GLACIER MONITORING: PAKISTAN

Glaciers in Pakistan play a significant role in local and regional water resources, natural hazards, and geopolitical stability (Bishop et al. 2014). The country lacks fundamental and reliable quantitative information on glacier changes.

### Available series

**Front variation observations**

- First obs. year: 1856
- Last obs. year: 2010
- Nr. of Obs.:
  - 0
  - 2
  - 4
  - 6
  - 8
  - 10
  - 12
  - 14

**Glaciological MB measurements**

- First obs. year: 1986
- Last obs. year: 1991
- Nr. of Obs.:
  - 0
  - 2
  - 4
  - 6
  - 8

**Geodetic MB measurements**

- First obs. year: 1934
- Last obs. year: 1987
- Nr. of Records:
  - 0
  - 2
  - 4
  - 6
  - 8
  - 10

**Glacier inventories**

- Nr. of glaciers:
  - 1800
  - 2000

In Pakistan, a few front variation series are available, especially covering the 20th century. Only one short mass balance series is available from the 1980s and geodetic mass balance measurements exist for a few glaciers between 1934 and 1987. The inventories (especially GLIMS) cover large parts of the glaciated area.

### Key statistics

<table>
<thead>
<tr>
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<th>Front Variation</th>
<th>Mass Balance</th>
<th>Thickness Change</th>
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</thead>
<tbody>
<tr>
<td>total glaciated area:</td>
<td>15’918 km²</td>
<td>Number of series:</td>
<td>12</td>
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<tr>
<td>total coverage WGI:</td>
<td>62 %</td>
<td>Average length [years]:</td>
<td>31</td>
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<tr>
<td>total coverage GLIMS:</td>
<td>80 %</td>
<td>Average number of observations:</td>
<td>3</td>
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### Present state

- National correspondent available but no current glacier monitoring activities.
- No long-term and detailed monitoring program.
- Few balance observations available from Siachen glacier.
- About a dozen front variation and few geodetic observations available.
- Partial coverage in WGI and GLIMS databases.

### Future potential/needs

- Start glacier monitoring and coordinate with glaciologists from neighbouring countries.
- Initiate glaciological mass balance measurements.
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- Encourage the use of remote sensing data for assessing glacier changes in length and volume.

### Spatial distribution of series

Glaciers in Pakistan are concentrated in the North of the country, in the Hindu Kush and Karakoram mountains, and cover an area of about 16000 km². Pakistan exhibits some of the world’s longest mid-latitude glaciers in the higher altitude ranges due to snow accumulation from both winter westerlies and the summer monsoon, e.g. Baltoro glacier, around 60 km long.

References: