The authors proposed local level seasonal predictions of precipitation in the Western Ethiopia using the statistical approach at eight homogeneous regions clustered using k-means clustering technique. Large scale climate variables are used as potential predictors in developing the statistical model and unique set of predictors were assigned for each region. Results are compared with the dynamical prediction at regional scale and reported as the statistical approach is superior. This study is timely and helpful for the study region where rainfall is highly variable in space. The manuscript is well written and easy to understand and follow. I think this study will be a nice addition however a few moderate issues need to be resolved first. Please see my comments below.

1. The statistical approach is fully data driven approach that depends on the quality and length of the data. So how efficient is this technique in the area where there is sparse and poor quality data in the case of developing country like Ethiopia? The authors did not show how good the gridded rainfall data is through either validating with gauged data for selected weather stations or previous literatures that support the quality of this data.

We thank the reviewer for the comment. The dataset we use has been shown to reproduce station data over areas with both densely and sparsely distributed station networks. The original data is at a 10-day time interval, and we aggregate it to JJAS seasonal total precipitation, which may help offset some random errors and better represent the observations. Regarding the technique itself, as the cluster analysis and statistical model are purely data-driven, the data length and quality is essential to produce skillful results. With time, as the data length and availability improve, results are expected to become more skillful.

To justify the data quality, the following texts are added to the manuscript (Page 4 Line 7):

"…1983–2011 (29 years). This product has been verified against station data and has been deemed representative of observed precipitation in western Ethiopia (Dinku et al., 2014). "

And in the discussion (Page 15 Line 10):

"With additional data length in the future, the data-driven cluster analysis and statistical modeling approach are also expected to produce more confident, and perhaps skillful, results."

2. The author argue that this study gives perdition of seasonal precipitation at high resolution in the region. However, the classification of the homogeneous regions by NMA, Ethiopia, for the study region is almost equivalent (Koricha et al., 2007, pg 7685). I do not see any benefits of this study interms of the spatial resolutions at regional scale for Western Ethiopia.

We thank the reviewer for the comment. We agree that classifications of homogeneous regions are similar but still different. The prediction at regional scale in this study helps to verify our classification method, which is distinct from NMA's classification (see details in Zhang et al. (2016)). The regional-scale prediction also serves as an intermediate predictand for the grid-scale prediction under the indirect case. However, like the reviewer indicated, the highlight of the work should be the high-resolution prediction at grid scale.

3. No effort have been made on finding out the time lag between the predictor variables and the seasonal rainfall in the study area. For example which month of sea surface temperature really affects the seasonal rainfall in the study area.

We confirm that only one lead time is investigated in this work, and mention in the discussion that longer prediction lead times and evaluation of other relevant characteristics (e.g. intra-seasonal dry spells, seasonal onset or cessation, etc.) warrant future attention. However, for the purposes of this study, we consider only one lead time and instead focus on whether cluster analysis serves as a useful precursor to seasonal precipitation prediction at the local scale. Additional lead times can also be

readily applied to the current framework and are likely to be informative as to which months in the season-ahead are most related to JJAS seasonal precipitation.

4. I don't see any comparison of the result with the current operational NMA forecast in the manuscript, however, it is reported in the conclusion section asif the result is compared at the regional scale with NMA operational forecast.

We have compared our results and NMA's results qualitatively only, and briefly mention in the discussion that at the regional scale, our results are more skillful than NMA's prediction, based on (Korecha and Sorteberg, 2013). We have revised the sentence to avoid confusion:

"At the regional scale, the approach shows qualitatively comparable results with current NMA operational forecasts, demonstrating moderately more skill than climatology (Korecha and Sorteberg, 2013)"

Upon the reviewer and editor's request, we can add more details comparing against NMA's prediction for each clustered region.

5. The abstract is too short and mainly focused on the merit of conducting this study. It would be good if it is supported with some finding. There is no introduction given about the study area interms of the rainfall patter, topography etc.

We thank the reviewer for the comment. More content is added to the original manuscript (also included here):

In introduction:

"Precipitation in western Ethiopia peaks in the summer with approximately 70% of annual total precipitation falling during the main raining season - also known as the Kiremt season spanning from June to September (JJAS). On average, the seasonal total precipitation in the study region is approximately 760 mm; however in the northwest, precipitation can exceed 1200 mm (Fig. 1a). Along with the high spatial variability in this mountainous region, the temporal variability is also significant with spatial-average

seasonal total precipitation ranging from 650 mm in dry years up to 900 mm in wet years (Fig. 1b). These highly variable spatial and temporal precipitation patterns have made skillful seasonal predictions challenging, particularly at local scales. ”

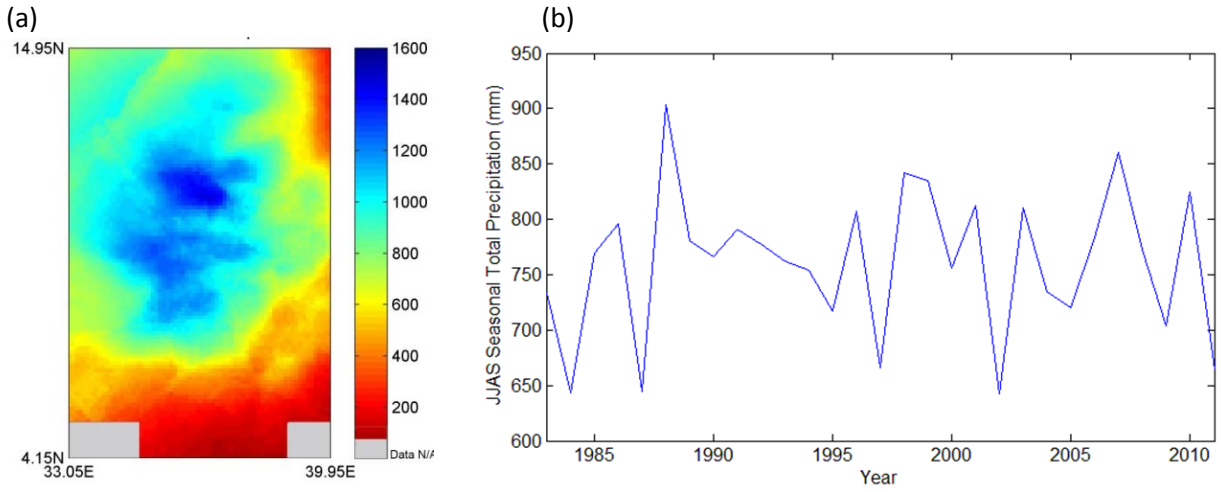

Figure 1: Spatial and temporal variability of June-September seasonal total precipitation in western Ethiopia: (a) spatial pattern of temporal-average, and (b) spatial-average time series.

In abstract:

“… makes clear advances in modeling methodology and resolution, as compared with previous studies. The statistical model prediction results show improvements over non-clustered case for some clusters. Among those clusters, Cluster 5, in agriculturally rich central-northwestern Ethiopia, performs best, with correlation and RPSS values of 0.5 and 27.4%, respectively. The general skill of dynamical models over the entire study region is higher than statistical models, although dynamic models produce a lower resolution prediction. However, for some specific clustered regions such as Cluster 5, statistical model outperforms dynamical models with grid-level predictions demonstrating higher correlations and RPSS in a finer resolution. ”

Reference from reviewer’s comments:

Korecha, D., and Sorteberg, A.: Validation of operational seasonal rainfall forecast in

Ethiopia, Water Resources Research, 49, 20 7681-7697, 10.1002/2013wr013760, 2013.

Reference from the author's responses:

Dinku, T., Hailemariam, K., Maidment, R., Tarnavsky, E., and Connor, S.: Combined use of satellite estimates and rain gauge observations to generate high-quality historical rainfall time series over Ethiopia, International Journal of Climatology, 34, 2489-2504, 10.1002/joc.3855, 2014.
Korecha, D., and Sorteberg, A.: Validation of operational seasonal rainfall forecast in Ethiopia, Water Resources Research, 49, 7681-7697, 10.1002/2013wr013760, 2013.
Zhang, Y., Moges, S., and Block, P.: Optimal Cluster Analysis for Objective Regionalization of Seasonal Precipitation in Regions of High Spatial-Temporal Variability: Application to Western Ethiopia, Journal of Climate, 29, 3697-3717, 10.1175/Jcli-D-15-0582.1, 2016.