

Answers to comments for HESSD

Answer to Referee 1

General:

- ✓ Spelling errors are all revisited and corrected
- ✓ Reference listings and citations are now corrected
- ✓ Linking the results with similar works of others and comparing with other parts of Ethiopia is also attempted but there only very few similar works done in Ethiopia
- ✓ Capitulation and table errors are revisited
- ✓ Missed words and phrases in the Abstract is correctly included (eg-----for the question which decade is second decade of June)

Specific

- ✓ Pages 3735 line 12,
- ✓ 3735 line 21,
- ✓ 3735 line 22-28,
- ✓ 3736 line 26,
- ✓ 3737 line 2 are all corrected according to the comments
- ✓ Page 3737 line 22, A minimum rainfall depth of decadal time step (ten-days).....
- ✓ Page 3738 line 1-10, location map will be included and growing period for the major crops grown will be included in the article
- ✓ Page 3738 line 15 citation is corrected
- ✓ Page 3738 line 22 table 1 should not have been captioned that way and will be corrected and rearranged
- ✓ Page 3739 line 14 citation is revisited
- ✓ Page 3741 equation symbols are corrected
- ✓ Page 3742 line 15 reference listing will be corrected
- ✓ Page 3744 line 22 season names corrected as comments
- ✓ Page 3745 line 18, the minimum requirement is a rainfall depth of a decade in for particular growing season needs to be at least 30mm or the rainfall depth of a certain decade equal to half of the potential evapotranspiration. In this regard most of the decades in Belg failed to meet this threshold limit.
- ✓ Page 3745 line 20, the phrase this 'particular season' refers to Belg
- ✓ Page 3746 line 12, the figure number is corrected
- ✓ Page 3747 line 2 is corrected as commented (tables, figures captions will be improved) and the source of table 1 is Vermes(1998).

Answers to Referee-2

General

- ✓ The order of equation is revisited and put in place in one series for better readability
- ✓ The reference listings and citations are also checked and corrected

Specific

- ✓ Page 3734 line 5, 6 and 15, the words are corrected as commented
- ✓ Page 3736 line 16, naming is corrected to match the reference section with what in the text
- ✓ Page 3737 , Line 19, and 22 corrected as in the comment
- ✓ Page 3738 line 4 year is added to Yemenu (Yemenu, 2009)
- ✓ Page 3738, line 23, this table caption should not have that way and also corrected to describe the content of the table
- ✓ Page 3738 line 25 corrected as commented and Eq 17-18, $Z=SPI$ was only put for purpose of illustration
- ✓ Page 3740 equation 1-6 the equation symbols are explained as in the comment
- ✓ Page 3739 line 3 done as in the comment
- ✓ Page 3740 line 19 corrected as in the comment
- ✓ Page 3741 Eq. 10 -14 , there has been no differences between $P1$ and Pw and similarly between Po and Pwd put in place for simplicity for they were used for different equation series but now I have considered the comment and put the equations in one series and symbolic illustrations are also corrected accordingly.
- ✓ Page 3741 line 16 and 18 , Standardized precipitation index is simply the difference of precipitation from the mean for a specified time period divided by the standard deviation where the mean and standard deviation are determined from past records. The disadvantage of this simple method is that precipitation is typically not normally distributed for accumulation periods of 12 months or less, but this can be overcome by applying a transformation to the distribution. Thom (1958) found the gamma distribution function to fit climatological time series well. I am interested in SPI because it only requires precipitation data (the easily and sufficiently available data in our Country) for defining drought and wet events and in addition it is now well used in the world.
- ✓ Page 3742 line 1 done as in the comment
- ✓ Page 3742 Eq 13-14, the λ is removed as commented and line 6, the unit of precipitation is mm

- ✓ Page 3744 line 1 done as commented
- ✓ Page 3744 line 18-21, the threshold limit values is taken from the FAO (1978) model basing the concept: Crops are seriously affected if the rainfall or water amount they are given is less than half of their crop water demand (in this case half of the potential evapotranspiration), Hence in this case the threshold limit is defined as: rainfall amount in a decade is greater than or equal to half of the potential evapotranspiration. In another model Redy(1990) defined the minimum amount of daily rainfall requirement of crops needs not to be less than 3mm and hence for a decade (10 days) this will amount 30mm. Thus we used this limit for calculating and defining the dry and wet spells in the growing seasons.
- ✓ Page 3744 line 22, changed as in the comment
- ✓ Page 3745 line 21 done as in the comment
- ✓ Page 3746 line 3, 13 14 and 24 are all corrected as commented

References: I have take the comment and correct the styles as commented, and also add the missing references

Tables

- ✓ Table 1 is not correctly captioned and will be corrected; Tabel 1 in the body was made out as enough was said about the construction of SMDs and was wrongly referred to this table in the body which had different content.
- ✓ Table 2. the classification of the stability of the onset basis the value of the standard deviation of the onset decades of growing seasons (Redy,1990). Here is the table for reference:

. Parameters used to determine the stability onset of the
growing season

Standard deviation (SD in no of decades)	Stability
< 1	Very high
1-2	High
2-4	Moderate
>4	Low

- ✓ Table 4 done as commented
- ✓ Table 5, 6 7, 8 and 9 Will be improved as commented
- ✓ Fig. 2 is corrected as commented and the unit of precipitation is mm
- ✓ The ration between precipitation and ETo is put in place for each year and comparison will be made.
- ✓ The intensity of drought (DI) was calculated by dividing the sum of the SPI values over the time the drought has elapsed in a given time or period.

Answers to Referee 3

- ✓ This particular referee has commented the article in general sense with the exception that he had /she had very important issue for us to explain the differences between the contents of the tables 9 and 10. We were a little bit biased in interpreting the tables based on their contents though the figures in the tables are almost similar. We have taken the consideration to meaningfully improve the interpretations.