

XBAER: eXtensible Bremen Aerosol/cloud and surfaceE parameters Retrieval (snow)

XBAER input for SLSTR nadir observations

- SLSTR TOA reflectance at 0.55, 0.67, 0.87, 1.6 μm
- Sun Zenith Angle (μ_0), Viewing Zenith Angle (μ), Relative Azimuth Angle (φ)
- Longitude, Latitude, Time

Identify bright pixels, mask out dark pixels and fill the values
 Cloud Mask with the following criteria (P1, P2 and P3 are threshold values)

- $(R_3 - R_4)/R_3 > P1$ and $(R_3 - R_2)/R_3 < P2$ and $(R_2 - R_1)/R_2 < P3$
- 5x5 pixel to remove cloud adjacency effect

XBAER_standard cloud screening

OLCI TOA reflectance
 • 0.412 μm , 0.756 μm , 0.76 μm

Cloud free **snow**

NO → No retrieval

Atmospheric correction

- AOT (τ)
- Aerosol Type (weakly absorbing)

First iteration

- SGS first guess (r_0)

For 0.55 and 1.6 μm , interpolate LUT on geometry and SGS
Snow surface reflectance estimation based on Eq. (3) for a given ice crystal shape.

For 0.55 and 1.6 μm , interpolate LUT on geometry and AOT
Atmospheric Correction based on Eq. (2) for a given AOT(τ) and aerosol type

Find SGS and SPS such that
 $\|A_c(r_i, SPS) - R_s(r_i, SPS)\| \rightarrow \min$

NO → Max iteration

Yes → **EXIT**

NO → Abs($r_i - r_{i-1}$) < 0.1% → Yes → XBAER output

XBAER output

- **SGS** → **SSA**
- **SPS**

r_i - SGS for iteration step i r_{i-1} - SGS for iteration step i-1