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**Temporal fluctuations and frontal area change of Bangni and Dunagiri glaciers from
1962 to 2013, Dhauliganga Basin, central Himalaya, India**

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Abstract

Glaciers have been receding for the last 100 years in many glaciated regions of the world, and the rate of recession has accelerated during the last 60 years. Recent assessments of changes in glaciers in the Himalaya have usually recognized their variable rate of recession. The present study deals with snout retreat, frontal area vacation, and estimation of the equilibrium-line altitude (ELA) of Bangni and Dunagiri glaciers, in the Dhauliganga Basin, central Himalaya (India), using multi-image satellite data (Landsat MSS, 1976; Landsat TM, 1990; Landsat ETM+, 2005) and Survey of India topographic maps (1962; 1:50,000) along with field surveys (2012 to 2014) for the period of 1962-2013. The meteorological data of the India Meteorological Department (IMD) and TRMM suggested that the central Himalaya received less precipitation between 1960 and 1990. Because of the less precipitation, glaciers receded rapidly during this period. The present study shows that Bangni and Dunagiri glaciers retreated $\sim 2080 \pm 162$ m and $\sim 484 \pm 38$ m with average rates of $\sim 41 \pm 3.2$ m a⁻¹ and $\sim 9 \pm 0.6$ m a⁻¹ between 1962 and 2013, respectively. During this period Bangni and Dunagiri glaciers lost about 17% and 11% of their length, respectively. The result

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