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3D models of Lobuche and Changri Nup glacial fronts (Nepal, Everest region). A terrestrial laser scanning application for change detection purposes.

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Terrestrial laser scanning is presented as an useful technique for change detection analysis of glaciers located in remote mountain areas like in the Himalayas, where very high altitudes and logistical difficulties can make less advantageous the more frequently adopted airborne approach. Less expensive than the aerial surveying system, the close range scanning seems to be well suited for not large areas when the main goal is the accurate investigation of the morphological aspects of the glacier surface and the dynamic trend of significant local phenomena inside of it.

Varies campaigns have been conducted for few years in Nepal Everest region being their main purposes the application of the more advanced terrestrial surveying techniques in the field of glacier monitoring. With the fundamental support of GPS measurements in real time kinematic (RTK) approach, used overall for position data collection of glacial front profile and sections (Changri Nup glacier) and in order to control displacement and velocity variations for stability evaluation of moraine dams delimiting glacial lakes (Imja and Tchola lakes), laser scanning sessions have been recently carried out to acquire range measurements for 3D model construction of the Lobuche and Changri Nup white fronts, in addition to the extreme part of the Everest Ice Fall. Acquisition and processing phases are here explained for Lobuche and Changri Nup sites. Results from laser scanning models, enriched with textured images taken by an high resolution camera, are showed.

Considering the relevant activity of the debris covered areas inside the eastern himalayan glaciers and the remarkable volume decrease experienced by the white faces

of their uncovered part, the laser scanning can be confirmed as one of the most powerful method among field surveying techniques to inspect actual changes and identify local processes that can permit to understand more global behaviours and predict or manage potential hazards, such as floods, catastrophic drainage of glacial lakes and other ice collapses.