

Interactive comment on “Estimating surface fluxes over the north Tibetan Plateau area with ASTER imagery” by W. Ma et al.

Anonymous Referee #2

Received and published: 23 September 2008

The paper presented covers the estimation of surface fluxes over the north Tibetan Plateau area using ASTER data. For both climatological and biological projects, the area wide information of meteorological surface parameters and fluxes is a valuable data source and therefore the subject of the paper is worth to be published.

However, especially the validation section of the paper needs some major revisions since a reliable error estimate of such area wide data sets is vital for their subsequent use in other applications.

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1 Specific Comments

1707/19ff: It sounds as this paragraph already states the data processing used for the actual study but I assume that this paragraph should only summarize the current state of the art. Please clarify.

1709/24ff: For a more complete overview of the techniques applied in this study, please shortly explain the technique mentioned for the retrieval of the land surface temperature as you have already did it for the other parameters of interest.

1710/25: For the computation of longwave radiation fluxes you have to assume certain atmospheric conditions. Please specify what kind atmospheric profiles do you use?

1711/18ff: Please explain the the data base for the empirical retrieval of equation 4 (i. e. how many data pairs have been used, how have they been selected etc. and what was the general correlation between them?)

1712/02ff: If I understand correctly, the area-wide distribution of the sensible heat flux is solely dependent on the satellite retrieved surface temperature (air temperature is linearly computed from the surface temperature). All other parameters of eq. 5 have been held constant over the entire research area. If this is correct please explicitly mention that, if not, please explain how e. g. the roughness length has been distributed in space. In addition, please shortly discuss the retrieval of eq. 9 (i. e. data base, correlation etc.).

1714/01ff: The validation of the retrieved datasets has some drawbacks. You do not mention the number of stations used for the comparison (i. e. how many pixel values of the ASTER images could have been compared etc.). Moreover, it is not clear to me if the station measurements are really independent of the measurements used to derive the empirical functions in chapter 2. If they are not independent, they are of no use for the validation and you have to select other ASTER scenes. In addition, you only mention mean deviations for all three images - are there differences of the agreement

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between the seasons? Although I do not understand why you haven't included more ASTER datasets in the first place? Alternatively (if you had problems with the station measurements or something like that) you could have used precomputed MODIS product datasets and compare their data values to your ASTER products.

1716/20ff: Initially you have rejected "low" resolution sensors like AVHRR and MODIS because of the heterogeneity of the plateau. Now you propose to use them for the area wide distribution. In my opinion, MODIS would have been the first choice in the first place because of the nature of the task - 15 m area wide datasets for the entire plateau are generally not required by the majority of climatological and biological projects - and ASTER could be used for monitoring e. g. intensive plot areas of biological oriented projects. Nevertheless, you can easily aggregate the ASTER images to a 1 km scale, compute your analysis again and discuss the resulting (quantitative) differences between the 15 and 1000 m resolution data to get an initial estimate of the accuracy of MODIS datasets.

2 Technical Corrections

1706/26: Please replace "percent" by "percentage".

1707/15: Please change last sentence of paragraph; e. g.: "Since area-wide information on land-surface - atmosphere interaction parameters is required..."

1707/25: Please change "emissivity e IS derived" to "emissivity e ARE derived".

1708/14: Please replace "were rare" by "are rare".

1708/17ff: Please change second part of sentence; e. g.: "...1 km x 1 km and sub-pixel heterogeneity has been omitted."

1708/20: Please change last sentence; e. g.: "The aim of this research is to upscale

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in-situ point observations of land surface variables and land surface heat fluxes to the regional scale using high-resolution (15 m x 15 m) ASTER Data.

1709/06: Please insert "includes A variety".

1710/03ff: Please delete "evaluates" and modify sentence; e. g.: "Hook developed a land surface...".

1710/14: Please modify sentence; e. g.: "represents the shortwave (...) and L(...) the longwave (...) radiation...".

1710/22: Please modify sentence; e. g.: "where ai(...) are the correspondent ASTER band surface reflections."

1710/25: Please modify sentence; e. g.: "is derived directly from MODTRAN (Ma...)".

1713/05: Please change sentence to "functions ... ARE written as ...".

1714/14: Chapter 2.2.4 is only one sentence. I suggest to include this in chapter 2.2.3 and rename it to "Sensible and latent heat flux".

1714/07: The content of the sentence ("The derived land surface...") is repeated in the next sentence again. Please mention it only once.

1714/11: Please explain the meaning of "BJ".

1715/10: Please change the sentence; e. g.: "The reason is that the predominant land cover around the lake is composed by desertified grass which was dry at the time of the measurement."

1715/17: Please modify sentence; e. g.: "The reason is that most OF the land surface...".

1715/25: Please clarify the meaning - do you mean that the good agreement is partly because of the fact that the station has already been used to derive the empirical relationship between the soil heat flux and the satellite datasets?

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1715/xx: Please generally include "the" before "validation site".

1716/02ff: Please modify sentence; e. g.: "This is due to the fact that atmospheric boundary layer processes have been considered in more detail in our methodology and the proposed parameterization for ... can be used over ..."

1716/11: Please delete "the" before "field observations".

1716/13: Please modify sentence; e. g.: "The retrieval of regional...".

1716/16: Please delete "at a specific time of specific day".

1716/17: Please modify sentence; e. g.: "To obtain more accurate regional land surface fluxes (daily to seasonal variations) over a larger area (Tibetan Plateau), more field...".

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1705, 2008.

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