Laboratoire de Glaciologie et Géophysique de l'Environnement

# Séminaire

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**Salle L. Lliboutry, LGGE**


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## *Dynamic response of land-terminating glaciers and ice sheets to present climate warming*


Over the last 150 years, glaciers and ice sheets have been undoubtedly shrinking worldwide, making them the first contributors to the increase in oceans mass. Glaciers changes are partly driven by climate forcing, in particular rates of surface melt, snowfalls and ice/ocean interaction, which in turn impact the flow of ice and the mass transport to lower elevations and the ocean. Recent studies have shown that the ice discharge has increased for a majority of ocean-terminating glaciers. Nevertheless, more evidence show that long-term slow-down may be the predominant behaviour of land-terminating glaciers, implying that they may be more resilient to climate warming than previously thought. Detailed studies of glaciers dynamics is therefore needed to understand and constrain the future contribution of glaciers to sea level rise.

Here we present a methodology to derive ice surface velocity from a series of satellite optical images at regional scales. The application to the Pamir-Karakoram-Himalaya shows a clear slow-down of the glaciers for this 92 000 $km^2$ region over the last 15 years. Comparison with the results of an ice flow model shows that this slow-down can mostly be attributed to the change in glaciers geometry (thinning) over the same period. The same method is applied across an 8 000 $km^2$ land-terminating region of the west Greenland Ice Sheet (GIS) margin. Results show that annual ice motion was 12% slower in 2007-14 compared with 1985-94, despite a 50% increase in surface meltwater production. Increases in meltwater production from projected climate warming may therefore further reduce the motion of land-terminating margins of the GIS. Our findings suggest that these sectors of the ice sheet are more resilient to the dynamic impacts of enhanced meltwater production than previously thought.