



Glaciers and Climate Change in Iceland:

outlook

in the beginning of the 21st century

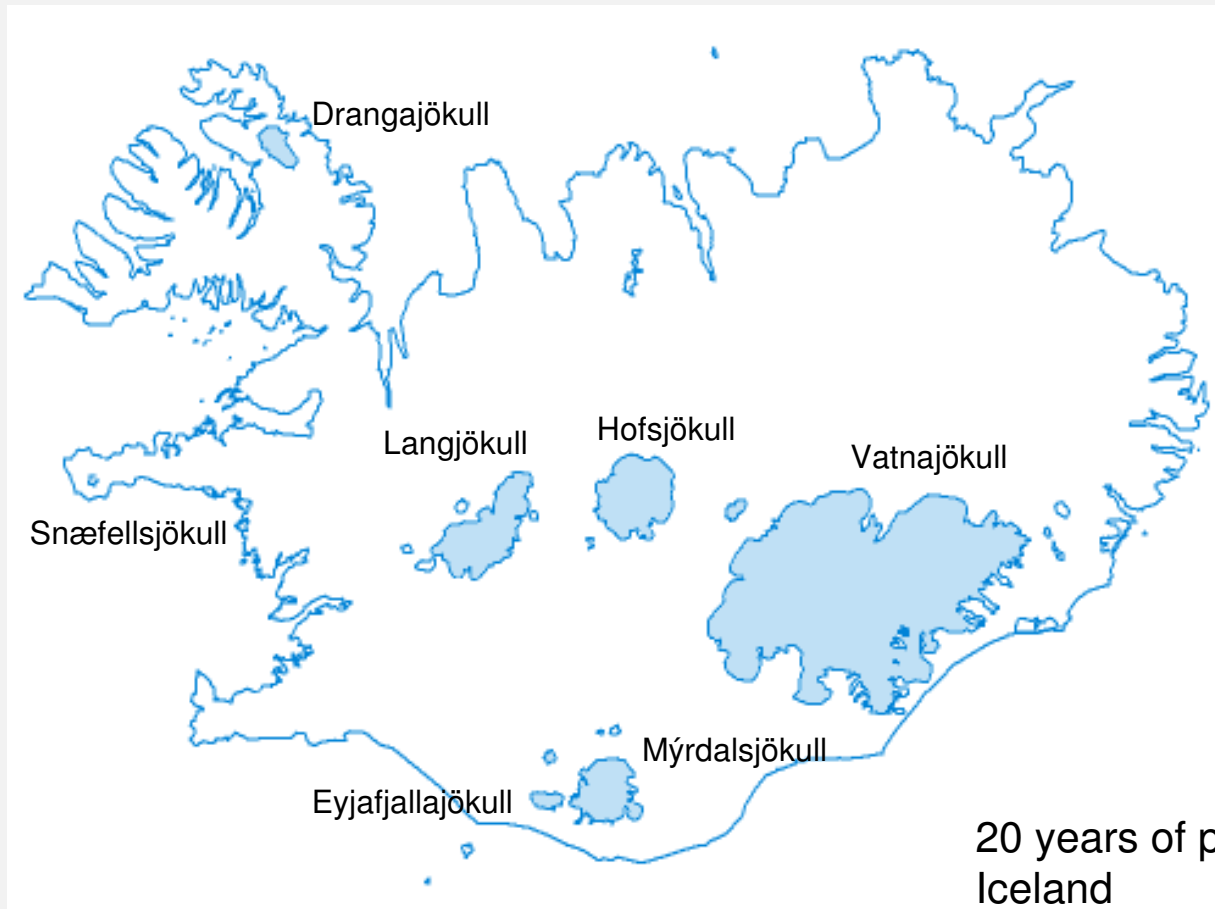
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Glaciers cover 11% of Iceland

They are rapidly shrinking



Evaluation of Glacier Evolution

Acquisition of basic data:

Glacier geometry: surface and bedrock

Glacier mass balance

Ice dynamics

Glacio-meteorology

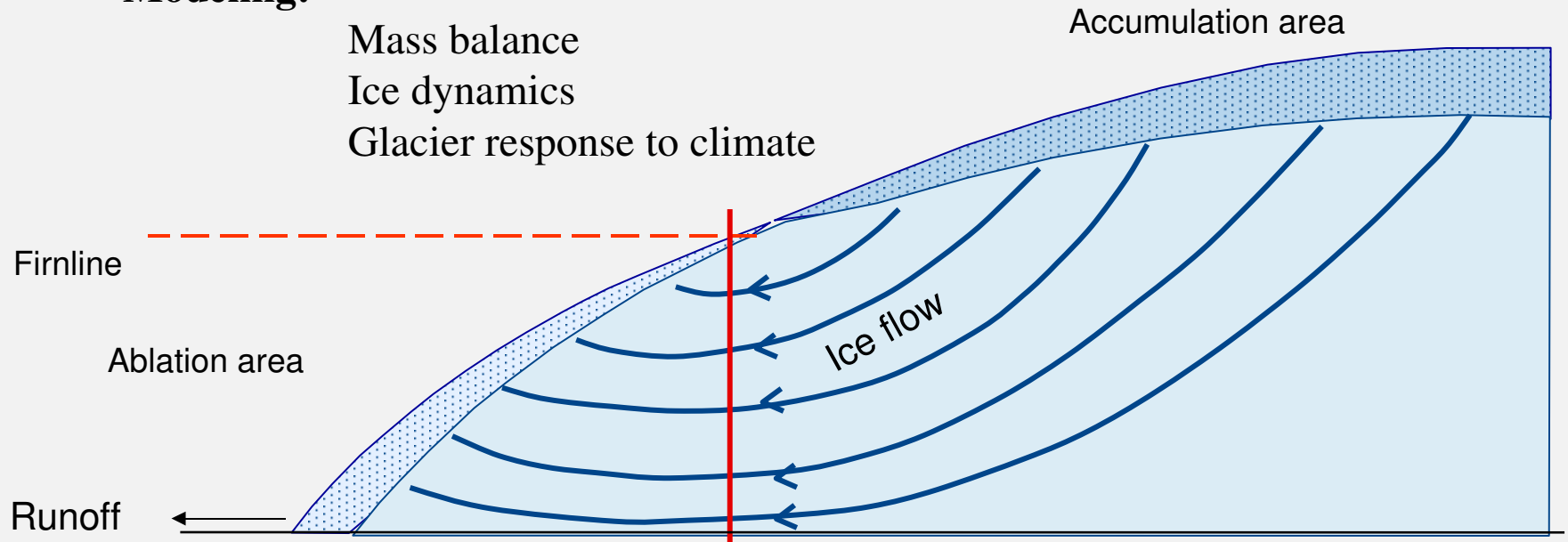
Drainage of meltwater

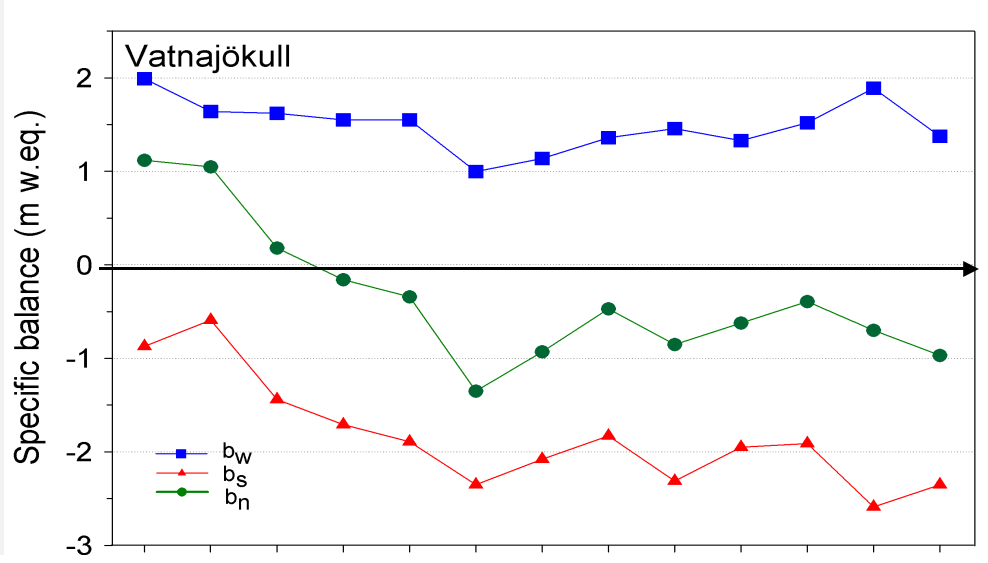
Modeling:

Mass balance

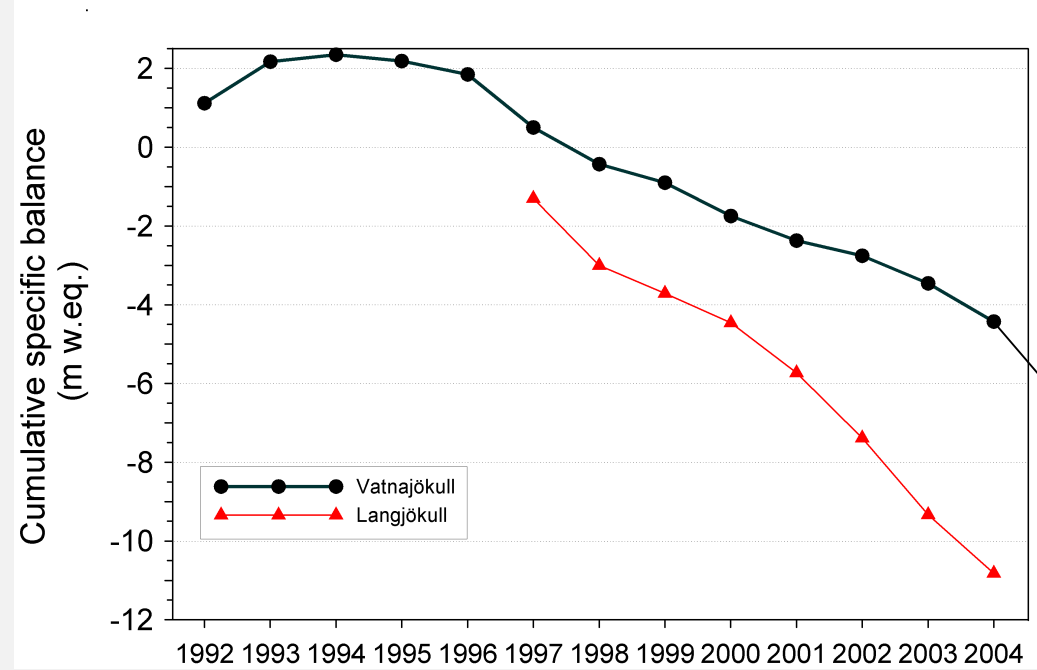
Ice dynamics

Glacier response to climate





Mass
balance



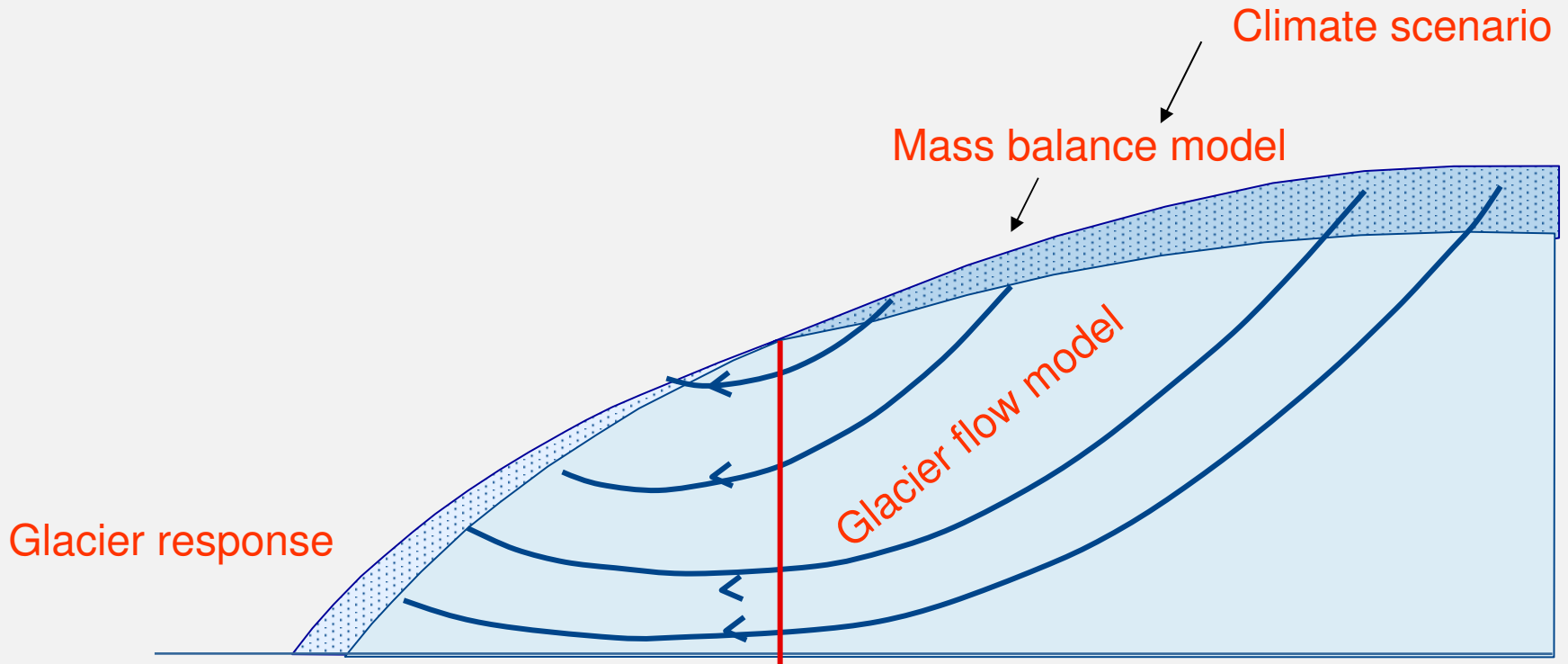
accelerating
volume loss

1995-2007: 10 m
80 km³

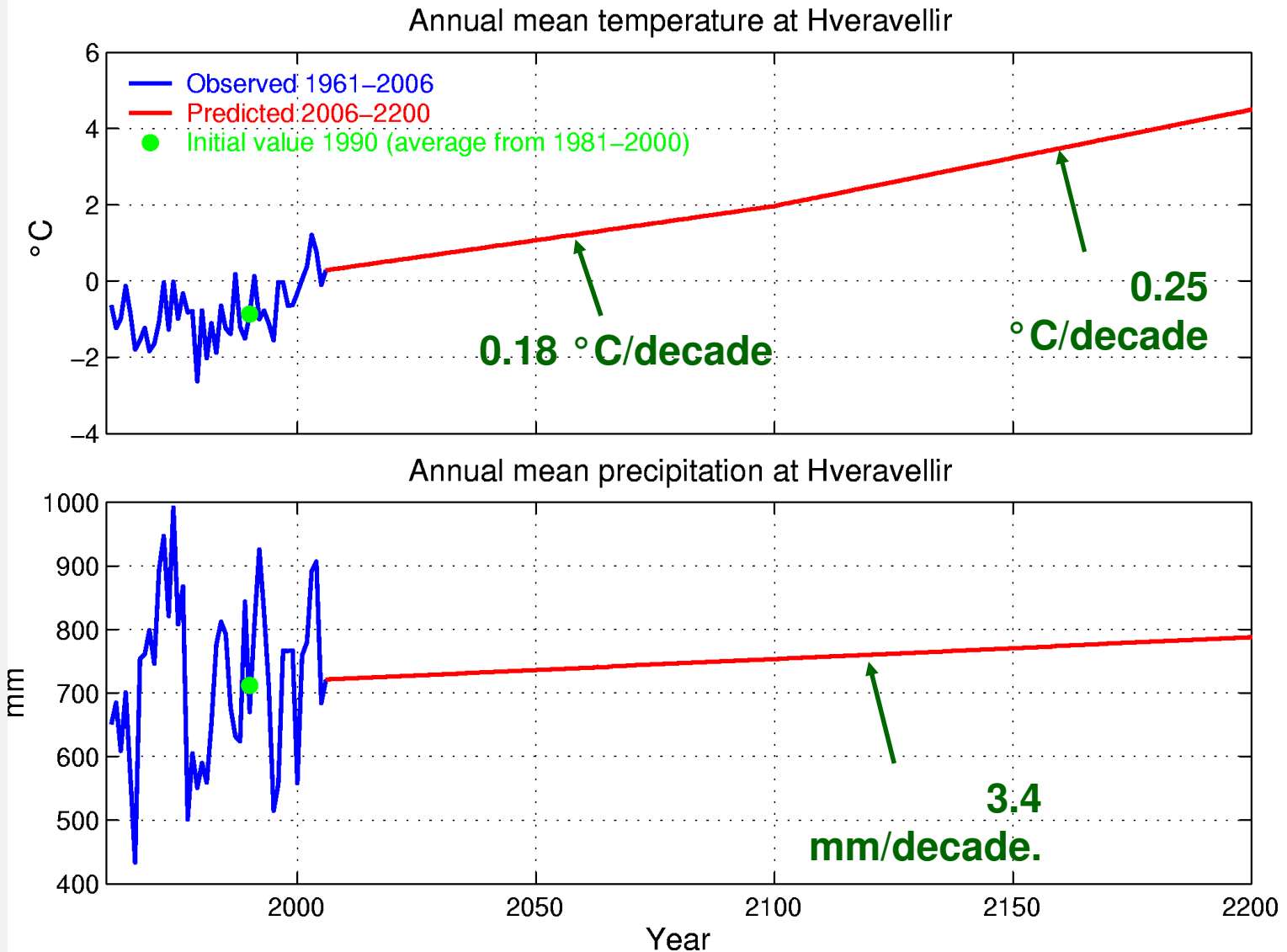


Approach:

Field observations & modelling \Rightarrow prediction given climate scenarios

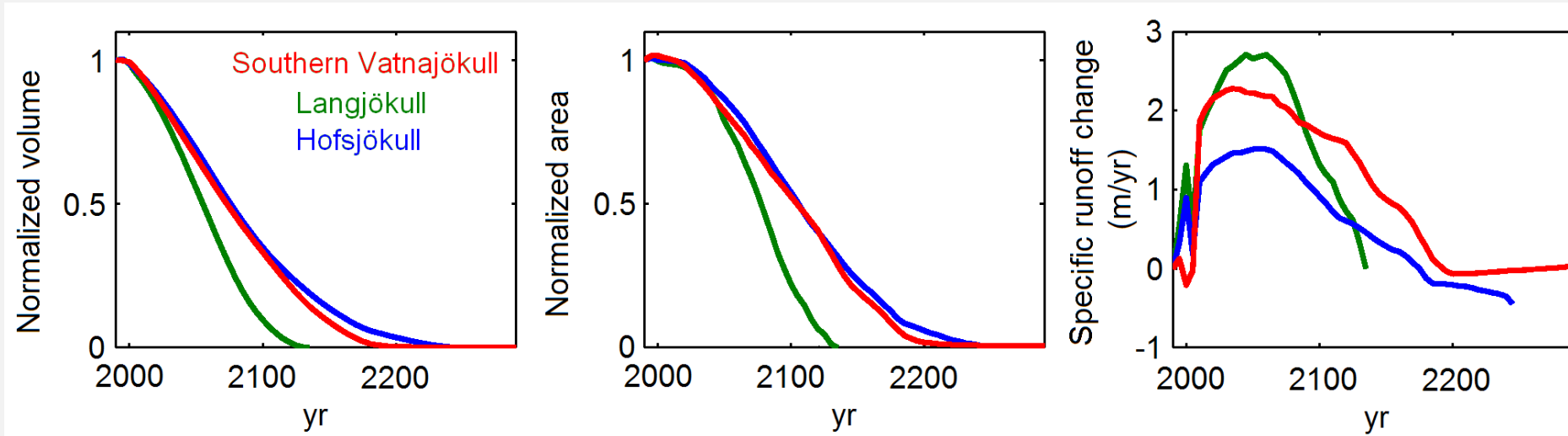


Climate change scenario for Icelandic highland



Predicted response to CE climate change scenario

Model responses shown for three Icelandic glaciers:
Vatnajökull, Langjökull and Hofsjökull

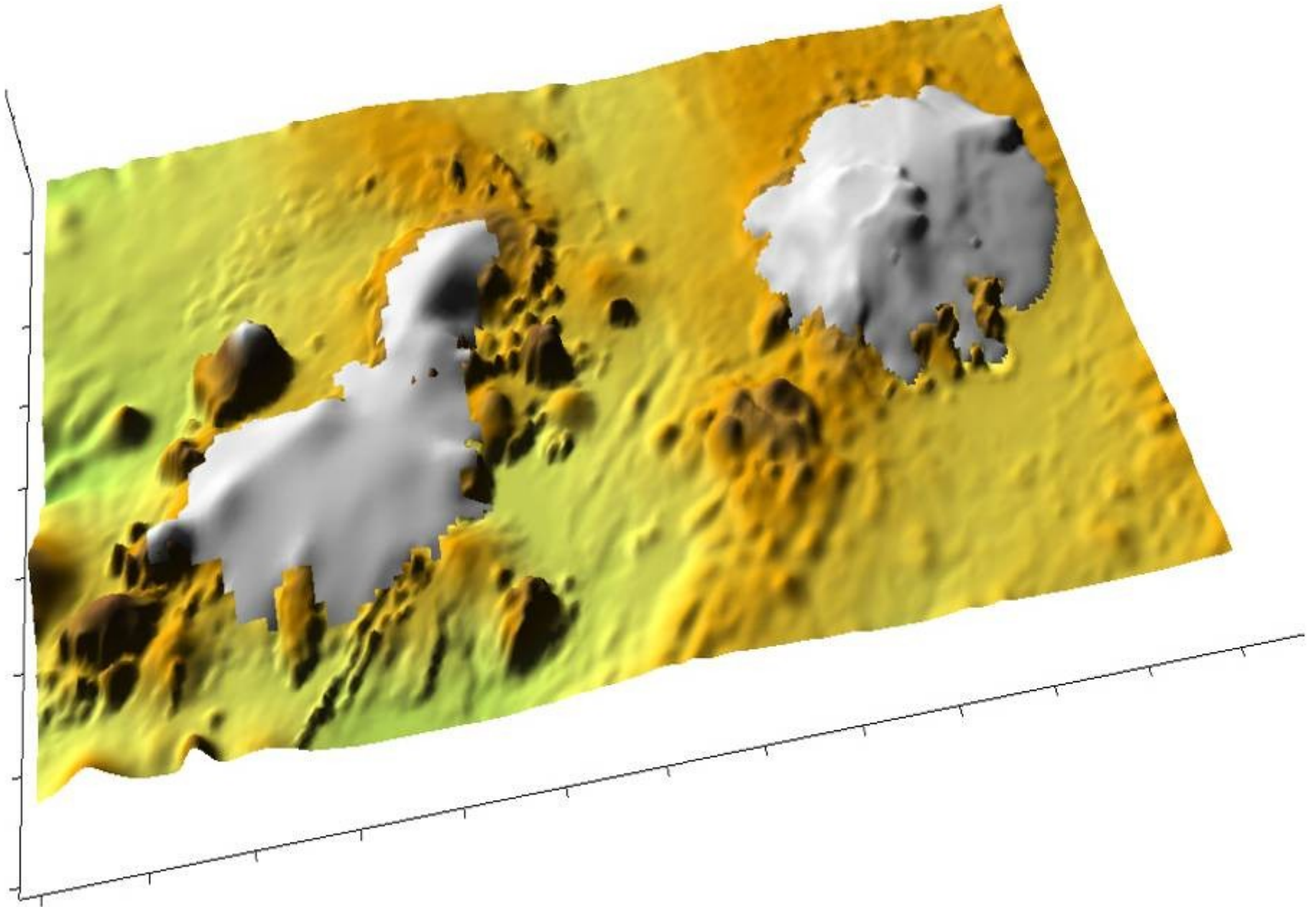


Note:

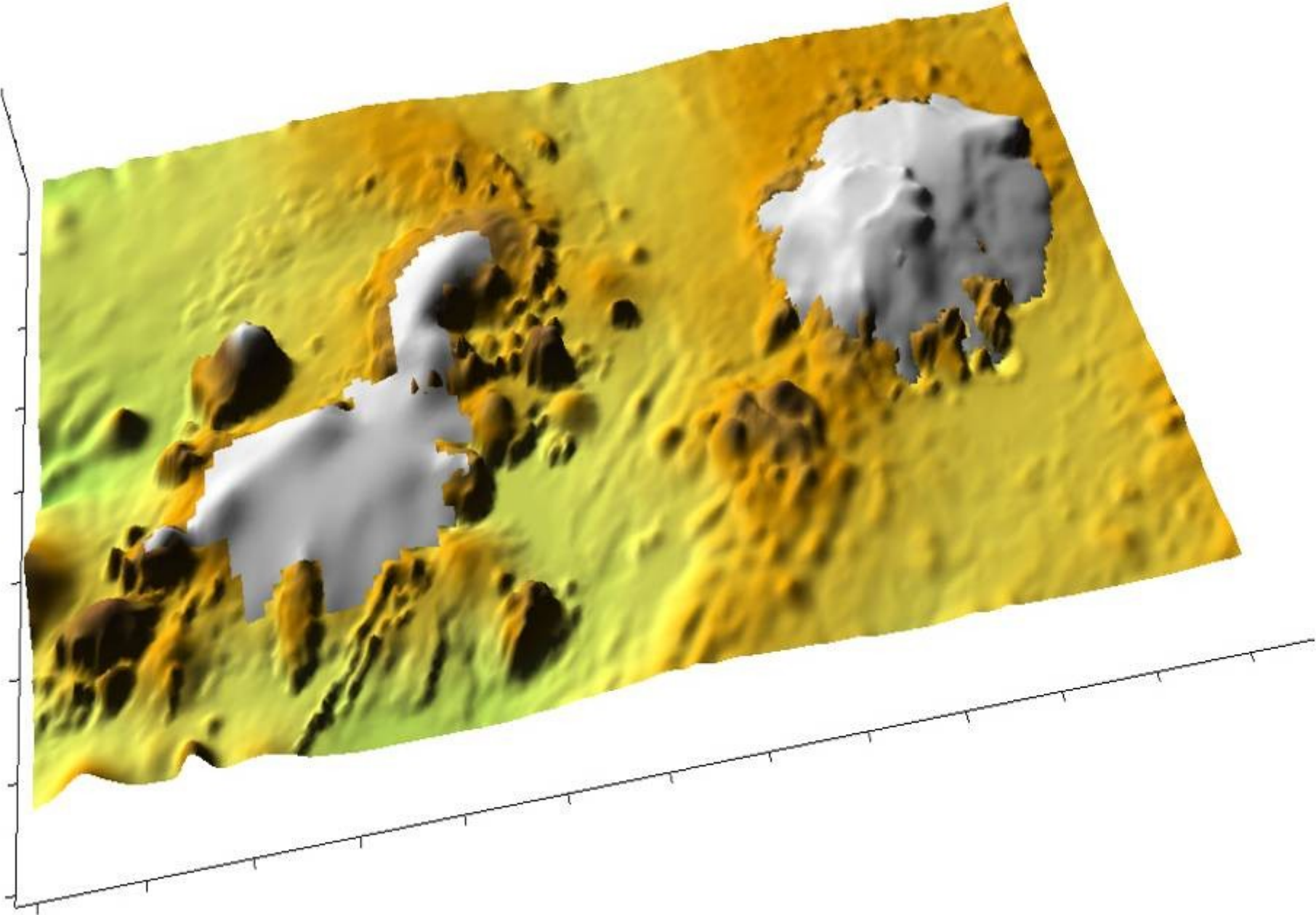
Volumes and areas are normalized to present day values

Specific runoff is from the present day glacier covered area

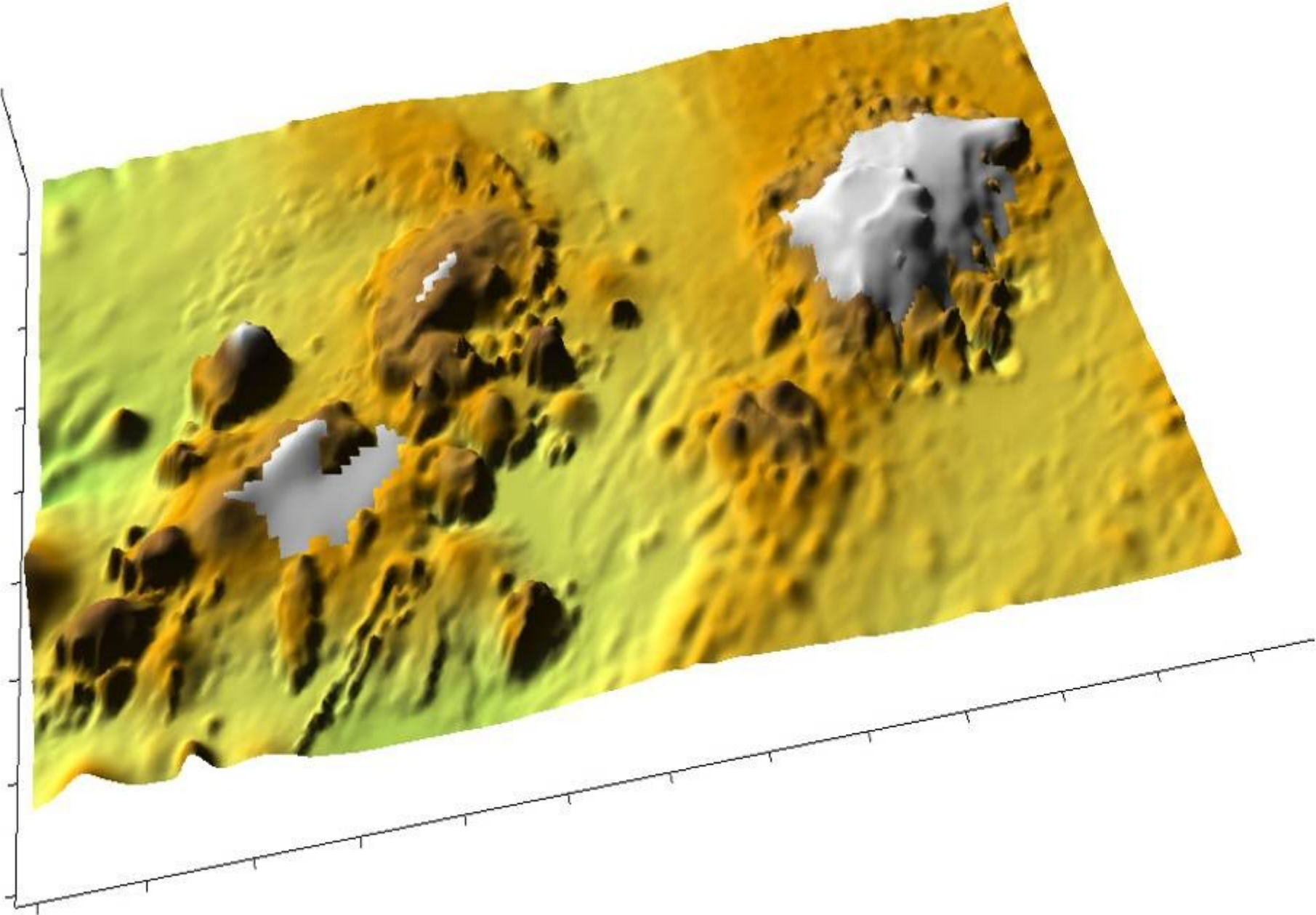
Year: 2000



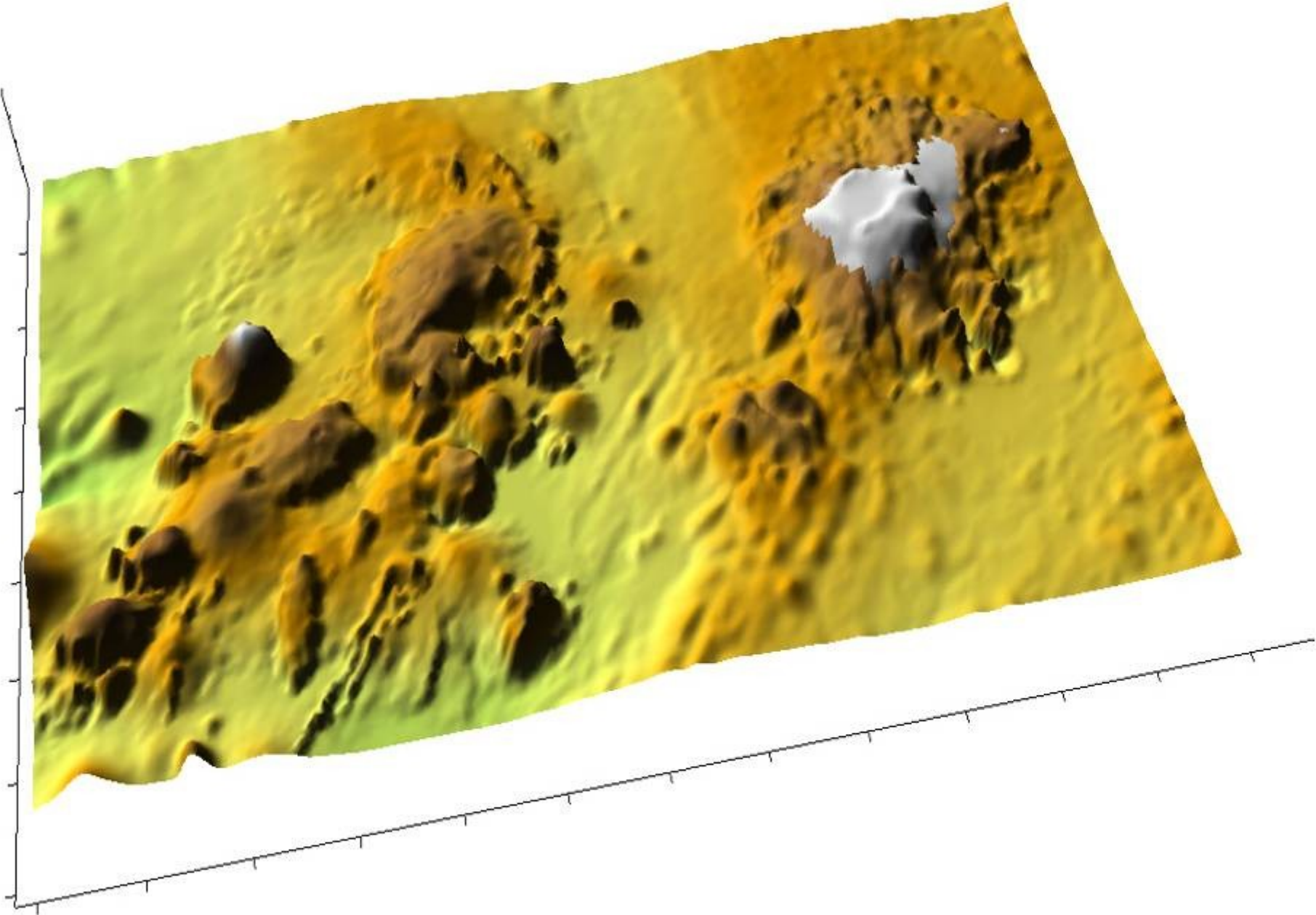
Year: 2050



Year: 2100



Year: 2150



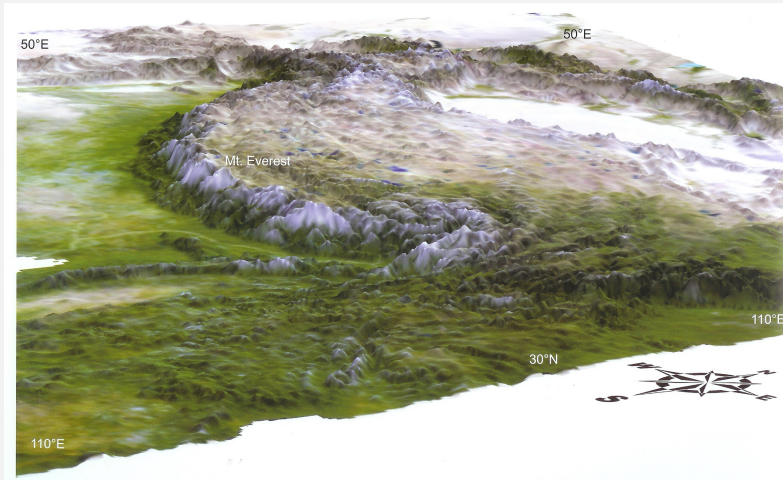
Consequences of climate change

- Glaciers disappear in 100-200 yrs
- Discharge from glaciers increases over next 50 yrs and then decreases
- Seasonal rhythm in discharge changes, some rivers disappear
- River discharge = precipitation
- Changes in sediment load of rivers



Research Program on Glacial Changes in the Himalaya and the Consequences for the Economic and Social Development of India

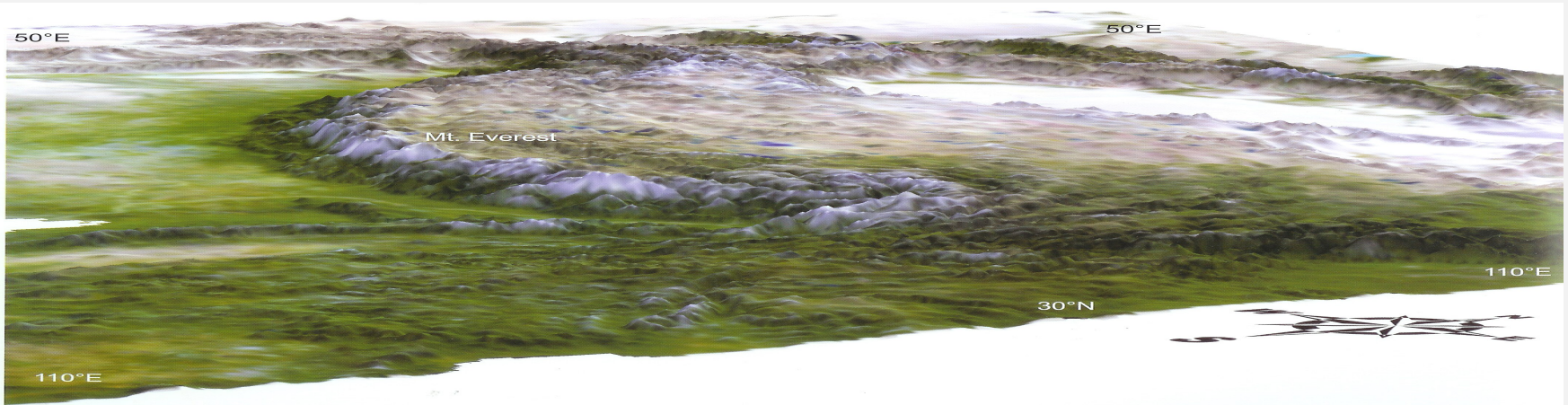
Proposal initiated by the President of Iceland
HE Ólafur Ragnar Grímsson



Indus, Ganges, Brahmaputra

Research Steps toward Prediction of Glacial Changes

1. Collecting required basic field data
 2. Develop glaciers models
 - mass balance
 - physical flow dynamics
 3. Combine mass balance and flow models and run for different climate scenarios
 4. Prediction, analyses of consequences and adaptation
- Requires education and training of young scientists , - constructive political reactions



Consequences of Himalayan Glaciers Disappearing in 40-70 years

- Hydrology
 - Flood hazards, outburst floods
 - Seasonal changes in river discharge, drinking water, irrigation
 - Drought
 - Changing design criteria of bridges and hydropower plants
- Regional planning and development, adaptation, mitigation
 - Agriculture, food production
 - Transport
 - Tourism
- Impact on ecological systems, human health

