Validation requirement and plan

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Validation is a very important part of satellite remote sensing programs even for technically-matured sensors. A space-borne lidar is a new sensor and it will require very careful planning of validation experiments because a satellite-borne lidar has never been implemented for a long term, except a shuttle-borne lidar (LITE) and a lidar (ALISSA) for a space station, and little is known about characteristics of space-borne lidars.

Validation experiments will have to be made mainly with ground-based lidars to directly detect quantities similar to what the space-borne lidar obtains, and passive sensors like radiometers to get information on optical properties of clouds. Experiments sites must be chosen so that coincidence of measurements will be maximized. Airborne (aircraft) lidars would be effective tools to get better coincidences by flying along the tracks just under satellite.

International cooperation and coordination will widen the opportunities for validation data acquisition. Coordinated observations by various types of instruments are also recommended to get better scientific achievements.

Validation experiments requirements

(1) Verification of instrument performance

Target: Lidar signals (magnitude of signal, noise level)

Means: Ground-based/airborne lidars (calibrated)
Surfance reflectance

Difficulties:
Multiple scattering effects

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Validation experiments requirements (cont'd)

(2) Verification of data reduction to geophysical parameters

Target: Backscattering coefficients
Cloud top/base heights
Optical depth

Means:
Ground-based/airborne lidars (calibrated)
Meteorological sondes
Sunphotometer-type instruments, etc.

Difficulties:
Attenuation correction scheme
Extinction to backscattering ratio uncertainty
Multiple scattering effects