S4 approach to aerosol and surface reflectance

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Catalysts
software is our passion

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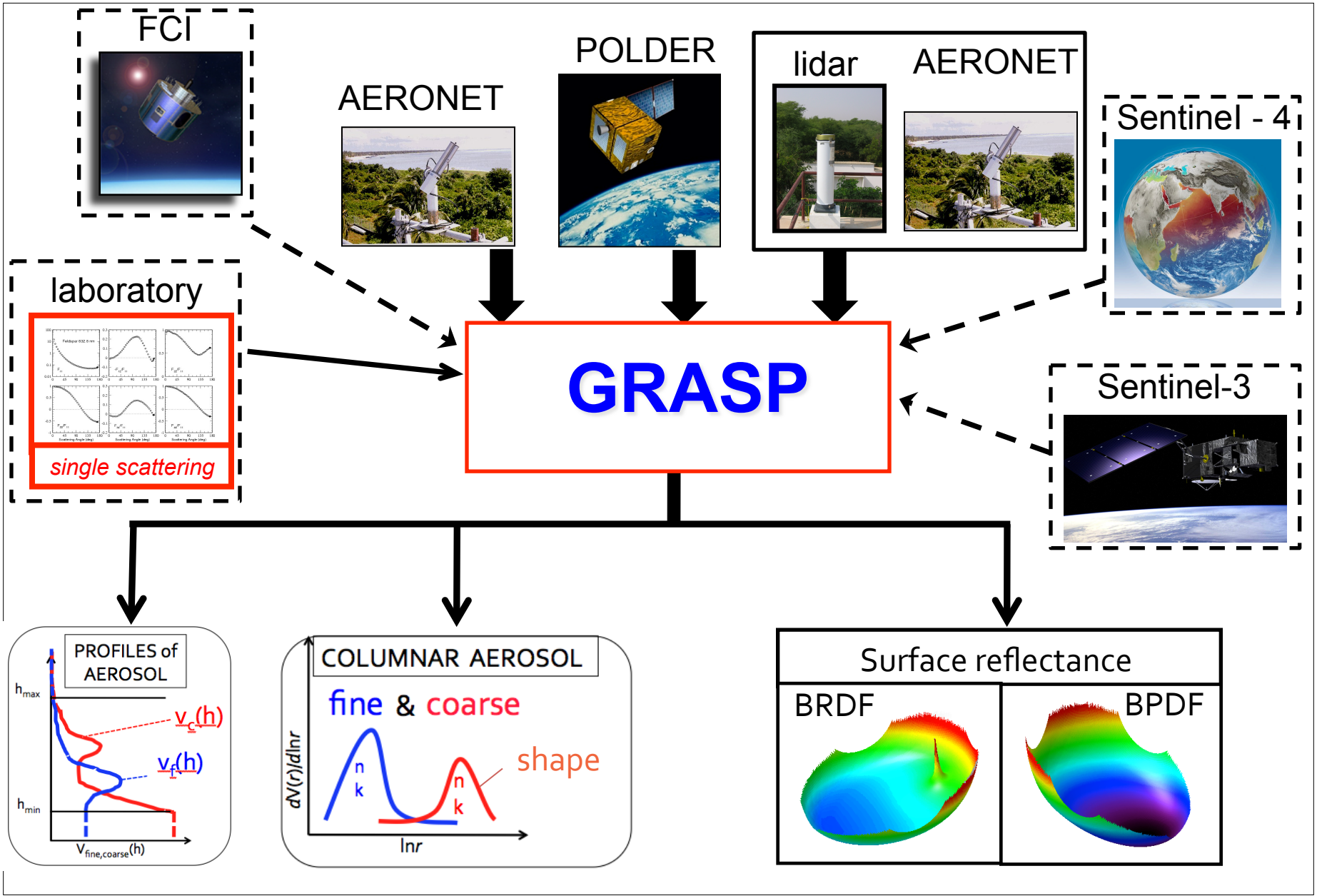
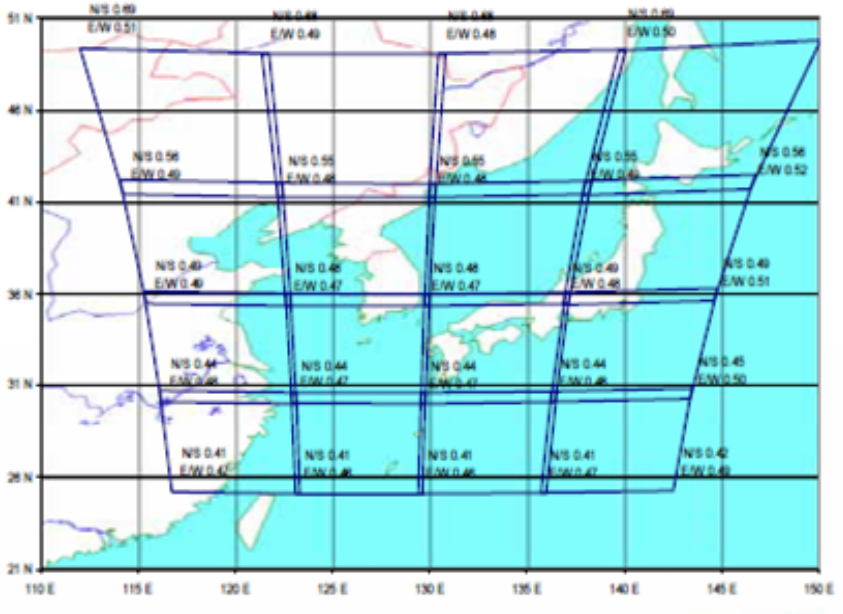
GRASP

GRASP: Generalized Retrieval of Aerosol and Surface Properties

(Dubovik et al. (2011), (2014))



GRASP/GOCI: aerosol and surface (Sentinel-4 "proxy")



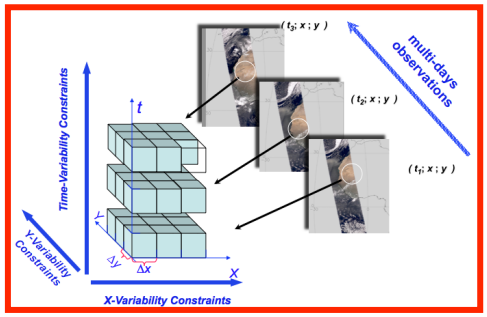
The Sentinel-4 Instrument on MTG-S

	Spatial resolution	**Temporal resolution**	**Wavelength**	**Objectives**
Sentinel 4	8 km (Europe, North Africa)	1 hour	0.305-0.4 μm; 0.4-0.5 μm; 0.75-0.775 μm	Atmospheric chemistry, aerosol

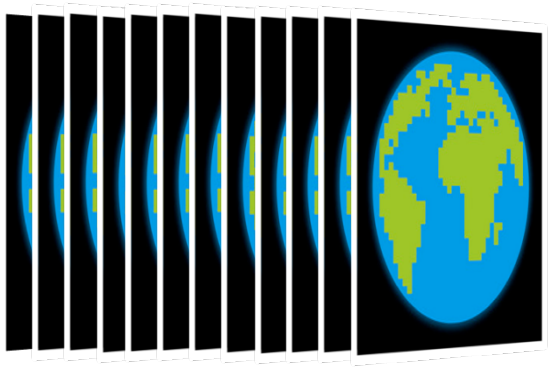
The GOCI Instrument on COMS

	Spatial resolution	**Temporal resolution**	**Wavelength**	**Objectives**
GOCI	500 x 500 m (East Asia)	1 hour	0.412, 0.443, 0.490, 0.555, 0.66, 0.745, 0.865 μm	Ocean color, aerosol, vegetation

GRASP/GOCI inversion scheme

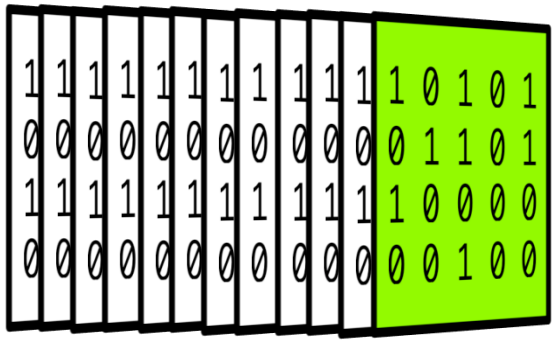


multi-day (multi-hours) retrieval



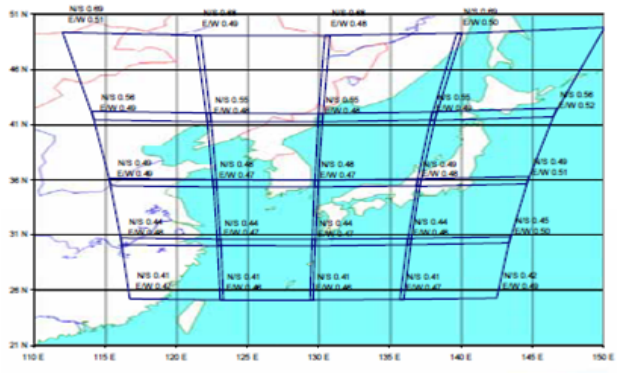
N-hours measurements

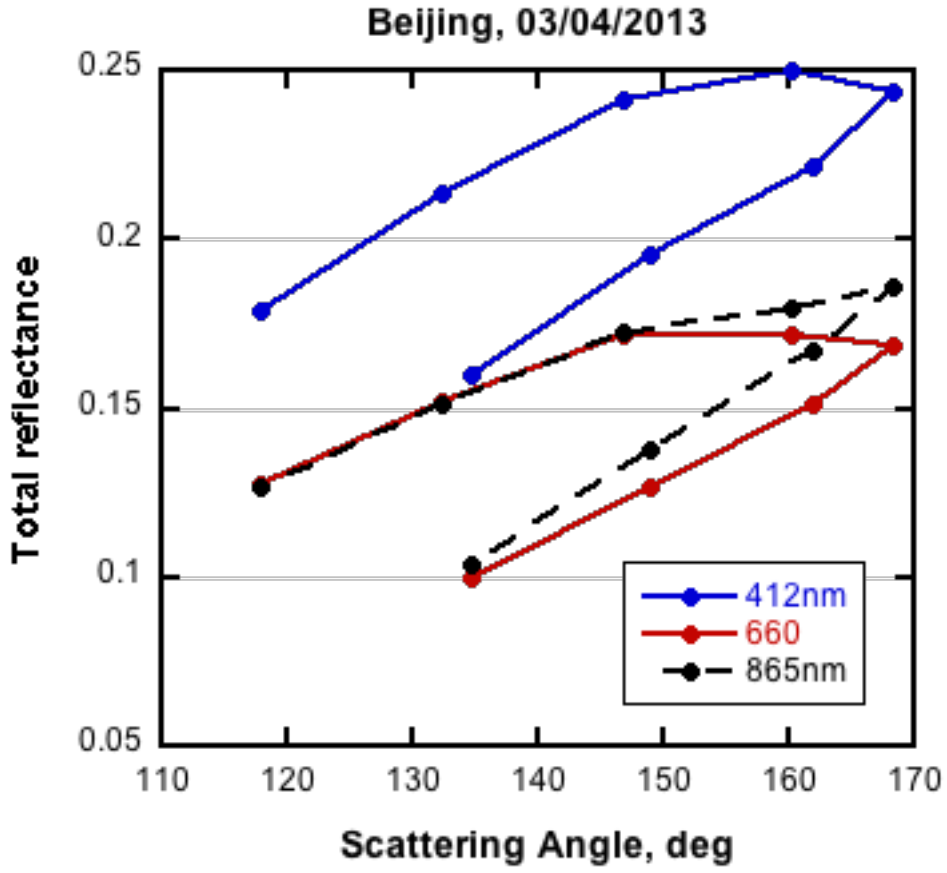
1 time

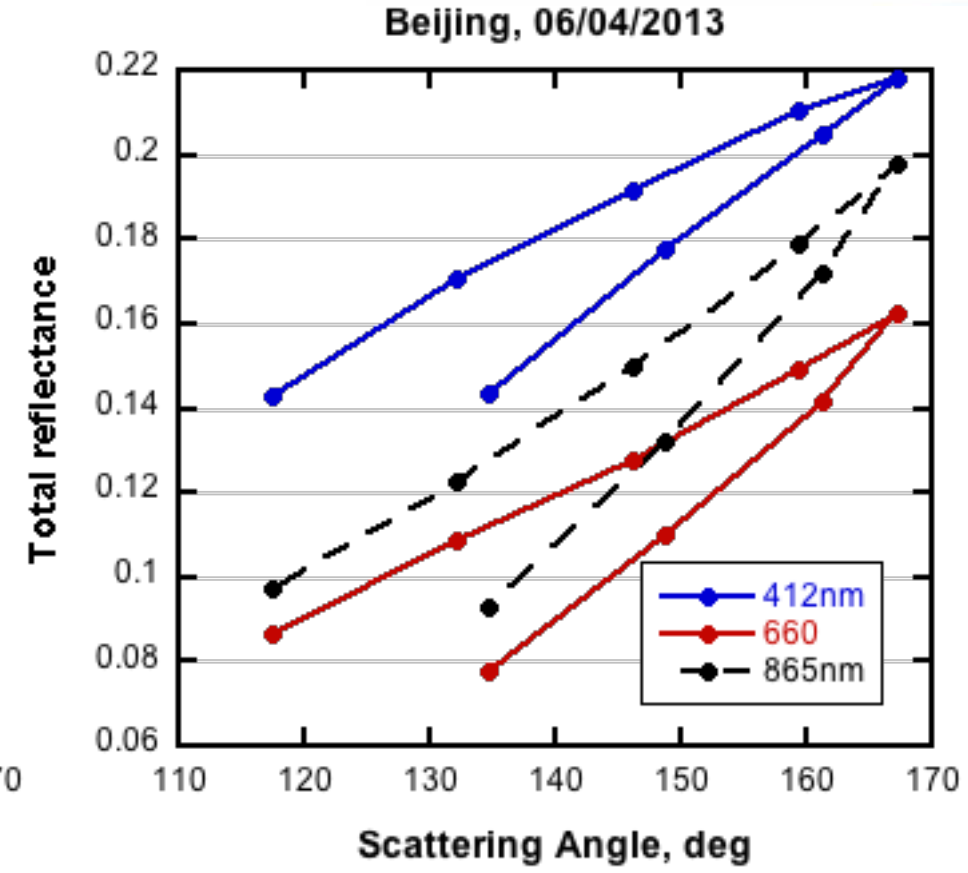


Results for N hours

Angular profiles from GOCI daily measurements

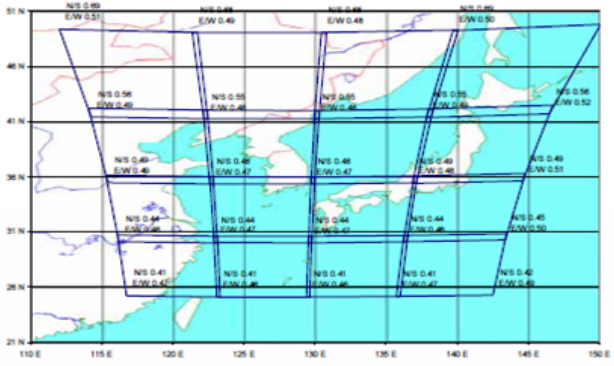


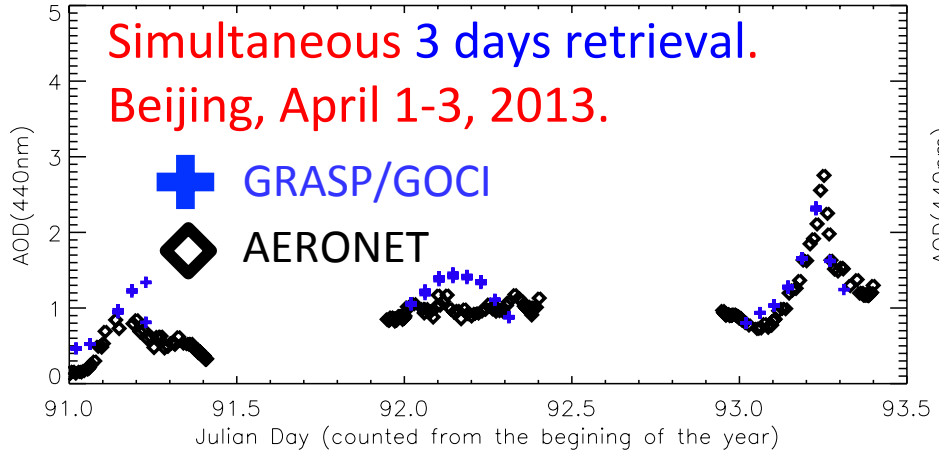


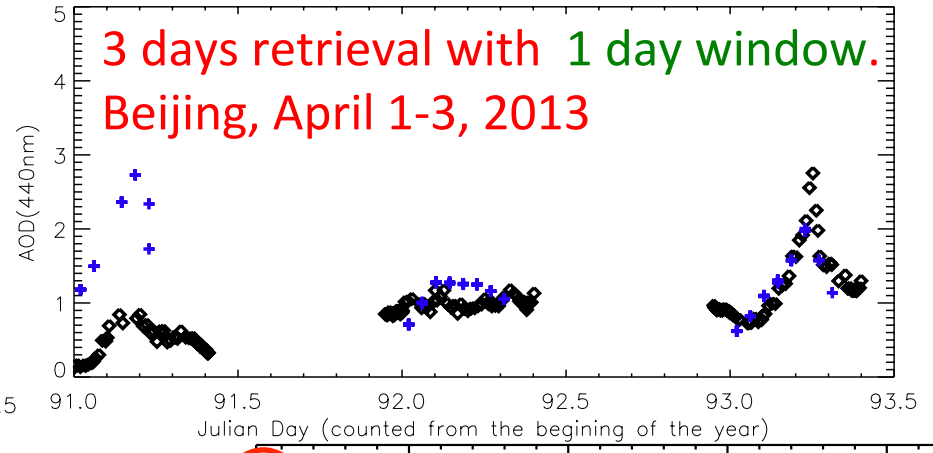


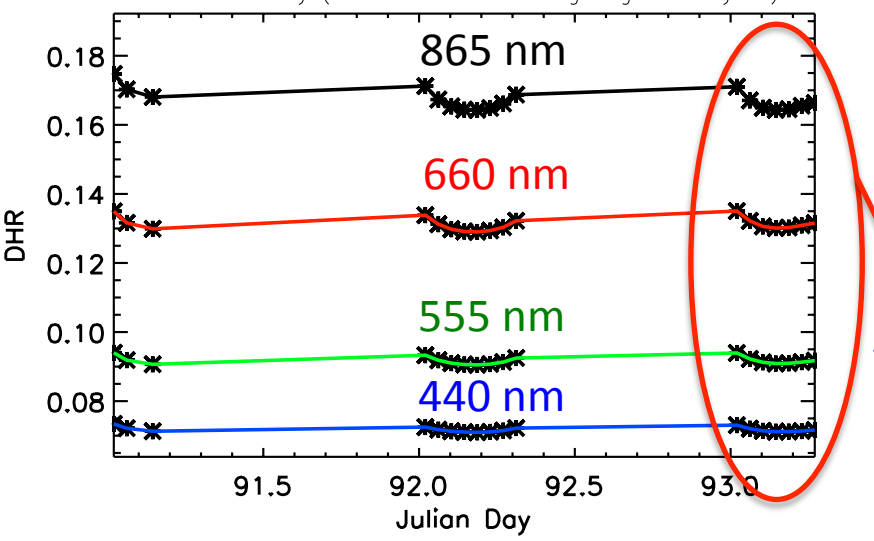
Multi-days GRASP retrieval can enhance aerosol/surface characterization.

GRASP/GOCI:
multi-day surface retrieval from geostationary satellite

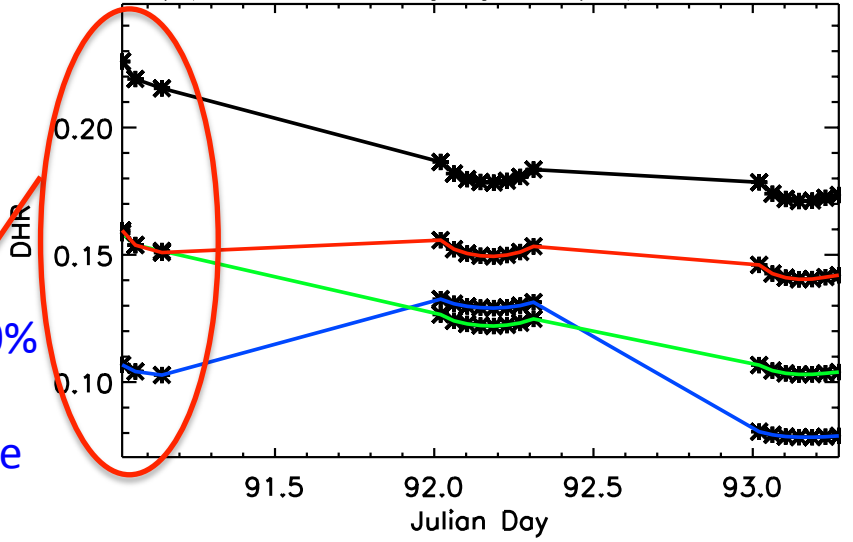








About 20% Relative difference

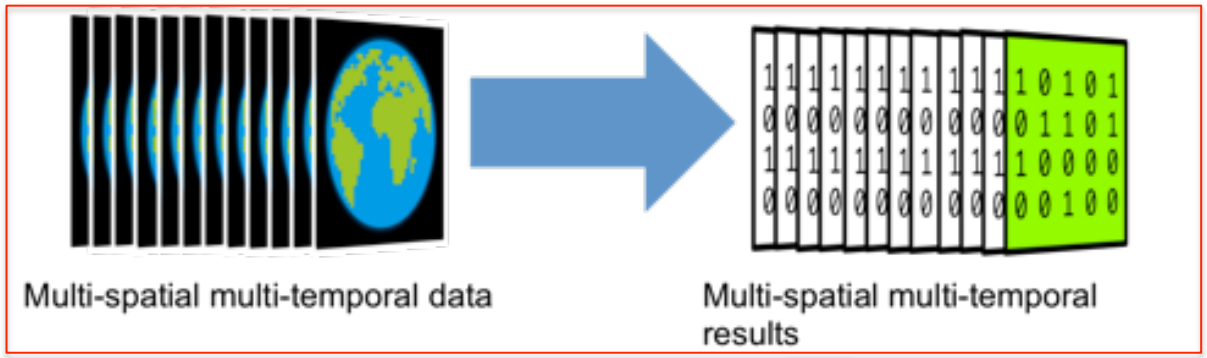


Multi-days retrieval provides more stable and accurate surface reflection retrieval !

GRASP/S4 product processing scheme

Multi-day retrieval for surface a priory value

A priory Surface With 2 weeks update



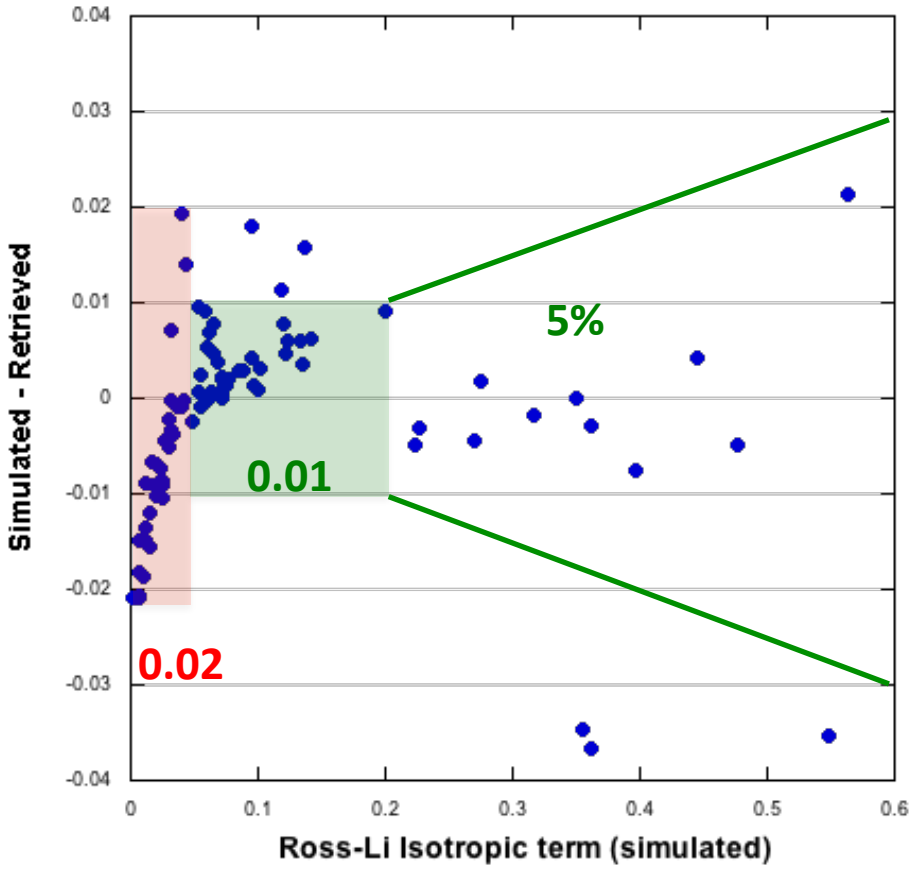
A priory value processing

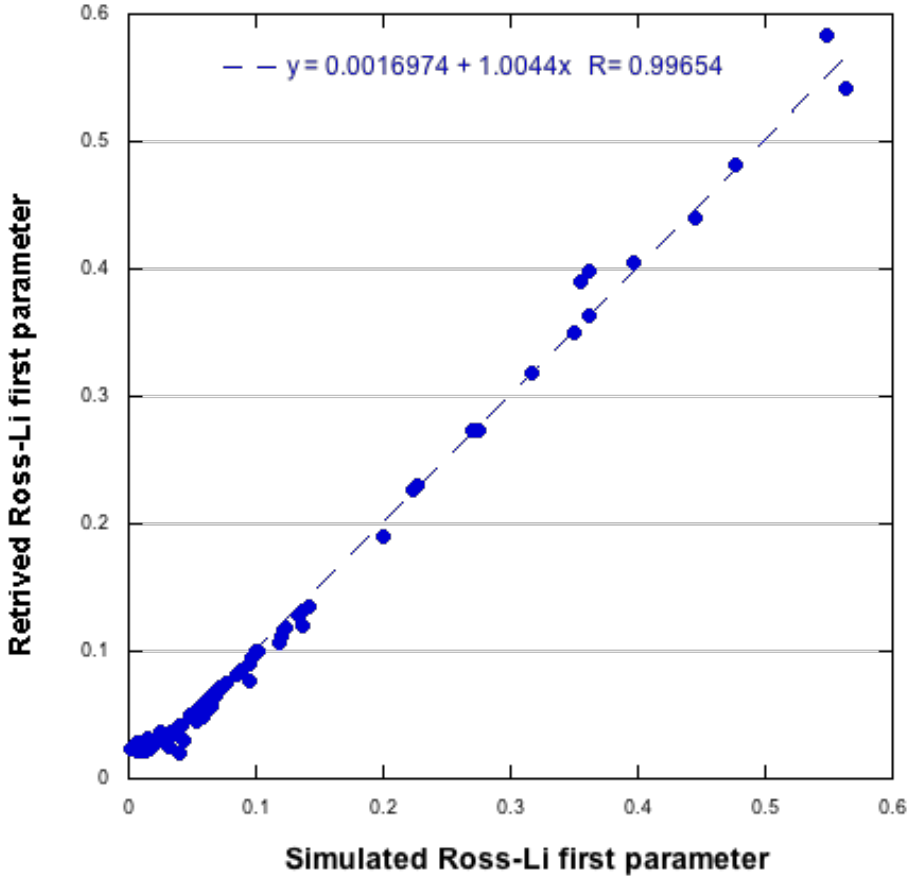
Processing during the night for previous day

One-day (multi-hours) retrieval

SUR/GSR

Expected retrieval uncertainties





Estimated **Surface Albedo** uncertainties.

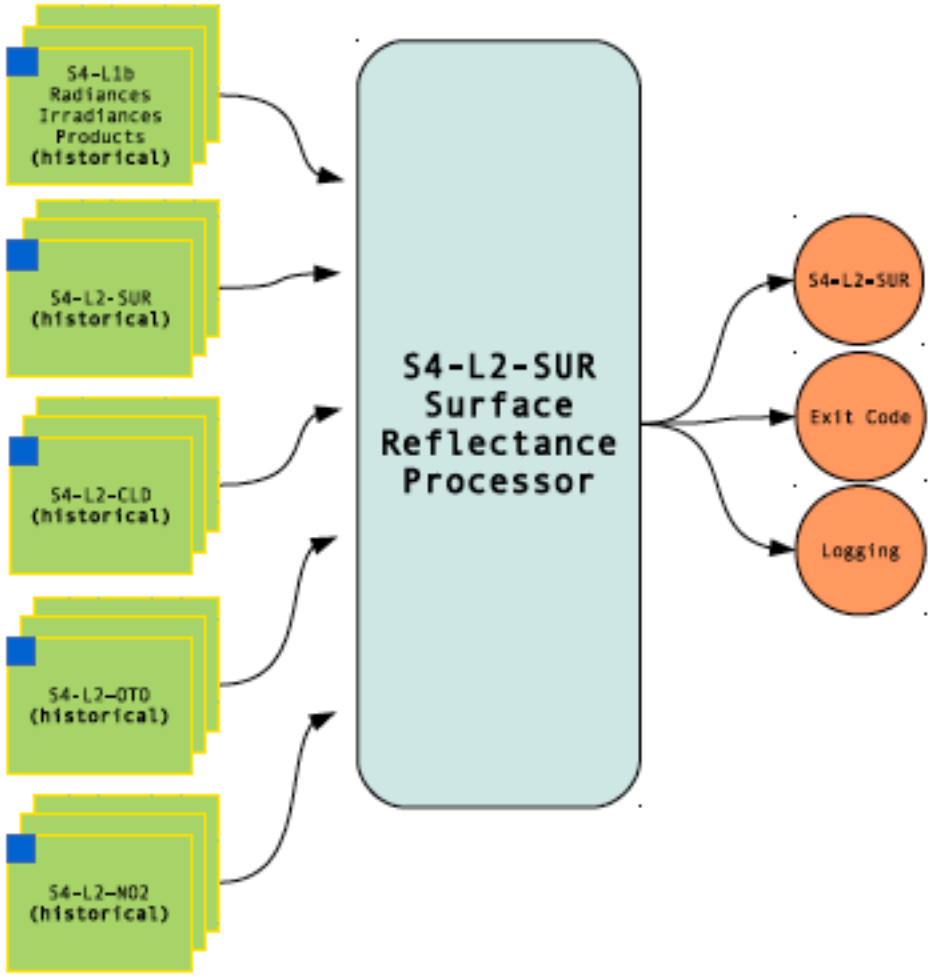
Albedo =< 0.03: **0.02 absolute** in absolute value

Albedo < 0.03: **0.01 absolute** or **5% relative** value

Estimated **AOD** uncertainties:

0.05 or **15 %** (**very close to GCOS requirements)**

SUR hourly product



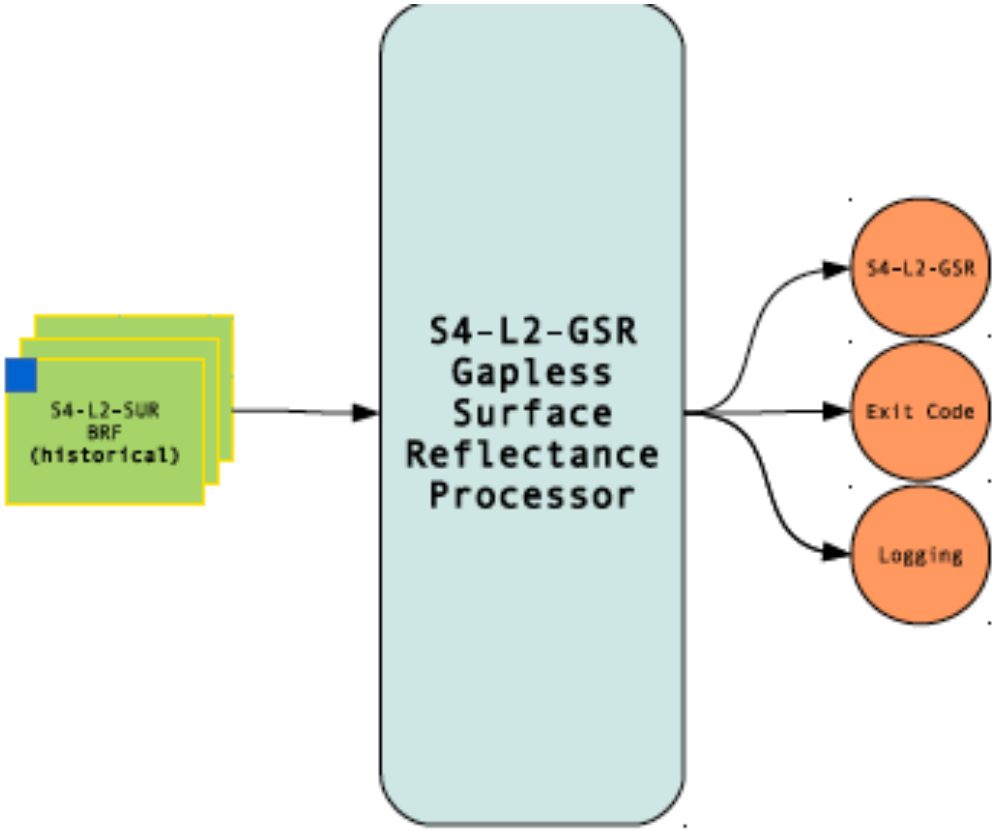
SUR product:

1. Hourly Surface **BRDF** (BRF, DHR, White Sky Albedo) for cloud free conditions
2. Hourly **AOD** for cloud free conditions

SUR Wavelengths:

342, 367, 410, 443, 490, 755 nm.

GSR (Gapless Surface Reflectance)



GSR OUTPUT:

1. Gapless Daily Surface Reflectance (**BRDF,** White Sky Albedo)

GSR Wavelengths:

342, 367, 410, 443, 490, 755 nm.

S4 SUR/GSR product

- **Multi-days (multi-hours) GRASP retrieval for accurate surface and aerosol retrieval.**

  Input: Multi-days S4 measurements.

  Output:

  1. Hourly and Daily Surface BRDF
     (BRF, DHR White Sky Albedo etc)
  2. Hourly AOD
     (342, 374, 410, 443, 490, 756 nm).