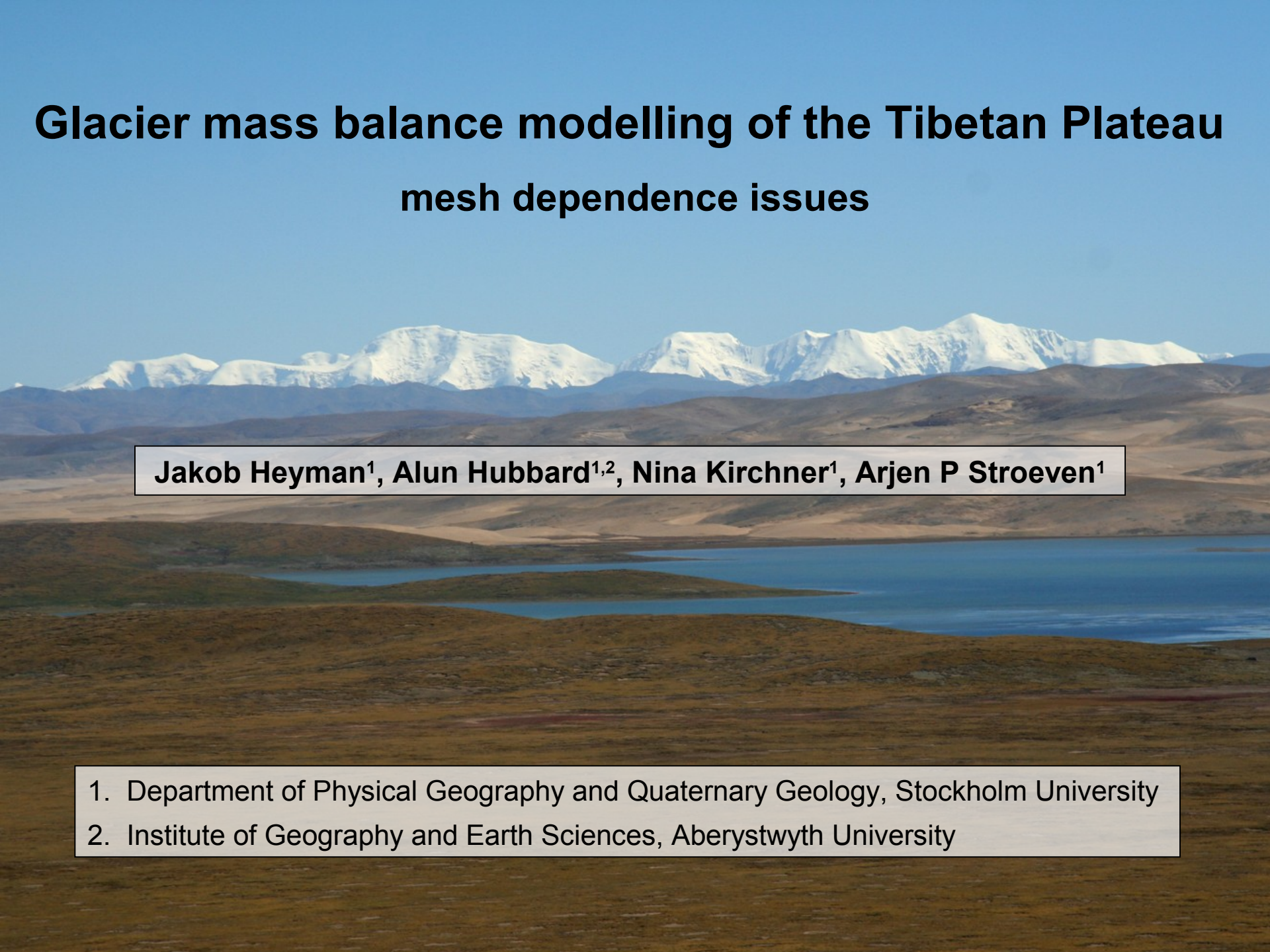
Glacier mass balance modelling of the Tibetan Plateau

mesh dependence issues

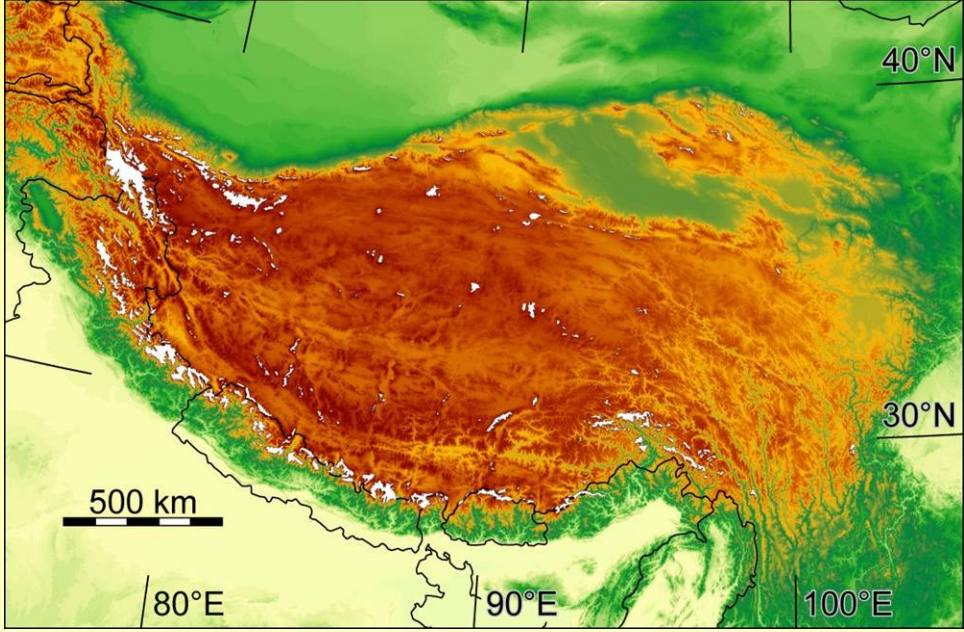


Jakob Heyman[1], Alun Hubbard[1,2], Nina Kirchner[1], Arjen P Stroeven[1]

1. Department of Physical Geography and Quaternary Geology, Stockholm University
2. Institute of Geography and Earth Sciences, Aberystwyth University

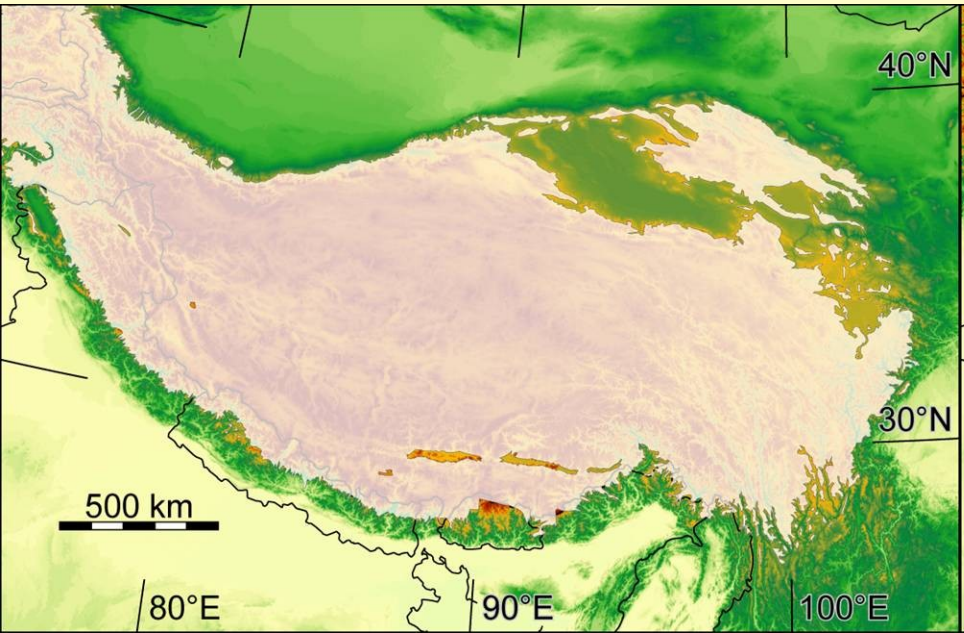
Outline

- Introduction – Glacial history of the Tibetan Plateau
- The model – a simple PDD mass balance model
- Model results
  - -Comparison with modern glaciers
  - -Grid resolution variation
  - -Grid resolution variation / climate perturbations
- Summary

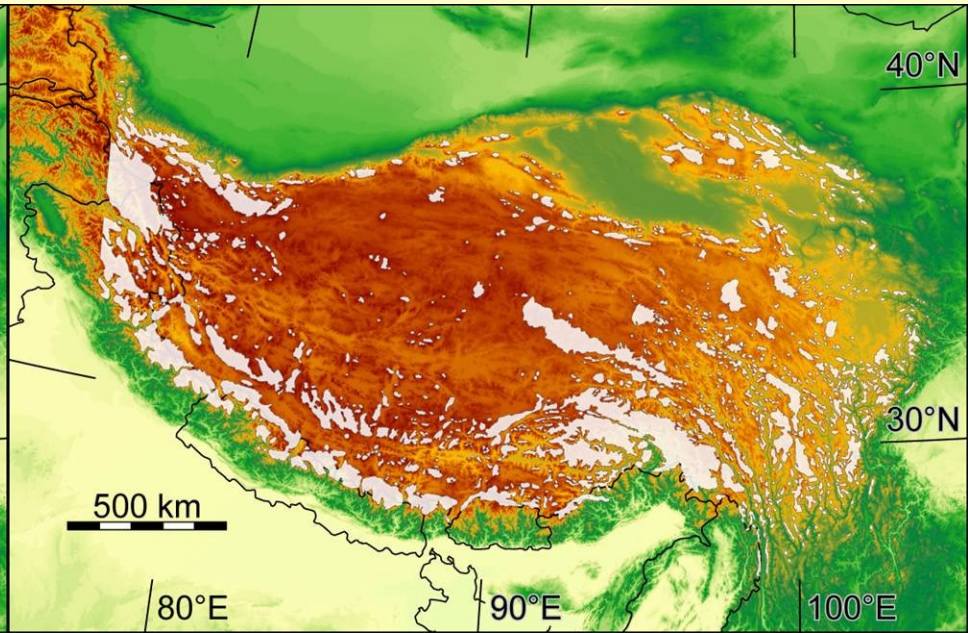


Contemporary glaciers

Kuhle (2004): Quat Glac – Ext and Chronol, Vol III



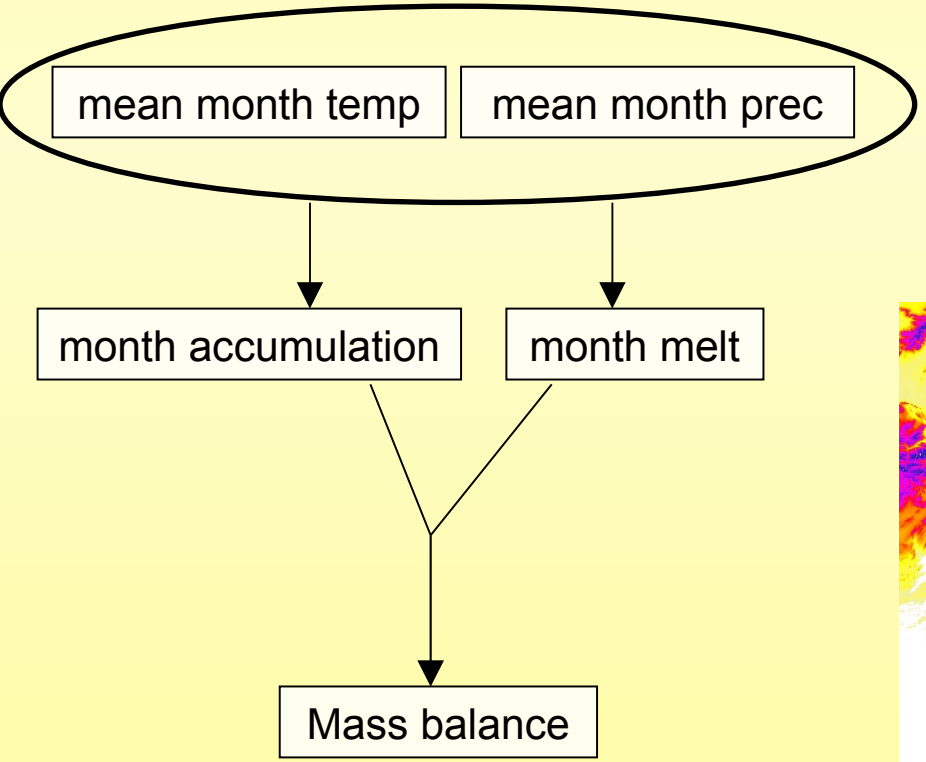
Li et al. (1991): Science Press, Beijing

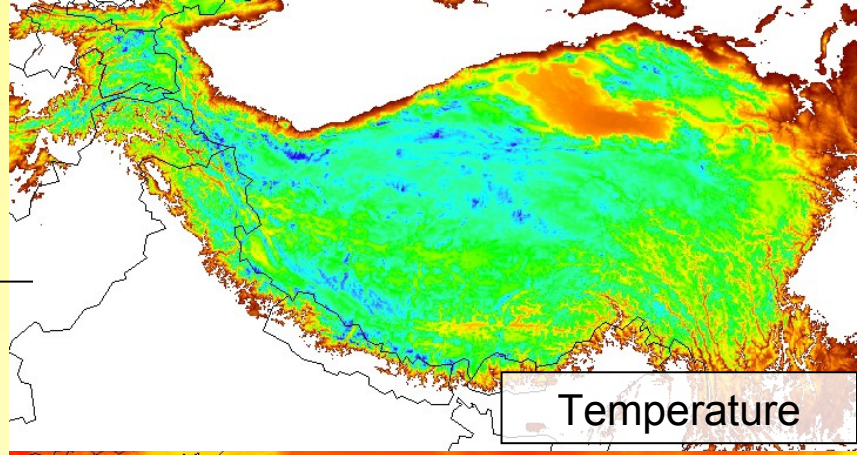


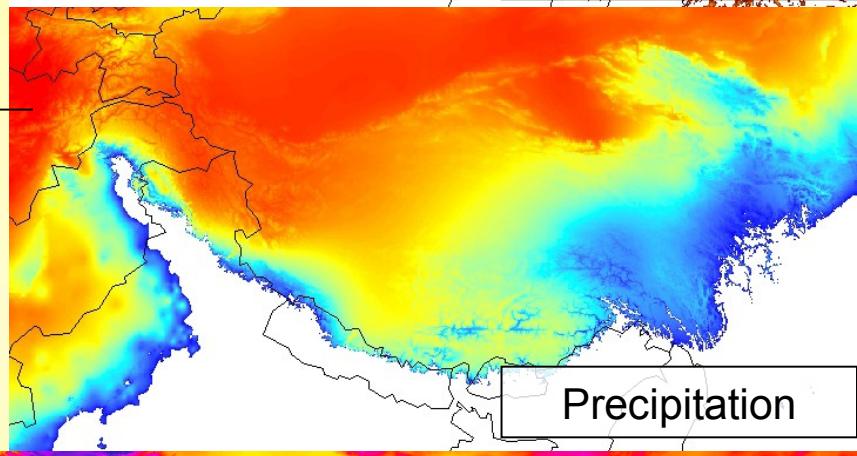
The model

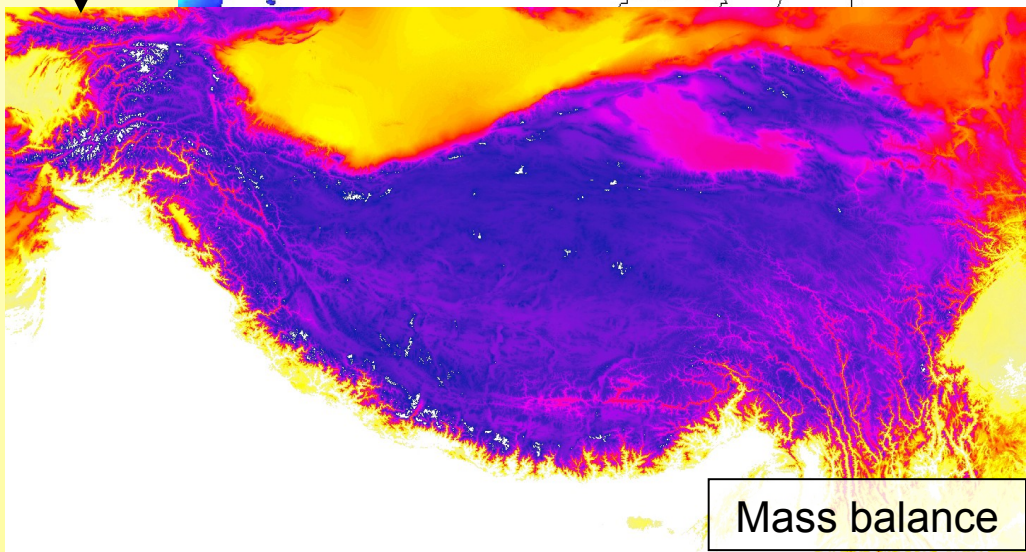
Simple positive degree day model

Input: 1 km resolution climate data
(WorldClim: Hijmans et al. 2006, *International Journal of Climatology*, 25)

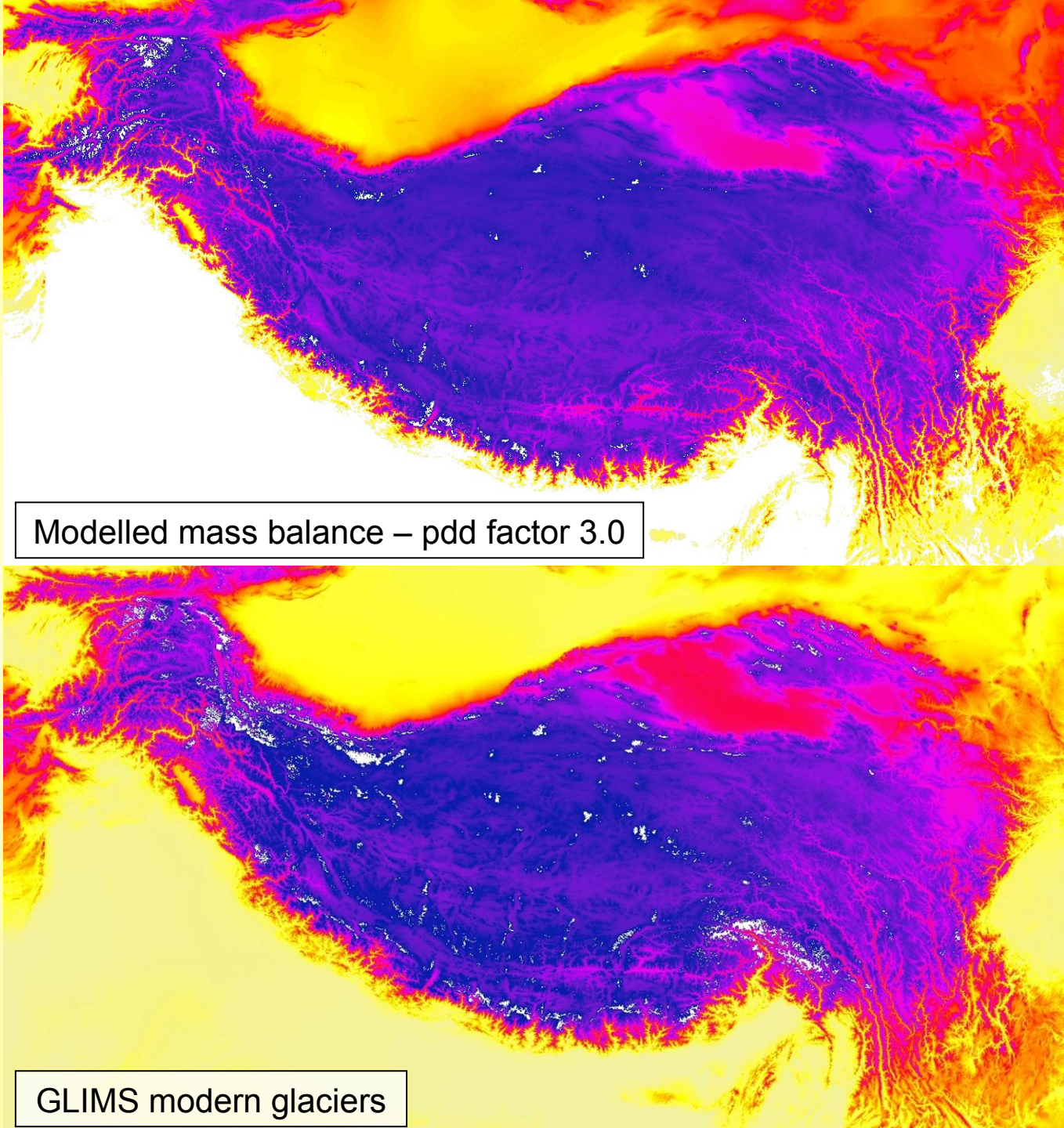




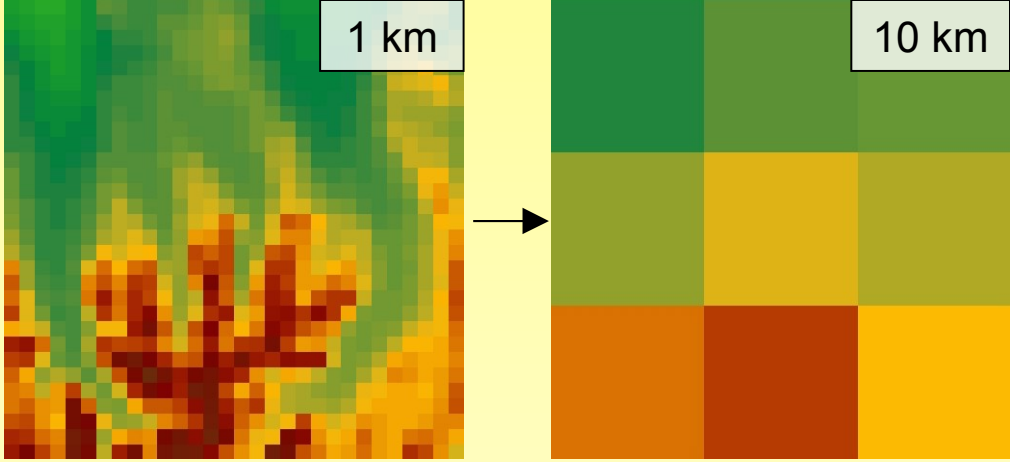


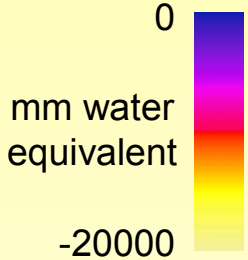


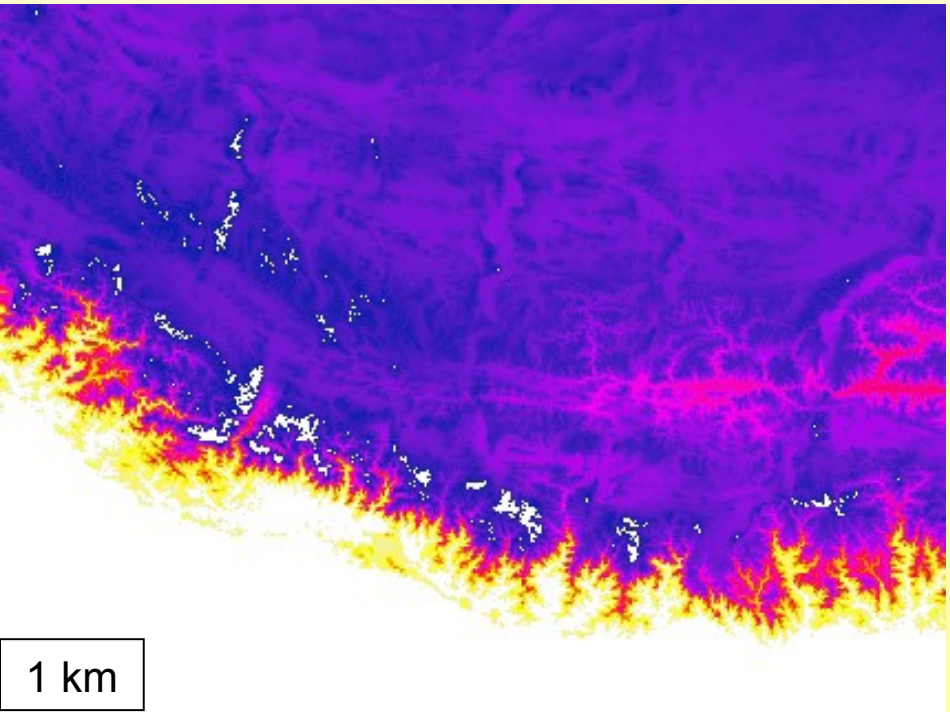
Results

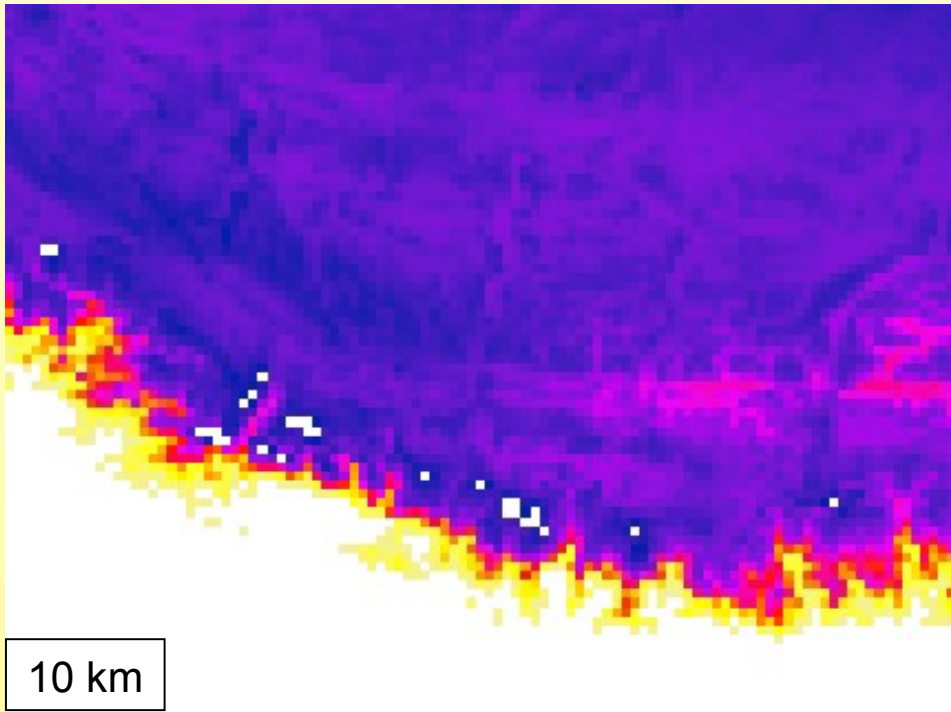

0
mm water equivalent
-20000
Modelled mass balance – pdd factor 3.0
7778
m a.s.l.
0
GLIMS modern glaciers

Grid resolution variation



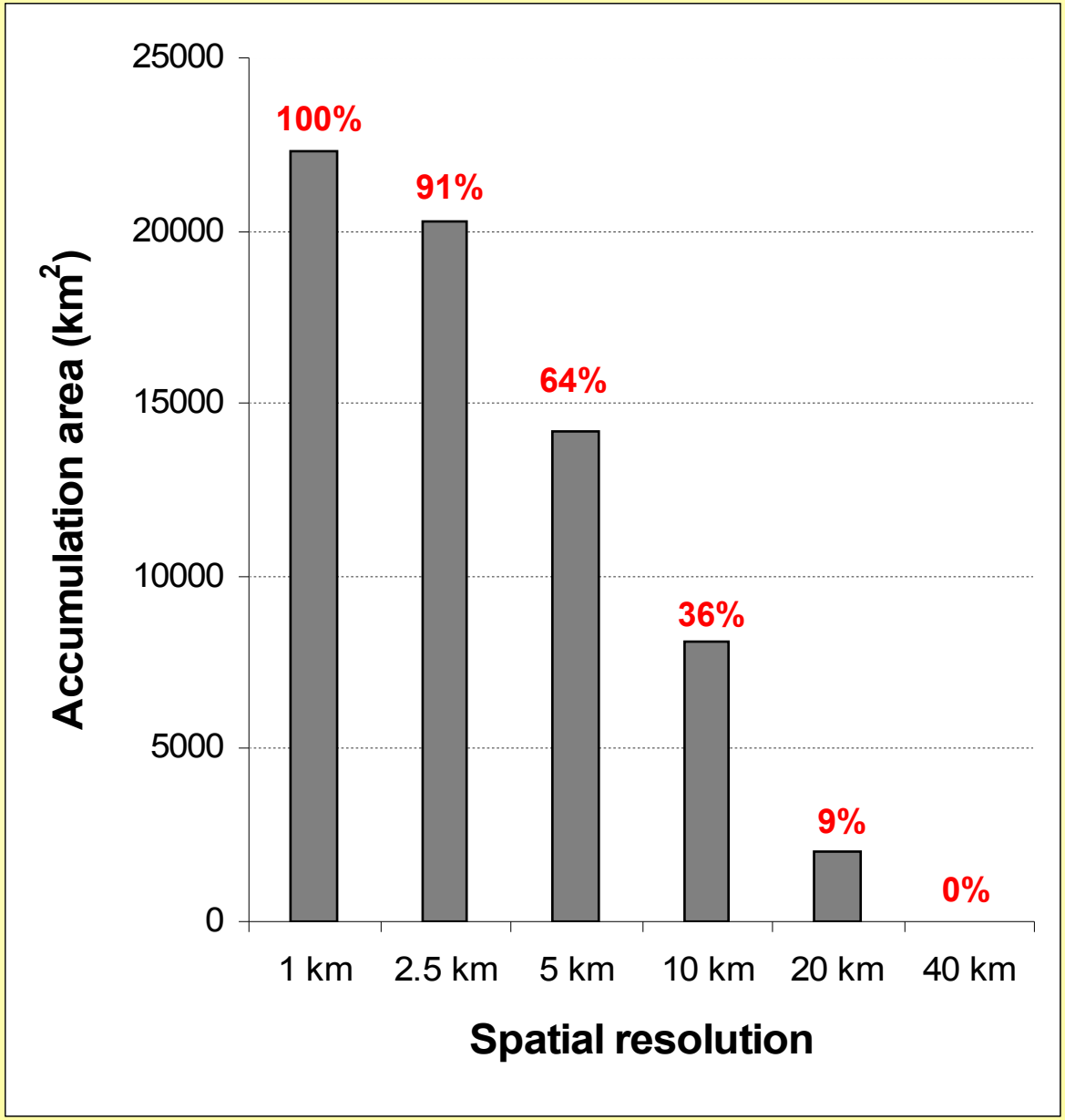




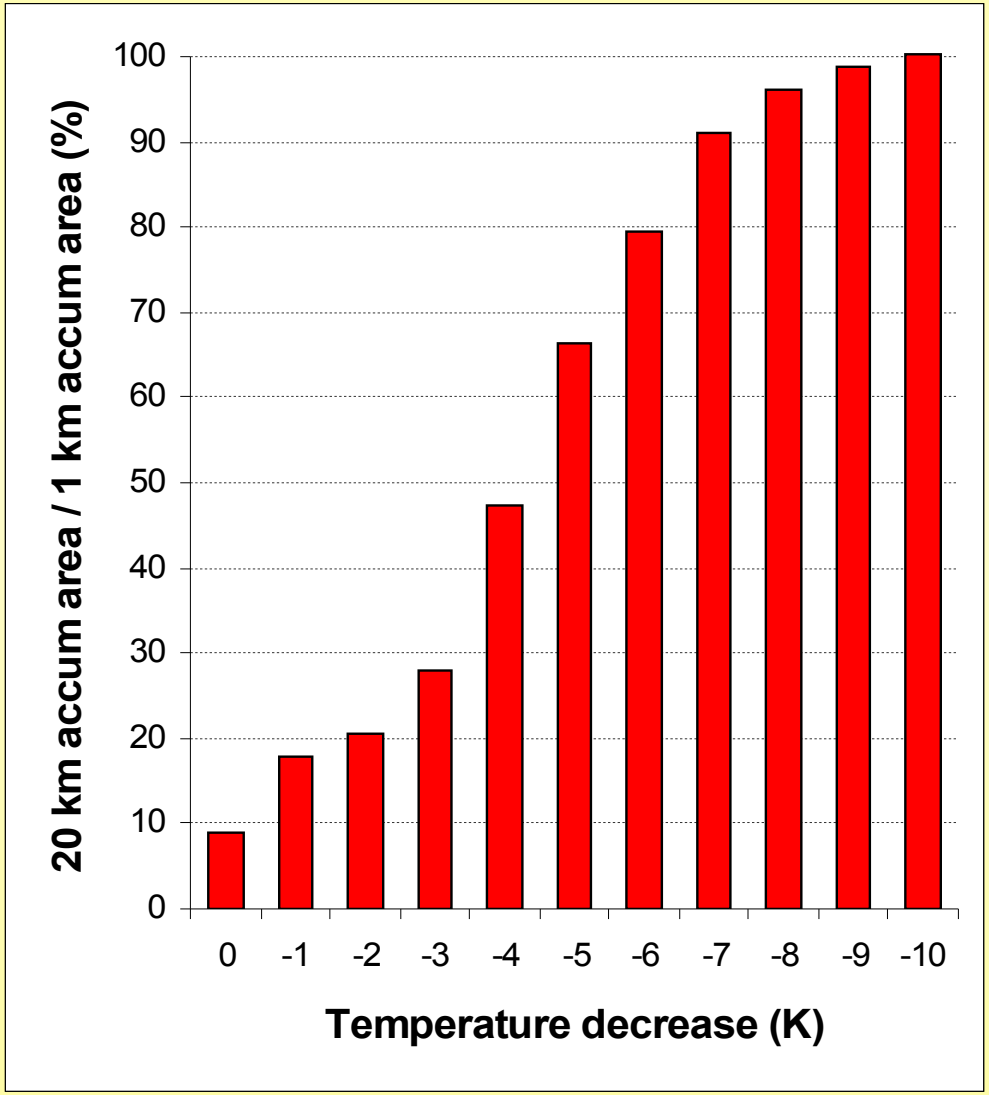


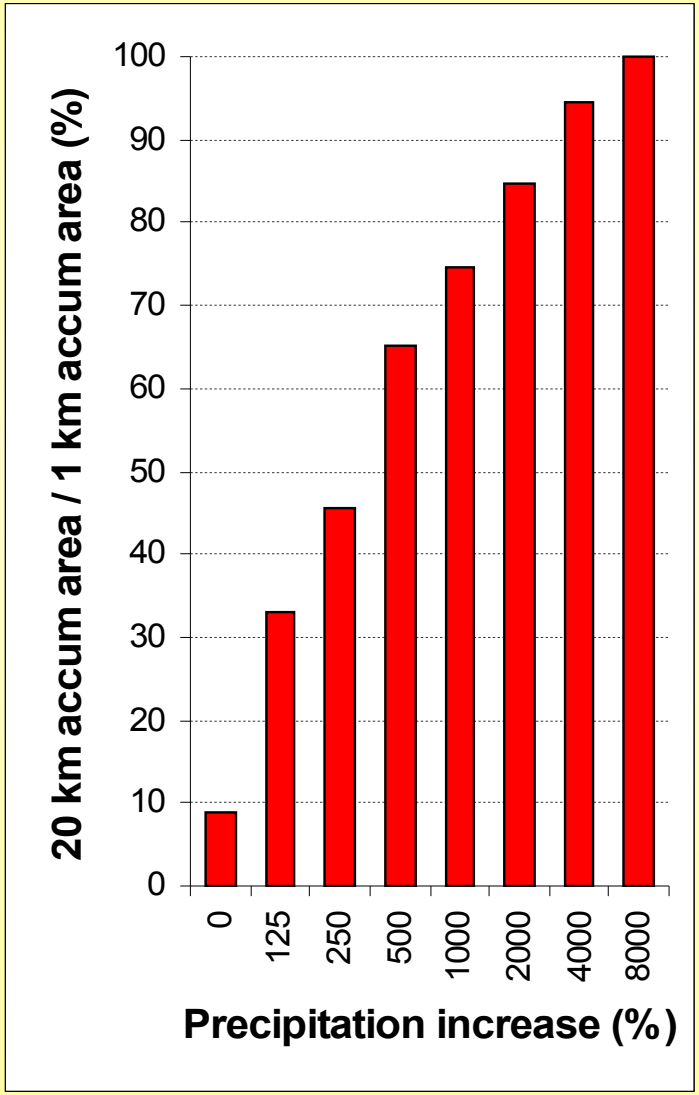
Grid resolution variation

resolution	nr of grids
1 km	6617600
2.5 km	1058816
5 km	264704
10 km	66176
20 km	16544
40 km	4136

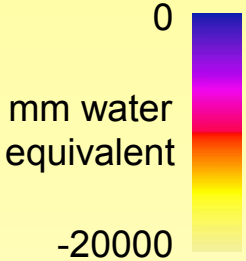


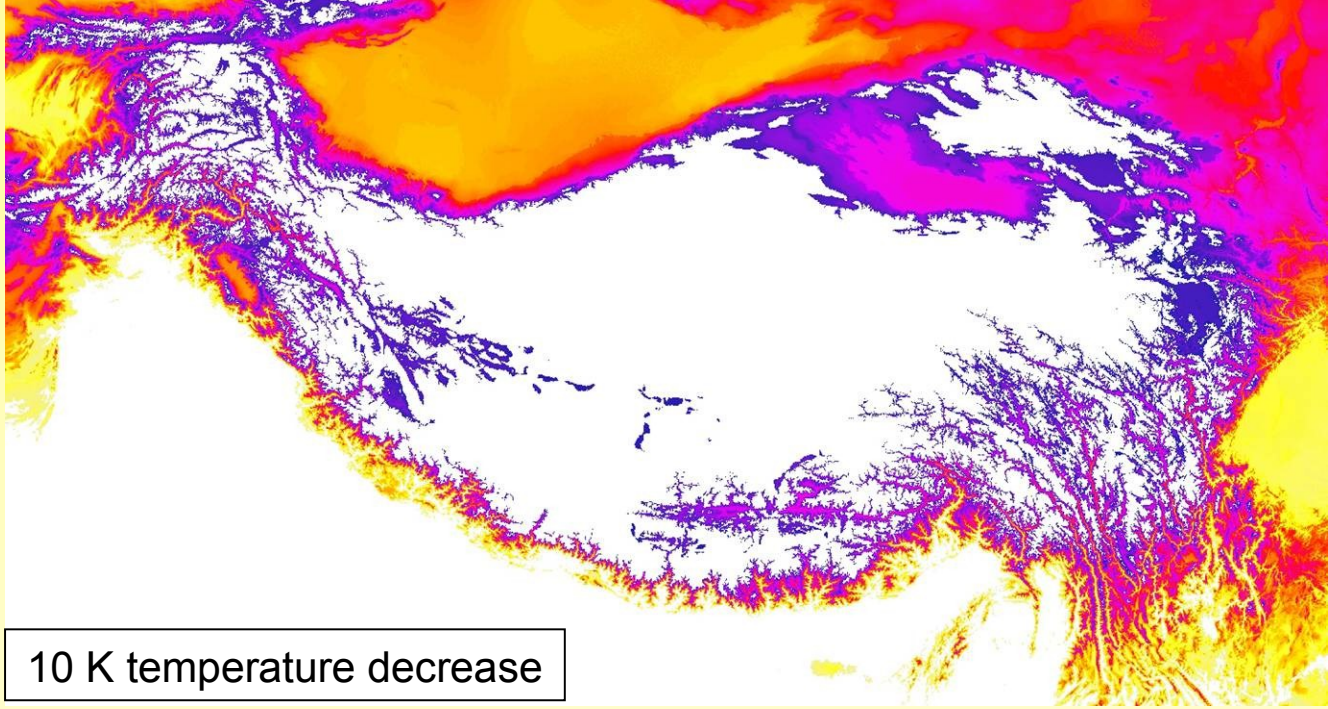
Climate perturbations



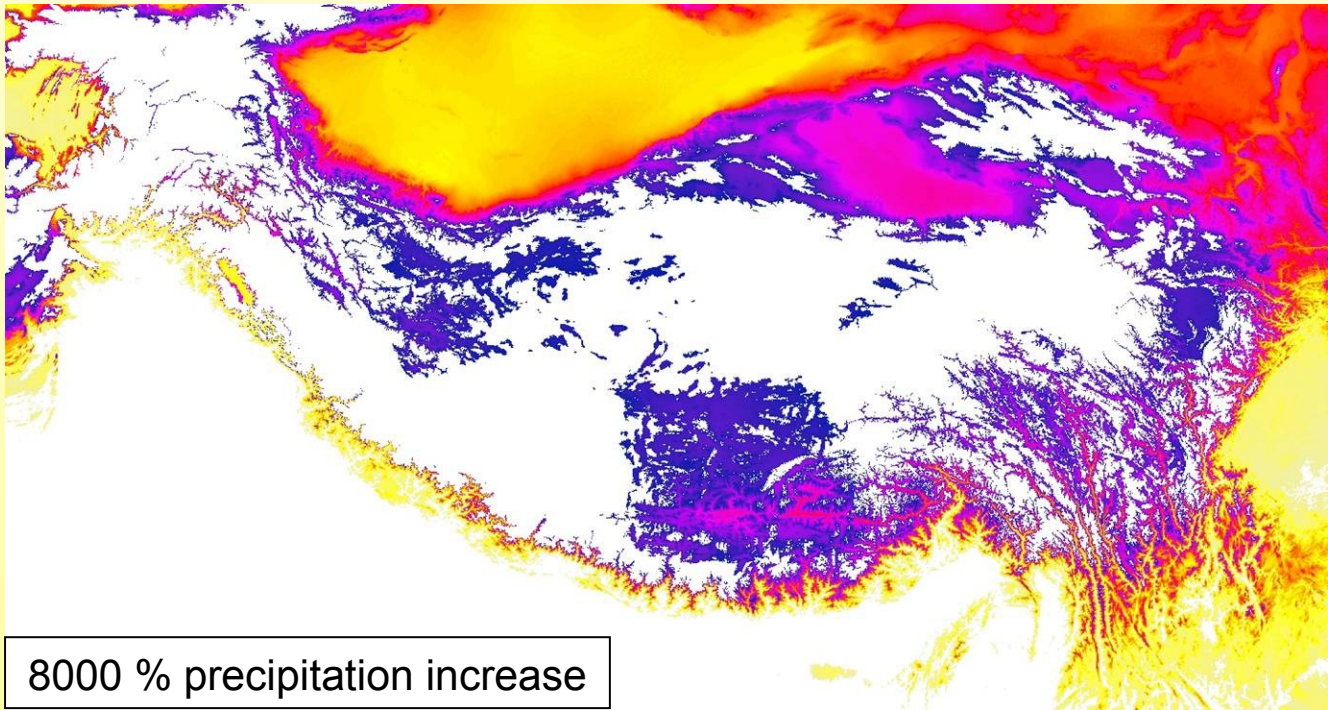


Climate perturbations





10 K temperature decrease



8000 % precipitation increase

Summary

A simple pdd mass balance model with high resolution WorldClim climate data as input reproduce the accumulation areas of modern glaciers reasonably OK

Grid resolution effects the accumulation area significantly

Larger grids → smaller accumulation area


Thanks