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Hydrology and Earth System Sciences Discussions

Interactive comment on "Commentary on comparison of MODIS snow cover and albedo products with ground observations over the mountainous terrain of Turkey" *by* A. Ü. Şorman et al.

J. Foster

james.l.foster@nasa.gov

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General Comments

This paper addresses the need for rigorously validating MODIS-derived snow cover data. The authors of this commentary look at snow data from Turkey, primarily mountainous eastern Turkey – the source region of the Euphrates River. Here, cloud cover and topography (shadows, slopes and changes in elevation) can make snow mapping

an arduous process. In order to confidently evaluate the MODIS products, it's critical to thoroughly examine snow cover regimes (accumulation and ablation patterns) in different geographic regions. Markedly improving water resource management in developing countries, especially in those countries where the presence of snow contributes greatly to the water reserves, and where such reserves need be shared by multiple nations, is a key objective of snow cover remote sensing. This paper makes an important contribution in this effort.

Specific Comments The comments below are meant to help the authors in fine-tuning the results of their study.

Study Area Though a description of the study area is included, a bit more detail would be welcome. For example, is the area forested, what is the forest density, what is the average snow thickness, what is the basin morphology?

Discussion Comparing point data, from meteorological stations or snow courses, with satellite pixels is not especially meaningful unless the study area is particularly data rich. Validation of MODIS satellite pixels can be especially challenging, not only because of the moderate pixel size (in comparison to Landsat, for instance) but also because many pixels at the 500 m x 500 m footprint size are likely to be heterogeneous and thus much more difficult to compare to a single point value. Therefore, for an accurate and meaningful validation, it's extremely important to have a dense network of ground observation stations – at similar elevations to the MODIS pixels.

As the authors rightly indicate, without thorough in situ sampling at varying scales within the MODIS 500 m x 500 m footprint, spatial scale differences cannot be eliminated. Shadowing, varying slope reflectances, and fractional snow cover (patchy snow) can each affect the accuracy of snow mapping. In addition to the above, cloud shadows (generally cumulus and alto cumulus clouds) cover can also result in misclassification.

In regards to both snow cover area and albedo, snow may not be present on high

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summits if angles are sufficiently steep (angle of repose). High winds can also remove snow along ridge tops and elevated plateaus.

Matching snow cover and snow water equivalent to streamflow at available gauging stations is perhaps the most valuable and consequential way to verify observed snow values. Was this done? Why not?

Proofread again for sentence structure and grammatical errors.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 3655, 2006.