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Glacier Changes in the Ravi basin, North-Western Himalaya (India) during the last four Decades (1971-2010/13)

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Abstract: A glacier inventory of the Ravi basin, north-western Himalaya has been generated for the year 2002 using Landsat ETM+ and ASTER Global DEM (GDEM V2) as the baseline data for the change analysis. The Ravi basin consists of 285 glaciers (> 0.02 km^2) covering an area of 164.5 ± 7.5 km^2, including 71 debris-covered glaciers with an area of 36.1 ± 2.1 km^2 (22 % of total glacierised area) in 2002. Change analysis based on Corona KH-4B (1971), Worldview (2010) and Landsat 8 OLI/ TRIS (2013) images was restricted to a subset of 157 glaciers (covering an area of 121.4 ±5.4 km^2 in 2002) due to cloud cover. Glacier area decreased from 125.8 ± 1.9 km^2 (1971) to 119.9 ± 4.8 km^2 (2010/13), a loss of 4.7 ± 4.1 % or 0.1 ± 0.1 % a^{-1}. The glacier recession rate has decreased, to a minimum for the recent decades (2002-2010/13). The debris-covered glacier area increased by 19.24 ±2.2 % (0.5 ±0.05% a^{-1}) in the Ravi basin. However, there were significant variation in its sub-basins i.e. in Budhil and Upper Ravi sub-basin, where the **debris-covered** area increased by 28.6 ±3.1% (0.7 ±0.1% a^{-1}) and 14 ±1.6% (0.3 ±0.04% a^{-1}), respectively, between 1971 and 2010/13. Field investigation of selected