**1-Modeling Lake Titicaca Daily and Monthly Evaporation**

**Dear reviewer:**

Surprisingly the climate warming in this regions today exceeds the average global warming, the evaporation today is one the variables that might be altered enormously. Then as it is pointed out the evaporation issue is crucial for this lake, also the interest is to propose a practical models for their implementation, beside the couple of models proposed already by Delclaux et al. (2006), which are dependent on limited variables, like solar radiation and wind factor data.

According to the previous studies of evaporation in other places there have been found important differences by applying the daily and monthly computation. We think that in order to study the climate change assessment through the models at different time scale, for the case of Titicaca Lake, must be defined the appropriate models at both time scales, and also based on our available data. For the first time we obtained high resolution met data for this Lake in the last couple of years. Thus the outputs from climate changes scenarios at any time scale should be able to analysis for this Lake.

**Major comments:**

As so far we have rewritten the abstract of the paper as it follows:

**Abstract.** Lake Titicaca is a crucial water resource in the central part of the Andean Mountain range, which is one of the lakes most affected by climate warming. Since surface evaporation explains most of the lake´s water losses, reliable estimates are paramount for the prediction of global warming impacts on Lake Titicaca and for the region´s water resources planning and adaptation to climate change. Evaporation estimates were done in the past at monthly time steps and using the four methods, as follows: water balance, heat balance, and mass transfer and Penman´s equation. The obtained annual evaporation values showed significant dispersion. This study used new, daily frequency hydro-meteorological measurements. Evaporation losses were calculated following the mentioned methods using both, daily records and their monthly averages, to assess the impact of higher temporal resolution data in the evaporation estimates. Changes in the lake heat storage needed for the heat balance method were estimated based on the morning water surface temperature, because convection during nights results in a well-mixed top layer every morning over a constant temperature depth. We found that the most reliable method for determining the annual lake evaporation was the heat balance approach, although the Penman equation allows an easier implementation based on generally available meteorological parameters. The mean annual lake evaporation was found to be 1700 mm year$^{-1}$. This value is considered an upper limit of the annual evaporation since the main study period was abnormally warm. The obtained upper limit lowers by 200 mm year$^{-1}$ the highest evaporation estimation obtained previously, thus reducing the uncertainty in the actual value. Regarding the evaporation estimates using daily and monthly averages, these resulted in minor differences for all methodologies.

**Comment 1:**

Some years ago, I analyzed spatial variation of evaporation in part of the Bolivian Altiplano using remote sensing from MOD16. Unfortunately, MOD16 does not provide data for the Titicaca Lake because of passive imagery limitation. Therefore, it would be interesting if the authors might provide the spatial variability of the evaporation.

**Answer to comment 1:**

Within the territory of Bolivia are established the three main watershed: Altiplano (or TDPS) La-Plata and Amazon, several data source of direct measurement (e.g., radar or satellite) were used recently, mostly for the rainfall spatial analysis (Heidinger et al., 2012; Moya, et al., 2014, Blacutt et al., 2015; Satge et al., 2015, 2017) or for comparison. All the resources showed some discrepancy when using different rainfall features over the regions, for instance, TMPA showed more accurate for the Amazon an for the TDPS, while IMERG of the La-Plata (Satge et al., 2017). Moreover all the product during the rainy season between December-March might increase the performance and less for the dry season. Furthermore Lake Titicaca with extensive water surface area close to 9000 $km^2$, and here some of SREs estimated deficit rainfall, explained and probably due to emissivity contrast, which are: TMPA-3B42, PERSIANN and GSMaP. Also we understood that on MOD16 also there as found similar problems by the time you applied remote sensing data.

In the next paper exactly we will be focused on the spatial evaporation analysis and probably taken into account the MOD data, with more terrain observed data since we have the predicting models. On this aspect your concern really is well focused.

**Comment 2**:

Authors collected data from the hydrological years 2015-2016. Climatological conditions in the Altiplano are highly influenced by El-Niño South Oscillation (ENSO). I believe it would be important to provide some information and discuss about the climate conditions on that year.

**Answer to comment 2:**

We are totally agree with you, part of 2015 and 2016 was one of the strongest El-Niño in the Altiplano, even though the world (http://www.ciifen.org). For sure we will analyze our results related to that event. For that, we will analyze more the air temperature data for longer period; then we should be able to detect the influence on our results the warmer period taken in those months.

In advance, that you very much for your valuable contribution for improving our research.

All the best,

Ramiro