

## ***Interactive comment on “Thermal remote sensing of ice-debris landforms using ASTER” by A. Brenning et al.***

**Anonymous Referee #2**

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This manuscript presents an empirical study about the application of ASTER thermal imagery to characterize debris-covered glaciers and rock glaciers in Punta Negra Valley (Central Andes). A statistical evaluation is performed to analyze the spatial patterns of Aster surface temperature and near surface in-situ temperature measurements. The purpose is to distinguish rock glaciers and debris-covered glaciers from other debris landforms by using the apparent thermal inertia derived from Aster surface temperature estimates. The approach is novel and interesting. The authors reference well most of the recent literature and the paper is well presented and structured. However, the study area is rather small, the data and the results are not sufficient to support the utility of using apparent thermal inertia as a proxy for mapping ice-debris landforms and also the transfer to other mountain regions. The utility of this approach is limited and I would suggest major revisions or rejection.

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The apparent thermal inertia calculation should be discussed in more detail, especially in-pixel distribution of surface temperature and the influence of topography (aspect and slope). Sensible and latent heat fluxes should be included in the analysis to support the application in a complex terrain and transfer to other areas.

Other comments:

Some information about the lithology in this area should be presented.

What is the area (km<sup>2</sup>) covered by rock and debris covered glaciers in Punta Negra Valley?

If available, ground albedo measurements (also literature) should be compared to remote sensing data.

What is the distance between EEY and the analyzed area?

Are debris thickness measurements available at the near surface temperature sites? Correlation between debris thickness and in-situ temperature measurements?

Errors both involved in estimating surface temperature, albedo, apparent thermal inertia from the Aster imagery and in-situ temperature measurements should be presented and discussed in more detail.

Pag. 2917 Lines 19-21: Physically based modeling and geophysical investigations would indeed provide valuable insights for this study.

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Interactive comment on The Cryosphere Discuss., 5, 2895, 2011.