Precipitation and Glacier Change in High Mountain Asia Over the Modern Era

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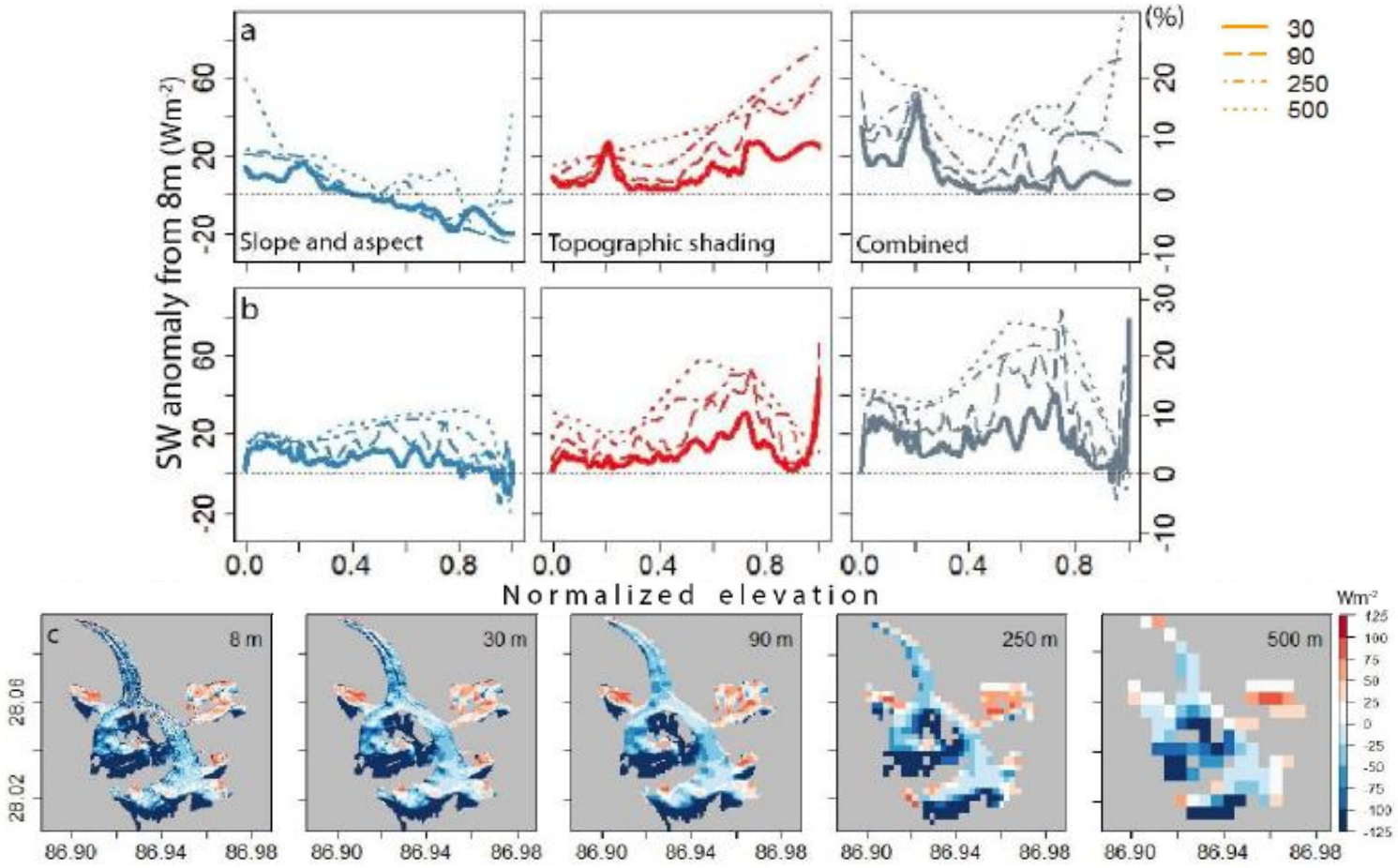
Purpose: Achieve process-level understanding of snow and glacier response to anthropogenic forcing

Study Objective: Evaluate the added benefit of supplementing medium resolution imagery with higher spatial resolution commercial imagery for energy balance modeling

Imagery: WorldView-3, GeoEye

Findings: Higher spatial resolution Digital Elevation Model (DEM) derived from commercial imagery improved the reliability of energy balance modeling for glaciers in rugged terrain, such as over High Mountain Asia. The availability of the near-infrared bands and their high radiometric quality improved the ability to differentiate snow from other bright surfaces.



The Shortwave anomaly is the difference between the change in irradiance determined at each coarse DEM resolution relative to the change in irradiance calculated with the 8-m HIMAT DEM. The anomaly is shown at 30-, 90-, 250-, and 500-m resolutions for the East Rongbuk Glacier (a, top panels) and the Lumsamba Glacier (b, middle panels) on March 21. Panel (c) shows the combined change in irradiance due to all terrain attributes on this day at each down sampled resolution for East Rongbuk Glacier.

Overall, incident SW radiation is overestimated when resolution is coarsened. For both glaciers, the combined bias is most impacted by changes in modeled topographic shading and slope/aspect. This holds true for all 10 glaciers in this study.