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Hydrology and Earth System Sciences Discussions

Interactive comment on "The use of remote sensing to quantify wetland loss in the Choke Mountain range, Upper Blue Nile basin, Ethiopia" *by* E. Teferi et al.

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The authors wish to thank the editor for the useful comments. We feel the paper has benefited from the comments and appreciate the suggestions. Please see below details of how and where we added the required information. Best regards,

Do not start a sentence with a number, rather use a word (sixteen not 16). I have seen in more than 2 places this.

Response: This comment is addressed already in the reply given to referee #2 comments.

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Interactive Discussion

Discussion Paper

Page 6260: 'To understand the wetland class characteristics the use of Landsat images is not convenient because these images lack higher temporal resolution." This is not true. In the end you used a 16-day MoDIS NDVI.

Response: We have revised the sentence. If you allow us to explain a bit more: although Landsat (TM and ETM+) has 16-day repeat cycle, these 16-day images are not available for the period 2001-2009. Therefore, we used 16-day MODIS NDVI to generate time series of class characterstics. But to distinguish classes, we used the high spatial resolution advantage of Landsat image.

Legend for figure 5 is not clear. Use larger fonts.

Response: Done.

Use bar graphs for figure 7 since rainfall is a discrete data. Add title for x-axis

Response: Done

What year is in figure 8?

Response: Mean 16-day annual for the period 2001 to 2009. This was added to the figure caption.

Use large fonts for figure 8 as well.

Response: Done

Is rainfall in figure 8 cumulative for the 16-day?

Response: Yes; this was clarified in the caption.

How did you get cloud-free images in the summer?

Response: We tried to explain this on Page 6249 L11 "...little or no cloud cover". We have two wet season Landsat images. One was acquired on 09/11/1985 (no cloud cover) and the other was acquired on 15/10/2002 (6% cloud cover). The 6% cloud cover is concentrated on the peaks of Mt. Choke, while the wetlands that we examine

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were concentrated on low-lying cloud free areas.

I have also asked this before and I'm confused and still not convinced why November is dry in one year and part of wet season in another year.

Response: The selection of satellite images was mainly based on the availability of good quality imagery with minimal cloud coverage. Because of frequent cloud cover in the Mt. Choke range it is almost impossible to get cloud free images during the wet season. In the early November image (09/11/1985) the delineation of SWH and SWL is difficult. This is not noticeable even in Landsat TM band 5 which is sensitive to soil moisture. This indicates that the wet season for that particular year didn't end up until 09/11/1985. The moisture status at this stage doesn't help to make a distinction for this particular image. In dry season image the contrast among seasonal wetland with high moisture, seasonal wetland with low moisture and cultivated land is very high. Therefore the dry season image in the late November helped to identify SWH and SWL distinctively. That is why we took the GLS 2005 ETM+ image (acquired on 24/11/05) as dry season image.

I am asking again why B6 was not used in the classification? They are proven to be a good one in wetland delineation.

Response: In this research our interest is to test whether the fully automated hybrid classification is suitable for wetland classification or not. There are other techniques that might help wetland classification including the utility of thermal IR (B6) of Landsat TM/ETM+. We didn't test all of them. But because of the heterogeneity in soils, lithology, vegetation cover and topography in Mt. Choke area, we have a fear to consider that the coldest areas coincide with wetland areas. Therefore, our initial investigations did not lead to conclusive results. This may be our future research work to test for our study area.

Not much information on the groundtruthing data used for the 1986 image (Did you use the topos?) How informative are they?

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Response: To validate the classification of the past periods we were limited to topographic maps and aerial photographs. Stratified random sampling design was adopted to select 342 point sample sites. 70% (240 locations) of the collected data were used for classification and 30% (103) for validation. For the 1986 image ground truth data were collected from the 1984 topographic map with 1:50 000 scale. It is very common to use topographic maps for ground truth data (e.g. Hashiba et al., 2000; Peterson and Aunap, 1998). Besides, in places where it is difficult in identifying land covers manual interpretation of photographs (1982) of those specific areas were carried out (for example, at 3 locations). We also made interviews with people who are familiar with the landscape and its historic development to further validate our delineation.

References

Hashiba, H., Kameda, K., Uesugi, S., Tanaka, S., 2000. Landuse change analysis of Tama river basin with different spatial resolution sensor data by Landsat/MSS and TM, Advances in Space Research, Volume 26, Issue 7, Remote Sensing for Land Surface Characterisation, Pages 1069-1073, ISSN 0273-1177, DOI: 10.1016/S0273-1177(99)01120-5.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 6243, 2010.