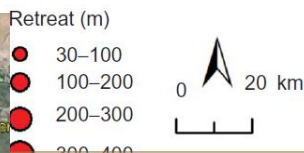
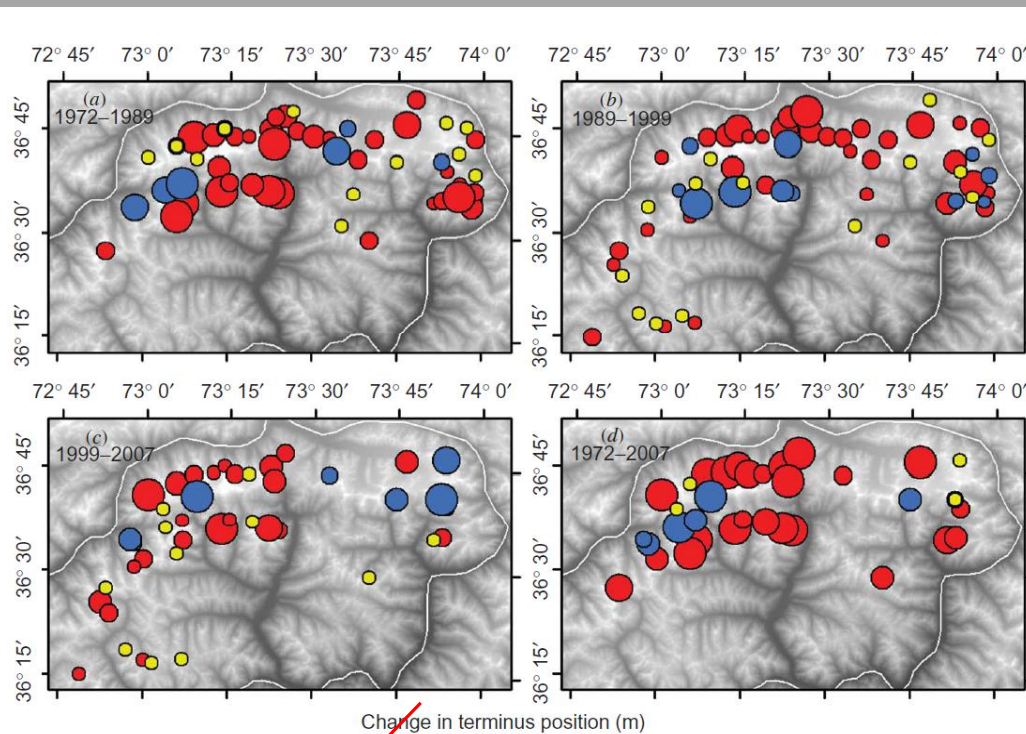


Characteristics of surge-type glaciers in the Karakoram

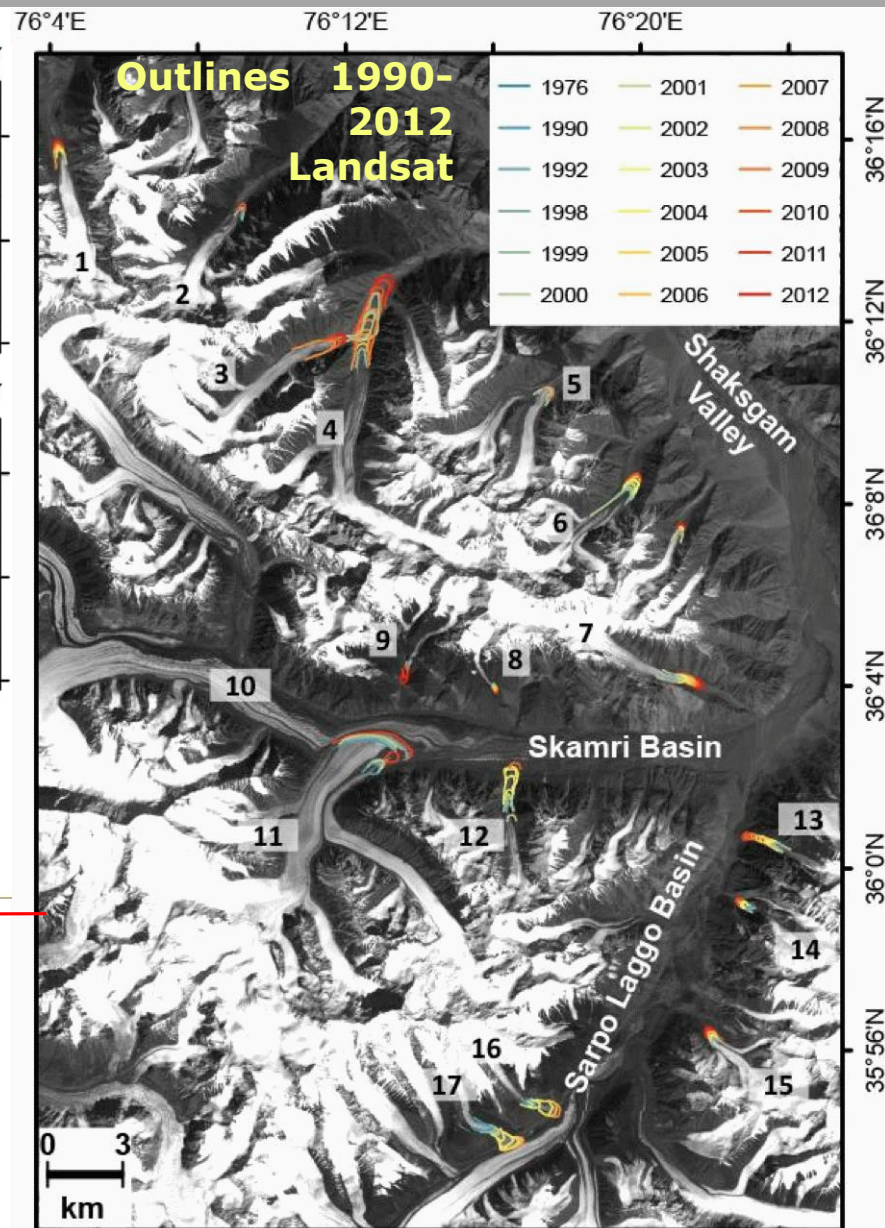
Nico Mölg, Tobias Bolch, Frank Paul, Philipp Rastner

DEPARTMENT OF GEOGRAPHY, UNIVERSITY OF ZURICH,
SWITZERLAND

Multi-temporal area and length changes

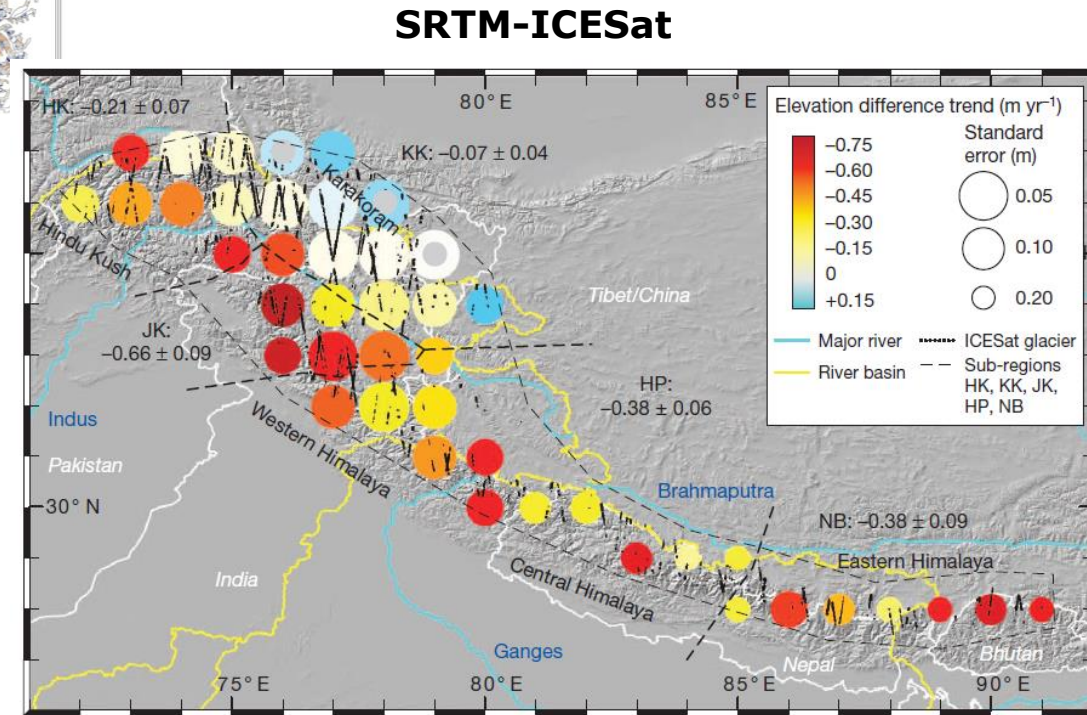
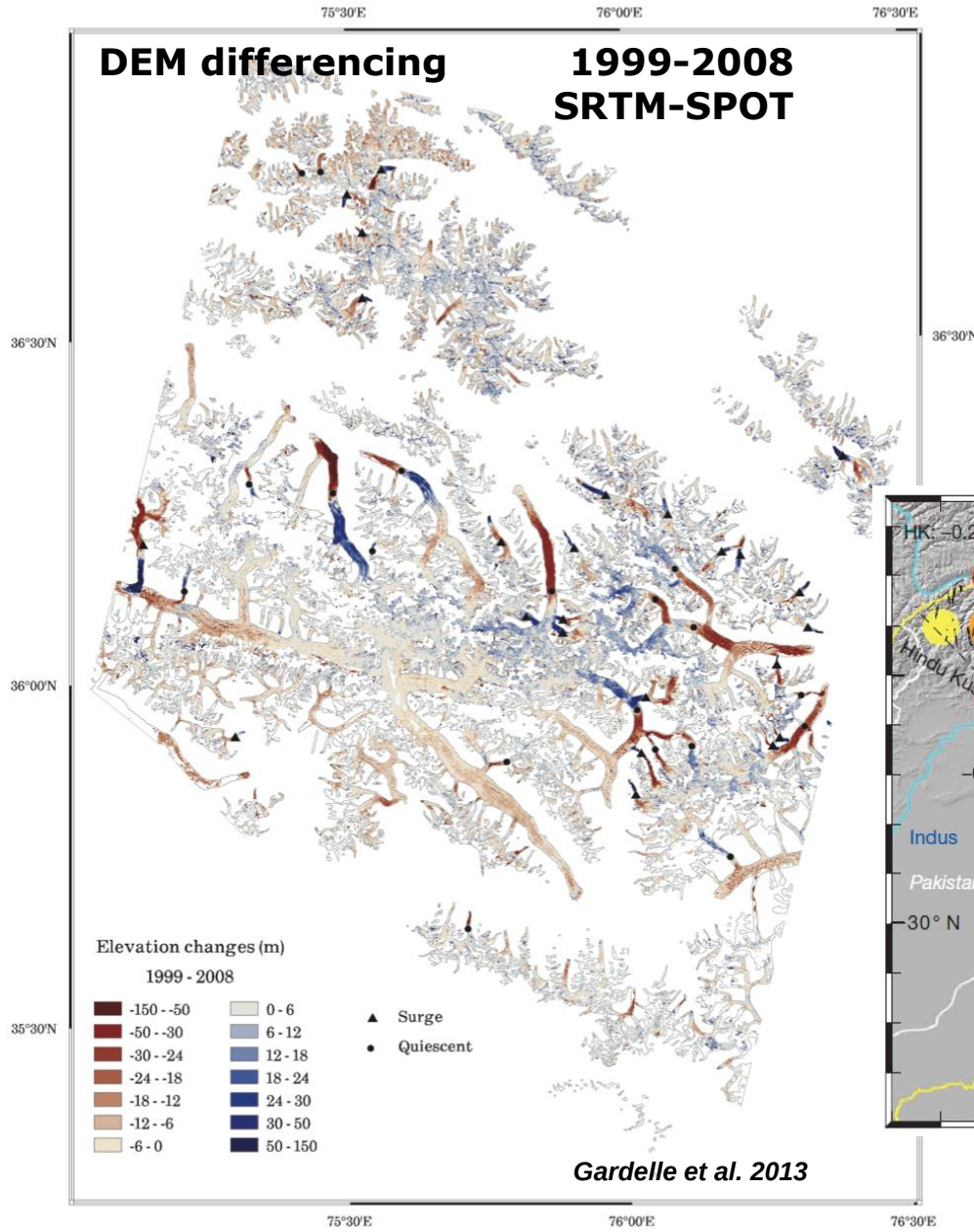


Sarikaya et al. 2012

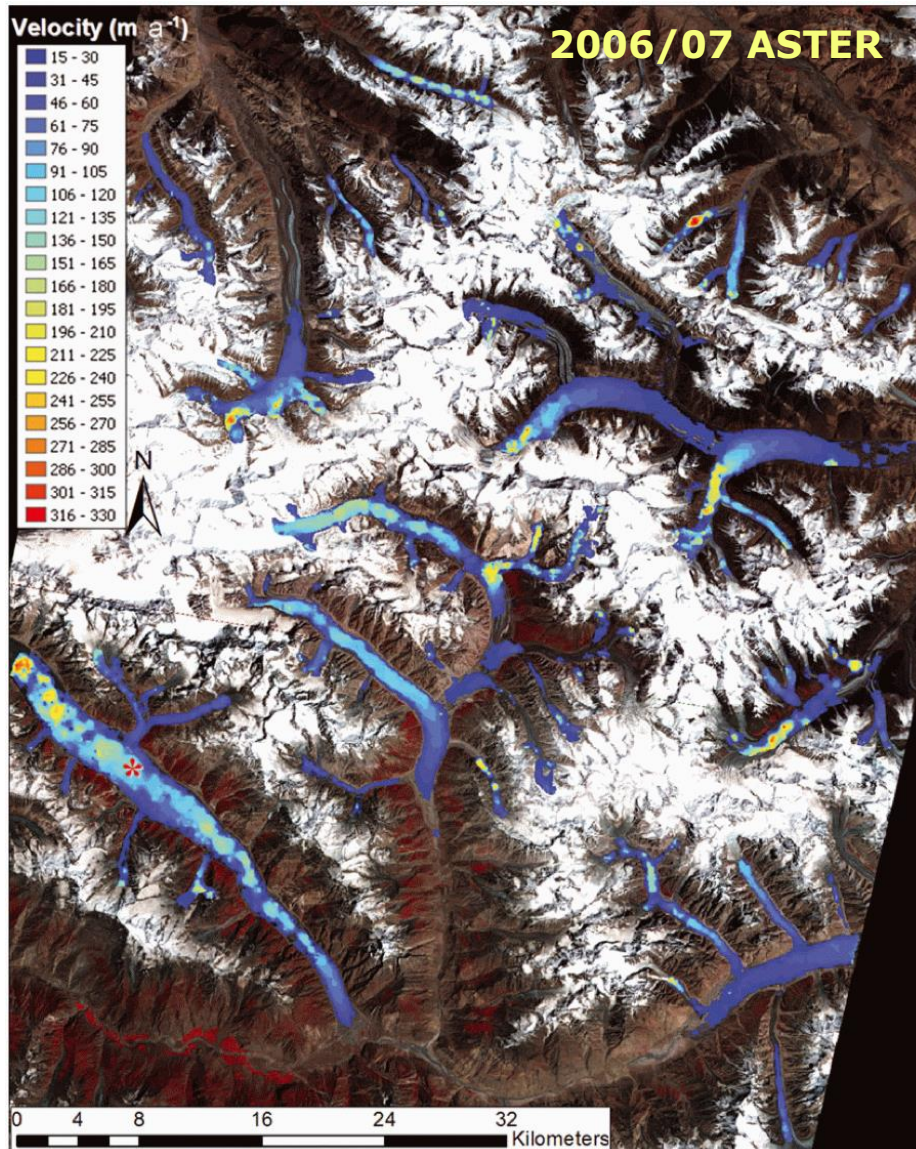


Rankl et al. 2014

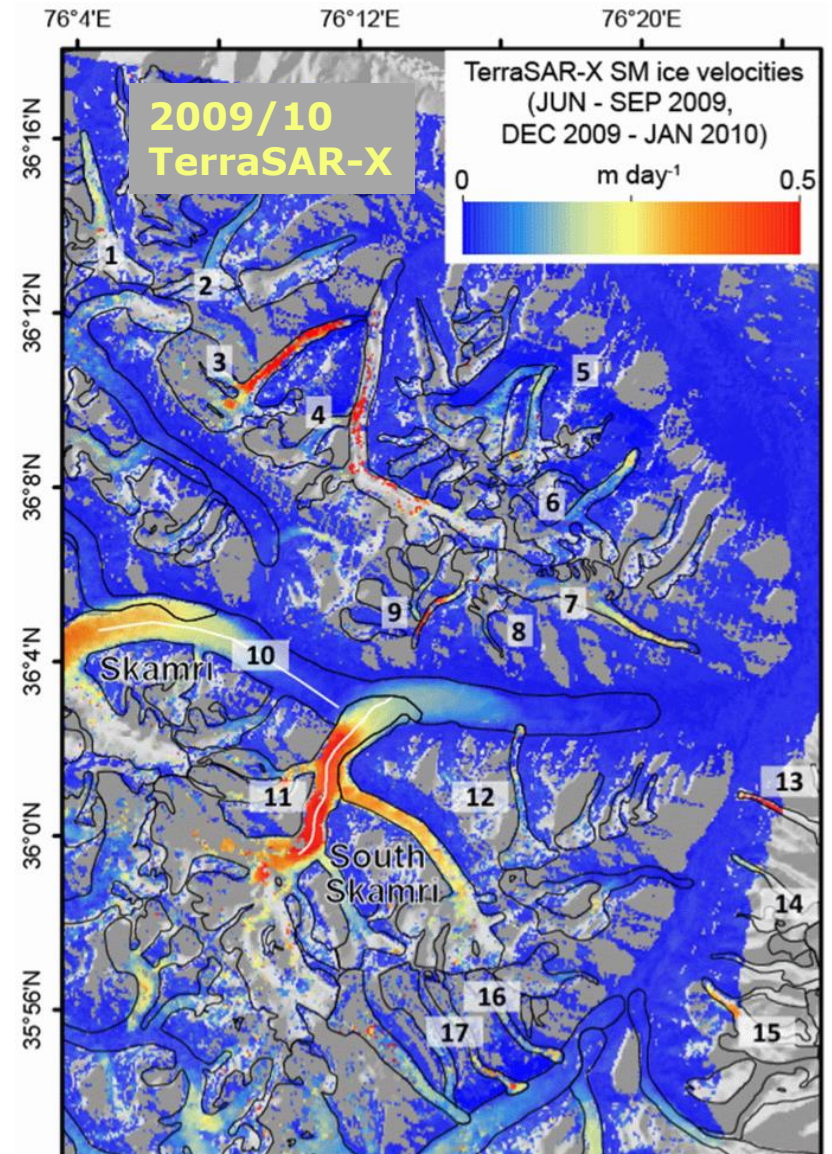
Volume changes from DEM differencing / laser



Glacier velocities

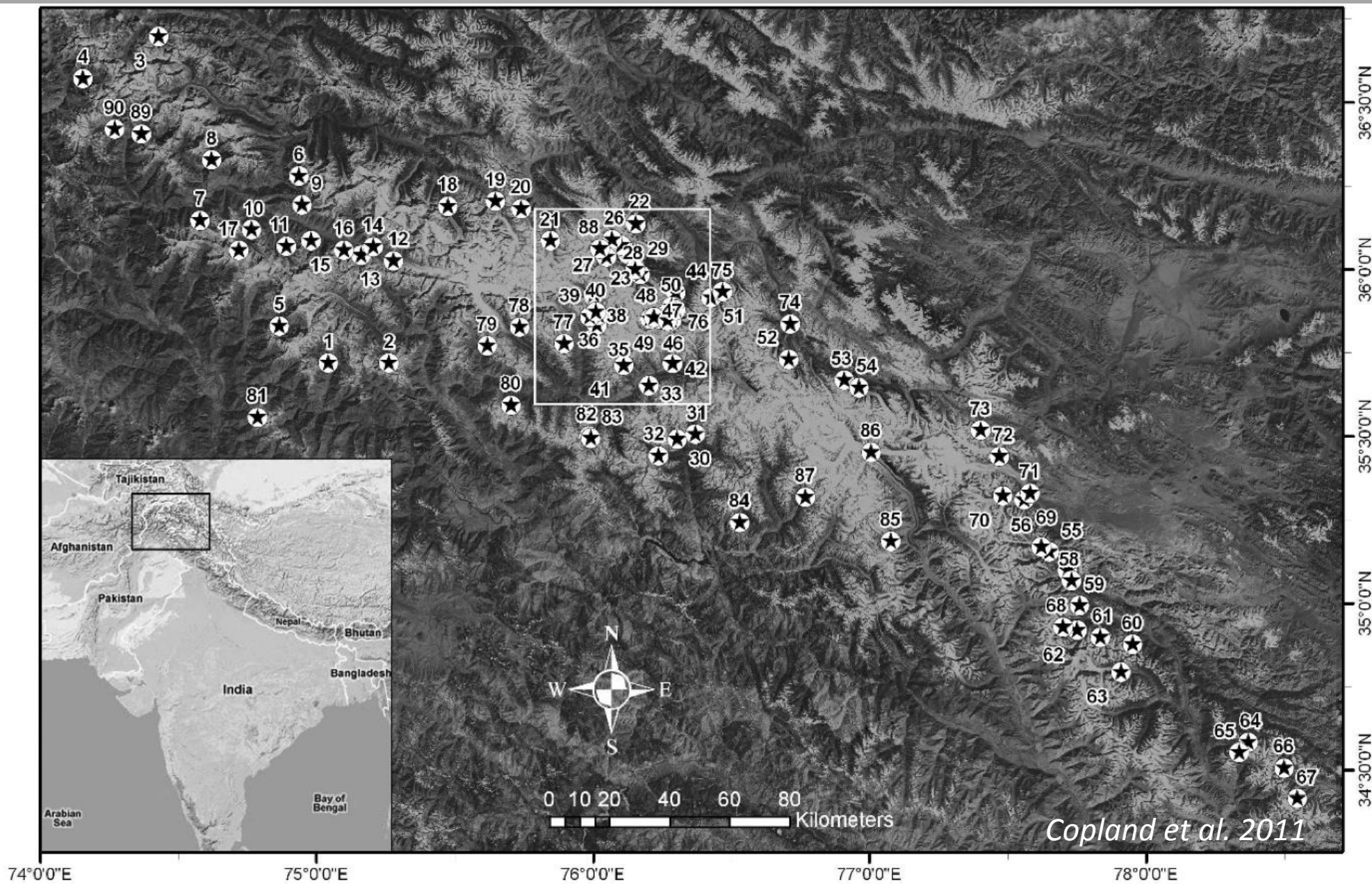


Copland et al. 2009



Rankl et al. 2014

References of surge-type glaciers

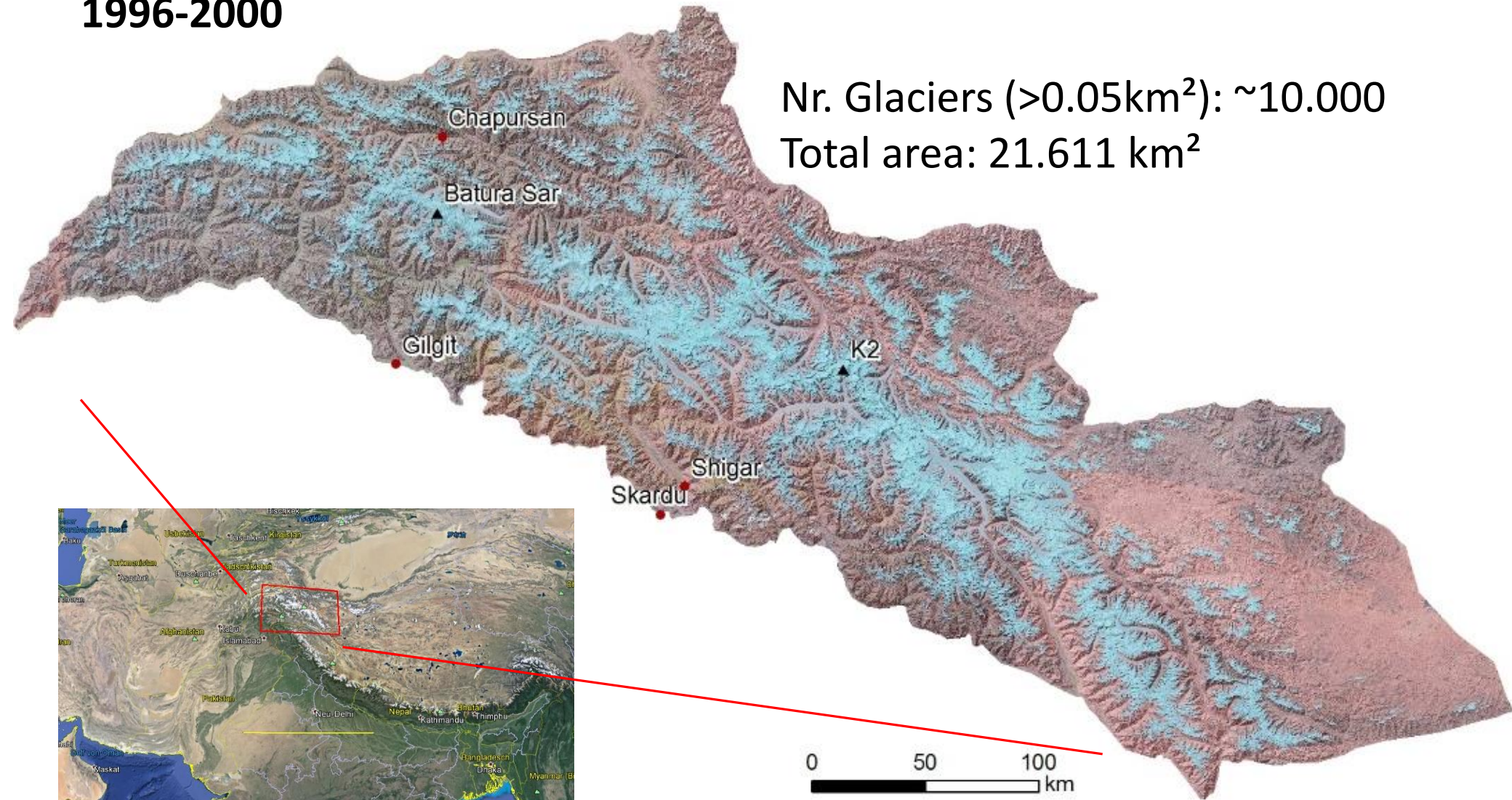


New Karakoram glacier inventory

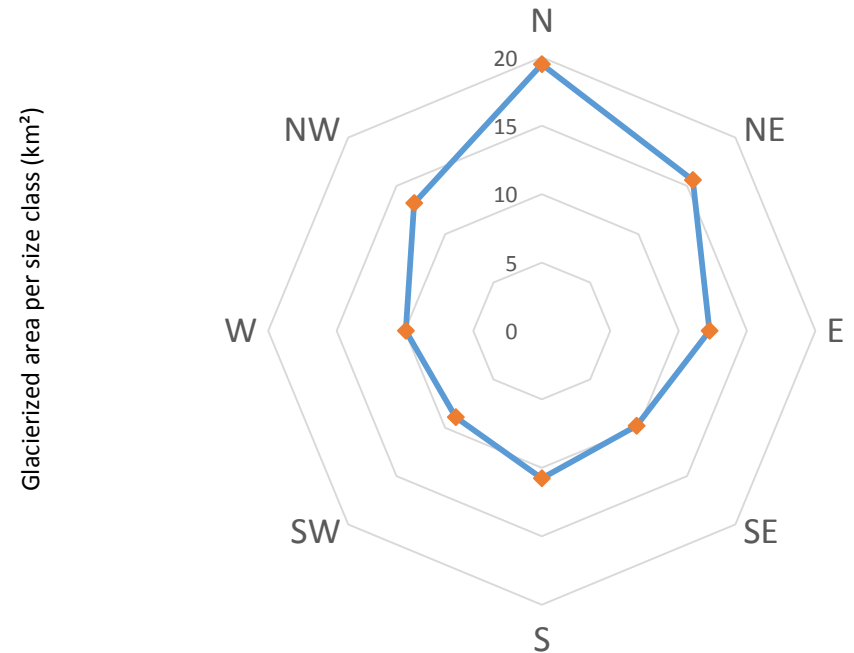
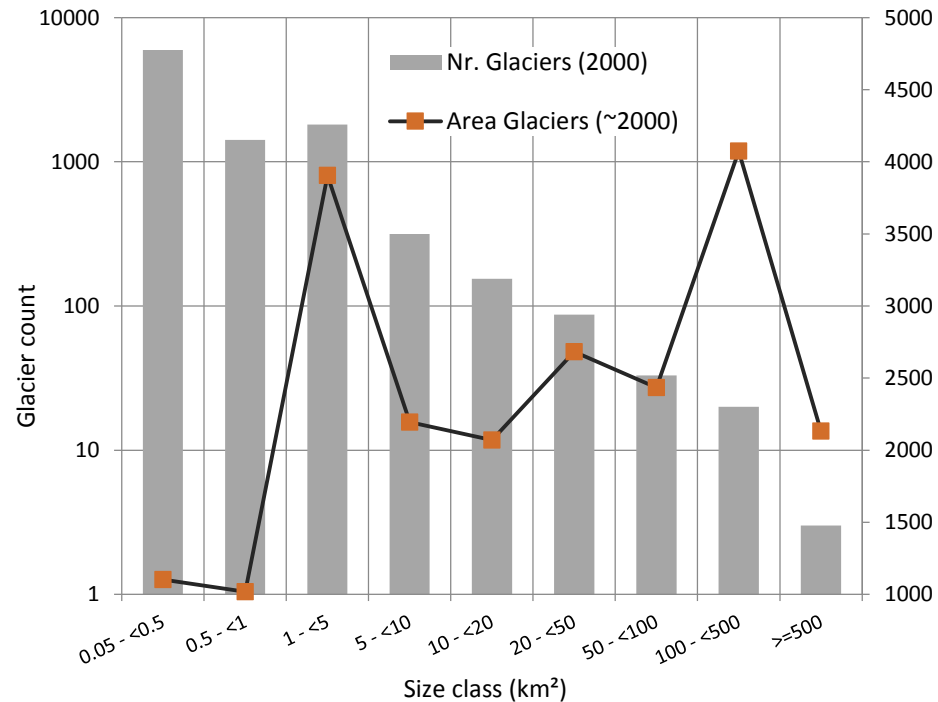
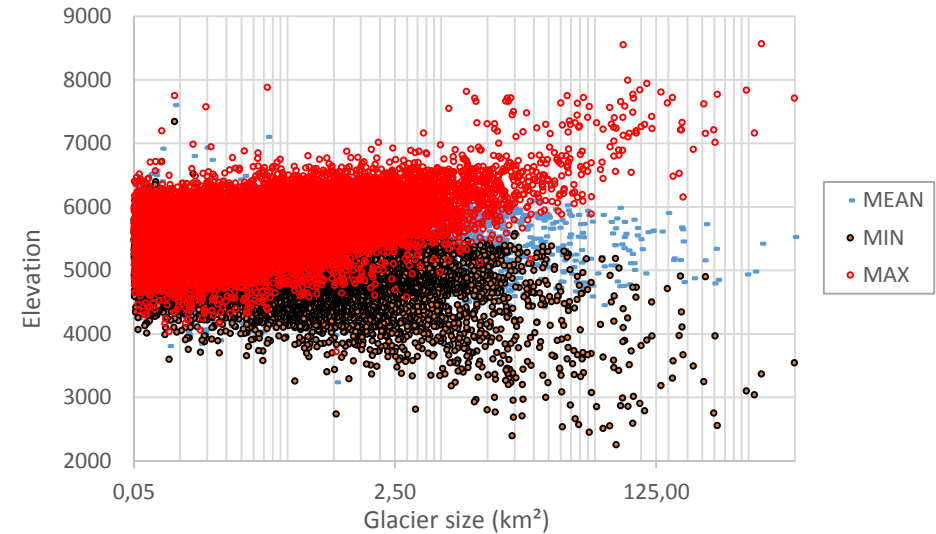
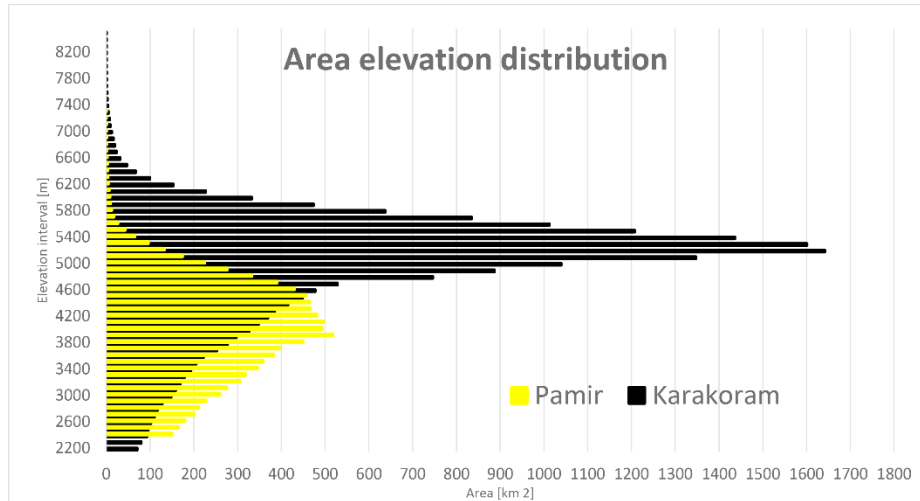


1996-2000

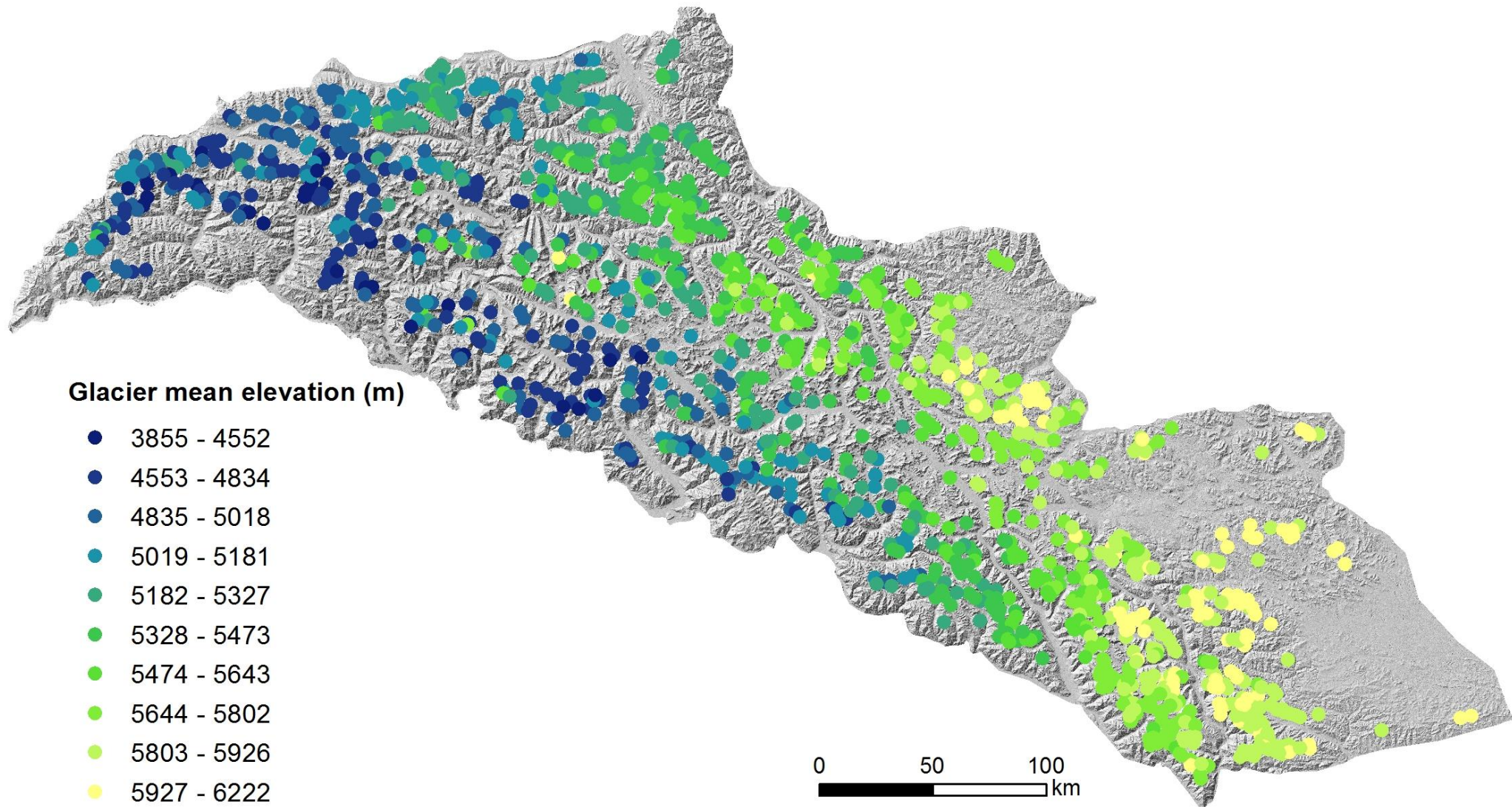
Nr. Glaciers ($>0.05\text{km}^2$): ~10.000
Total area: 21.611 km^2



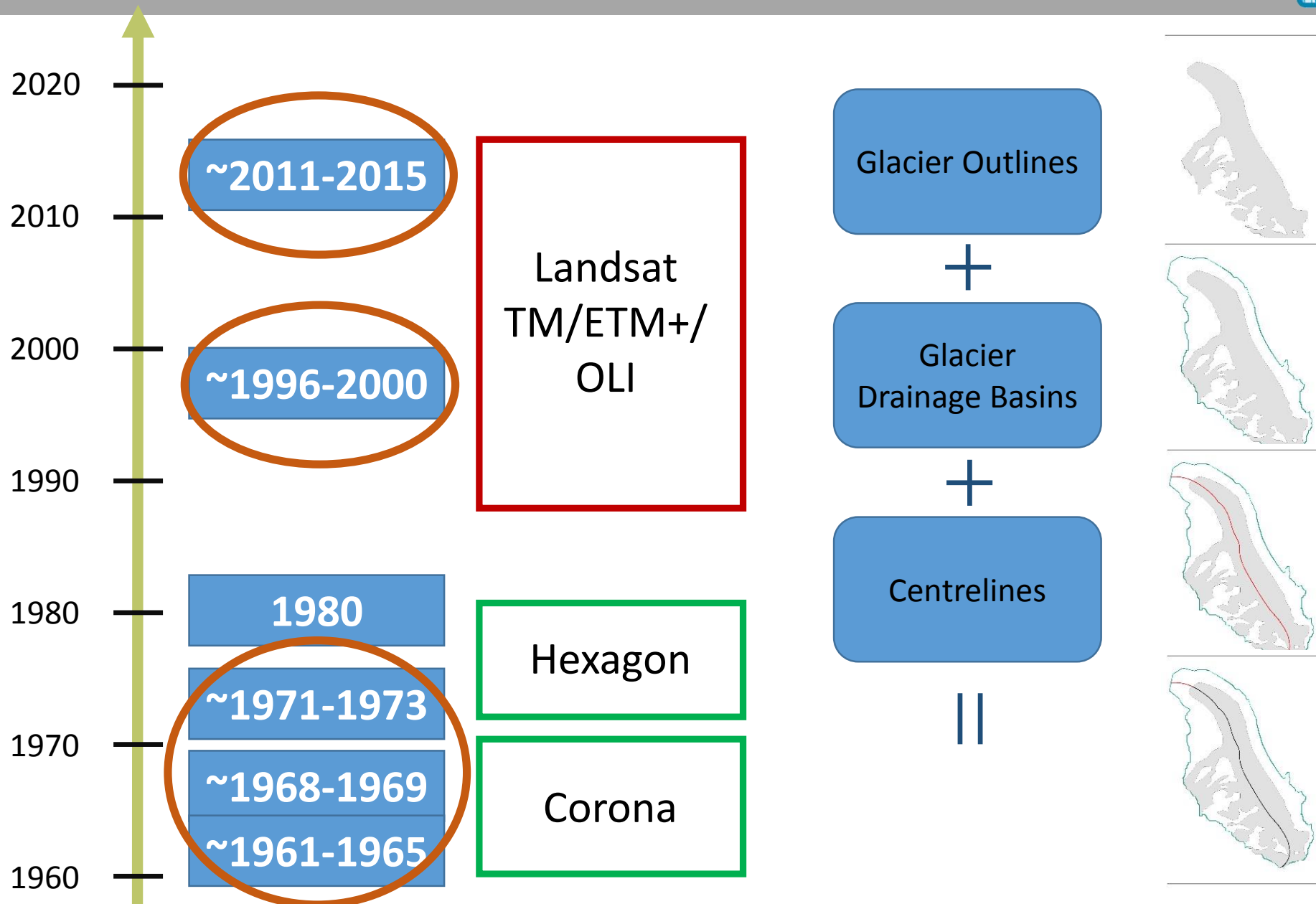
Glacier inventory statistics



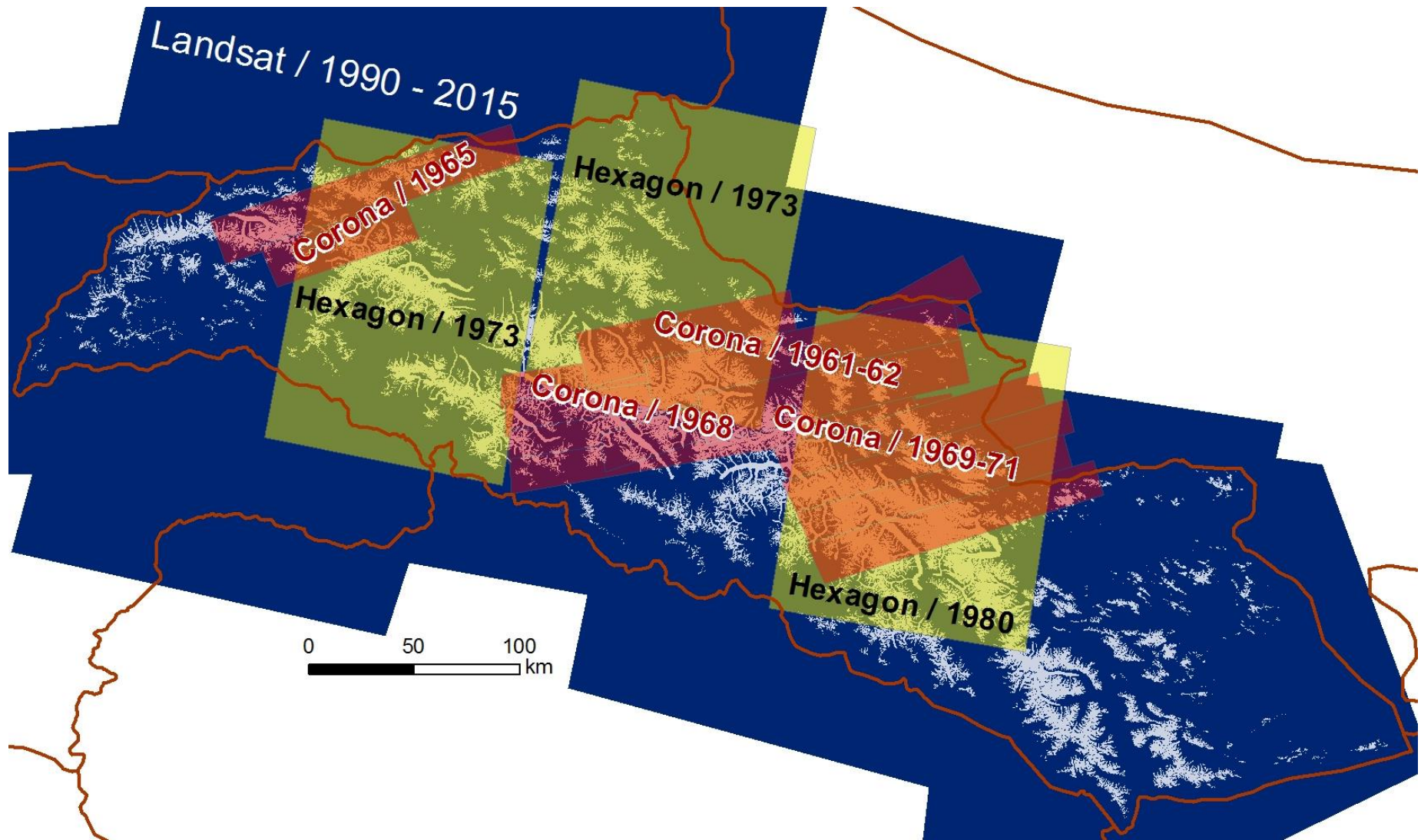
Glacier mean elevation



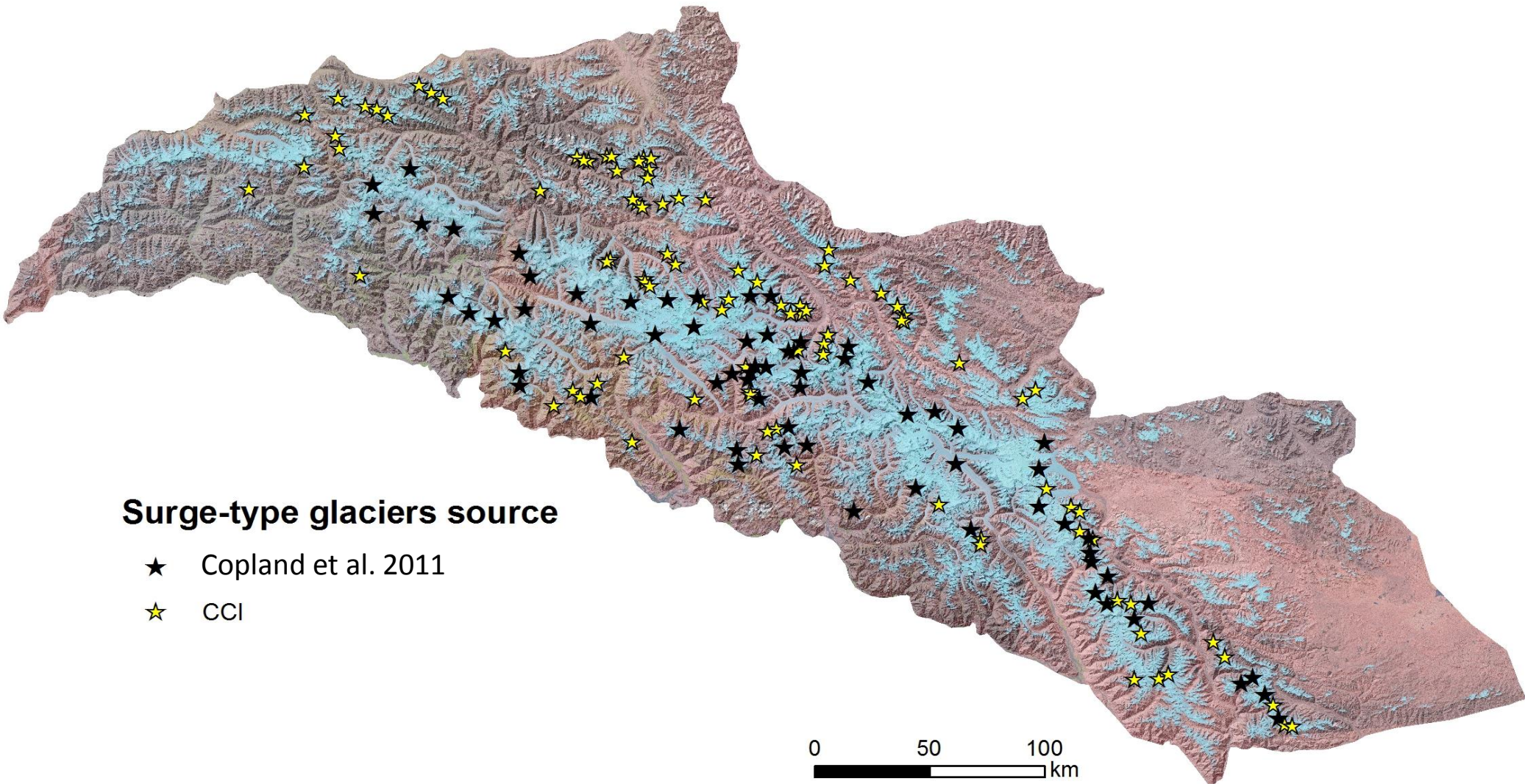
Timeline satellite images



Satellite image footprints



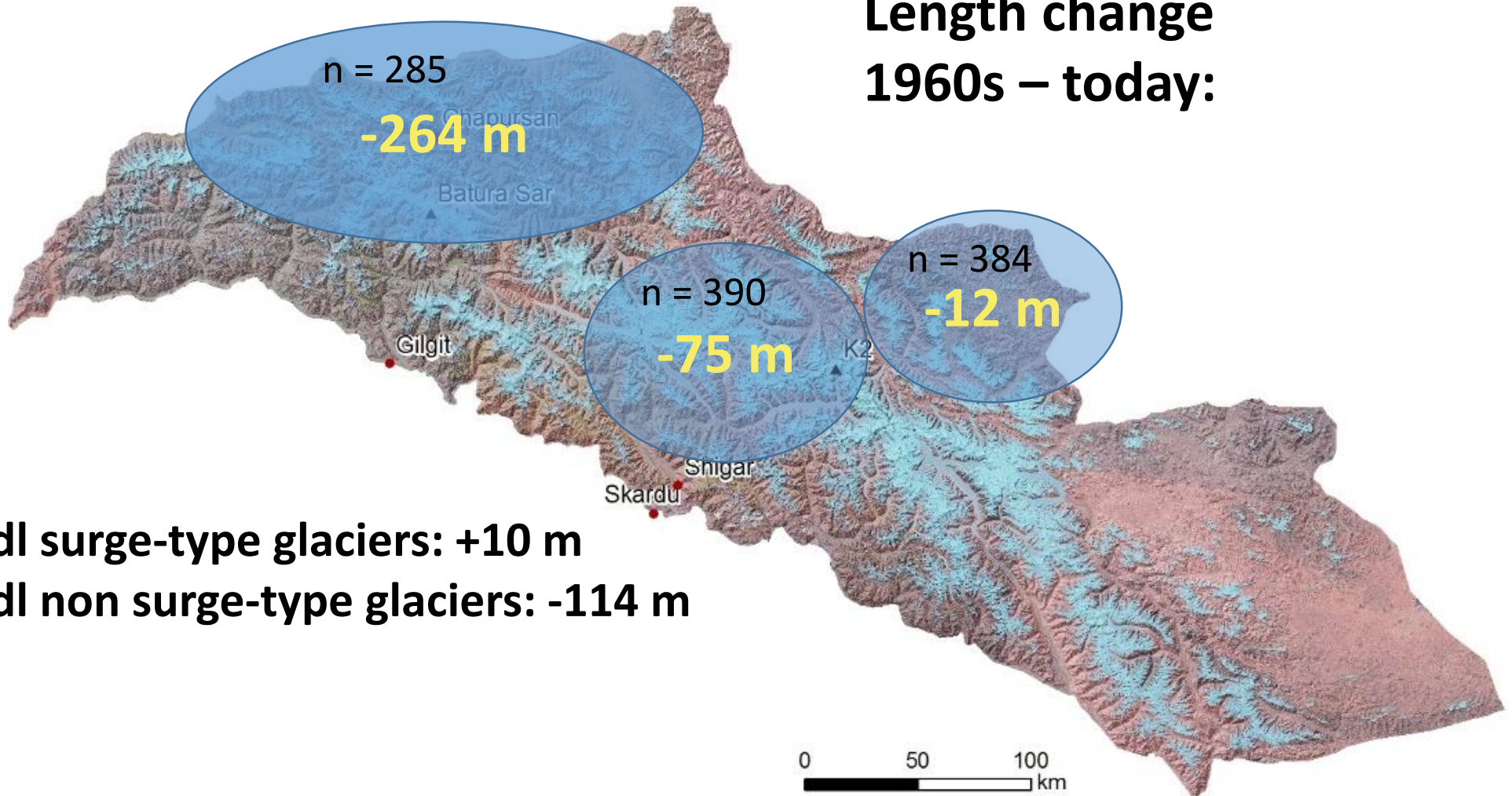
Identification of surge-type glaciers



Karakoram glacier changes



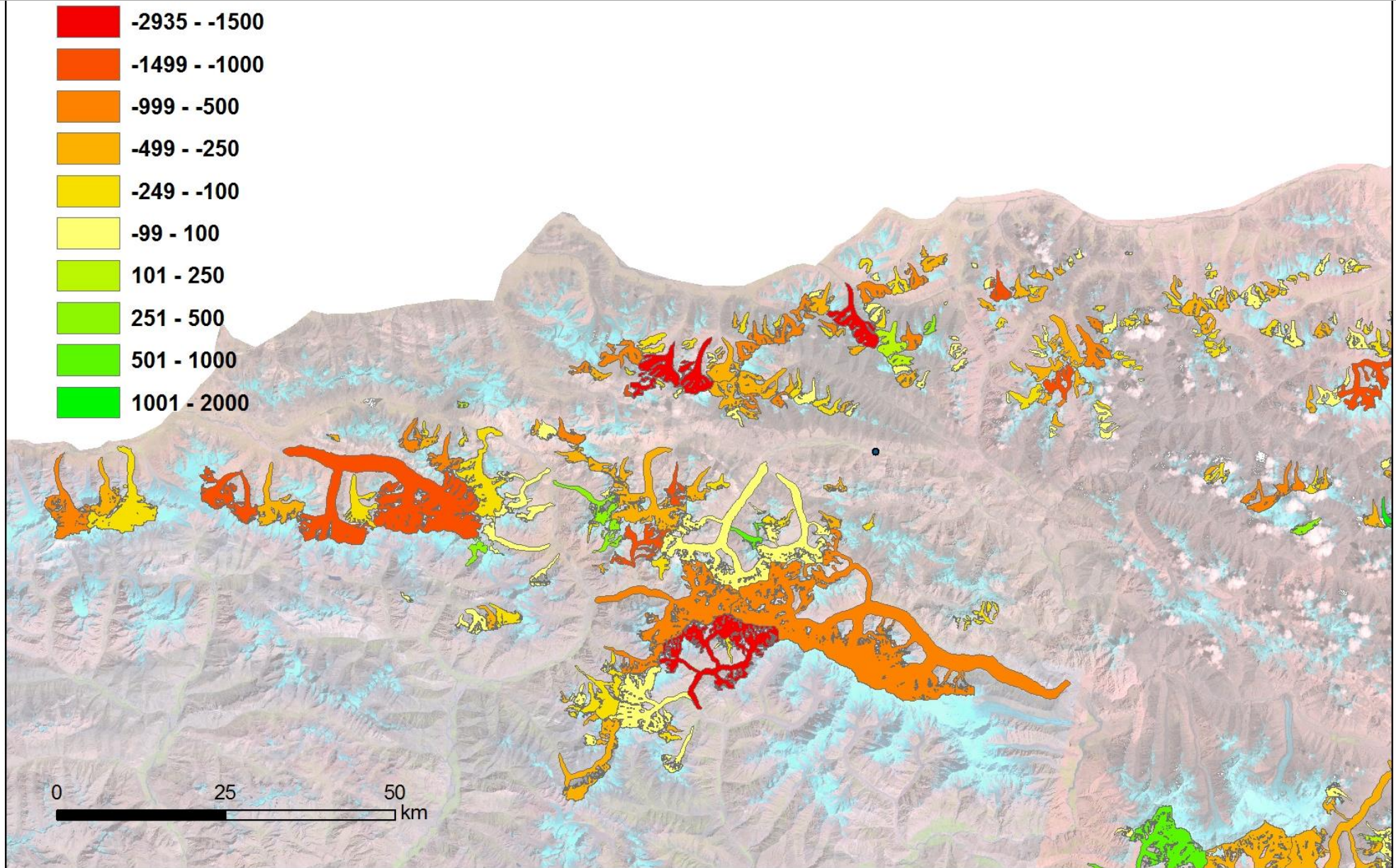
**Length change
1960s – today:**



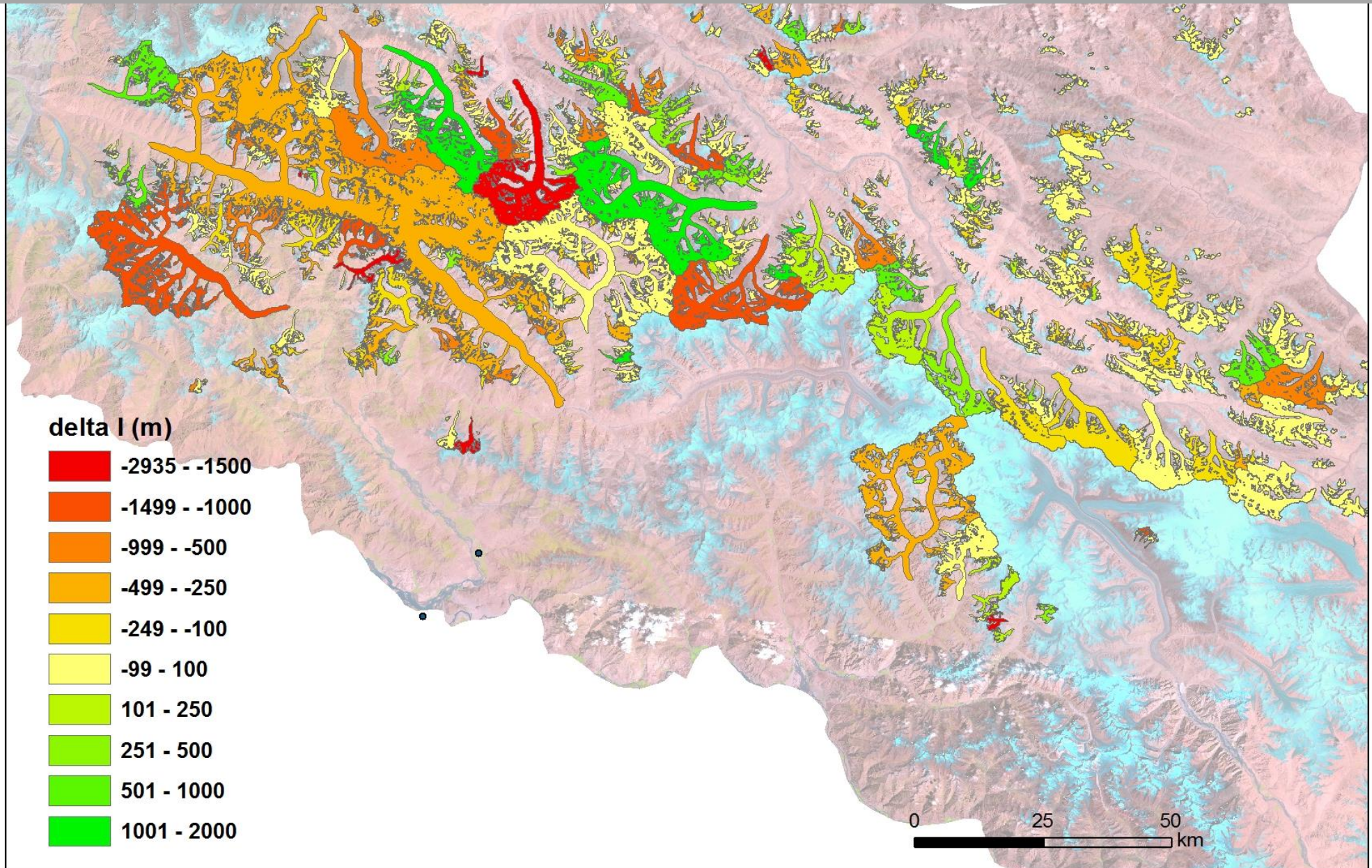
dl surge-type glaciers: +10 m

dl non surge-type glaciers: -114 m

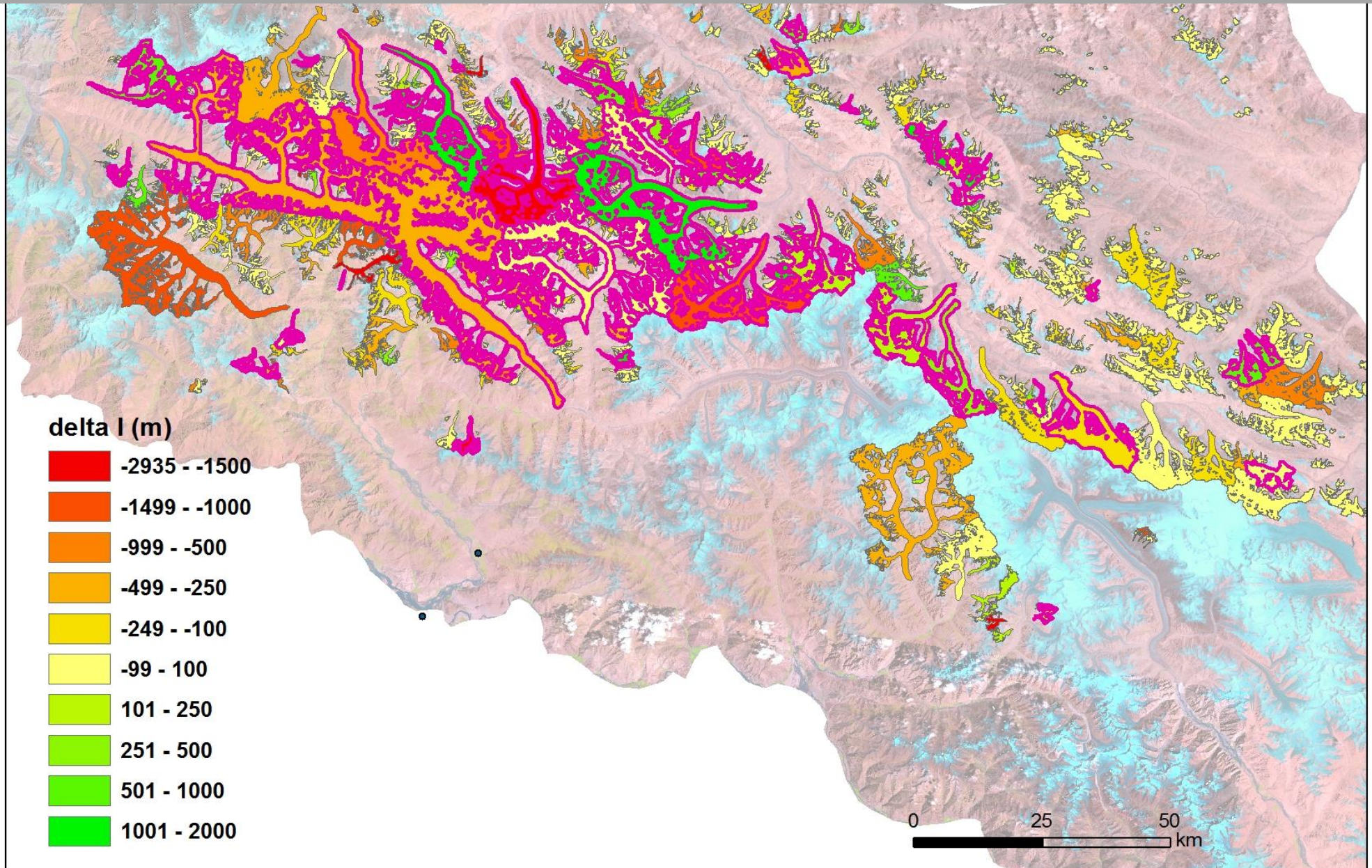
1960s – today: glacier length change



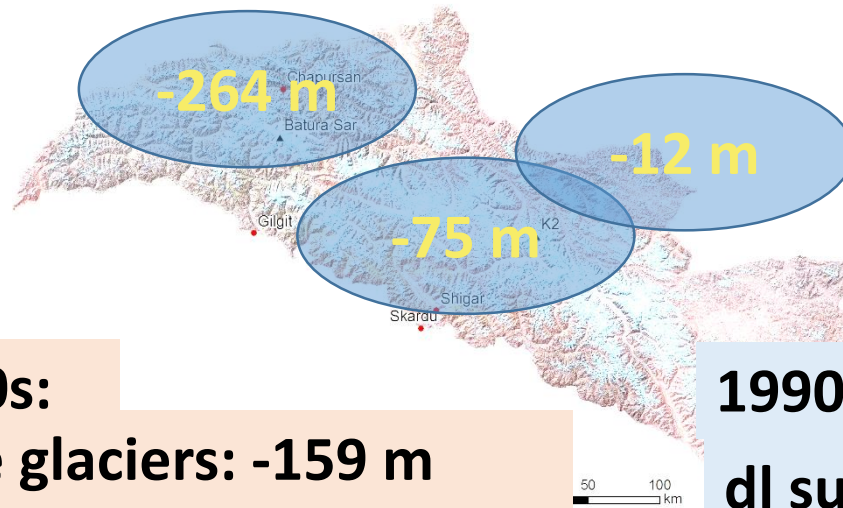
1960s – today: glacier length change



1960s – today: glacier length change



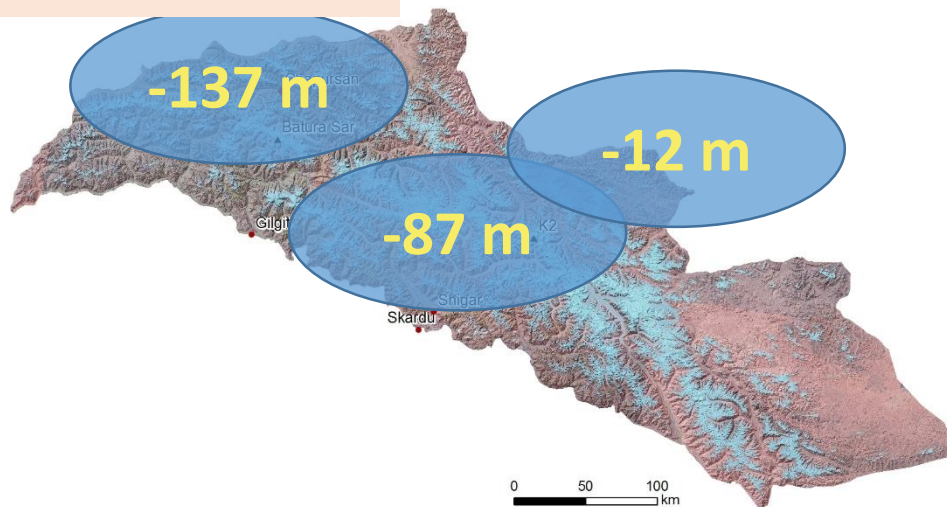
Glacier length changes – periods 1 & 2



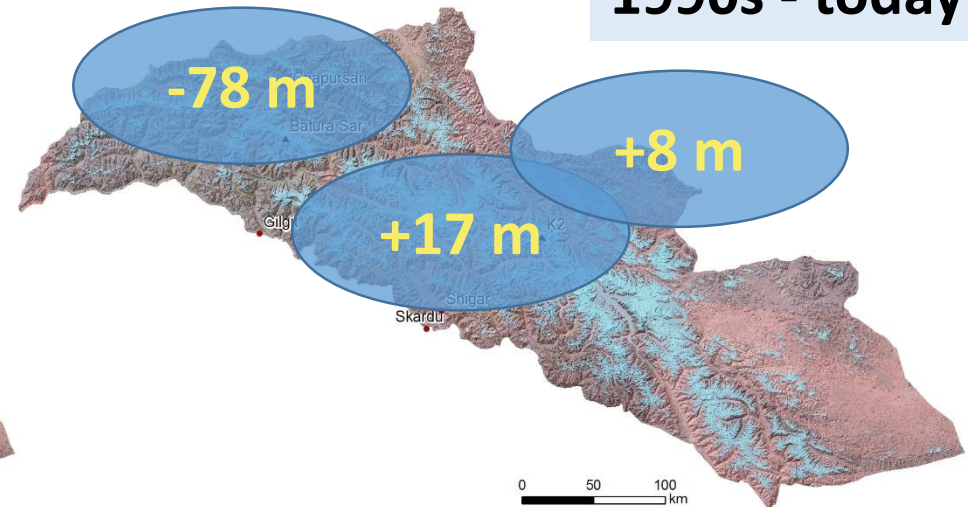
1960s – 1990s:
dl surge-type glaciers: -159 m
dl non surge-type glaciers: -78 m

1990s – today:
dl surge-type glaciers: +124 m
dl non surge-type glaciers: -18 m

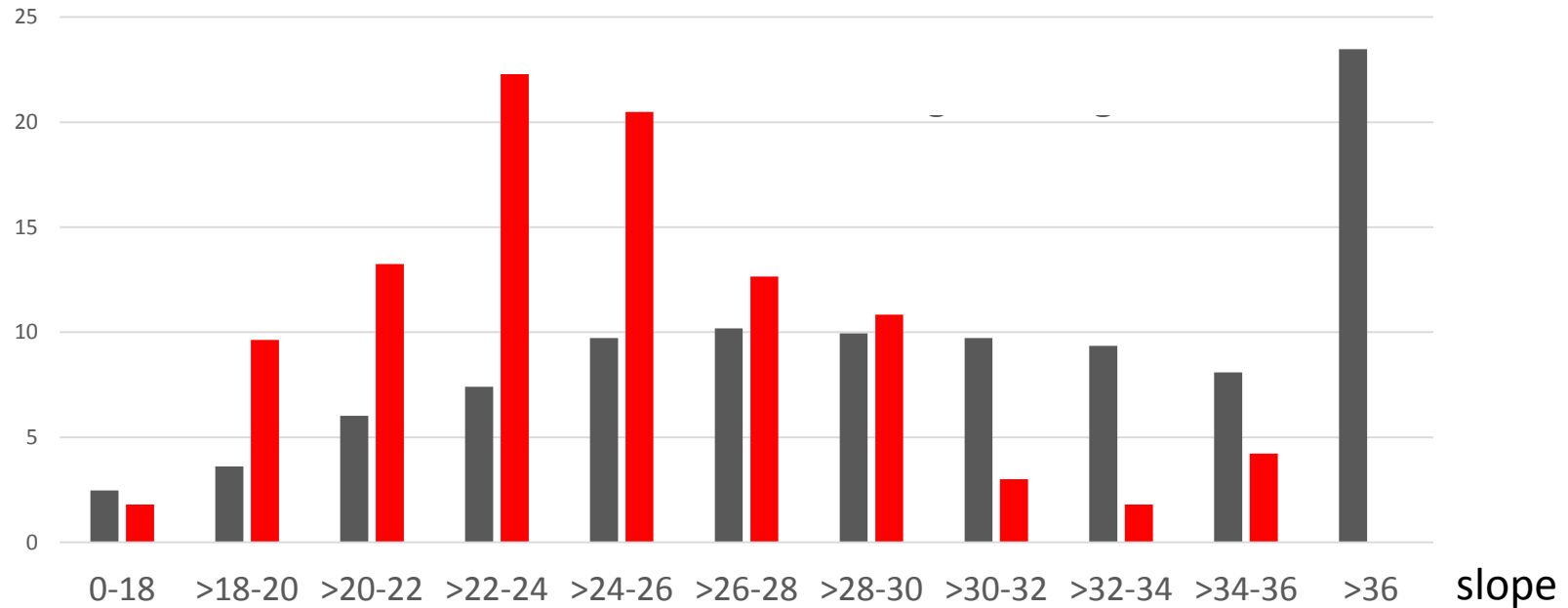
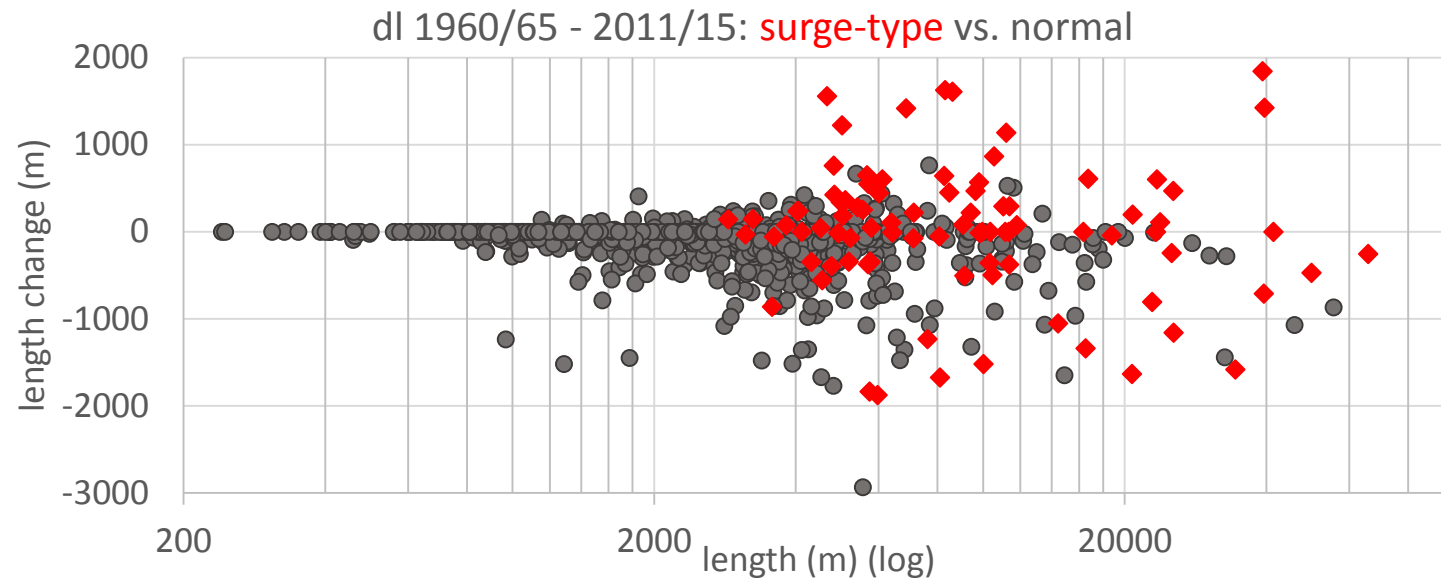
1960s – 1990s



1990s - today

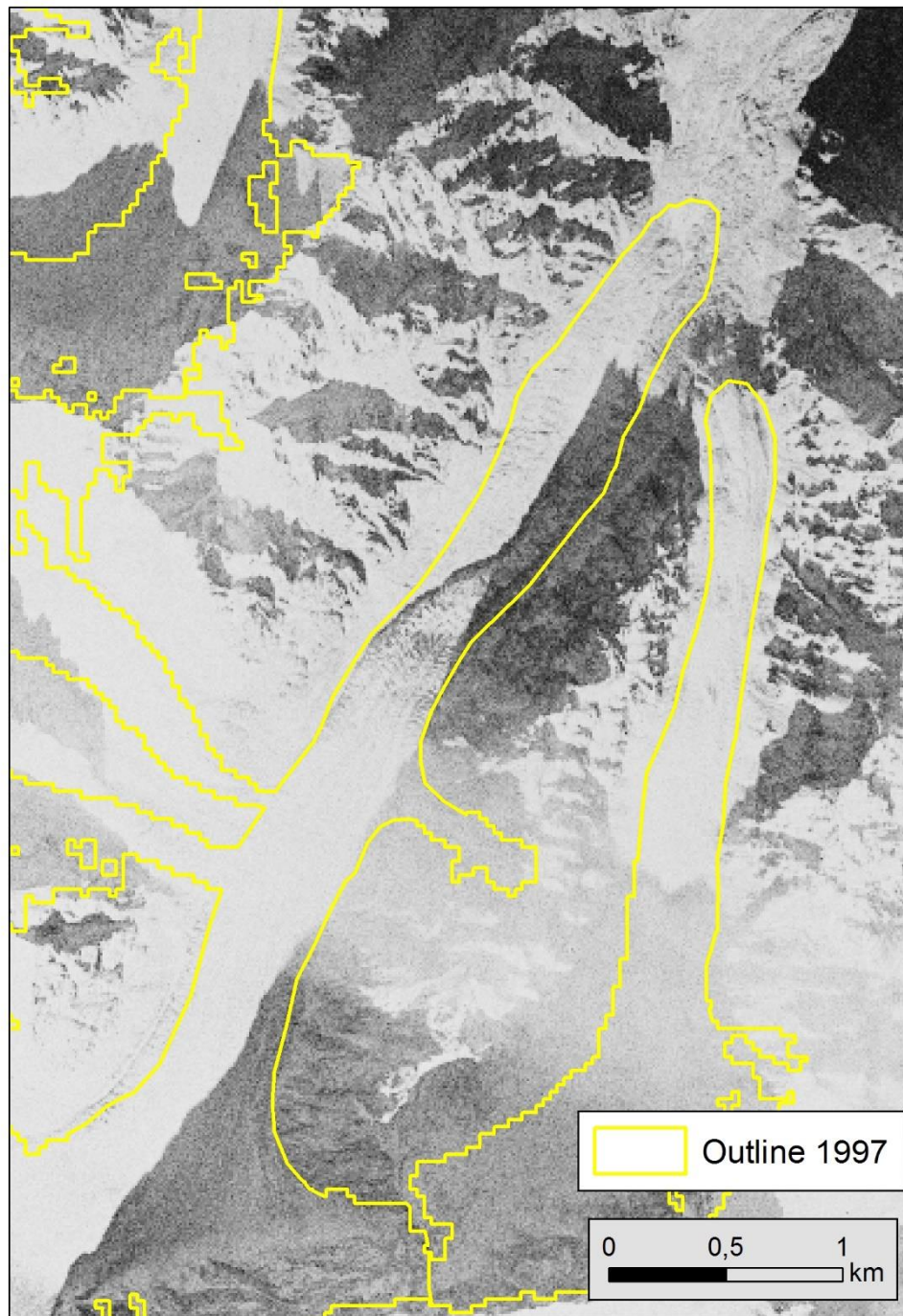


Karakoram surge-type glaciers



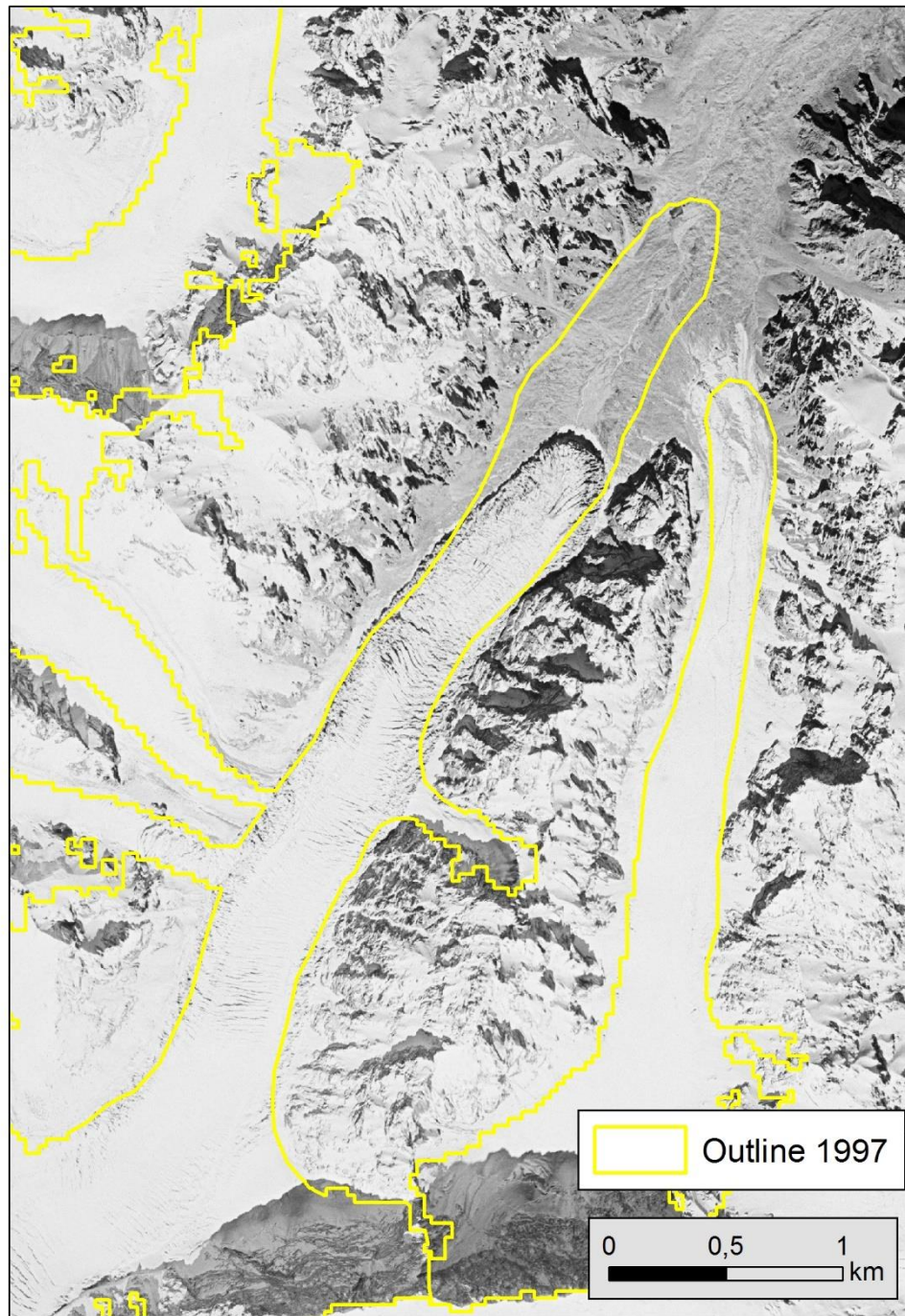


Corona 1961



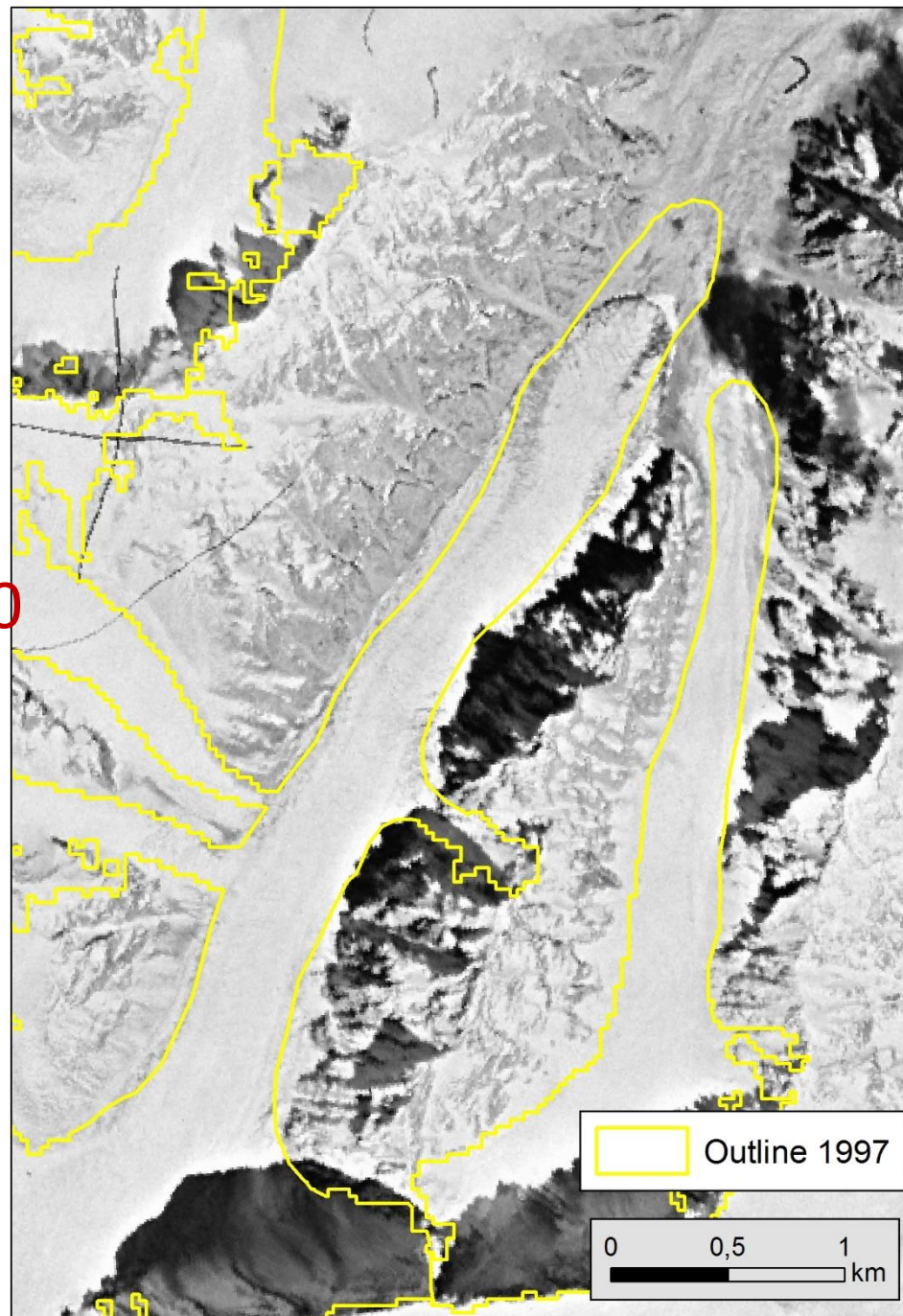


Corona 1971



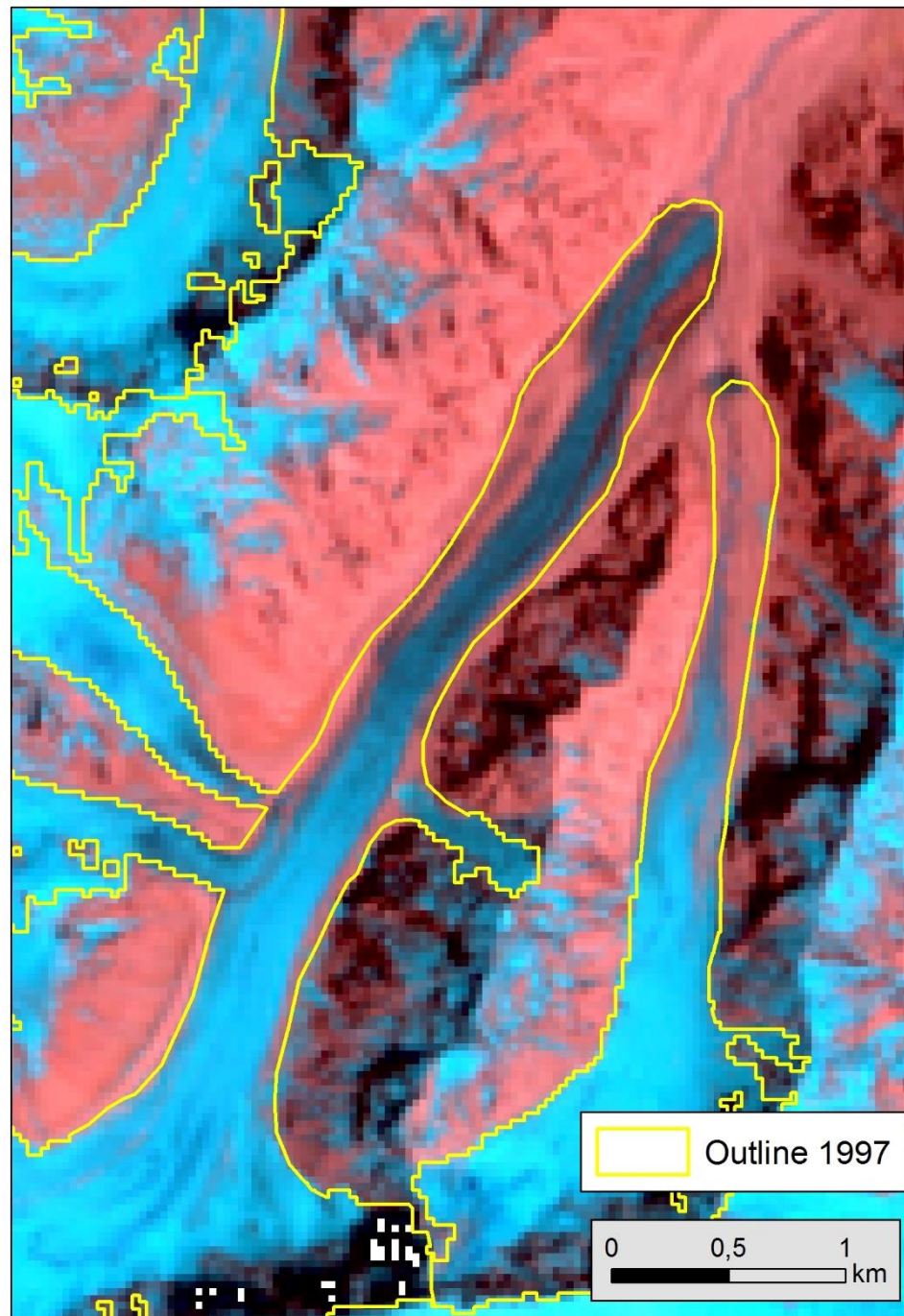


Hexagon 1980





Landsat 1997



- „Strong“ and CONTINUOUS **retreat in north**
- **Heterogenous development** in **central** Karakoram:
Retreat from 1960s-1990s, stable since 1990s
- Additional 97 surge-type glaciers in the region
- strong relation between heterogeneity and surge-type glaciers
- correlation between sg and topo: elevation, aspect – to be investigated

