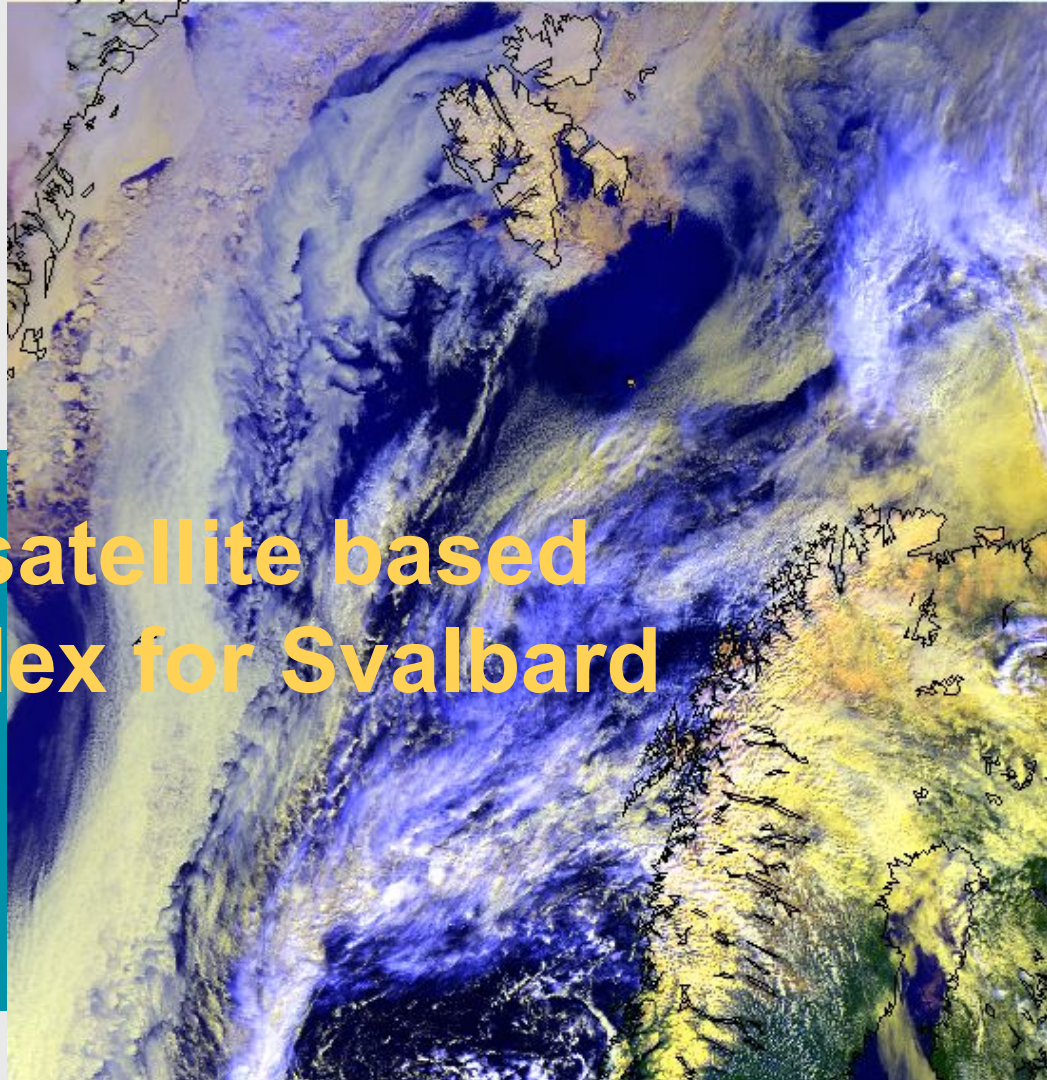




Norwegian
Meteorological
Institute

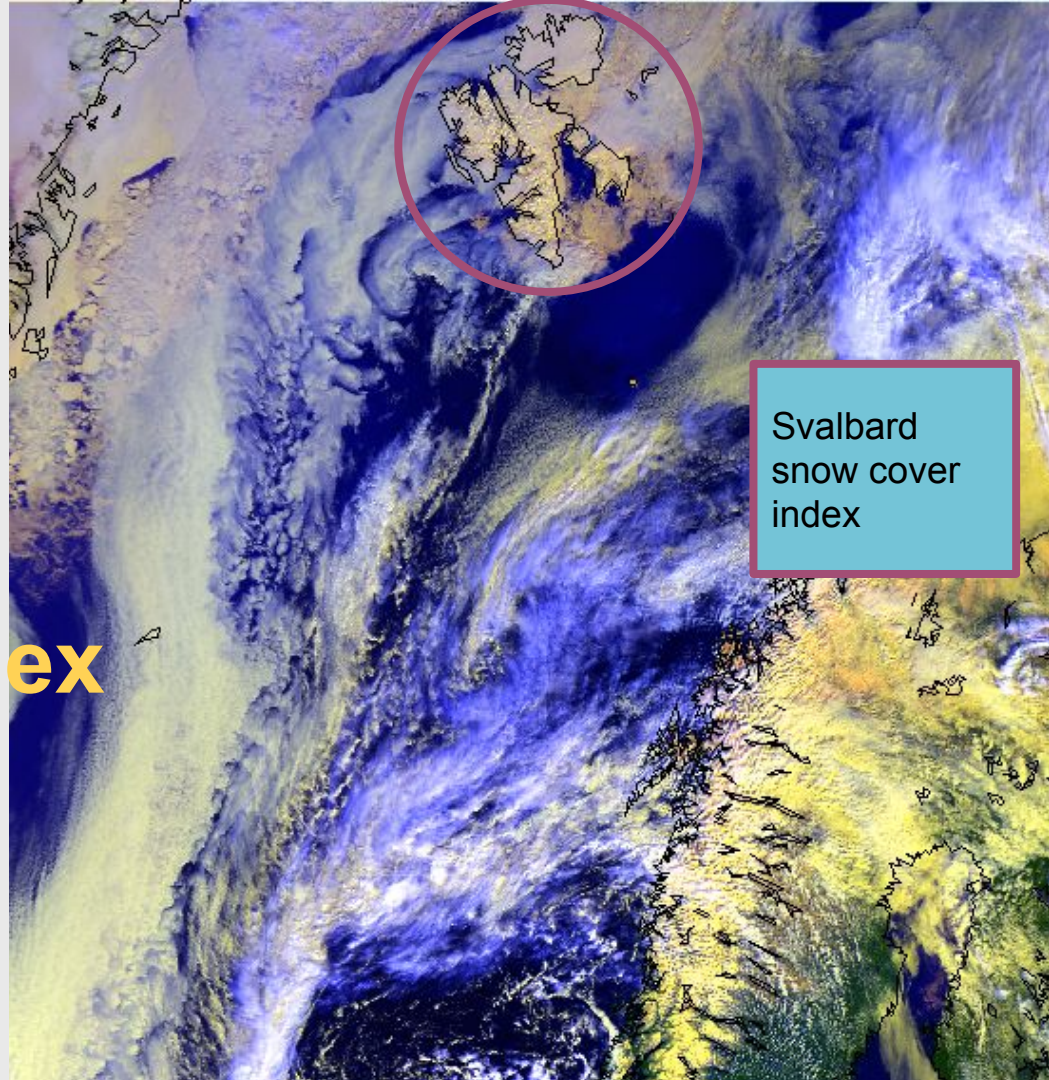
Validation of a satellite based Snow Cover Index for Svalbard

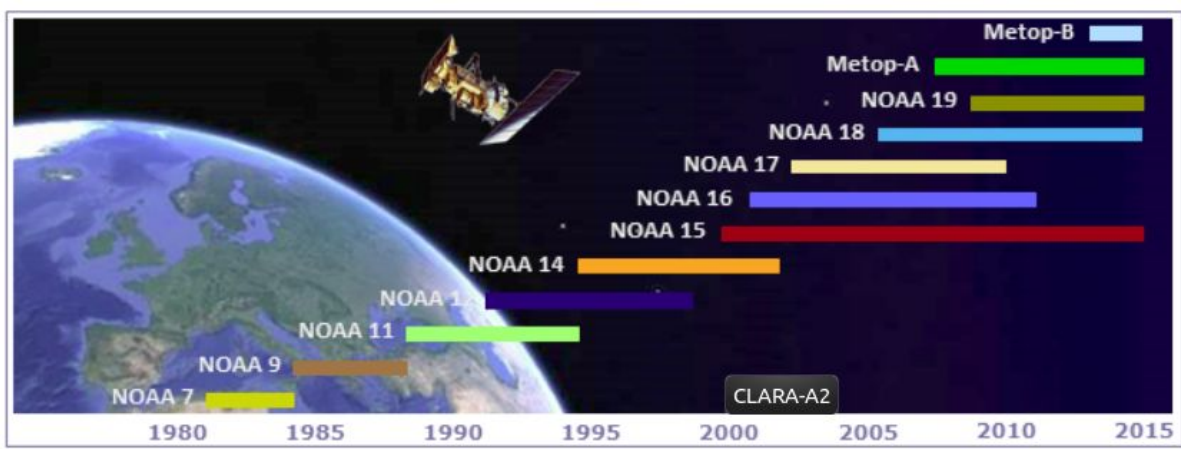
SIOS Polar Night Week 2019



Snow cover index

- A time series of total snow covered area





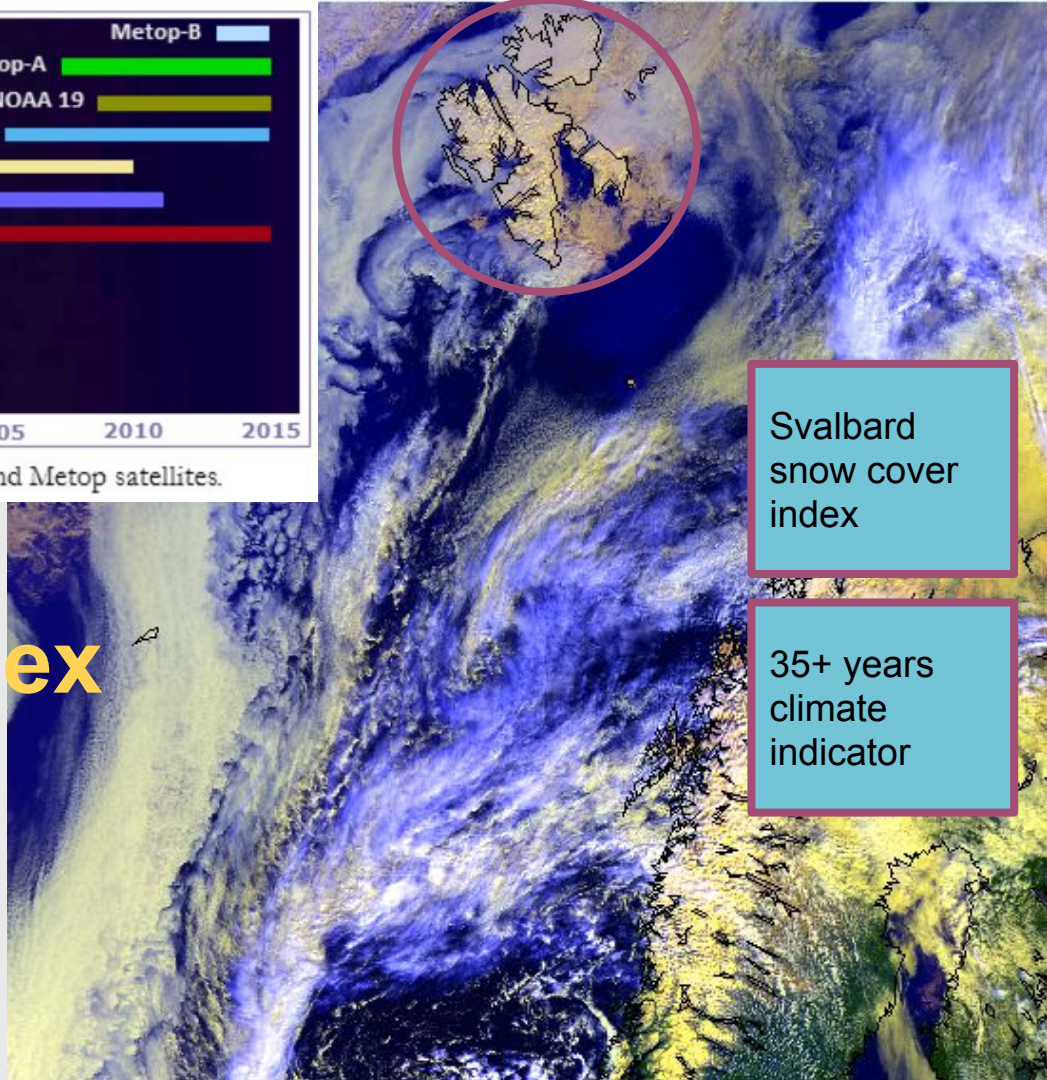
Temporal coverage of used AVHRR instruments aboard NOAA and Metop satellites.

Figure courtesy of EUMETSAT CM SAF

Snow cover index

- A time series of total snow covered area
- 35+ years of satellite data (polar orbiting) CDR + operational data

MetOp-A May 11 2010, 09:58 UTC



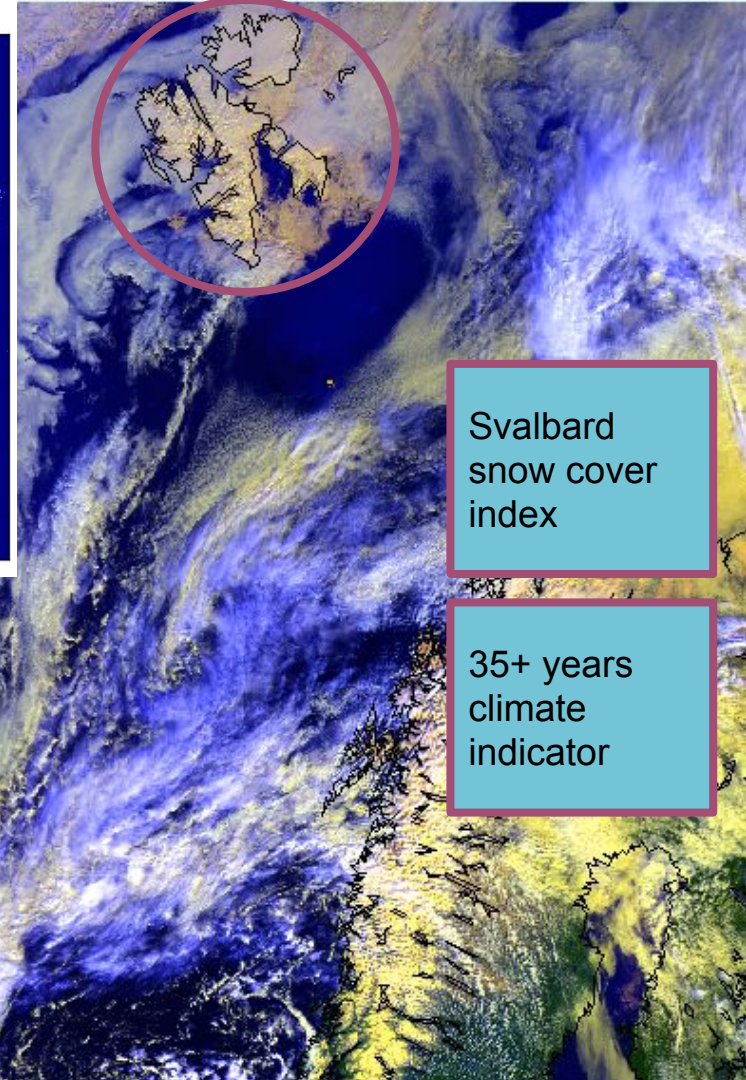
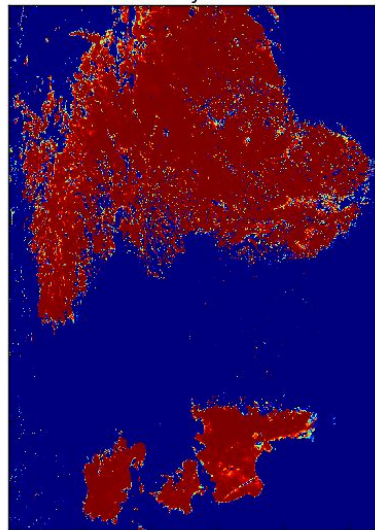
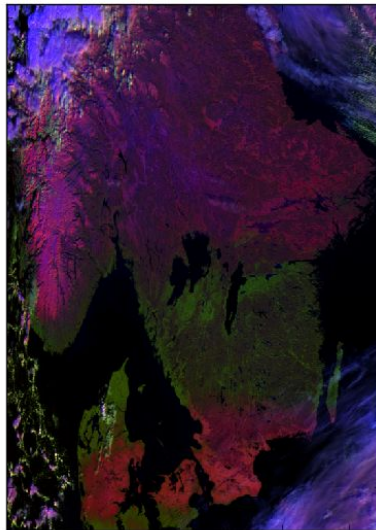
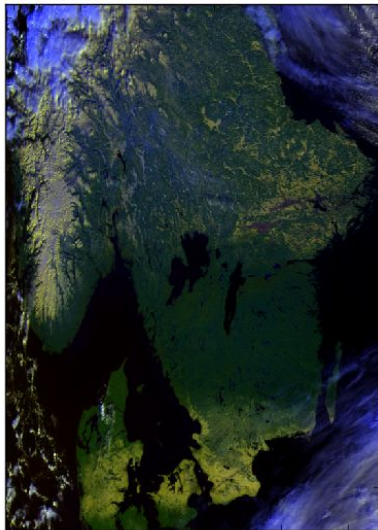
Svalbard snow cover index

35+ years climate indicator

RGB124

RGB264

Probability for snow



Svalbard
snow cover
index

35+ years
climate
indicator

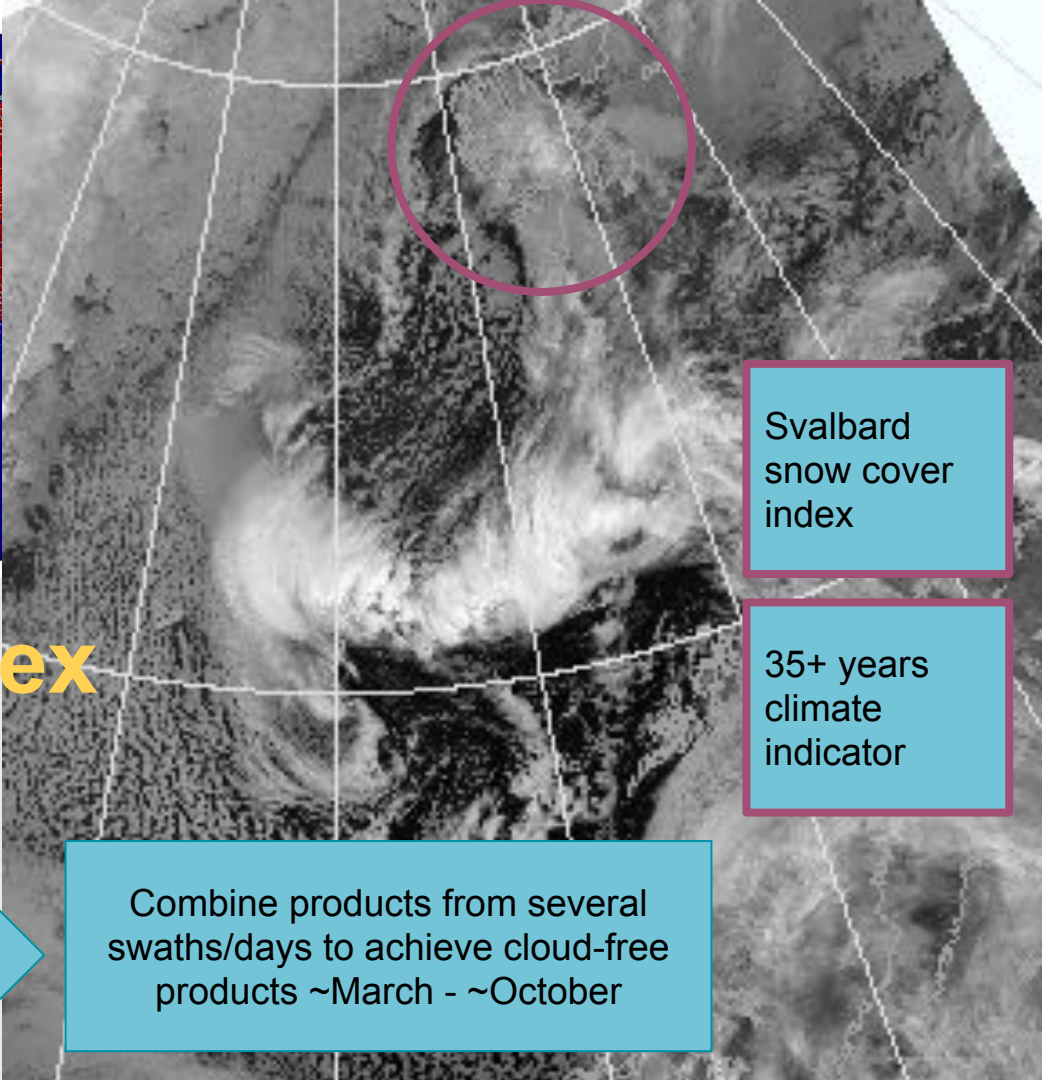
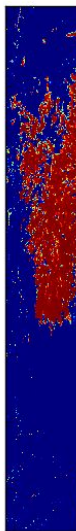
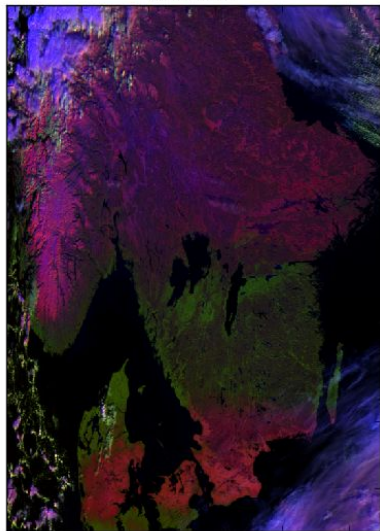
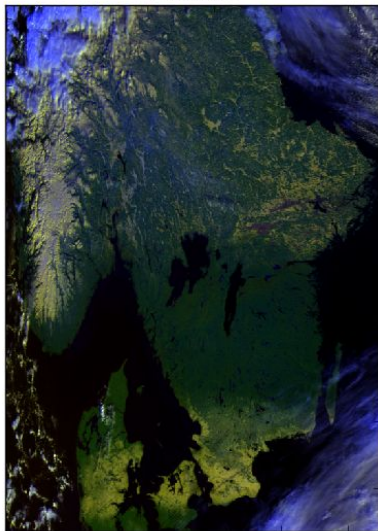
Example of satellite swath product

Snow cover index

- Bayesian algorithm estimates probabilities for snow, land and cloud

RGB124

RGB264



Svalbard snow cover index

35+ years climate indicator

Example of satellite swath product

Snow cover index

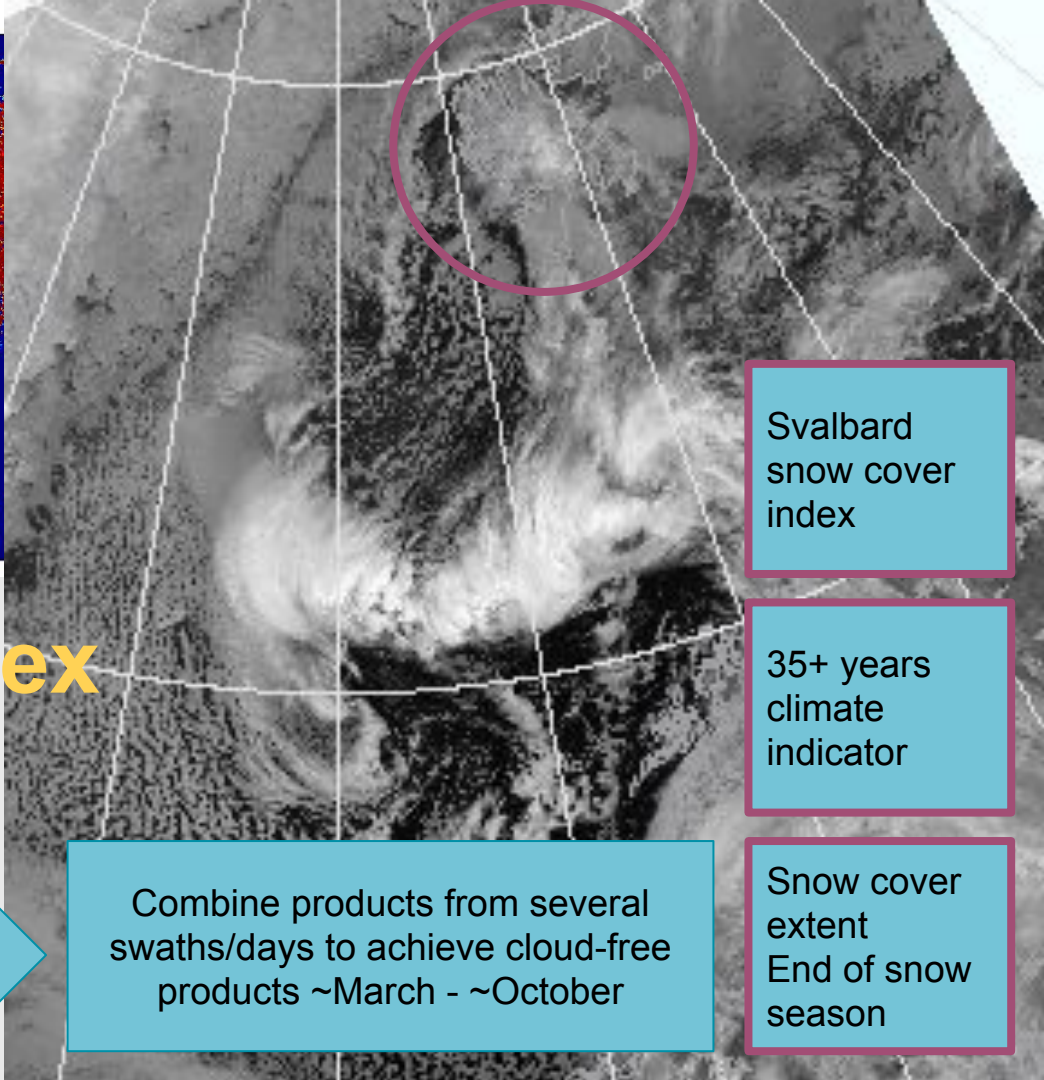
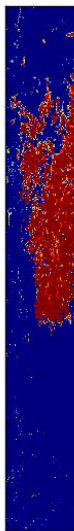
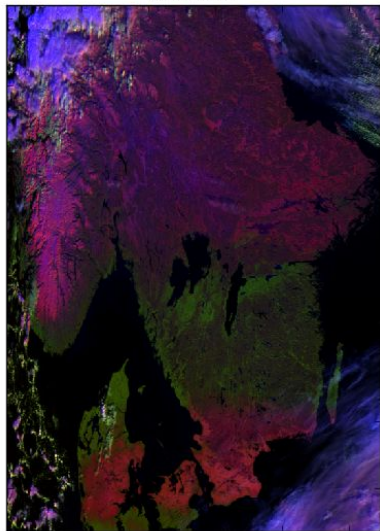
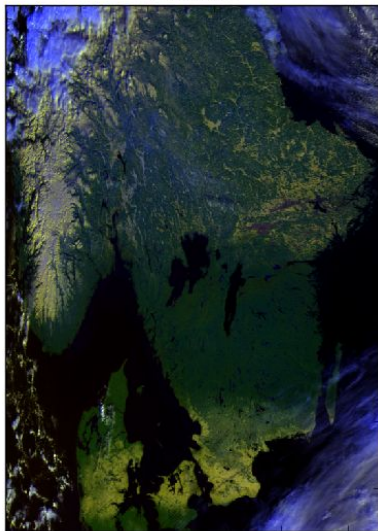
- Bayesian algorithm estimates probabilities for snow, land and cloud
- Cannot see through clouds
- Cannot see through polar night either



Combine products from several swaths/days to achieve cloud-free products ~March - ~October

RGB124

RGB264



Svalbard
snow cover
index

35+ years
climate
indicator

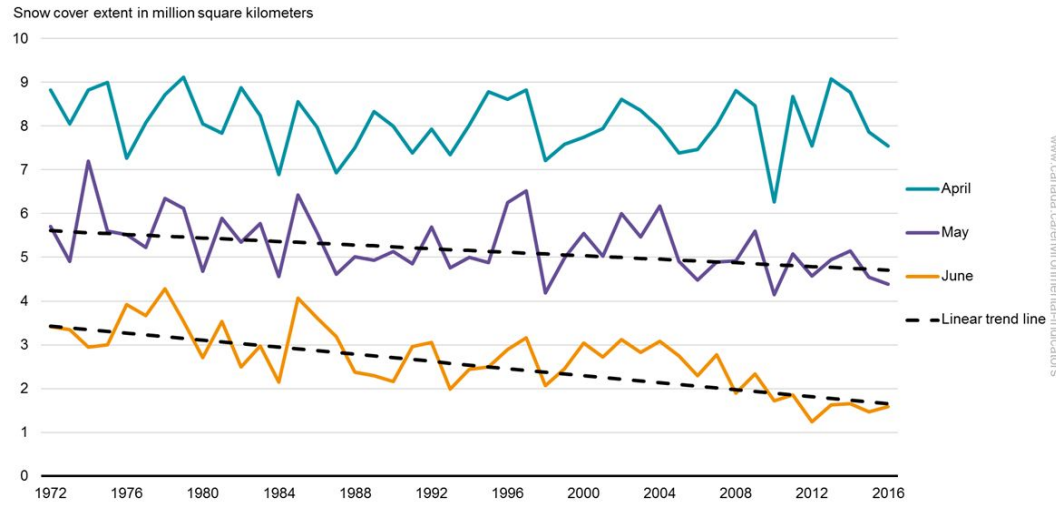
Snow cover
extent
End of snow
season

Combine products from several
swaths/days to achieve cloud-free
products ~March - ~October

Example of satellite swath product

Snow cover index

- Bayesian algorithm estimates probabilities for snow, land and cloud
- Cannot see through clouds
- Cannot see through polar night either



Example: snow cover extent for Canada (Figure courtesy of Government of Canada)

Snow cover index

- Bayesian algorithm estimates probabilities for snow, land and cloud
- Cannot see through clouds
- Cannot see through polar night either

Combine products from several swaths/days to achieve cloud-free products ~March - ~October

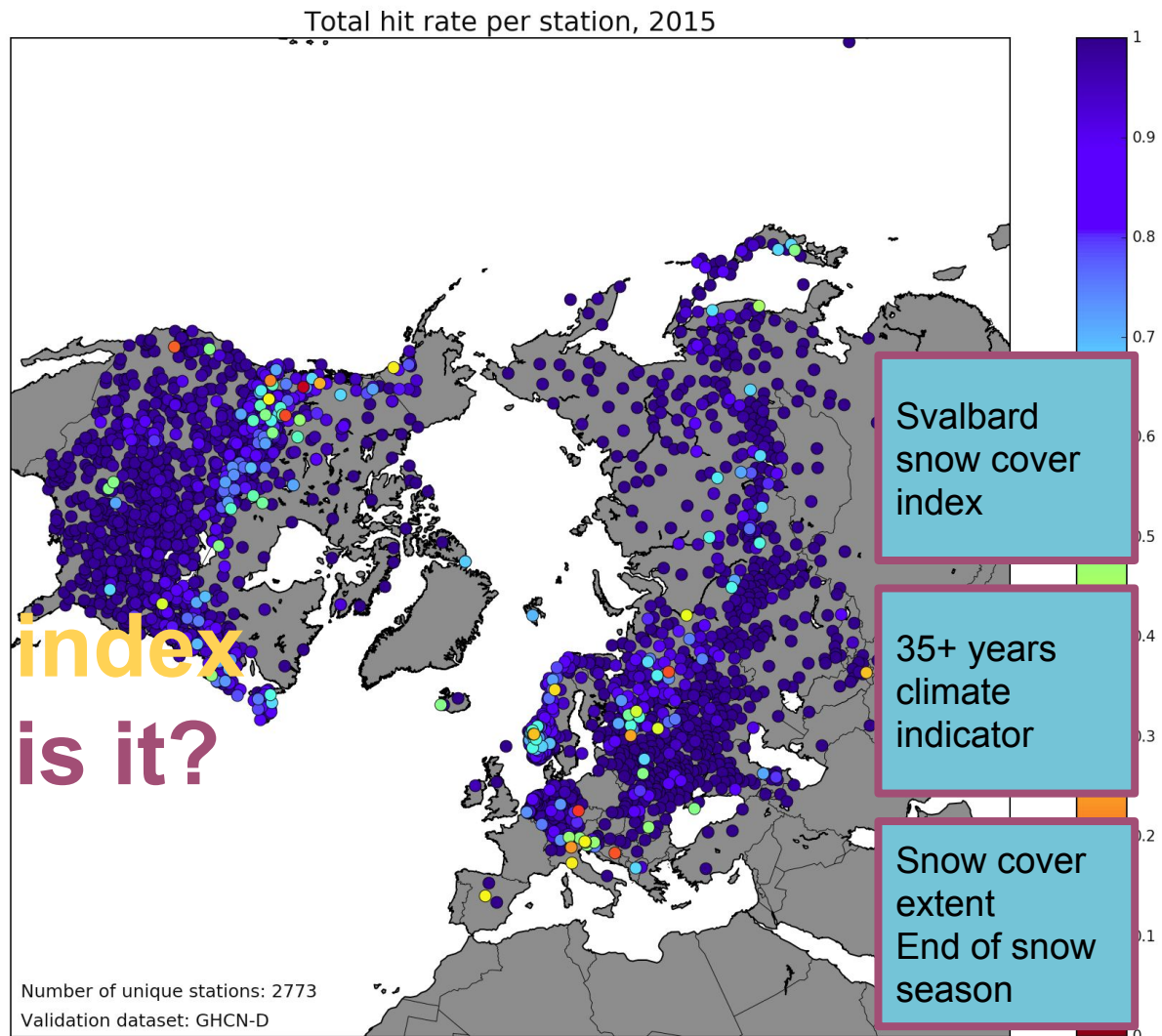
Svalbard snow cover index

35+ years climate indicator

Snow cover extent
End of snow season

Validation

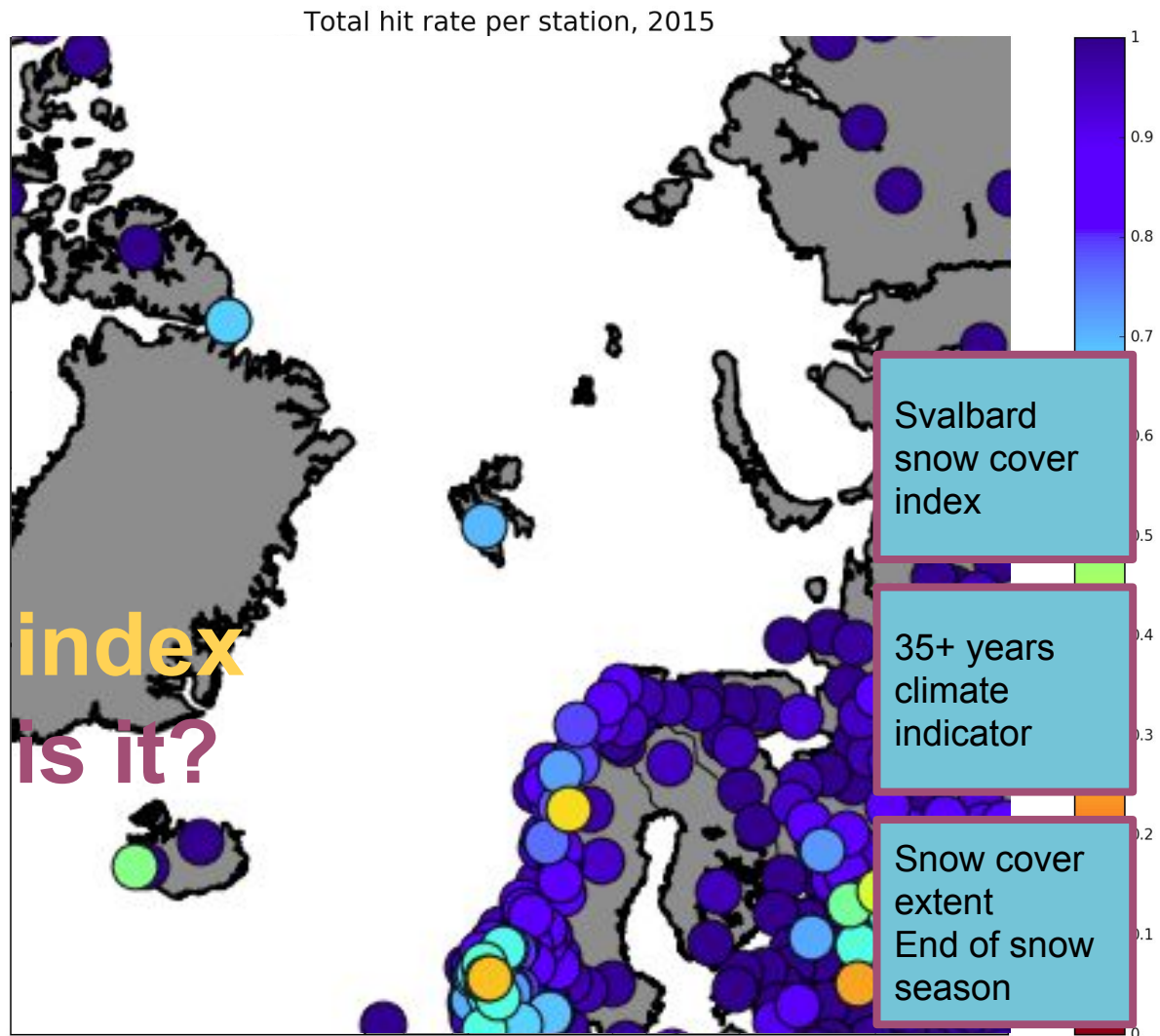
Snow cover index
- how good is it?



Validation

Snow cover index
- how good is it?

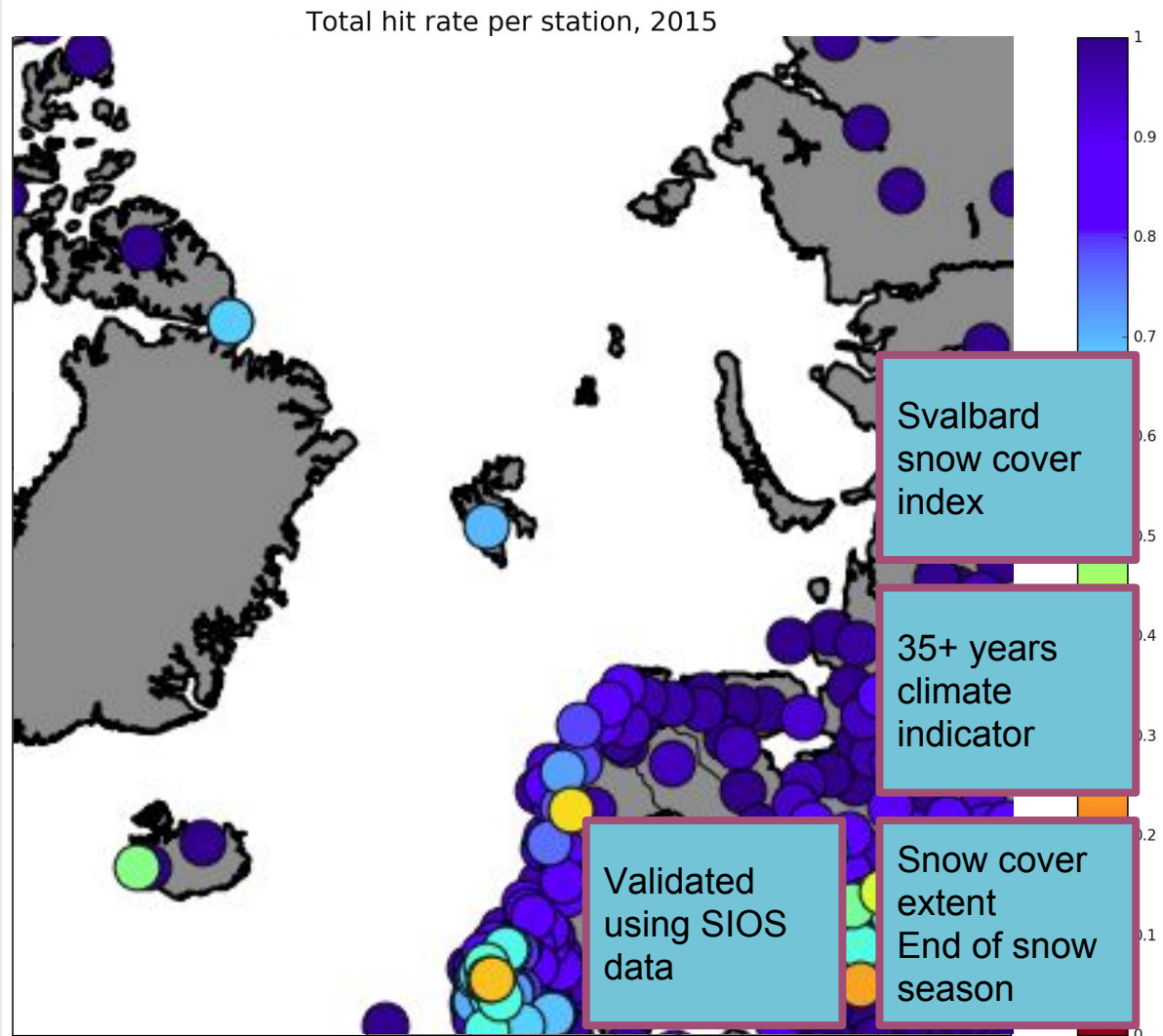
Example of global validation result



Validation using SIOS data

- Validate the product in its environment
- Svalbard: low solar elevation, steep mountains, mountain shadows, cloud shadows
- Validation data from SIOS: in situ snow depth, snow profiles, surface characteristics, etc..

Example of global validation result



Outcome, benefit to SIOS community

- Snow cover has a large impact in many areas (animal life and reproduction, human activities, atmospheric processes, ...)
- A validated 35+ years long time series for snow cover extent
- Climate indicator, available for all

