Catchment-scale modelling of current and future glacial retreat and lake development over northwest Himalaya under changing climate
Presentation Scheme

- Rationale
- Study area
- Methods
- Results
- Conclusions
The present study makes use of two warming scenarios to predict glacier retreat and associated proglacial lake expansion.

The growth of already existing proglacial lakes can lead to a shift in the hazard zones and consequently lead to an increase in the GLOF risk to the downstream population.
Study area

<table>
<thead>
<tr>
<th>Range</th>
<th>Associated glacier</th>
<th>Downstream village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pir Panjal</td>
<td>Barhma Sakli II</td>
<td>Asthal (~25 km)</td>
</tr>
<tr>
<td>Greater Himalaya</td>
<td>Girwar</td>
<td>Aru/Mondalan (~8km)</td>
</tr>
<tr>
<td>Zanskar</td>
<td>Dalung</td>
<td>Rangdum (~21 km)</td>
</tr>
<tr>
<td>Ladakh</td>
<td>Gya</td>
<td>Gya (~14 km)</td>
</tr>
</tbody>
</table>
We modelled the glacier bed-overdeepenings using a distributed ice thickness model - GlabTop. The present study makes use of two IPCC RCP scenarios (RCP 4.5 and RCP 8.5) to predict the glacier retreat by 2050. The glacier retreat will consequently lead to proglacial lake expansion, wherever the glacial-bed topography permits.

The future lake expansion was taken as an intersection of bed-overdeepenings simulated by GlabTop and length-reconstruction model suggested by Oerlemans (2005).

\[ T'(t) = - \left[ L'(t) + \frac{\tau dL'(t)}{1} \right] \]
From ground zero

Gya
(7 August 2014)
The 2014 GLOF of Gya Village

Near Site 1

Site 2

Site 3

Site 4

Site 5

Site 6
Conclusions

• The glacial lakes would expand by 760% in Darkut glacier (Karakoram), followed by 67% in Barhma Sakli II (Pir Panjal), 58% in Dulung glacier (Zanskar), 48% in Gya glacier (Ladakh) and 22% in Girwar glacier (Greater Himalayan range of Kashmir) by the end of 2050.

• The growth of already existing proglacial lakes can lead to a shift in the hazard zones and consequently lead to an increase in the GLOF risk to the downstream population.

• Our study is in harmony with the emerging trends in GLOF research that aims to characterize and identify specific areas for future lake formation and expansion.
Thank you