation

- **Select uniform, high cloud top DCC target**
  - Select uniform target using DN standard deviation
  - TBB of IR1<= 200K
  - TBB difference of IR1-IR2<=0.5K (Inoue T, 1987 J.G.R)
  - TBB difference of IR1-IR3<=0K
- **Retrieve cloud optical thickness of DCC from MODIS-L1B data.**
- **Influence of non-spherical shape crystals was minimized in RT radiance simulation.**
  - Large uncertainty in RT radiance calculation is caused by the difference of hexagonal and spherical shape particle phase function.
  - We introduce the geometrical condition which minimizes the error depending on a phase function.

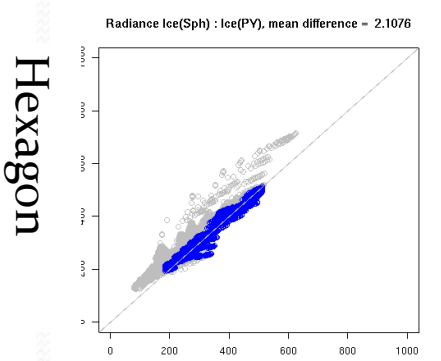


RT calculated radiance difference

Example of crystal shape

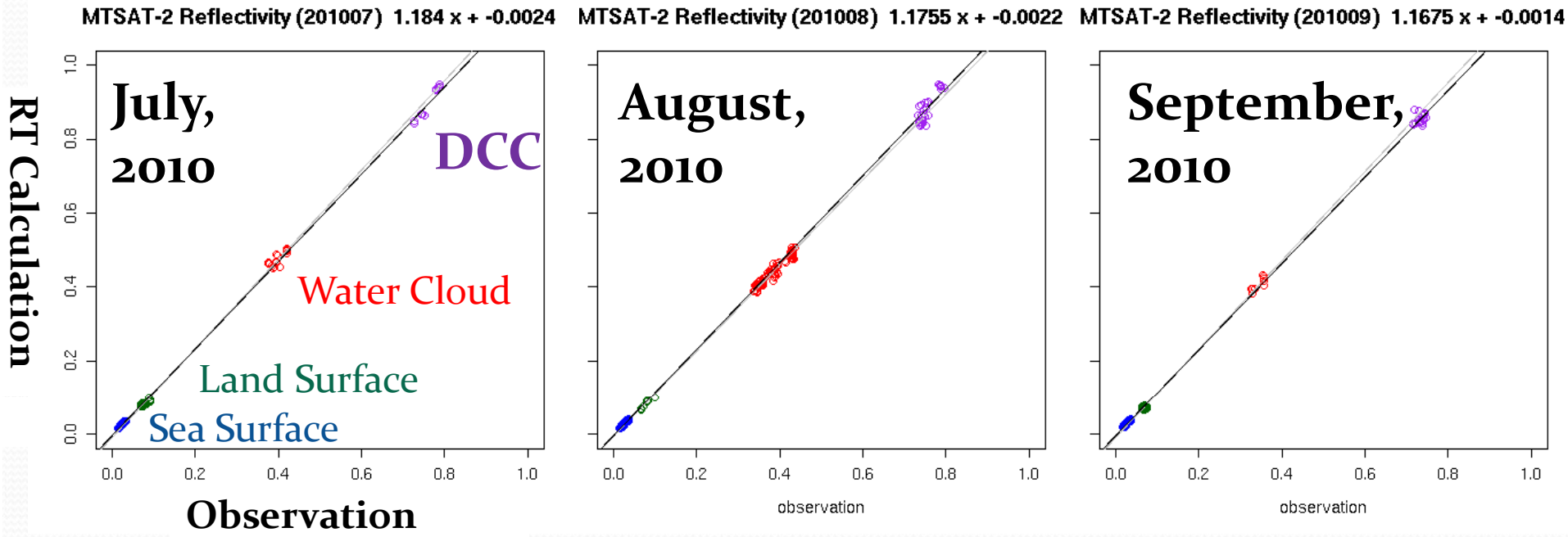


(Heimsfield, 2002)



Sphere

Calibration result



- Preliminary calibration result of MTSAT-2
  - DCC target looks consistent with other three targets.
- Validation of calibration accuracy using DCC target is current issue.

Summary

- DCC will be adopted as visible channel vicarious calibration target together with other three targets.
  - Select uniform, high cloud top target.
  - The influence of an non-spherical shape was minimized in RT radiance simulation.
- Result of DCC calibration was consistent with those of other targets.
  - Validation of calibration accuracy using DCC target is current issue.
- JMA would like to examine the Dave's DCC technique and compare with our method.