

April, 2025

To,
The Additional Chief Executive Officer (Admin.)
Uttarakhand State Disaster Management Authority,
IT Park Sahastradhra Road

Subject: Monthly Progress Report for the Project “Long-term Monitoring of Gangotri Glacier, Garhwal Himalaya” (**Reference:** Letter No. 493/USDMA-2024 dated 7th June 2024 and email dated 04.11.2024)

Dear Sir,

Regarding the above-referenced letter concerning the submission of the monthly progress report for the project titled “**Long-term Monitoring of Gangotri Glacier, Garhwal Himalaya,**” sponsored by the Uttarakhand State Disaster Management Authority (USDMA) and undertaken by the Wadia Institute of Himalayan Geology (WIHG) in March 2022. This project aims to map and monitor the Gangotri glaciers and their associated glacial lakes, collect meteorological and hydrological data, assess glacial hazards, and disseminate information regarding potential threats to The USDMA. In this context, we would like to inform you that a network of 2 Automatic Weather Stations (AWS), 1 Automatic Water Level Recorder (AWLR), and 2 broadband seismic stations was installed in the basin during October and November 2023.

As the Gangotri National Park officially opens to the public each year in April 2025, it also signals the start of critical scientific and conservation activities in the region. Before the influx of tourists and the seasonal rush begins, essential field preparations are carried out to ensure smooth monitoring operations in the Gomukh region. For the 2025–2026 season, fresh permission was obtained from the Director of Gangotri National Park to deploy watch and ward personnel at Bhojwasa an important field outpost located near the snout of the Gangotri Glacier.

In the early April, before the area becomes more accessible to visitors, the watch and wards conducted a pre-season inspection of the base camps at Chirwasa and Bhojwasa. Their objective was to evaluate the condition and functionality of installed monitoring instruments and to observe any major physical changes within the glacier basin including melting of snow cover. At this time, the Gangotri valley remains largely snowbound, making access to the glacier snout particularly difficult.

Despite harsh weather and limited accessibility, the team successfully reached both stations. They thoroughly checked all instruments, focusing on power supply, solar charging systems, and battery performance, ensuring that the monitoring infrastructure was fully operational. These early efforts, completed ahead of the tourist season, play a crucial role in maintaining uninterrupted observations throughout the spring and summer months. The readiness of the field stations by early April ensures that data collection and glacier monitoring can proceed effectively as the snowmelt intensifies and human activity in the park increases.

Upon reaching the base camp, the team proceeded to the snout of the Gangotri Glacier and observed that the route was almost entirely free of snow. The glacier snout, along with the emerging Bhagirathi River, was clearly visible, with sediment-laden meltwater actively flowing out from the glacier’s terminus. Snow was still visibly present across the Gangotri basin, especially in the upper reaches of the valley. The higher elevations and surrounding slopes remained covered in snow, creating a stark contrast with the partially cleared lower trail.



Figure 1. View of the snout of the Gangotri Glacier, known as Gomukh, in early April, showing the emerging Bhagirathi River and debris in the foreground.

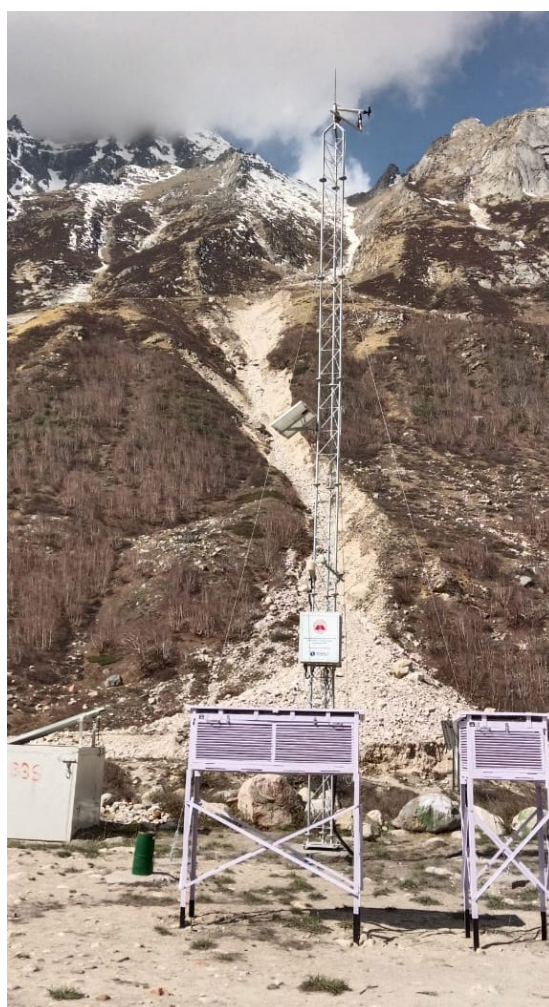


Figure 2. Early April view of the Bhojwasa base camp near the snout of the Gangotri Glacier, showing the installed Automatic Weather Station and Broadband Seismic Station, with the surrounding area notably free of snow during this period.

This persistent snowpack in the upper valley is typical for April and indicates that winter conditions are still dominant at higher altitudes, even as melting begins near the glacier snout. To confirm the extent of snow in the basin, field observations were complemented by satellite-based analysis. The analysis of Sentinel-2 satellite data over the Gangotri Glacier during April 2025 reveals significant variability in snow cover, influenced by both seasonal patterns and regional meteorological conditions typical of the central Himalayan basin. A total of five cloud-free images were identified and used for this study, corresponding to the dates **5th April**, **10th April**, **15th April**, **25th April**, and **30th April**. On 5th April, snow cover was recorded at 74%, which decreased to 68% by 10th April, indicating early spring melting driven by rising temperatures. A slight increase to 70% on 15th April suggests minor snowfall or a brief cold spell.

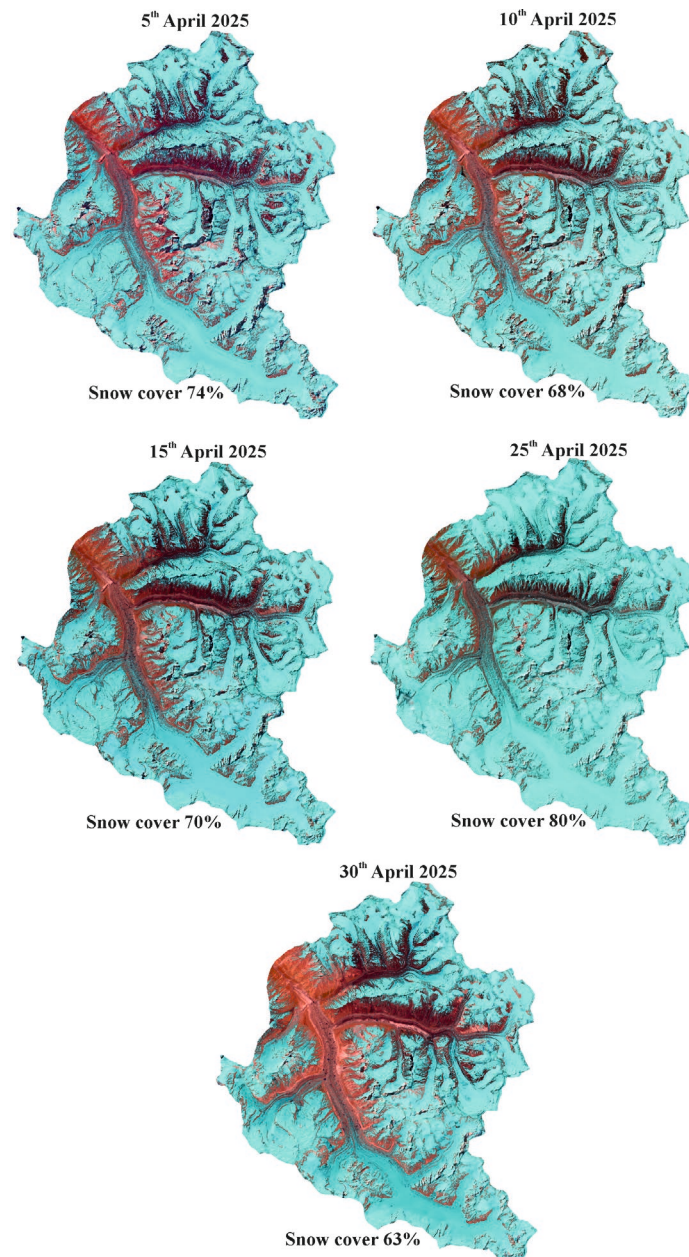


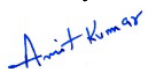
Figure 3. Distribution of snow cover during the month of February 2025.

A substantial rise to 80% on 25th April is likely associated with a Western Disturbance, a frequent synoptic weather event that brings fresh snowfall to the western and central Himalaya during this season. This was followed by a sharp decline to 63% on 30th April, likely due to post-disturbance

clear skies and higher temperatures accelerating snowmelt. These fluctuations highlight the dynamic interplay between short-term weather systems and seasonal warming, with direct implications for glacier health, meltwater availability in the Bhagirathi River, and hydrological behavior across the basin.

A decrease in snow cover was observed as spring melting began, driven by gradually rising temperatures during early April. The instruments installed at Bhojwasa and Chirwasa were found to be functioning properly, as verified by the watch and ward team during their site visit in early April 2025. In addition, satellite imageries was analyzed to detect any major events, such as debris flows or the formation of new glacial lakes. Both field observations and remote sensing analyses conducted during this period confirmed the absence of debris flows, glacial lake formation, or significant geomorphic disturbances in the vicinity of the Gangotri Glacier. These findings indicate a state of relative geomorphic stability, despite an observed increase in the snow-covered area in middle of months due to fresh snowfall events.

Thank you for your attention to this matter.



Dr. Amit Kumar

Scientist C

Wadia Institute of Himalayan Geology, Dehradun