

I CONVEGNO ISTITUTO DI SCIENZE POLARI

Field and satellite hyperspectral data for cryospheric applications



Di Mauro B.^{a,*}, Garzonio R.^b, Bramati R.^b, Bohn N.^c, Guanter L.^d, Cogliati S.^b,
Cremonese E.^e, Julitta T.^f, Kokhanovsky A.^g, Gilardoni S.^a, Rossini M.^b, Colombo R.^b

^a Institute of Polar Sciences – National Research Council of Italy, Venice (Italy)

^b Department of Earth and Environmental Sciences. University of Milano-Bicocca, Milan (Italy)

^c Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences (Germany)

^d Polytechnic University of Valencia (Spain)

^e Environmental Protection Agency of Aosta Valley, Aosta (Italy)

^f JB Hyperspectral Devices, Dusseldorf (Germany)

^g Telespazio Belgium, Darmstadt (Germany)

^h Institute of Polar Sciences – National Research Council of Italy, Bologna (Italy)

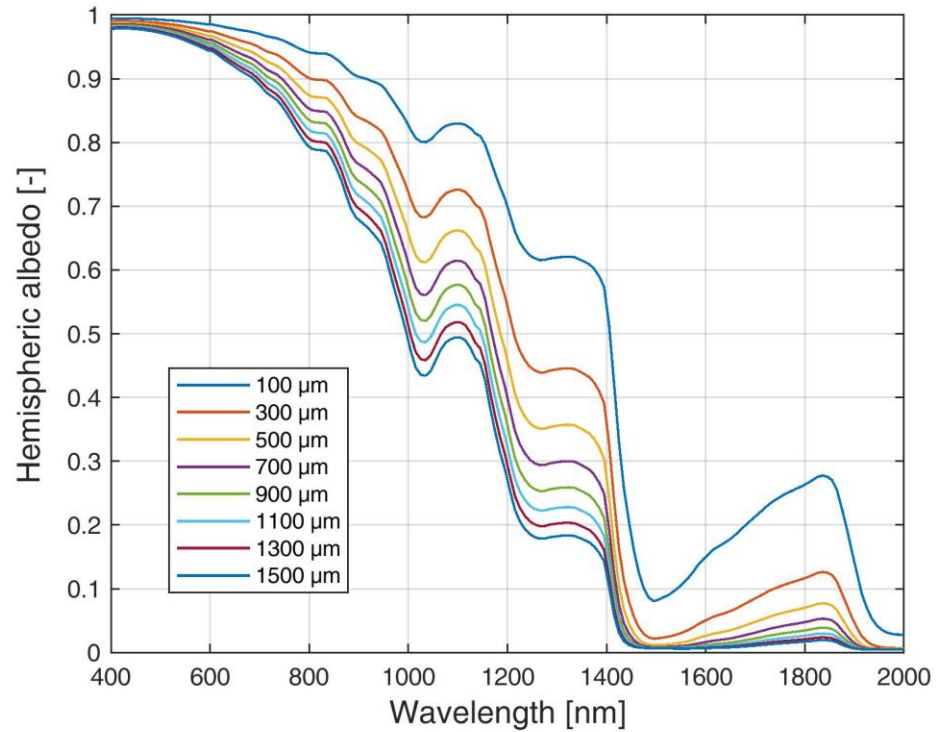
*: biagio.dimauro@cnr.it



Roma, 22 – 24 settembre 2021

Snow and ice optical properties

model: SNICAR-AD v3



Dry snow



Glacier ice



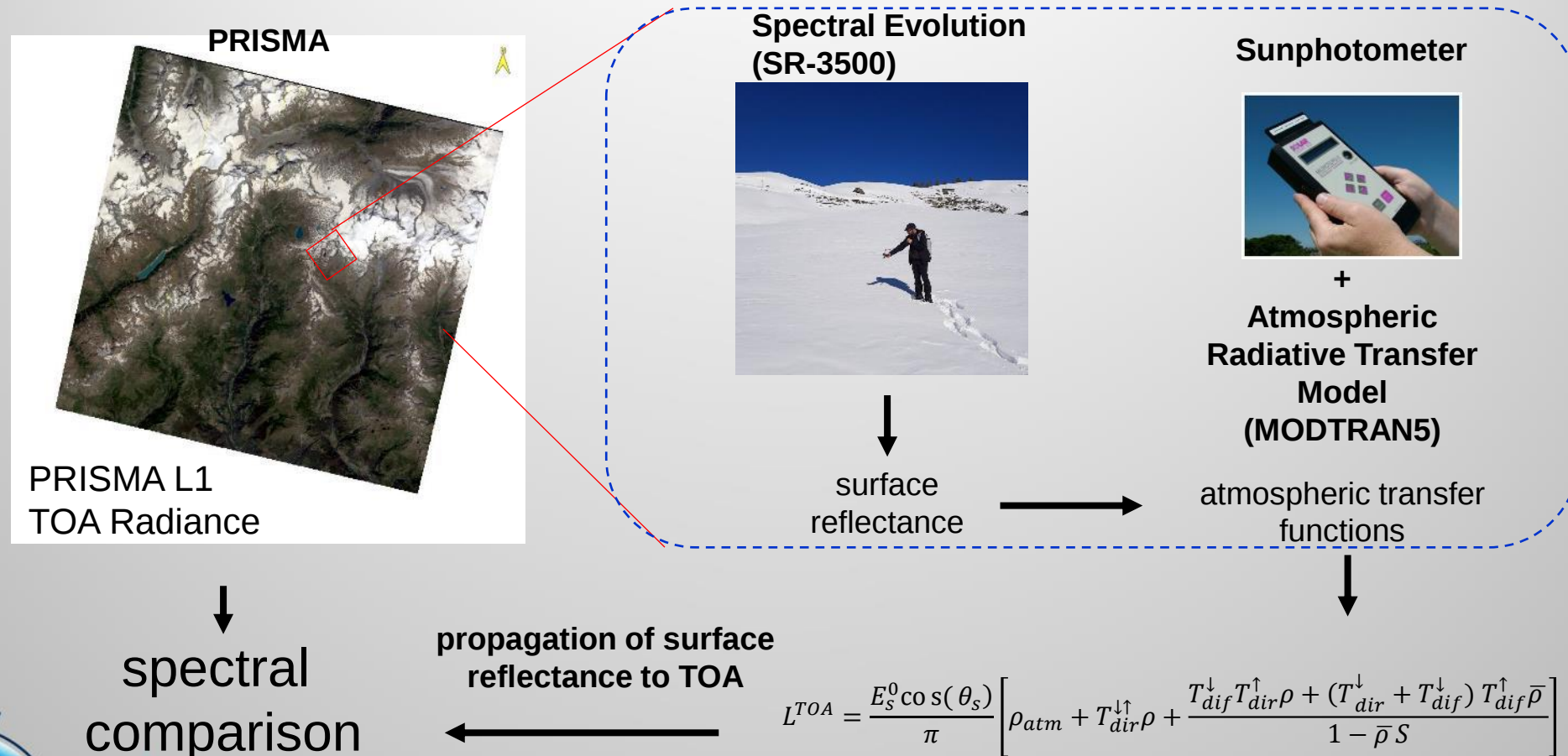
Which snow/ice parameters can be retrieved from hyper-spectral data?

- Snow and ice albedo [-]
- Grain size [μm]
- Liquid water content [%, mm]
- Impurities concentration [ppm] and radiative forcing [W m^{-2}]

Field data are fundamental for the development of retrieval algorithms

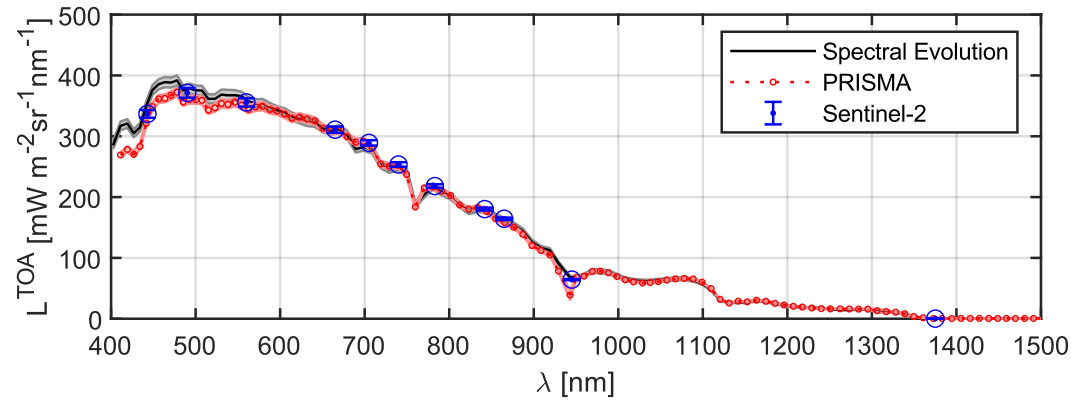


Calibration and validation of PRISMA data

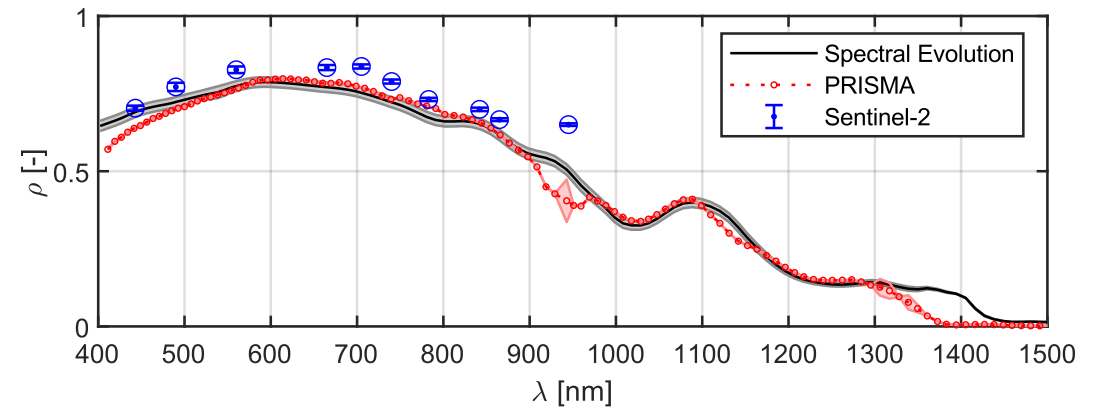


Calibration and validation of PRISMA data

Radiance Top of Atmosphere (PRISMA L1)



Surface Reflectance (PRISMA L2D)



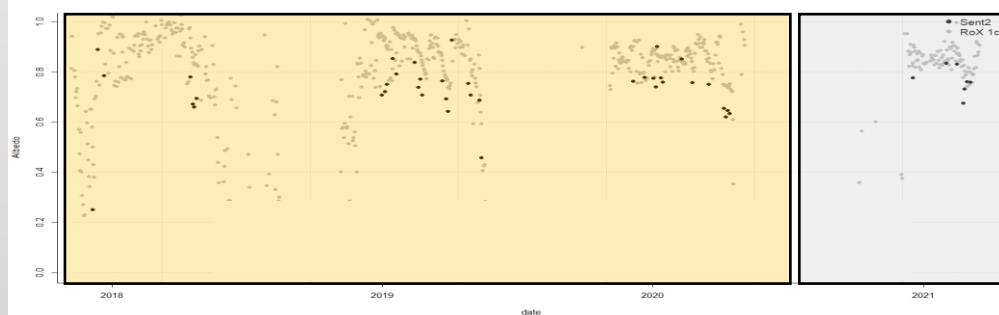
Monitoring snow dynamics

Data from the Torgnon
experimental site (Western Alps)

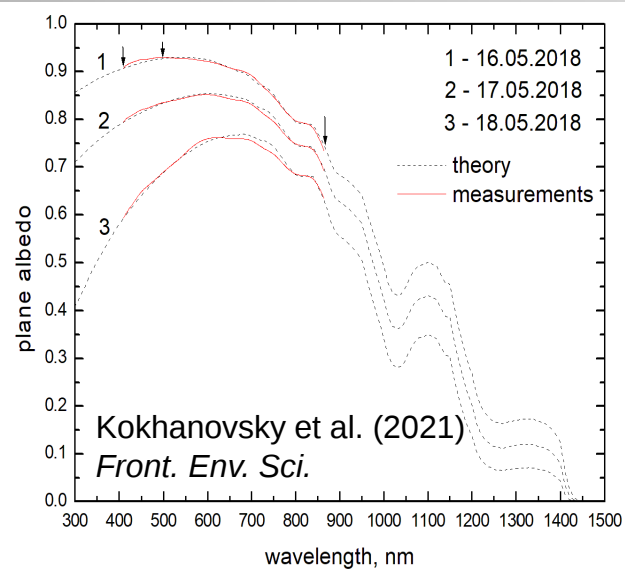
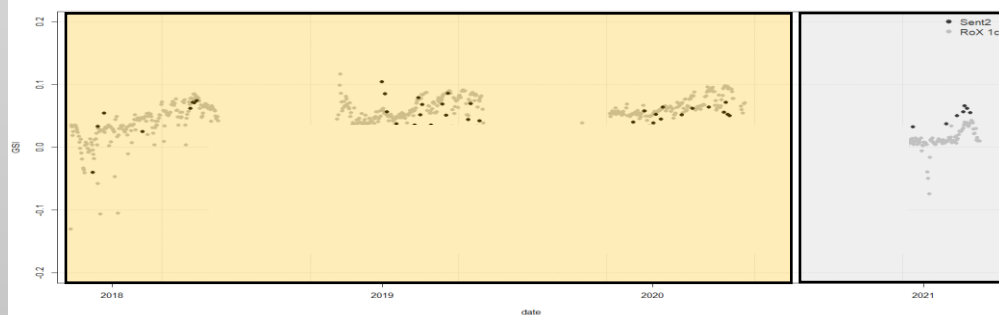


Rox and Sentinel-2 comparison

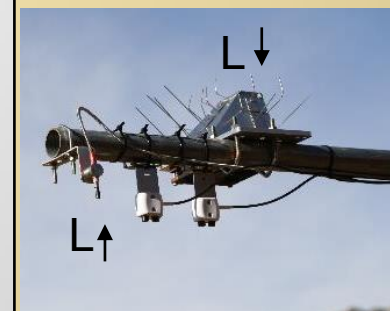
Albedo 2017-2021



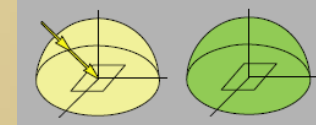
Snow effective radius 2017-2021



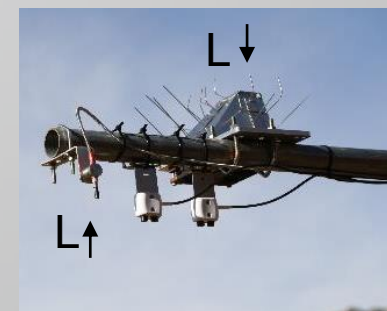
BiHemispherical Reflectance Factor



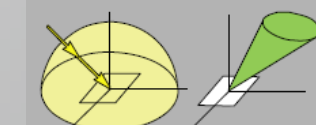
BiHemispherical
CASE 9



Hemispherical Conical Reflectance Factor



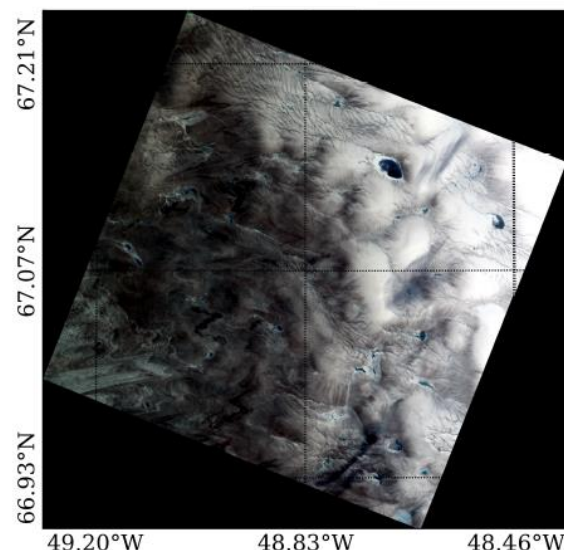
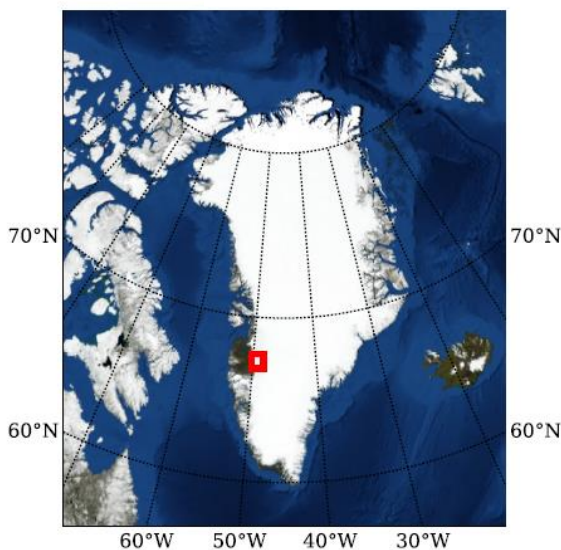
Hemispherical-conical
CASE 8



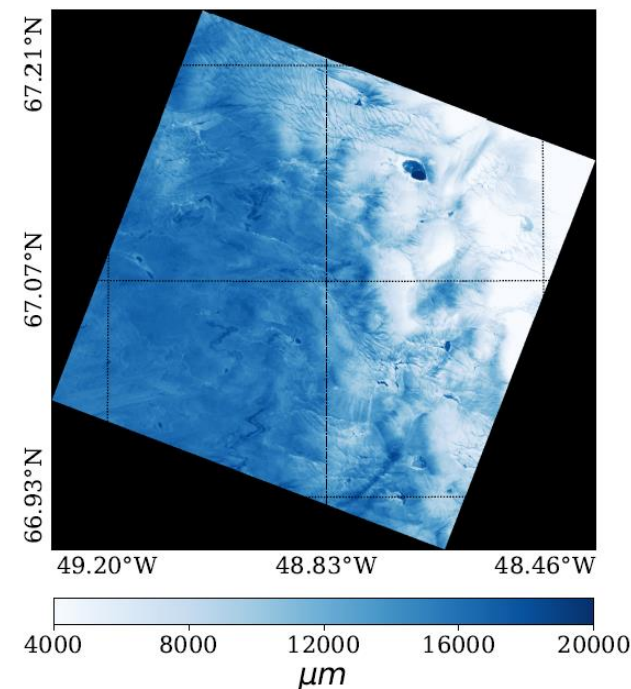
Retrieval of surface parameter



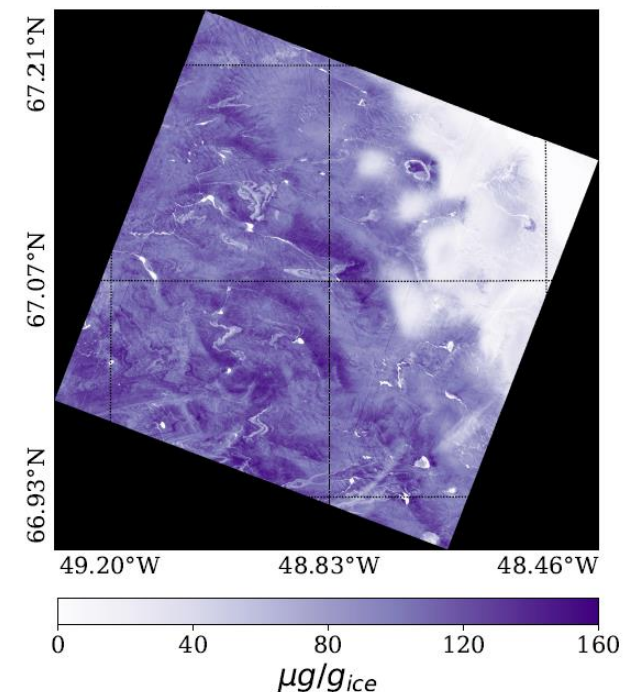
PRISMA acquisition in South-West Greenland: (30/08/2020)



Ice grain radius



Glacier algae conc.



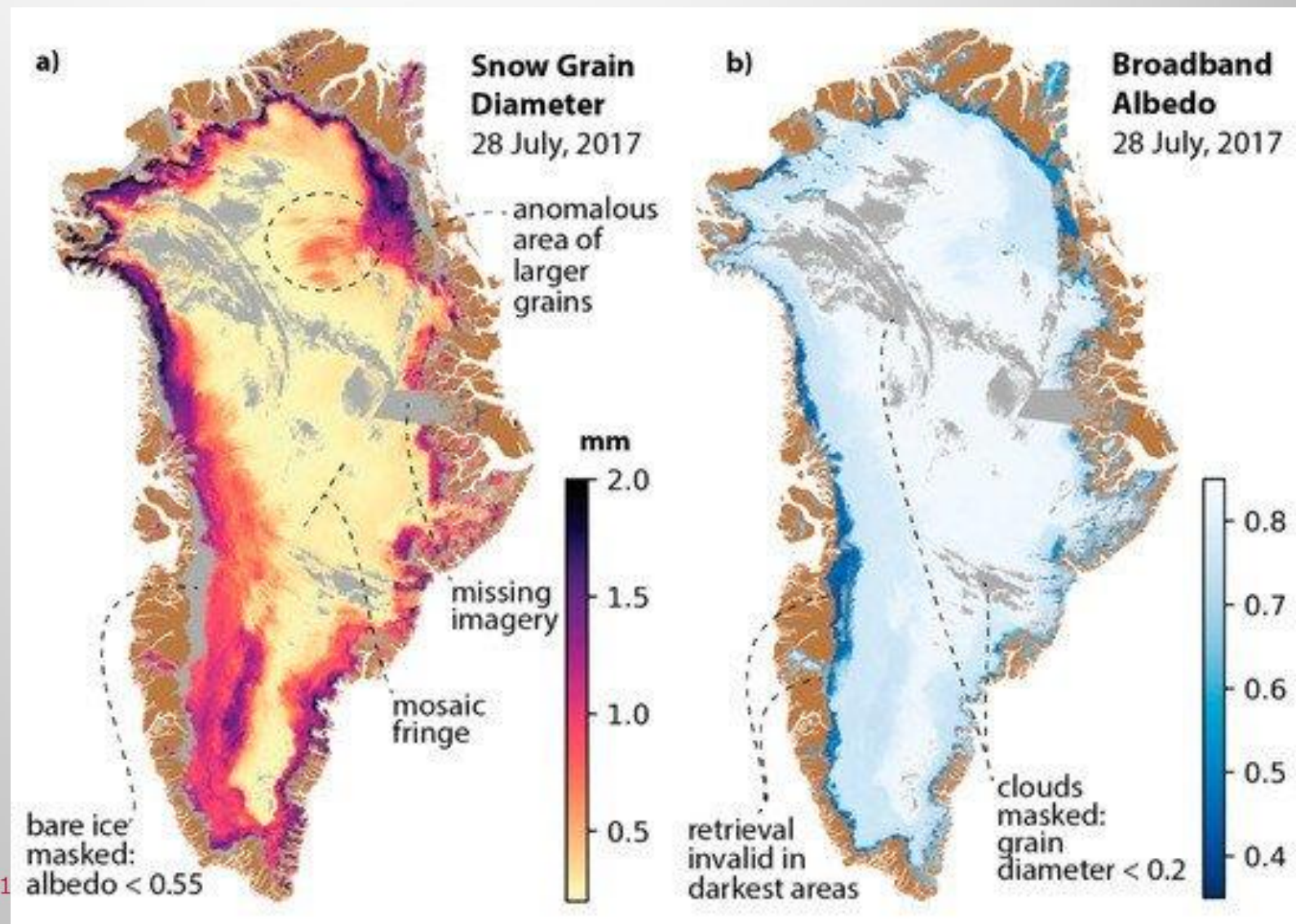
Retrieval of surface parameter



S3 Snow processor
included in SNAP toolbox



I CONVEGNO ISP
22/24 settembre 2021



Next steps:

SCIA project (2021-2023)

- To develop dedicated atmospheric and topographic correction for PRISMA data
- To validate retrieval algorithm through extensive field campaigns in the Alps



BioGeoAlbedo project (2021-2023)

- To apply these algorithms to Ice sheet margins in Antarctica
- To validate the retrieval in field campaigns programmed for 2022-2023

