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Mass balance fluctuations of Chhota Shigri glacier estimated from remotely sensed snow line altitudes

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Himalayan glaciers are representative indicators of climate fluctuations through their mass balance variations. Mass balance is generally computed from field measurements but can also be estimated from remotely sensed images. One remote sensing method uses snow line altitudes observed from satellite images as a proxy of the equilibrium line altitude at the end of the hydrological year. This method allows inferring quantitative information on the annual glacier mass balance. This technique, which proved to be reliable in the French Alps, has been applied on the Chhota Shigri glacier (Himachal Pradesh, Indian Himalaya). Annual field measurements since 2002 were used to validate the snow line altitude obtained from ASTER images acquired between 2002 and 2007. Nevertheless, snowfalls occurring at the end of the monsoon (sept/oct) are disturbing the signal and preliminary results point out the difficulty to apply this method in this region of the Himalayas. Consequences are an underestimation of the equilibrium line altitude leading to an overestimation of mass balance. Our abilities to observe a snow line representative of the glacier equilibrium line at the end of the hydrological year are limited by the scarcity of suitable images.