



# Glacier Change Detection



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# Overview



- Glacier mapping
- Derivation of drainage basins
- Glacier inventory
- Change detection
- Mass balance



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# Glacier mapping - algorithms

## - Normalized Difference Snow Index (NDSI):

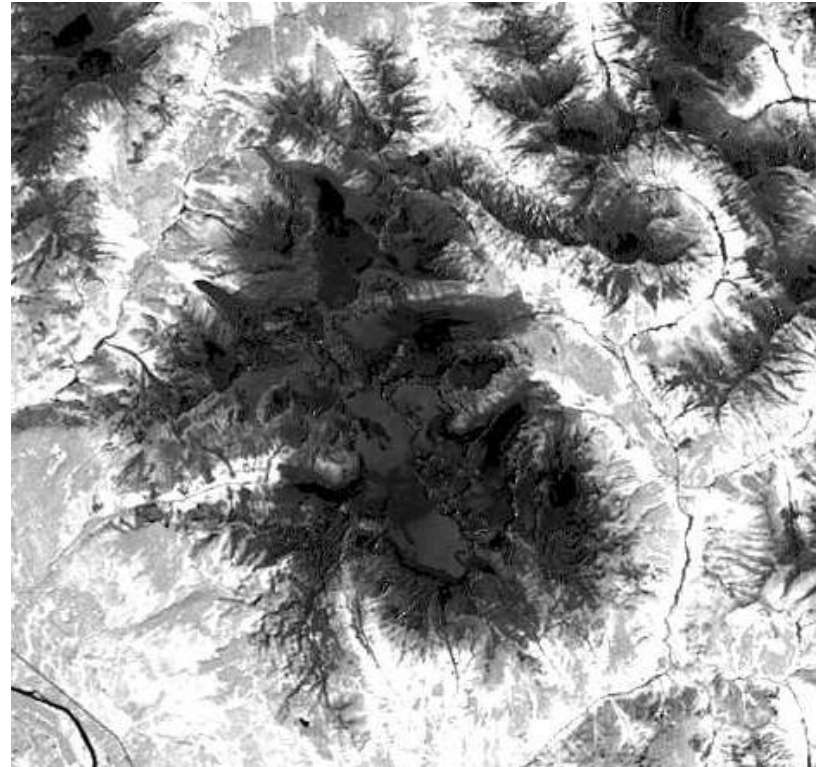
$(TM2-TM5)/(TM2+TM5)$  (for Landsat)

## - Ratio Images:

- TM3/TM5 -> good results in shadow zones (for Landsat)
- TM4/TM5 -> good results in areas facing sun (for Landsat)

These methods are:

- robust, simple, accurate (partly better than manual -> consistency)



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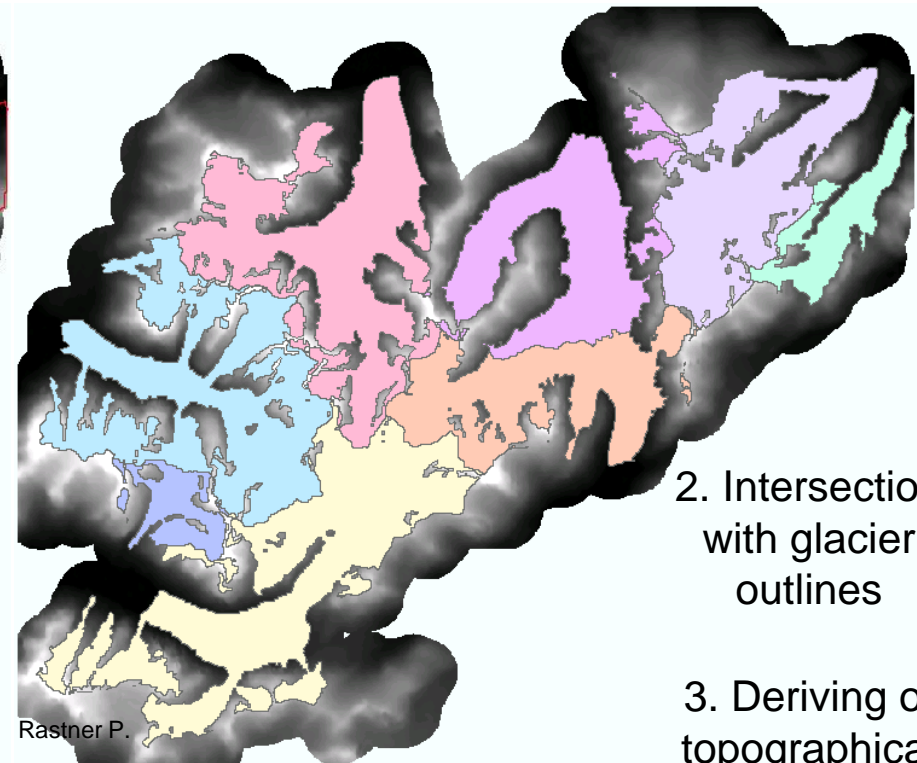
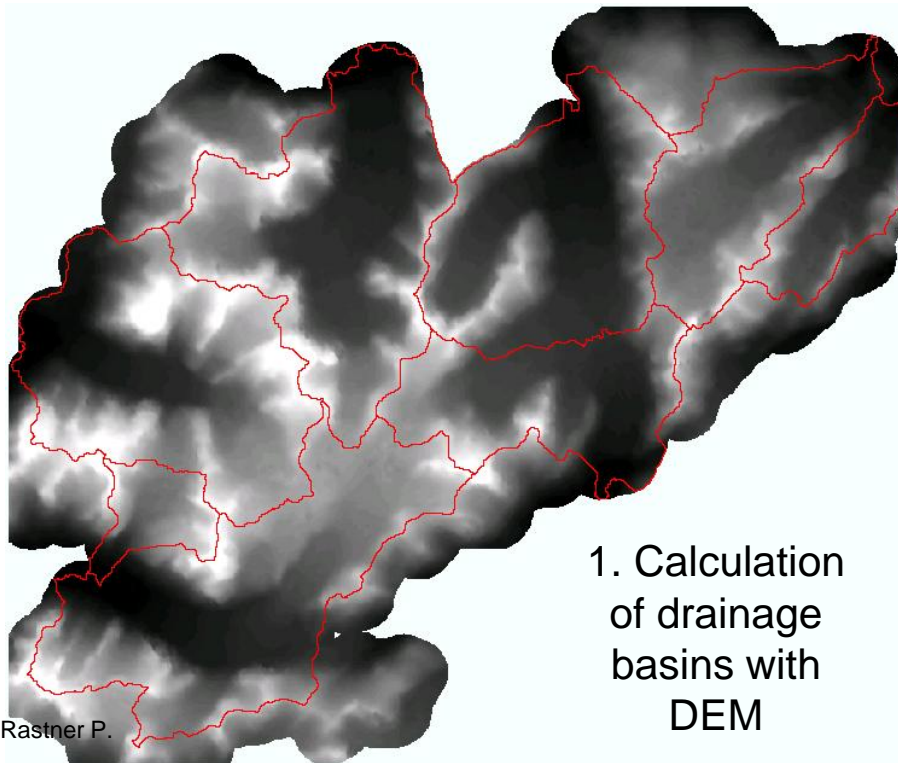
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# Derivation of drainage basins

CryoSat Ocean  
IceSat ASTER Glacier  
Radar Polar Scientists  
Cryosphere Earth  
Photogrammetry Melting Lidar  
Change Snow Remote Sensing Imaging Reading July 2011  
Climate EOTech Cluster NCEO Antarctica  
Satellite

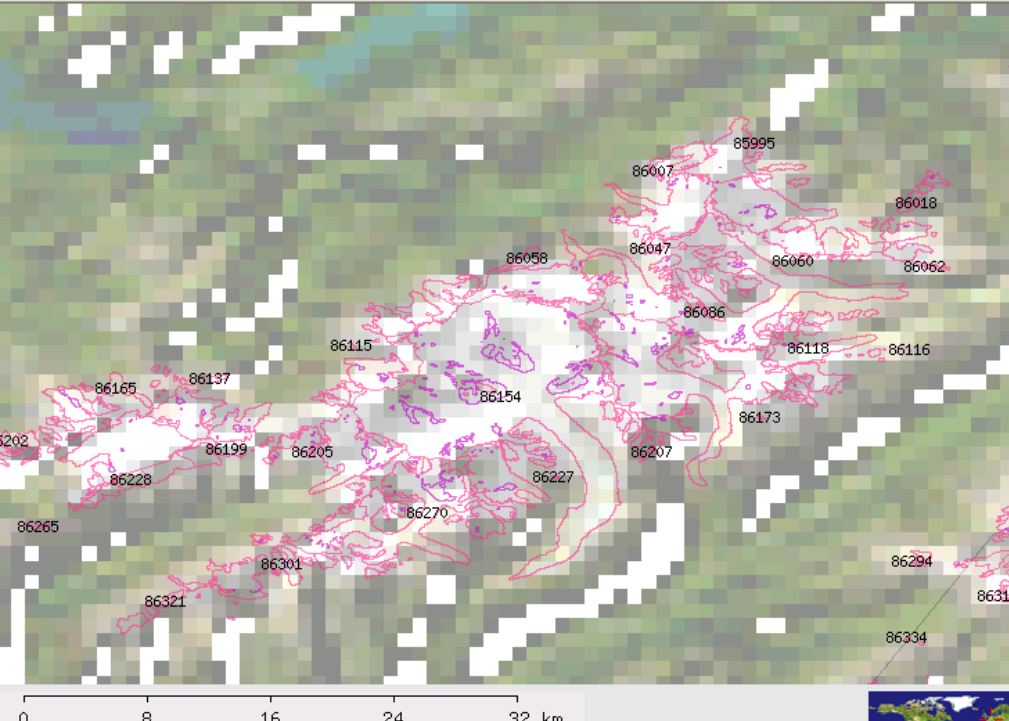
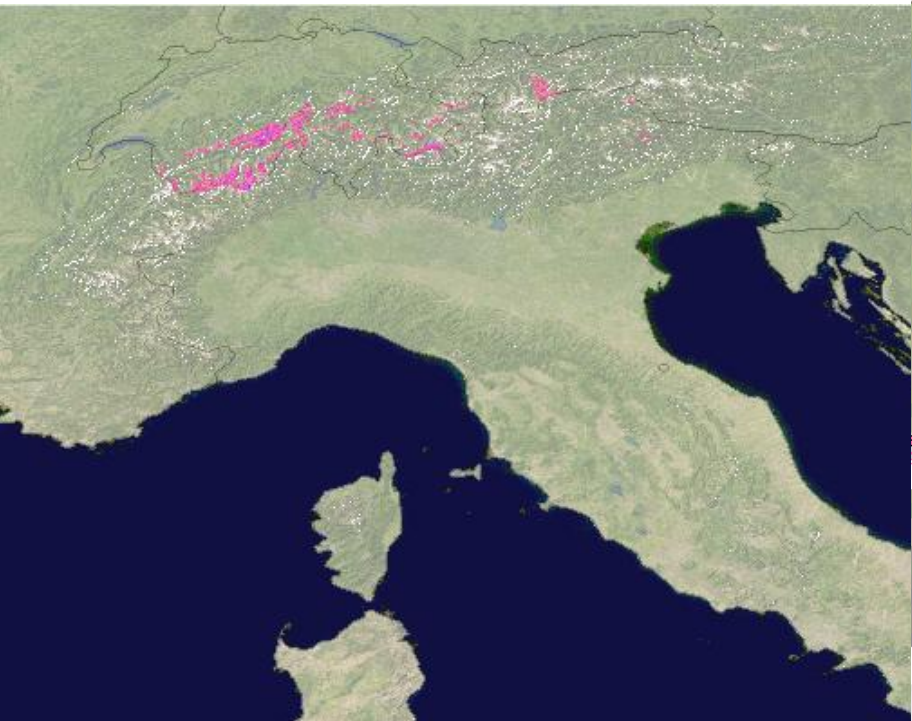


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# Glacier Inventory

CryoSat Ocean  
IceSat ASTER Glacier  
Radar Polar Scientists  
Cryosphere Earth  
Imaging Reading July 2011  
Photogrammetry Modelling Ice  
Change Snow Remote Sensing  
ESA Observation  
Greenland  
Arctica  
NCEO

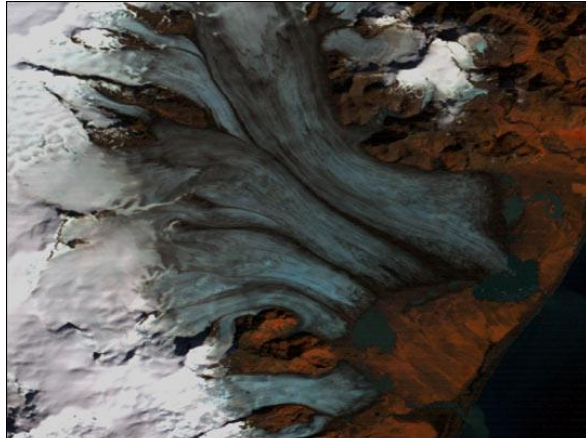


available @ GLIMS

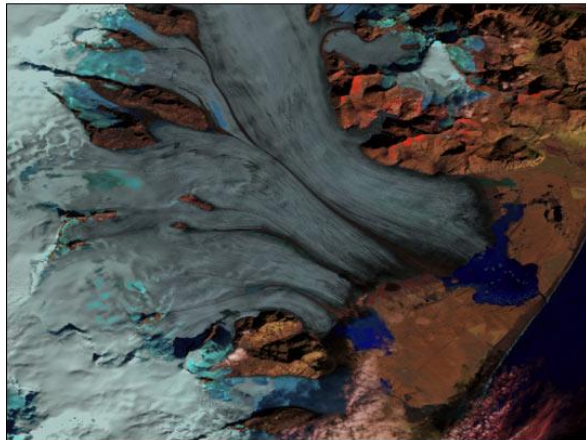


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# Change Mapping



1973



2000

<http://earthobservatory.nasa.gov/IOTD/view.php?id=1329>

## Necessary input data:

- Imagery of two different points in time

## Method:

- Georeference data (if necessary)
- Map glacier extends
- Calculate basins
- Derive topographical parameters



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