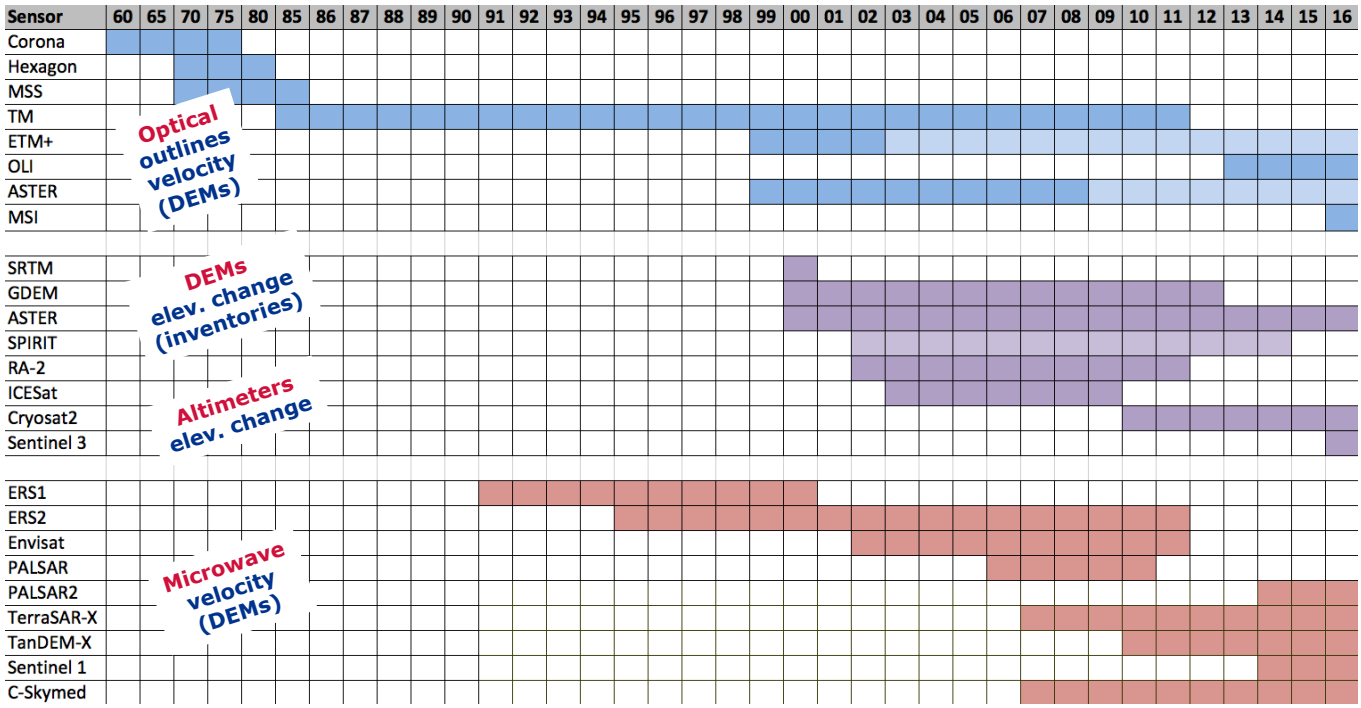
# Glaciers_cci

## Datasets and Applications

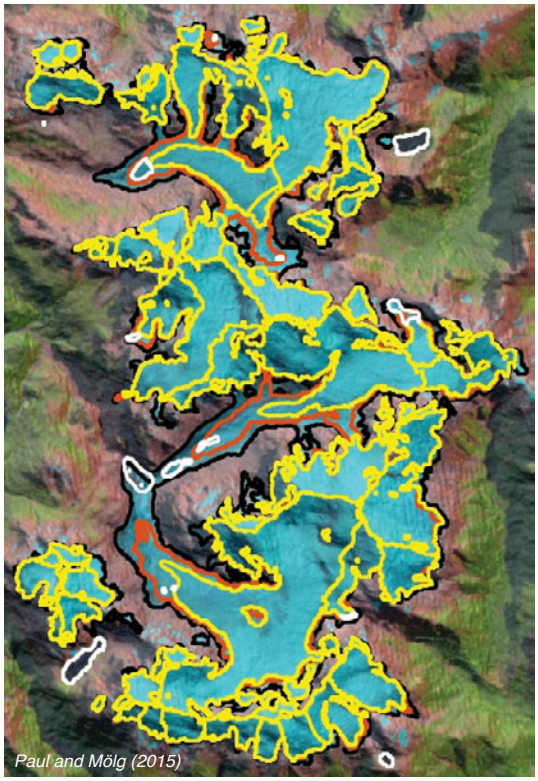
**Frank Paul, University of Zurich**
**on behalf of the Glaciers_cci consortium**

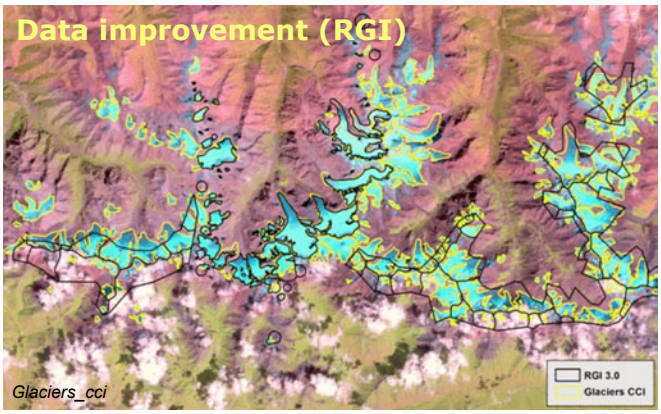
## Sensors: timelines and applications

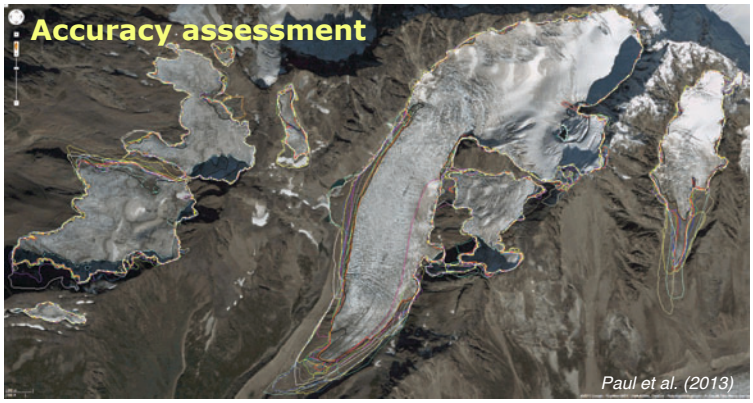


# Glaciers_cci products: Area

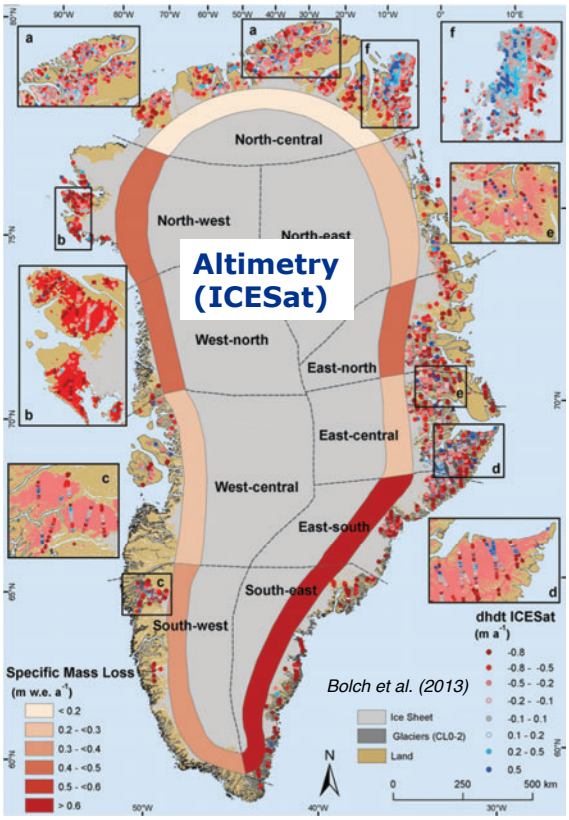
**Change assessment**

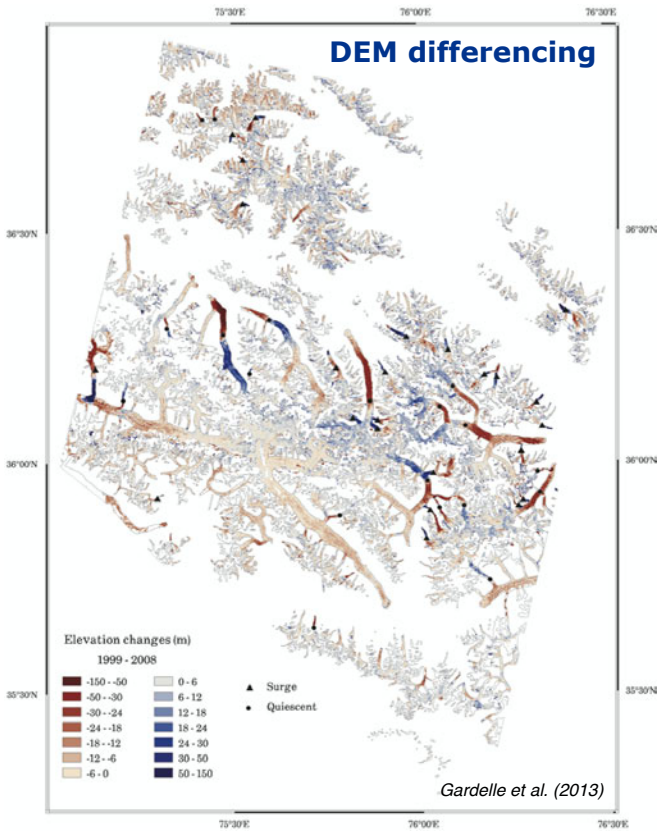


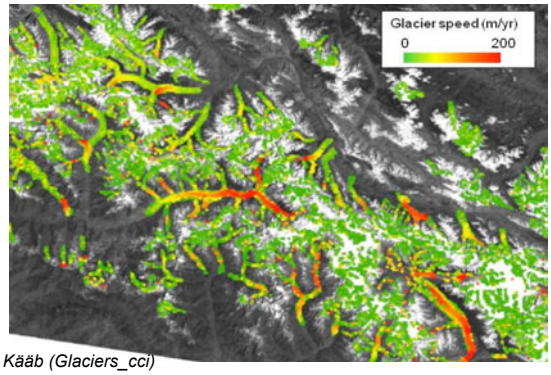

# Glaciers_cci products: Elevation change



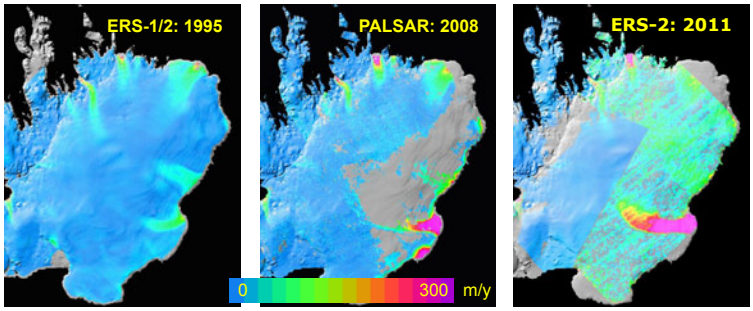
# Glaciers_cci products: Velocity

## Velocity fields



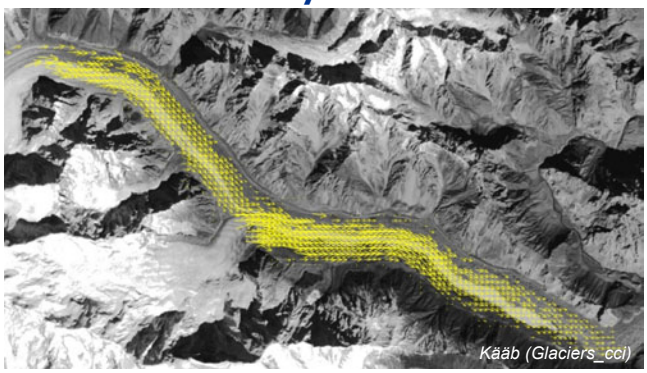

*Kääb (Glaciers_cci)*

## Velocity: time series

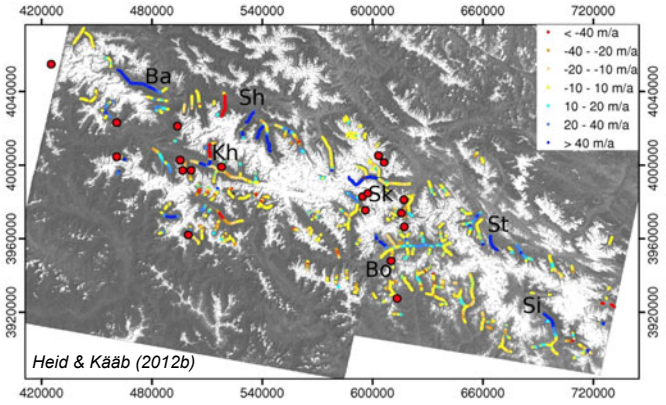



*Strozzi(Glaciers_cci)*

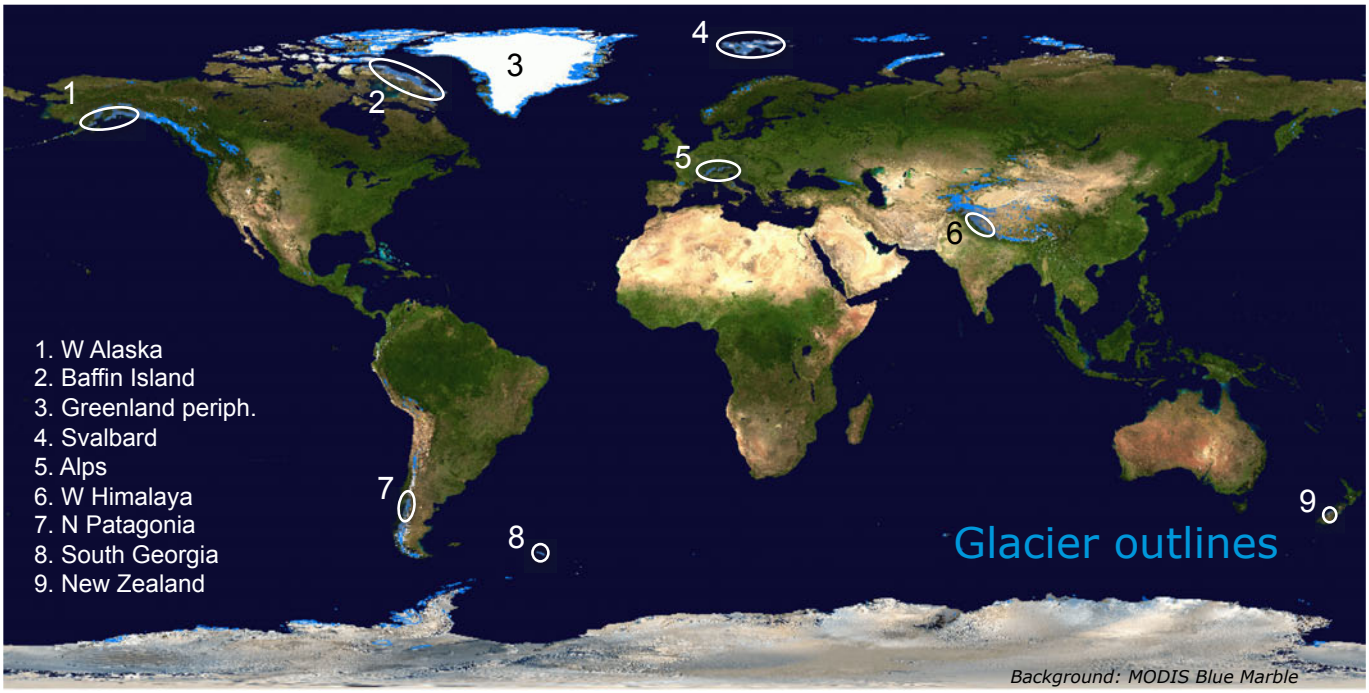
## Velocity vectors




## Velocity: decadal trends

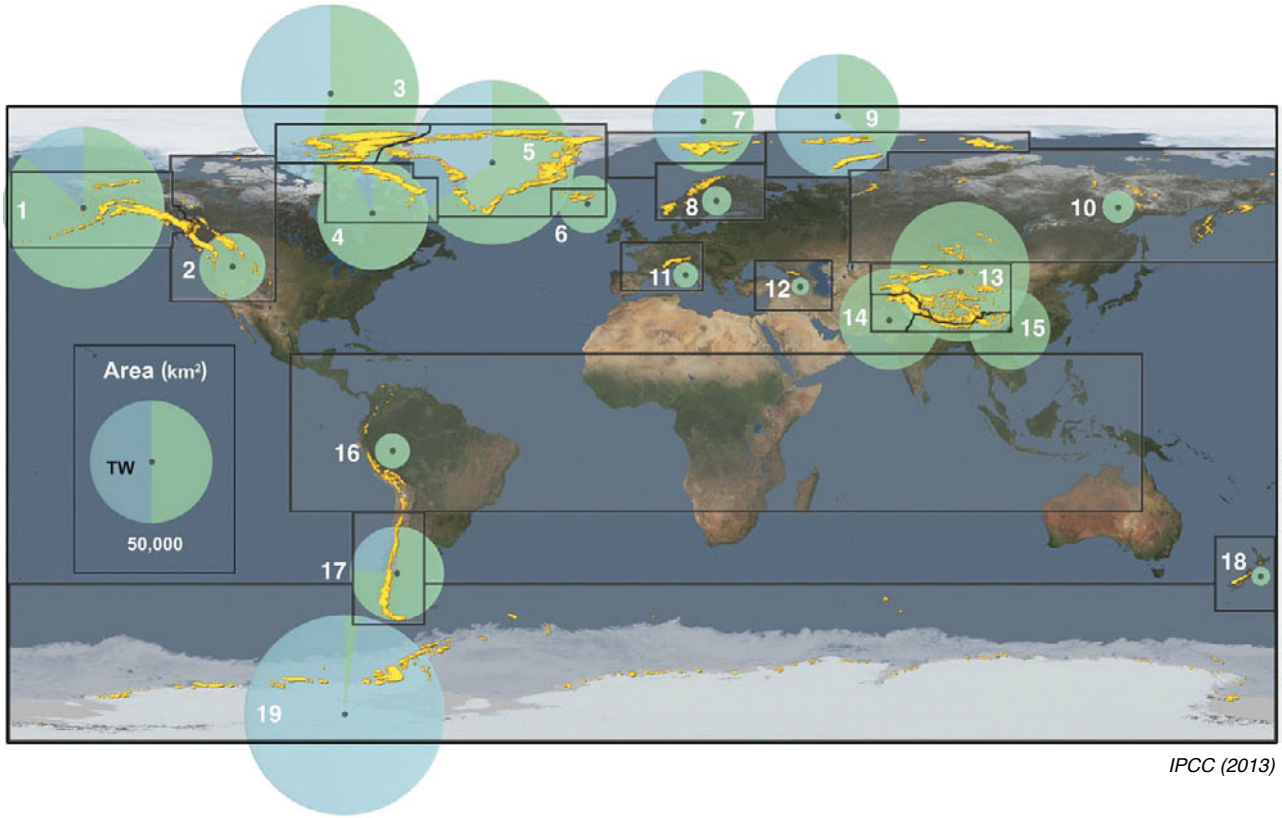



# Products provided by Glaciers_cci to the RGI



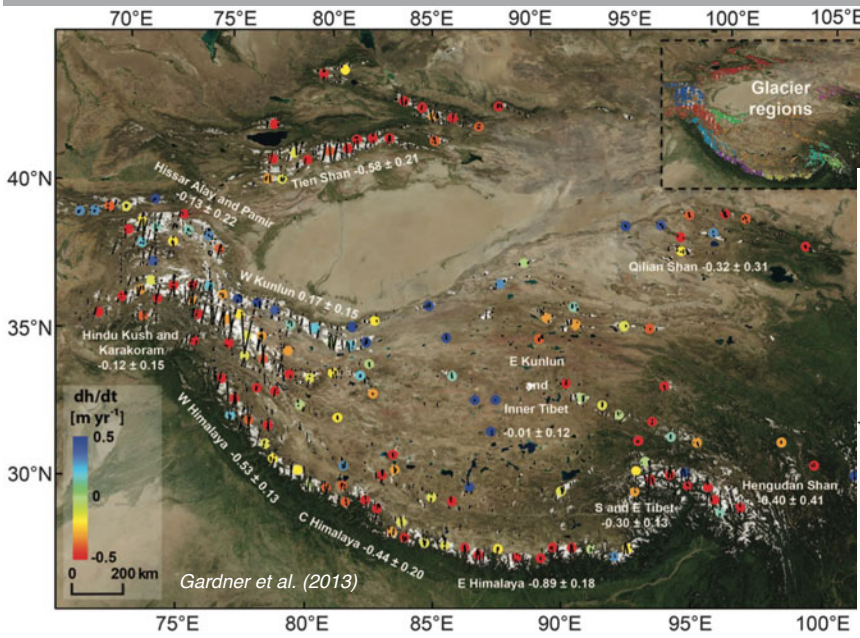

About 150 satellite scenes (ASTER, Landsat TM & ETM+) were processed by Glaciers_cci

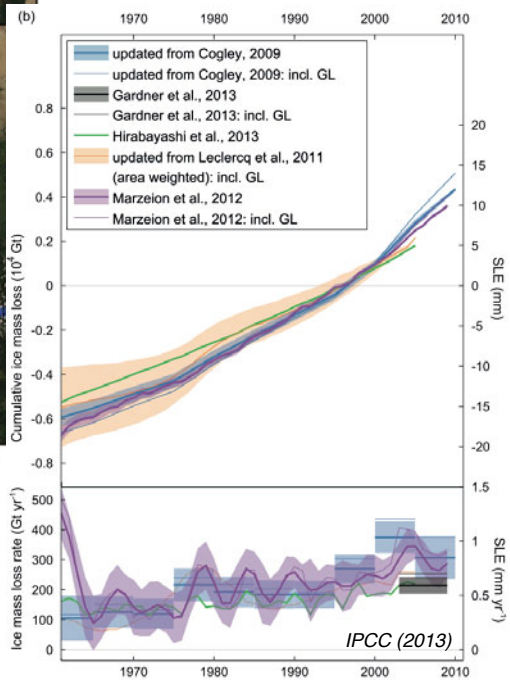
# First globally complete glacier inventory: RGI




IPCC (2013)

# RGI applications 2: Global mass changes

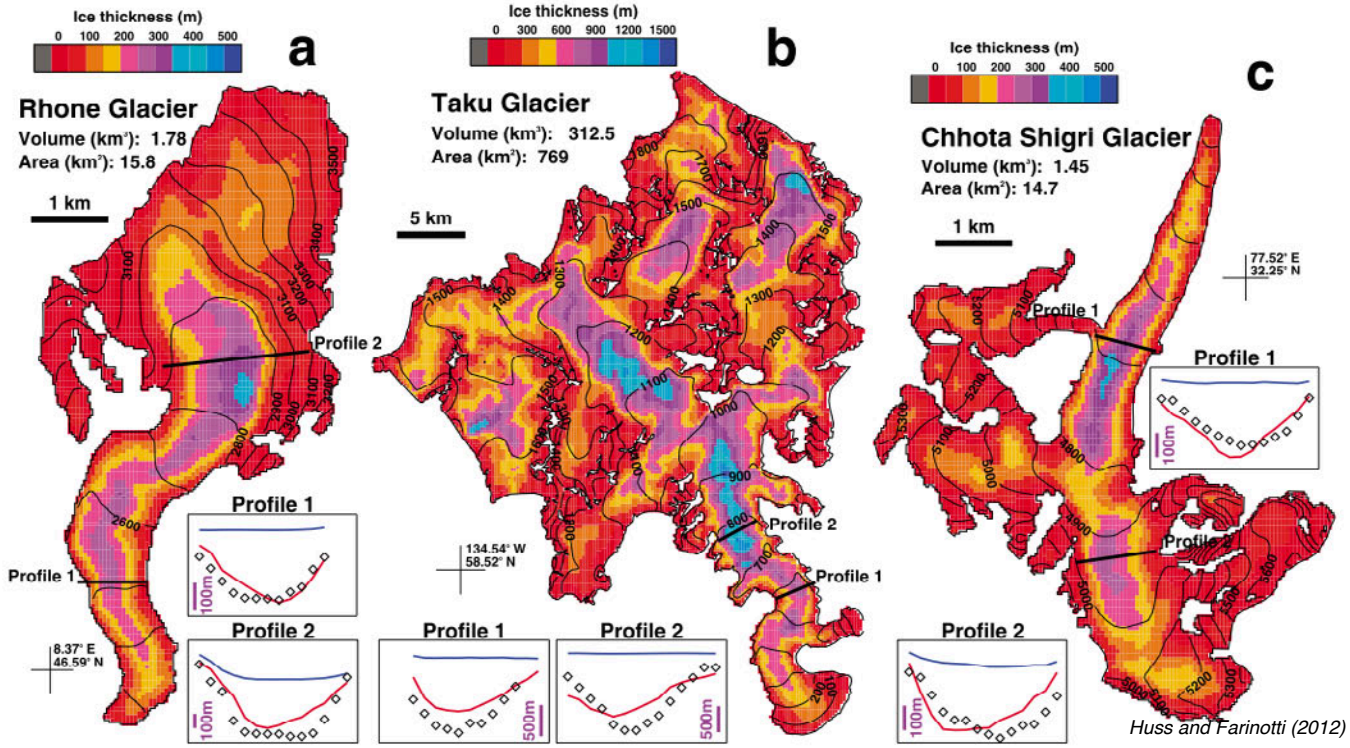



IPCC (2013)

# RGI applications 3: Ice thickness distribution

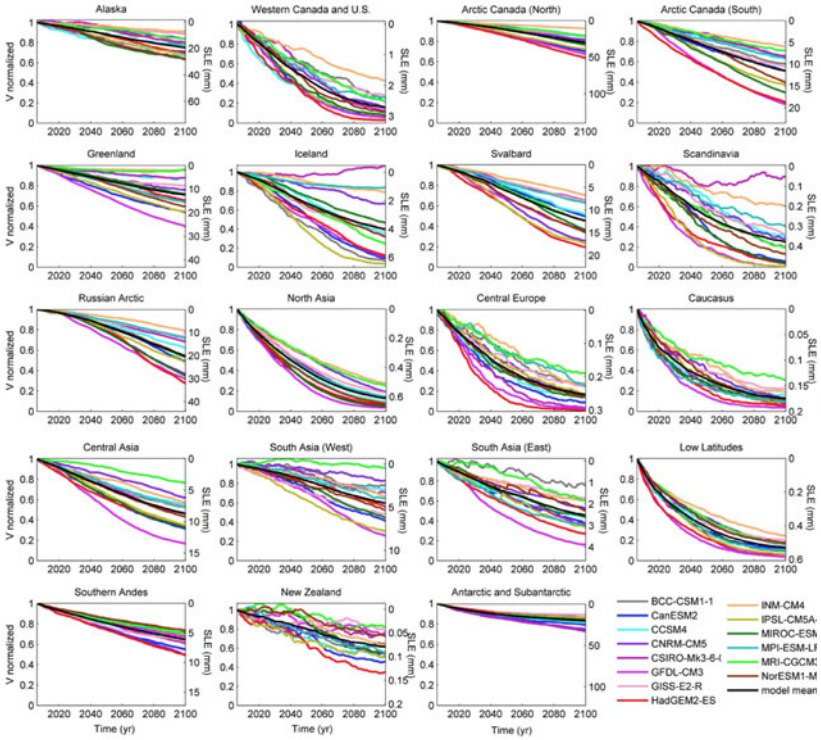





*Huss and Farinotti (2012)*

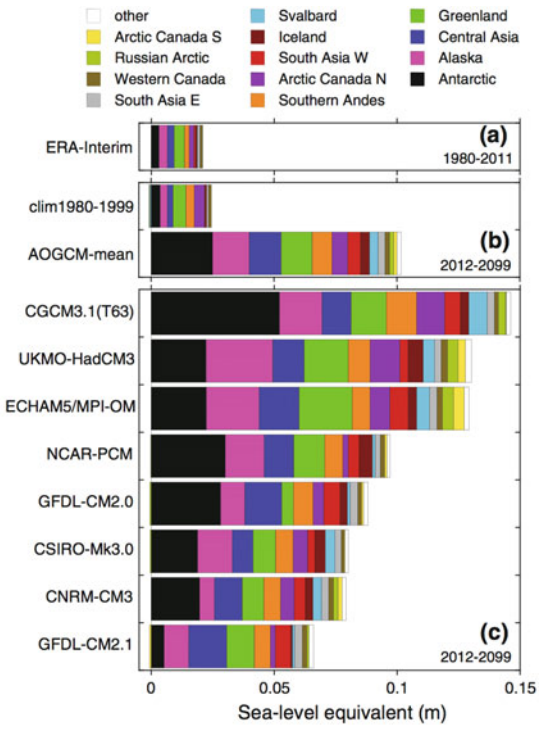
# RGI applications 4: Future glacier volume

## Transient evolution of global glacier volumes



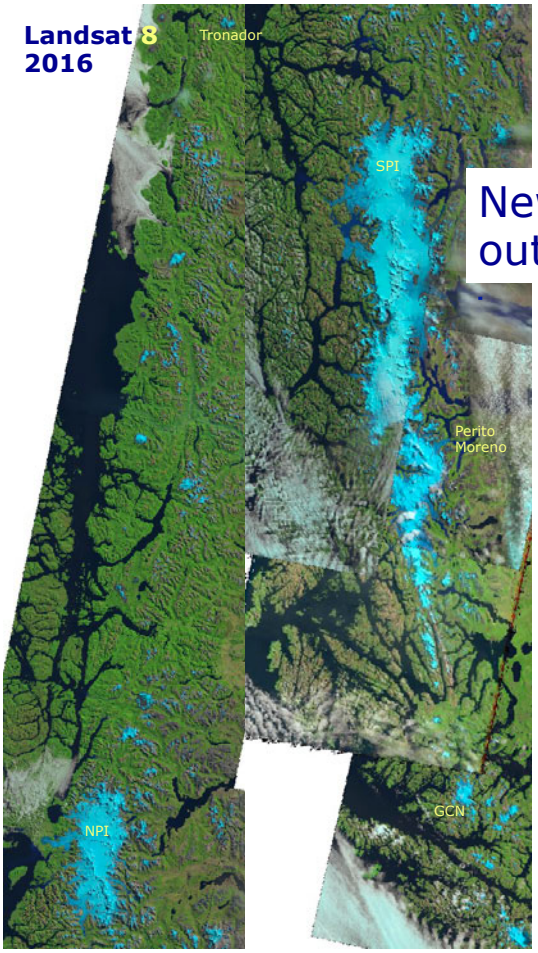

*Radic et al. (2013)*

## Future sea-level rise contribution

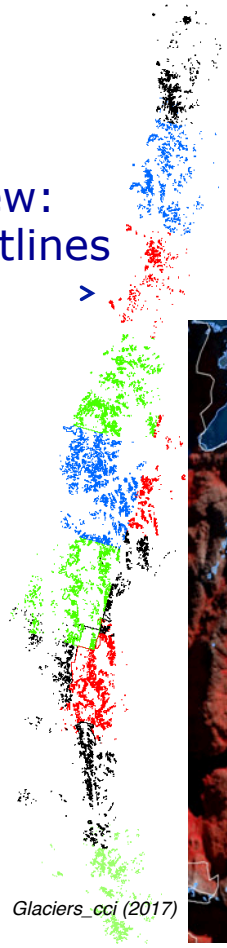



*Giesen and Oerlemans (2013)*

## Inventory Patagonia

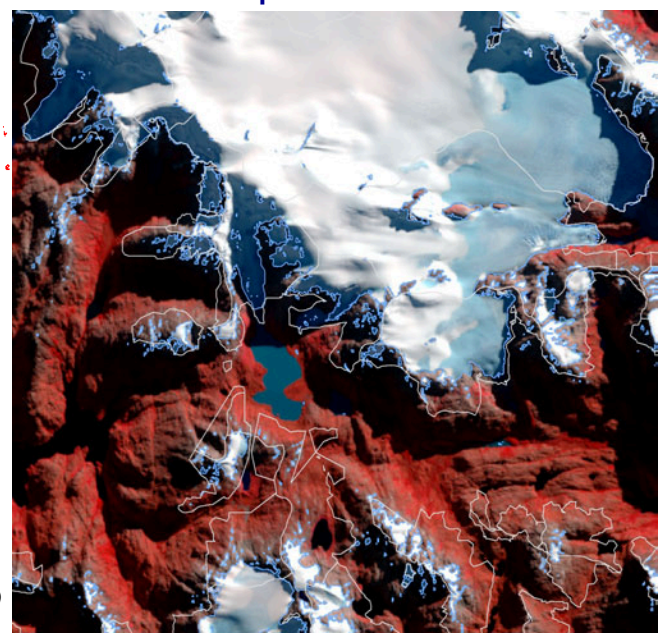



New:
outlines
>

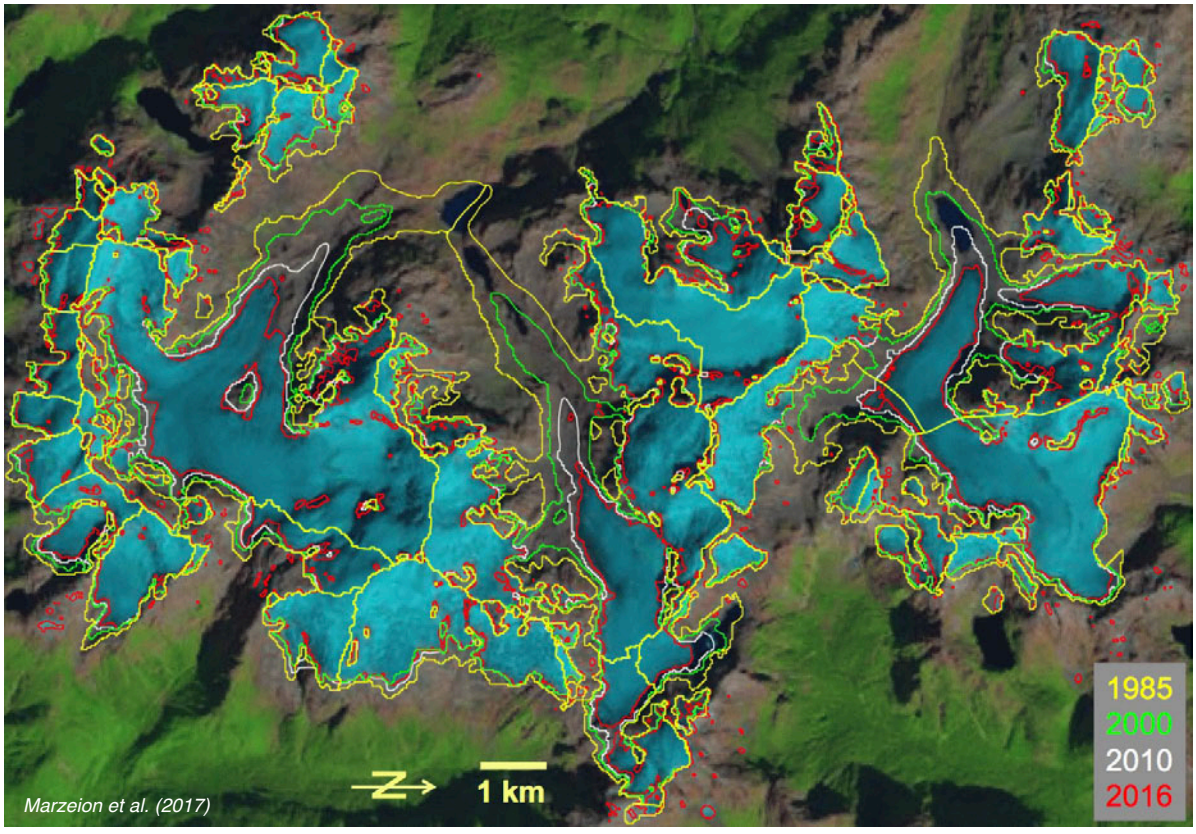


*Glaciers_cci (2017)*

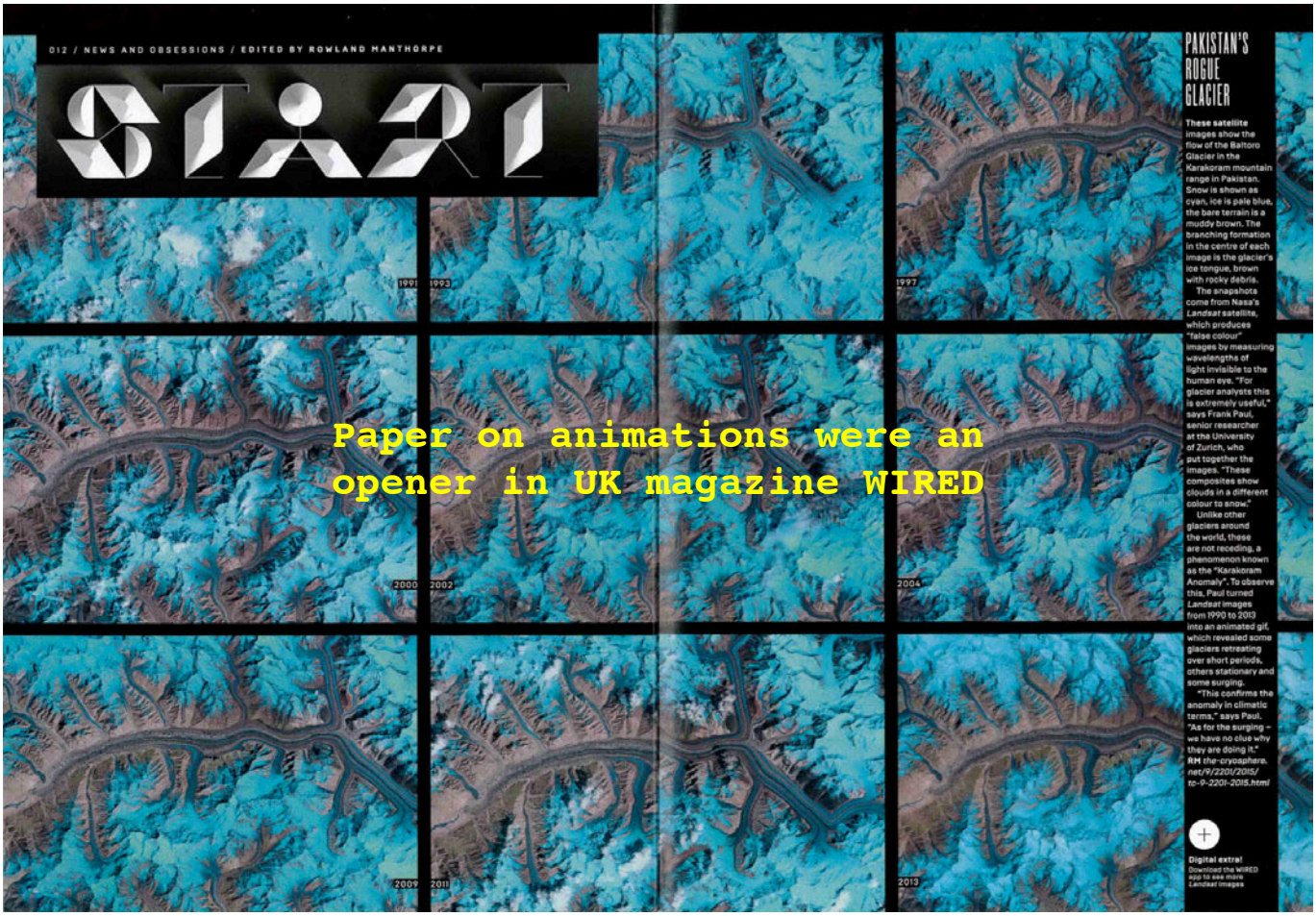
Example CCI vs RGI



## Area change Patagonia (quantitative)

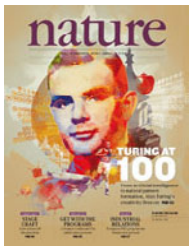



*Marzeion et al. (2017)*




**Paper on animations were an opener in UK magazine WIRED**

# Media sensitivity to Himalaya mass change




LETTER

doi:10.1038/nature10847

## Recent contributions of glaciers and ice caps to sea level rise

Thomas Jacob[1]†, John Wahr[1], W. Tad Pfeffer[2,3] & Sean Swenson[4]

## Are the world's glaciers threatened by climate change?

A Nature study has shocked researchers by finding that the Himalayas have lost no ice over the past decade. Leo Hickman,

The Telegraph

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### Melting glaciers on the Himalayas not contributing to sea level rise

The Himalayas has lost no significant ice over the past decade, according to a new study, that found melting ice from glaciers is having a much smaller effect on sea levels than previously thought.

## Himalayan glaciers have lost no ice in the past 10 years, new study reveals

Published February 09, 2012 / FoxNews.com

Print

The U.N. got it wrong on Himalayan glaciers -- and the proof is finally here.

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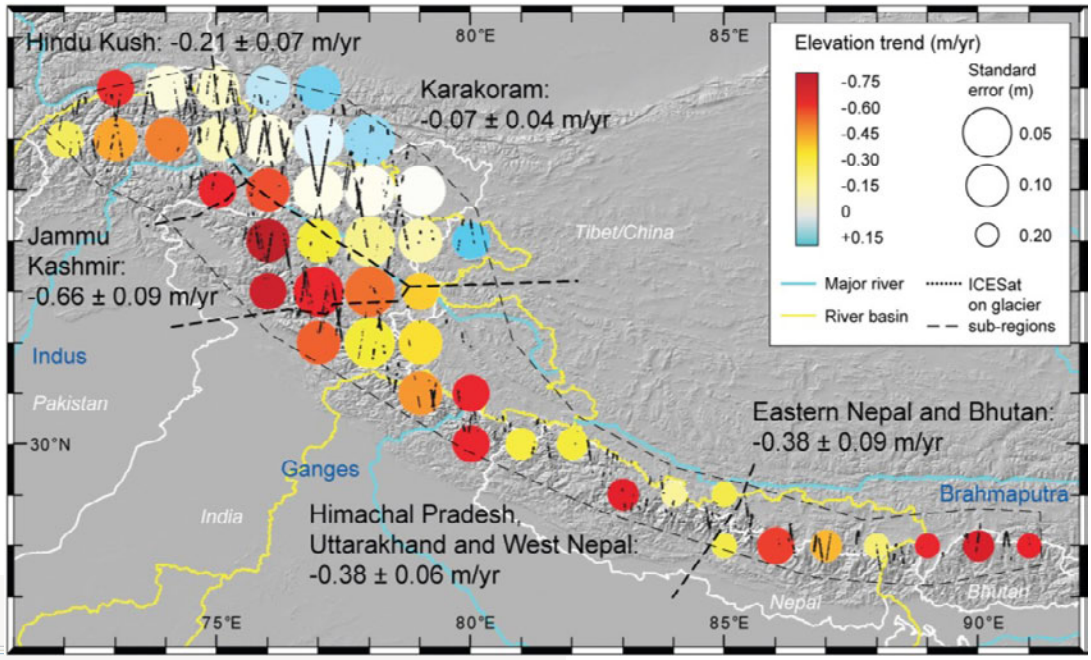
## New satellite data reveals that Himalayan glaciers are melting far more SLOWLY than predicted

# Glaciers_cci study gives clarity on mass changes




LETTER

## Contrasting patterns of early twenty-first-century glacier mass change in the Himalayas

Andreas Kääb[1], Etienne Berthier[2], Christopher Nuth[1], Julie Gardelle[3] & Yves Arnaud[4]

Kääb et al. (2012): **Nature**, 23 August

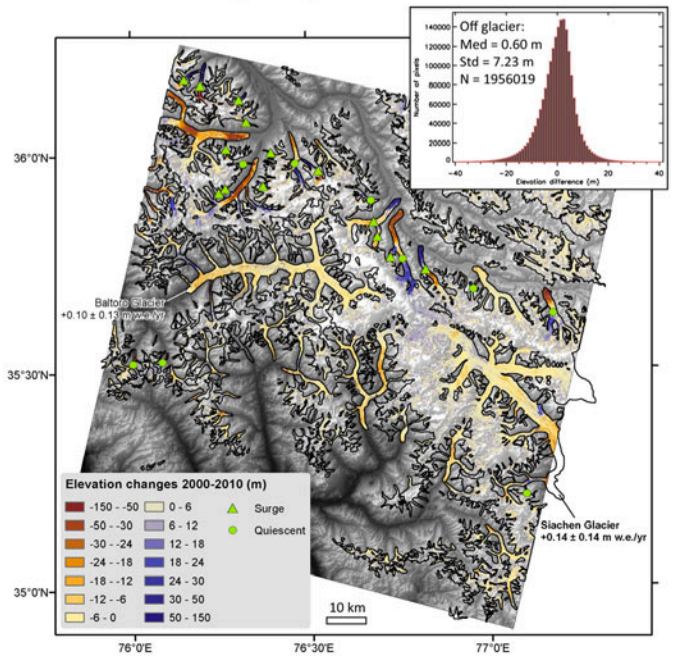
# DEM differncing study gets high attention

The Cryosphere, 7, 1263–1286, 2013
www.the-cryosphere.net/7/1263/2013/
doi:10.5194/tc-7-1263-2013

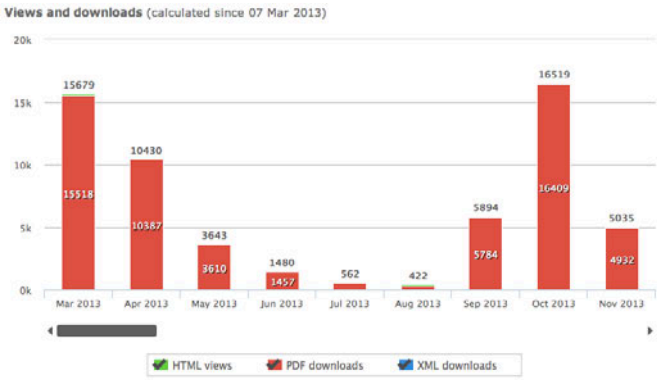

The Cryosphere
Open Access

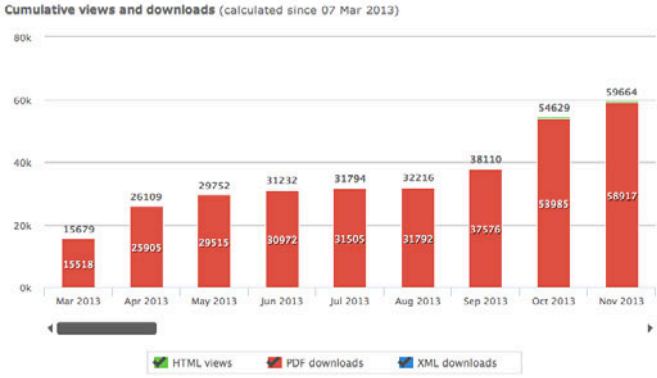
**Region-wide glacier mass balances over the Pamir-Karakoram-Himalaya during 1999–2011**

*Gardelle et al. (2013)*

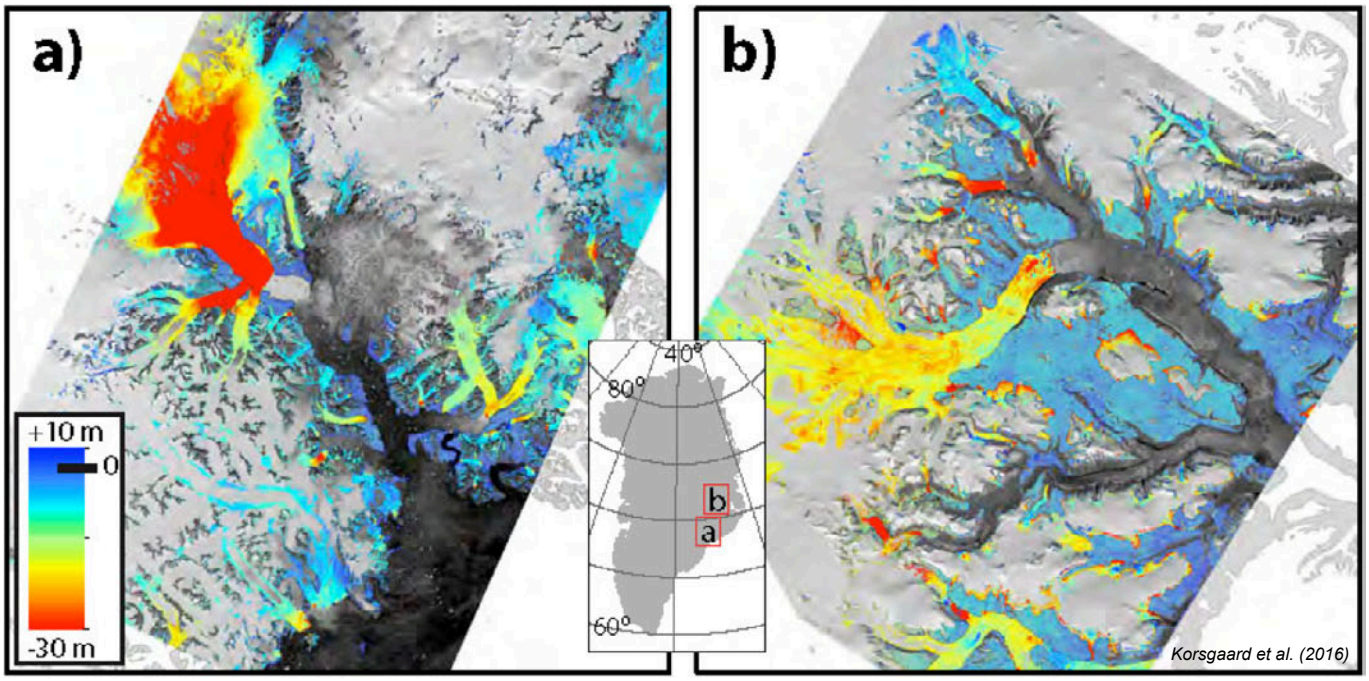



Download statistics from Copernicus

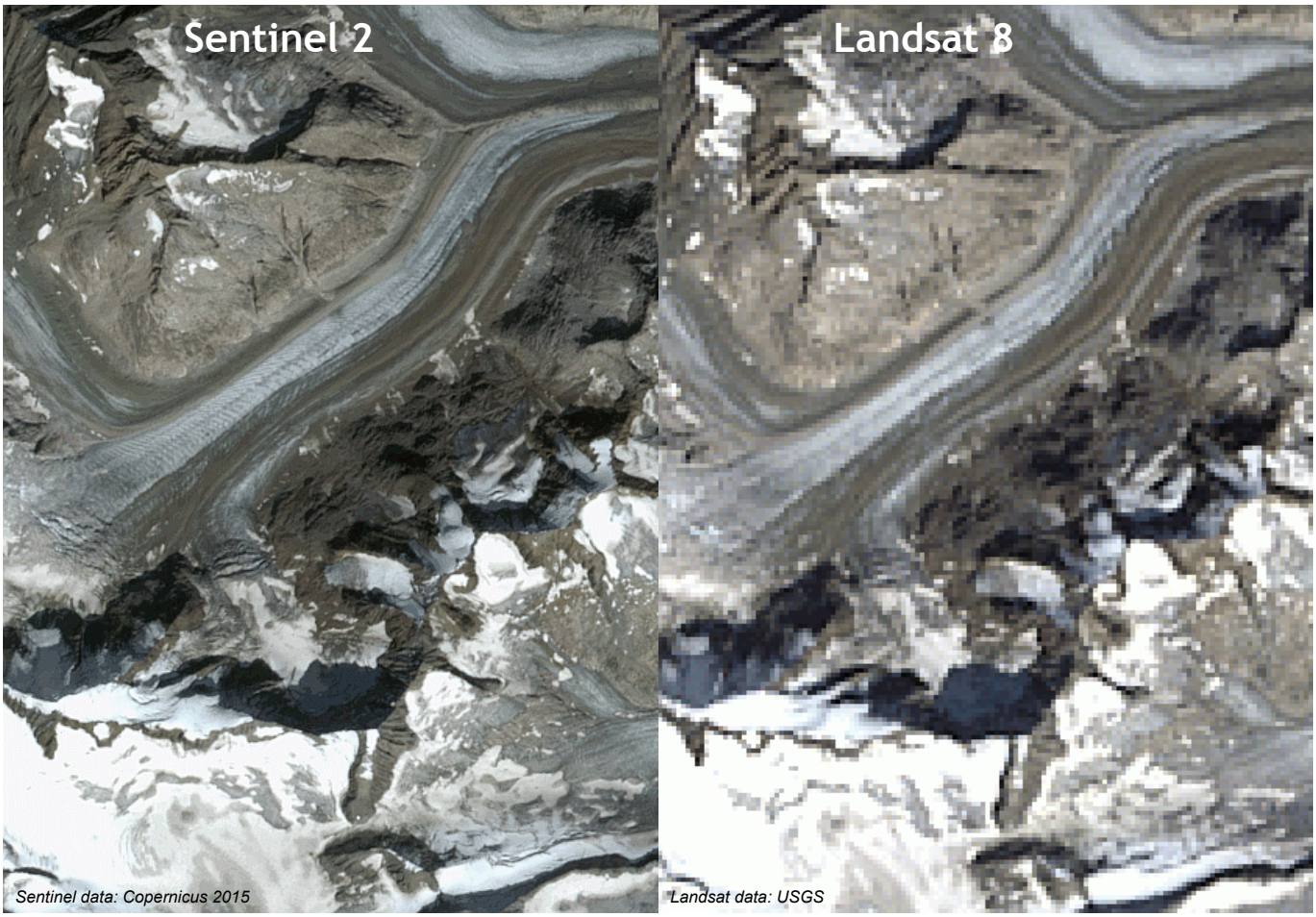


# Elevation changes SPOT – national DEM




Recently published: National DEM (1980s), Arctic DEM
soon: TanDEM-X, also: GDEM2 & GIMP DEM



# CMUG Questions

- **Strengths and features of the generated datasets**
  - Most are related to a publication (credibility, new insights, also methods)
  - All to be integrated in well-established databases for best dissemination
  - Production coordinated with GLIMS/RGI to avoid double work, new standards
- **Consistency with other ECVs and other EO data**
  - Common outlines/extent for local glaciers on Greenland & Antarctica (CL0/1)
  - Use in Landcover_cci to be established
- **Examples of data applications, especially ‘new or novel’**
  - Key input to RGI, widely applied by community, basis for IPCC AR5
  - First assessment of mass change HMA & Greenland local GIC (DEM+ALT)
  - Region wide-multi-temporal velocity, time-series of glacier flow, new surges
- **Future possible research directions**
  - Use of Google Earth and cloud processing for raw outlines (no debris)
  - Global-scale elevation changes (geodetic mass balance) from TanDEM-X
  - Higher product quality due to better resolution, time series/animations, hazards