CryoLand
Glacier Products

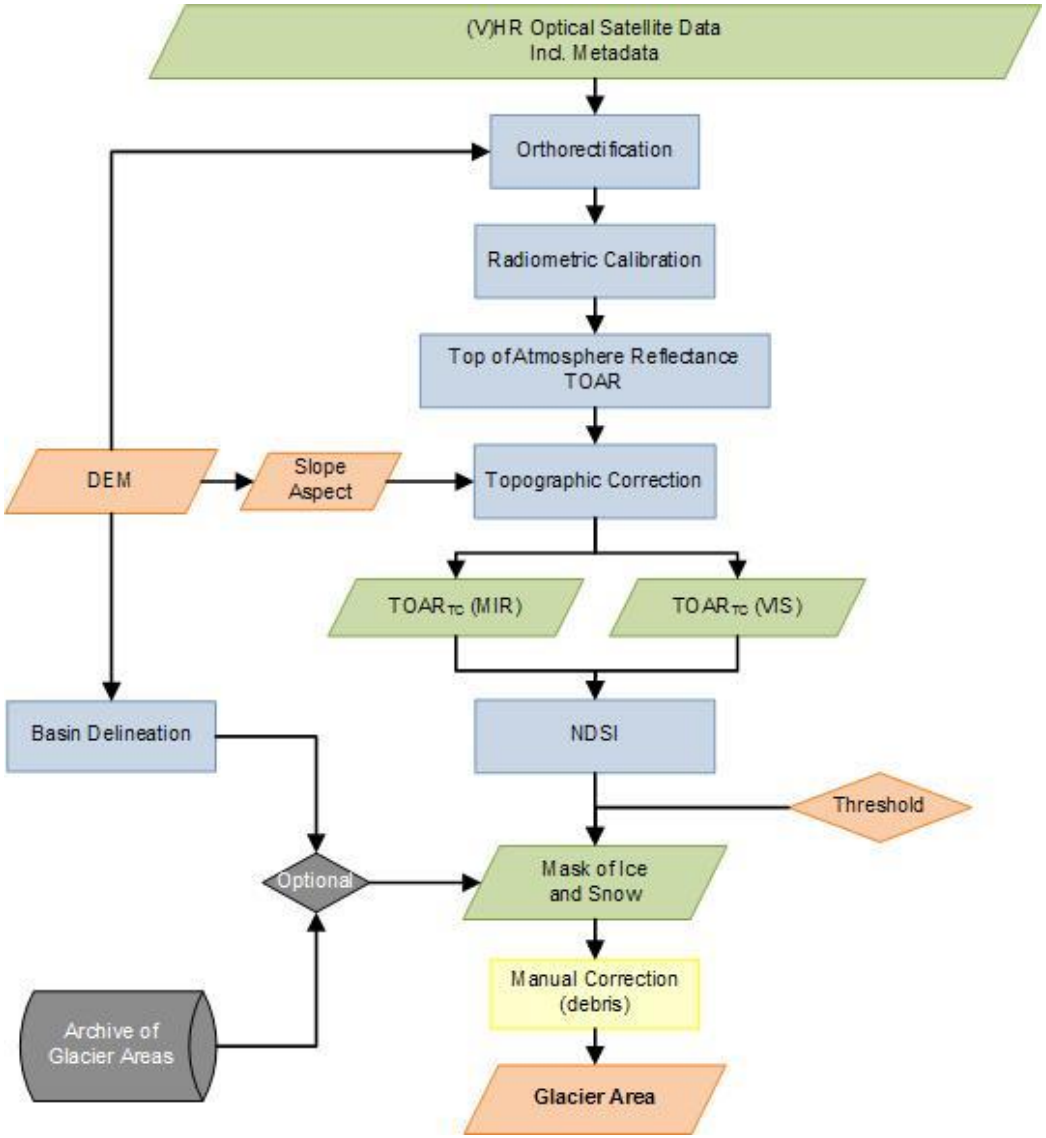
Dissemination Workshop - Nordic Users
Oslo 8/October/2014

Thomas Nagler,
ENVEO

CryoLand Glacier Products

Product type	Coverage	Grid / Projection	Latency time	Implementation order	Sensor
Glacier outlines	Local, regional (on user request)	Lat/Lon / WGS84, UTM / WGS84	3 months	1	High resolution Optical, SAR
Snow/ice area on glaciers	Local, regional (on user request)	Lat/Lon / WGS84, UTM / WGS84	3 months	2	High resolution Optical, SAR
Glacier Ice velocity	Local (on user request)	Lat/Lon / WGS84, UTM / WGS84	3 months	3	SAR
Glacier lakes	Local (on user request)	Lat/Lon / WGS84, UTM / WGS84	3 months, 10 days (quick analysis, hours (emergency)	2	High resolution Optical, SAR

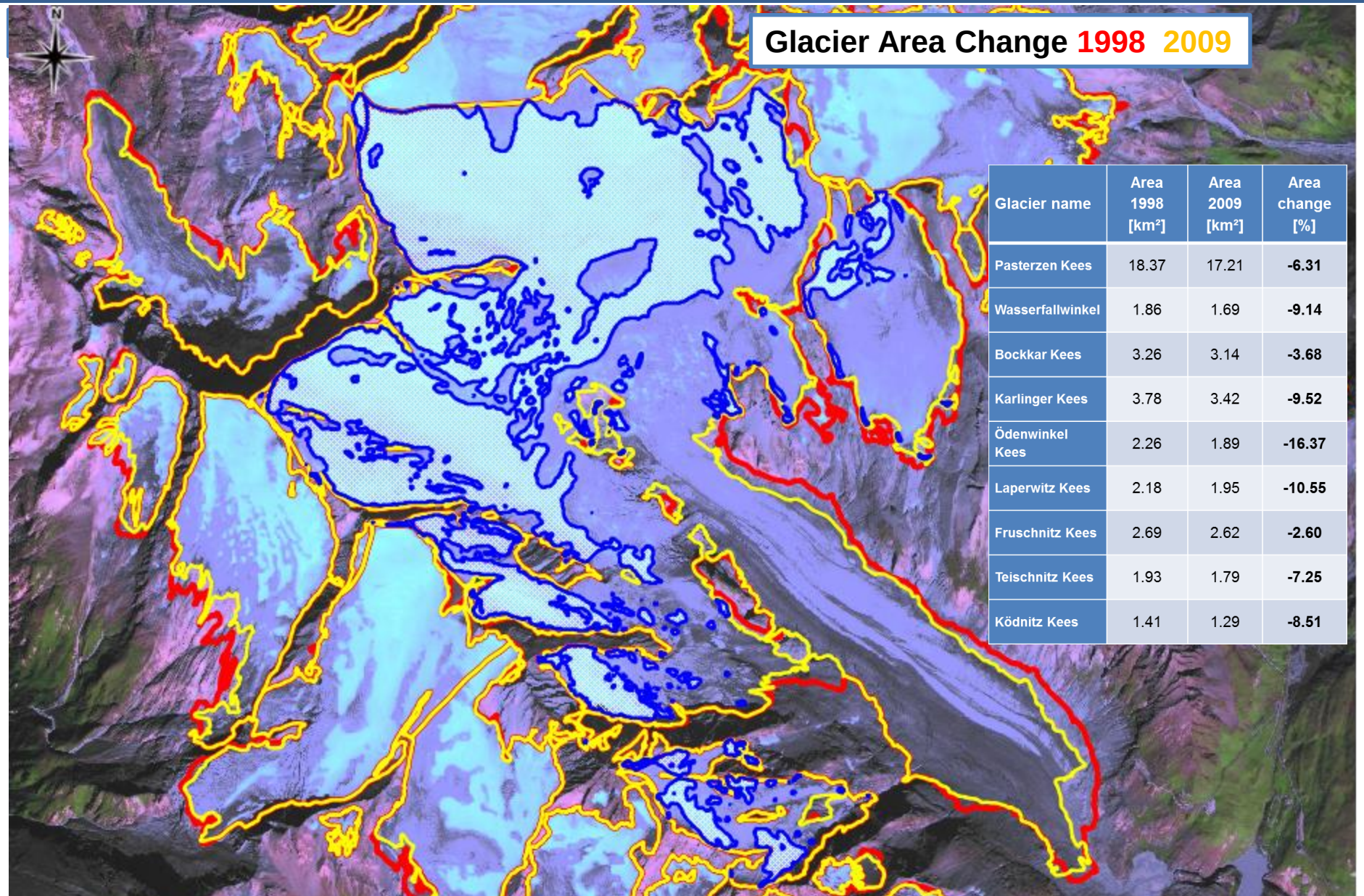
Processing Line of Glacier Area Product



Product information:

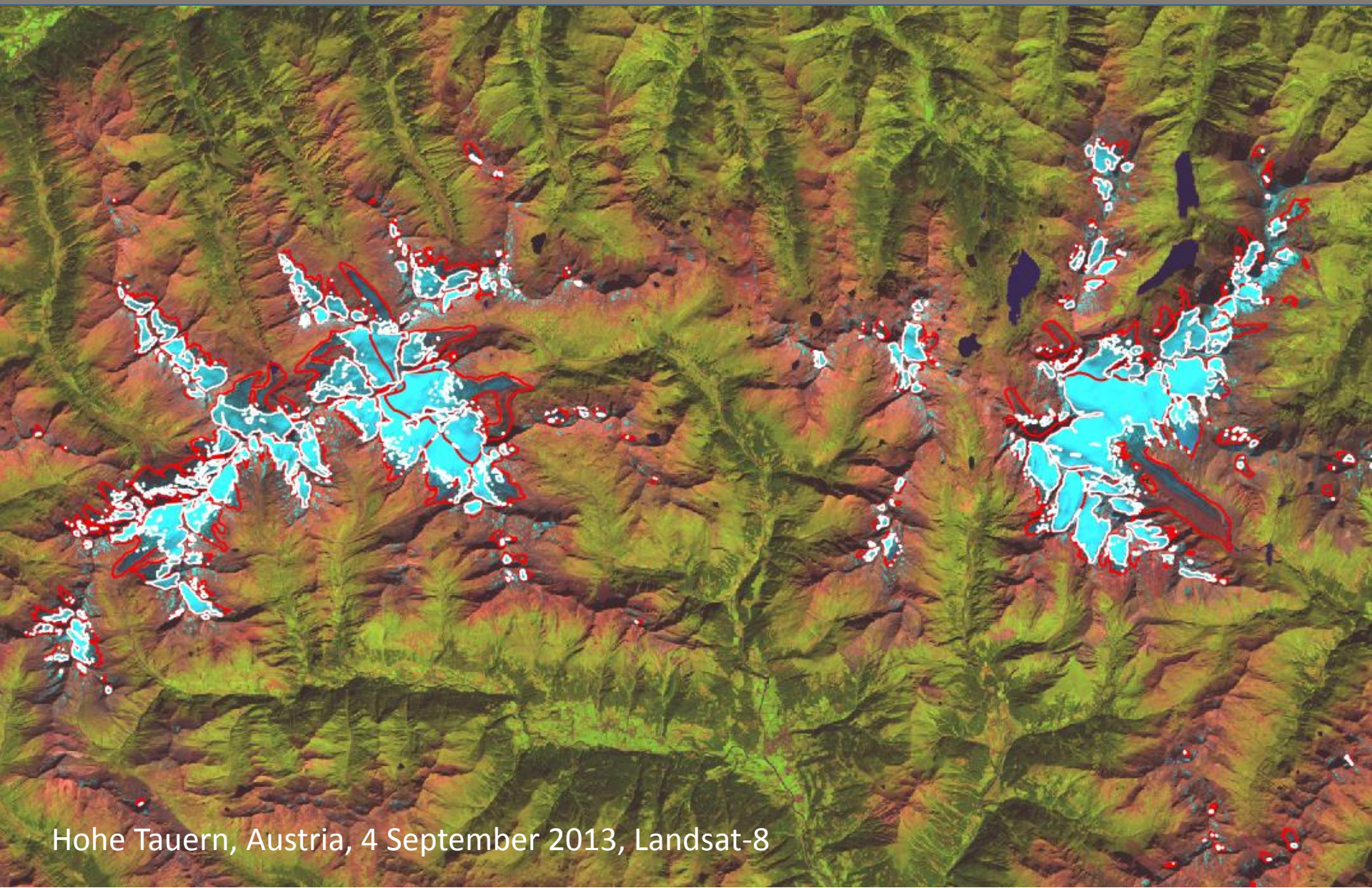
- A standardized, semi-automated processing line using MS (V)HR satellite data and DEM ad input: ice snow detection automatic, manual post-processing required over debris covered areas.
- Product generation within CryoLand is done on **User Request: selected glaciers in Austria, Greenland, Kyrgyzstan, Bhutan, and Norway**
- Products generated according to GLIMS and INSPIRE standards

Glacier Area Maps for Hohe Tauern Alps



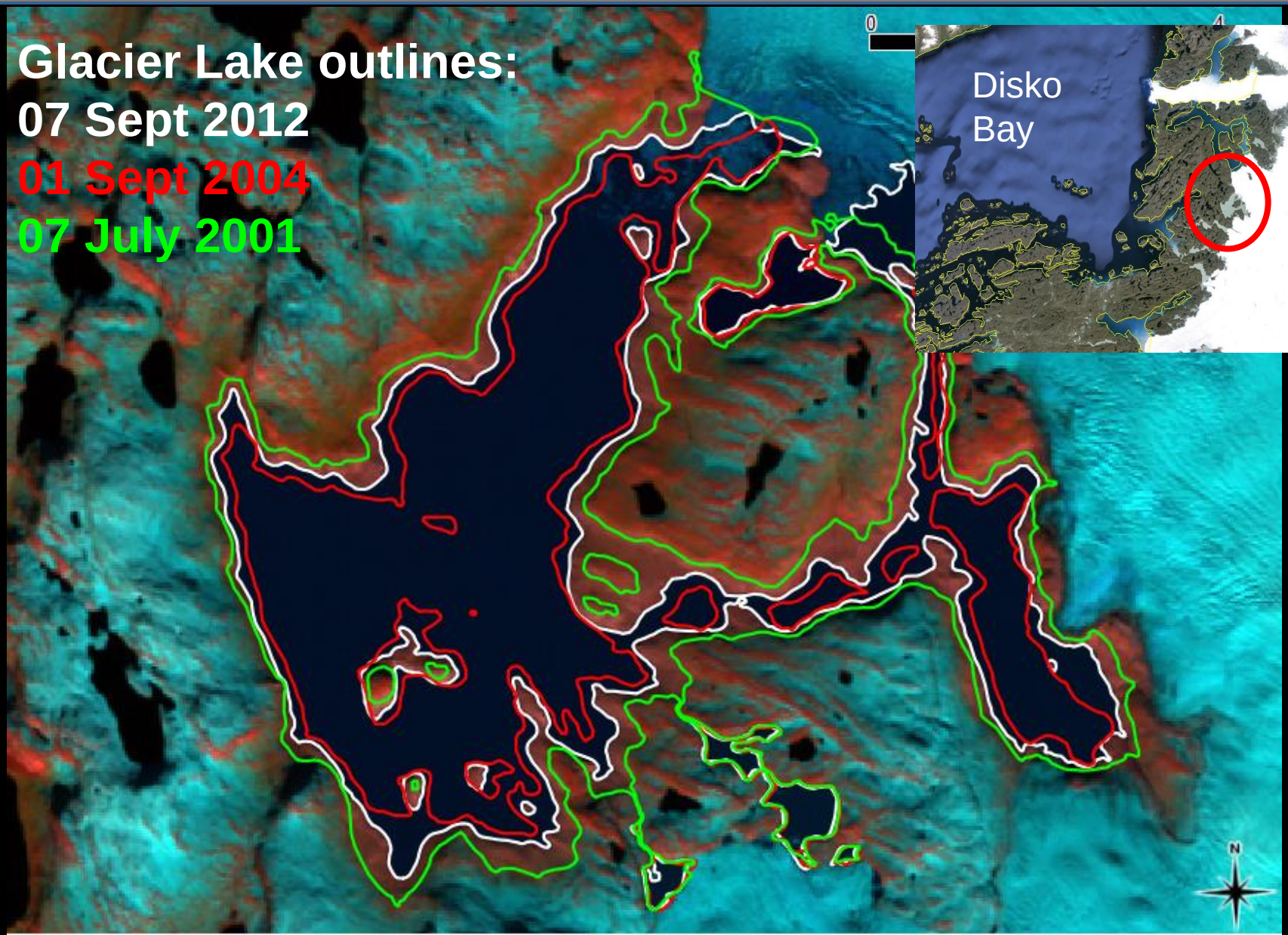
Glacier name	Area 1998 [km²]	Area 2009 [km²]	Area change [%]
Pasterzen Kees	18.37	17.21	-6.31
Wasserfallwinkel	1.86	1.69	-9.14
Bockkar Kees	3.26	3.14	-3.68
Karlinger Kees	3.78	3.42	-9.52
Ödenwinkel Kees	2.26	1.89	-16.37
Laperwitz Kees	2.18	1.95	-10.55
Fruschnitz Kees	2.69	2.62	-2.60
Teischnitz Kees	1.93	1.79	-7.25
Ködnitz Kees	1.41	1.29	-8.51

Austrian Alps, Hohe Tauern



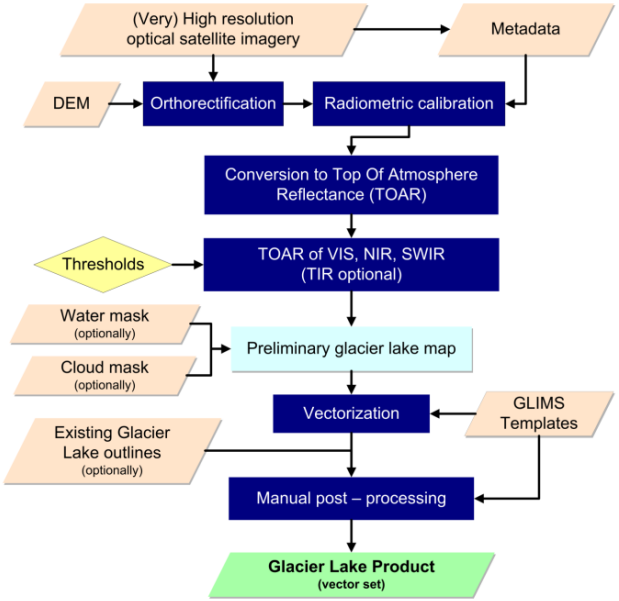
Hohe Tauern, Austria, 4 September 2013, Landsat-8

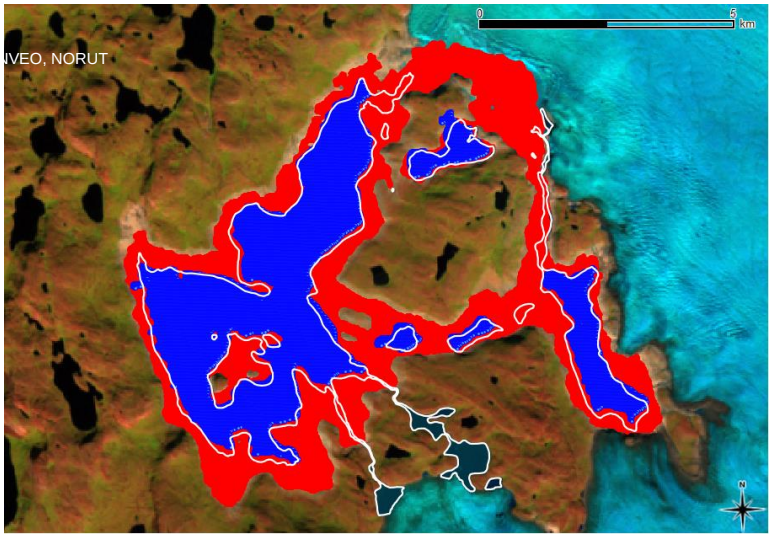
Product example Lake Tininnilik, Greenland



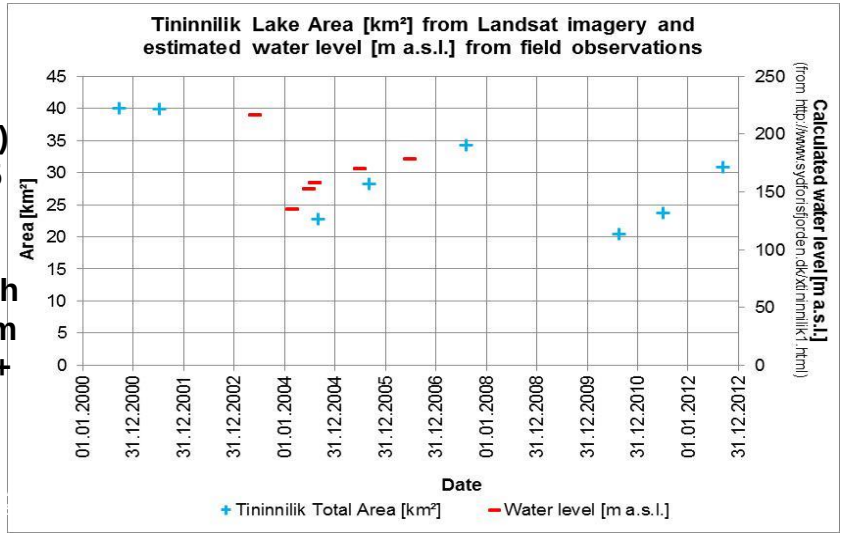
Extent of Glacier Lakes

- Glacier Lake Extent derived from optical satellite data and SAR data
- Method applies classification and manual post-processing and uses existing lake boundaries
- Glacier Lake Extent of multiple years for Lake Tininnilik, Greenland, Kyrgyzstan and Bhutan
- Validation is carried out with in-situ observations in collaboration with users



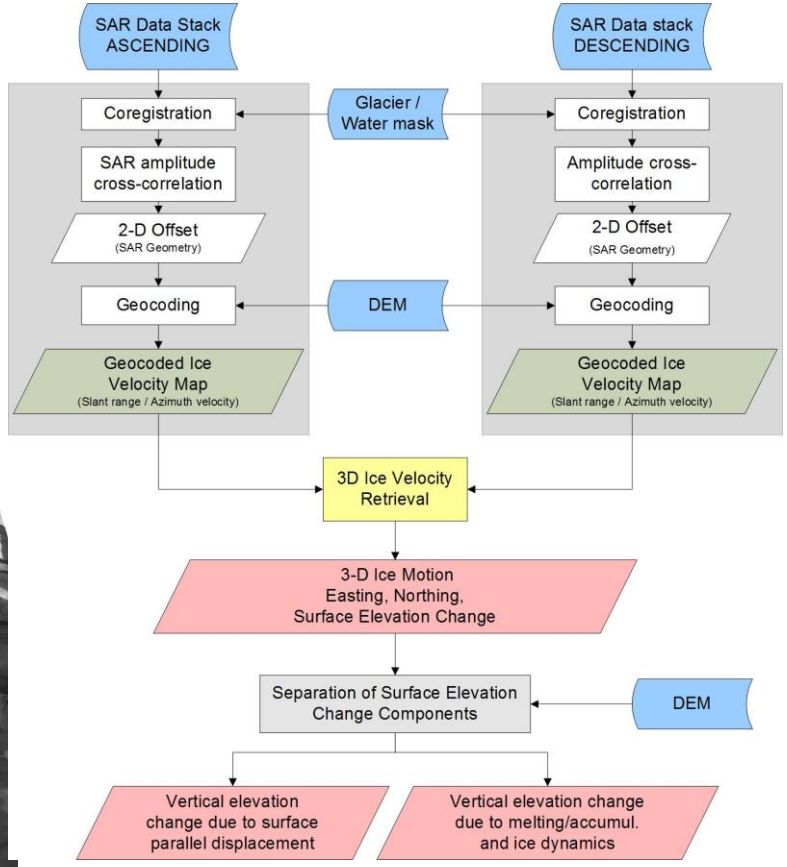


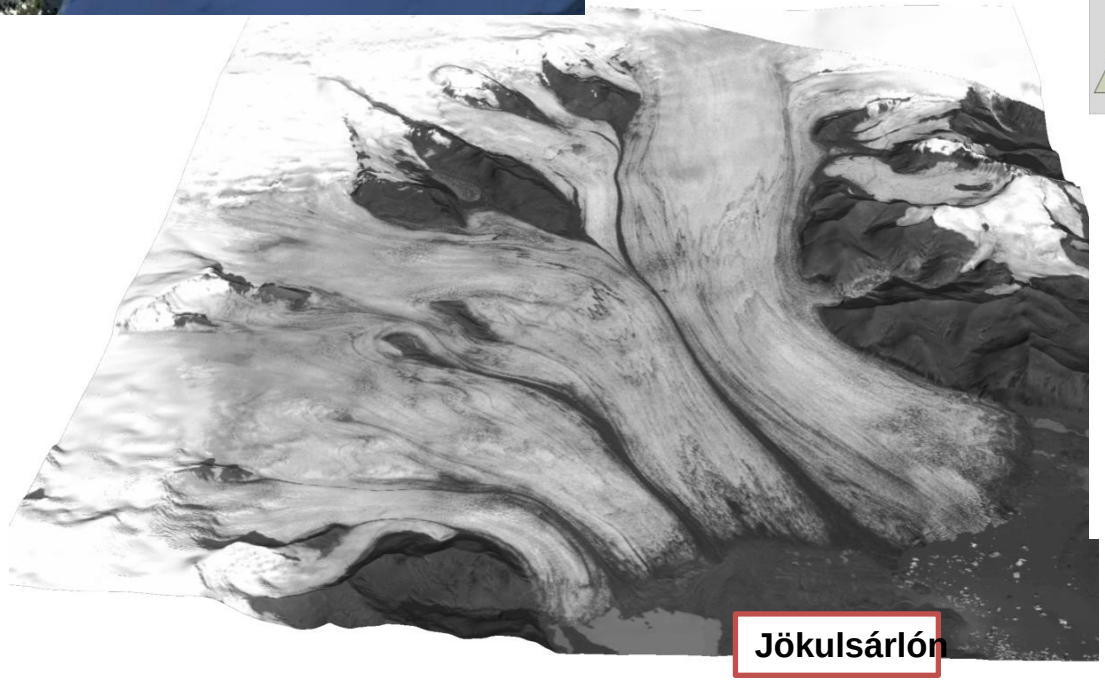
Lake outburst observed between 2010/06/28 (red) and 2010/07/05 (blue) using SAR. Comparison with GLL (white) from Landsat 7 ETM+ of 2010/08/17.



Breidamerkurjökull, Vatnajökull, Iceland

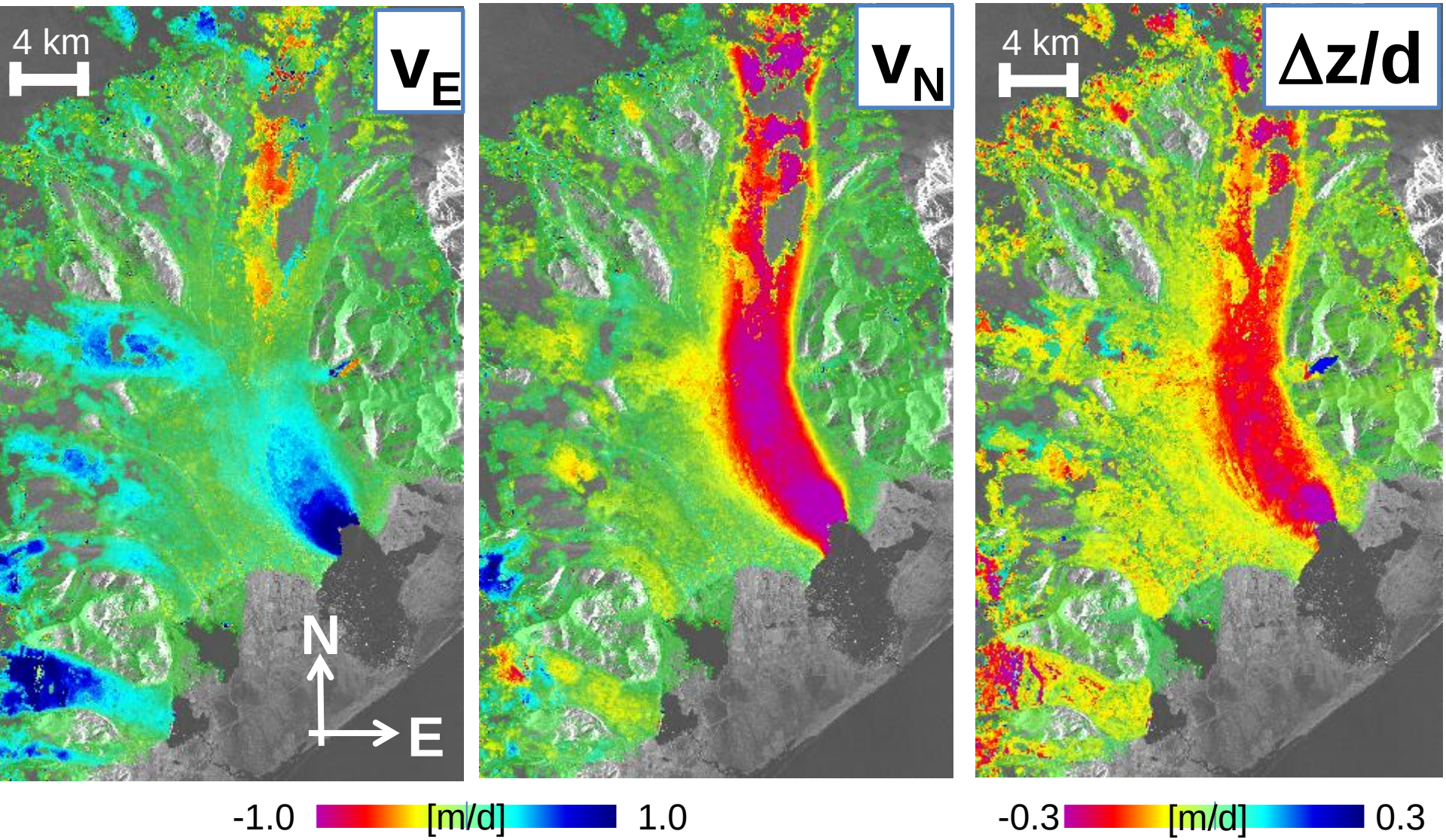
Time Series of TerraSAR-X images of crossing orbits Summer 2010





Spot5 image of Breidamerkurjökull on top of 2008 DEM.
Glacier claving into marginal lake (Univ. Iceland)

3-D Ice Velocity Components



Glacier Products on User Request

GLO = Glacier Outlines:	Austria, Greenland, Kyrgyzstan, Bhutan, Norway
GLS = Snow/ice areas on glaciers:	Austria, Kyrgyzstan, Bhutan, Norway
GLL = Glacier lakes:	Greenland, Kyrgyzstan, Bhutan
GLV = Glacier velocity:	Norway

Glacier Services by ENVEO

Copernicus Snow and Glacier Services:
Glacier Services for monitoring Glacier Outlines in Europe using Sentinel-2 has been proposed as Copernicus Service to Copernicus Office

Glacier Services by ENVEO on User request (Downstream Service) (word wide service):

- Specification of Area of interest
- Exploring and selection of available satellite data or ordering new satellite data (eventually data costs)