Thank You for the review and the comments. We acknowledge the input and will consider it in revised version of the paper.

**Responses to the comments:**

1. **It was mentioned by the referee that scaling should be reconsidered.**

Removal of seasonal cycle doesn't impact our result as PCA is performed on covariance matrix. For example, let's look at two variables X and Y. Let's assume we are performing some standardization on each of them and acquiring new variables X' and Y':

$$X' = \frac{X - C_1}{S_1}, \quad Y' = \frac{Y - C_2}{S_2}$$

Covariance between initial variables is:

$$Cov(X, Y) = \frac{\sum_{i=1}^{n}(X_i - \bar{x})(Y_i - \bar{y})}{n - 1}$$

Covariance between transformed variables:

$$Cov(X', Y') = \frac{\sum_{i=1}^{n}(X_i{}' - \bar{x}')(Y_i{}' - \bar{y}')}{n - 1}$$

Where:

$$\bar{x}' = \frac{1}{n}\sum_{i=1}^{n} X_i' = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{X_i - C_1}{S_1}\right) = \frac{1}{S_1}\left(\frac{1}{n}\sum_{i=1}^{n} X_i - C_1\right) = \frac{1}{S_1}(\bar{x} - C_1)$$

And:

$$(X_i' - \bar{x}') = \frac{1}{S_1}(X_i - C_1 - \bar{x} + C_1) = \frac{1}{S_1}(X_i - \bar{x})$$

Similarly:

$$(Y_i' - \bar{y}') = \frac{1}{S_2}(Y_i - \bar{y})$$

And this implies that covariance and therefore PCA is not affected by subtracted values:

$$Cov(X', Y') = \frac{\sum_{i=1}^{n}(X_i - \bar{x})(Y_i - \bar{y})}{(n - 1)S_1 S_2}$$

Subtraction of mean values is important for visualization as it gives similar range for principal components and therefore of their illustration. The change of scaling in regard to subtraction of mean value will impact the values, but won't impact the pattern.

As for scaling future – we wish to compare the change in climate index from past to future and data processing should be kept similar in our case. As a similar example could be

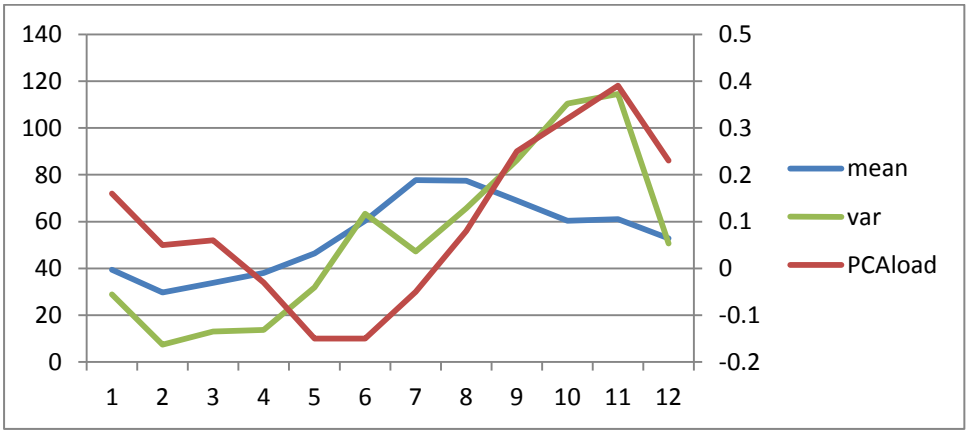
considered comparison of growing degree day sum in past and future. If we wish to make comparison then usually same base temperature and period (start, end date) should be used for both past and future, even though there might be changes in seasonality.

Also our method was mentioned as valid in Cai et al. (2013). Still we agree that adjustments to scaling should be considered (in addition to rotation of principal components) in future development of these climate indices and this point was mentioned in the 'Discussion' part.

2. **Result interpretation and conclusions**

We agree that the interpretation of our results should be reviewed and often clarified or reconsidered, especially that it should be emphasized that any correlation we mention is spatial not temporal. Many of referee's comments are on point and will be implemented in revised version of the paper.

**"The difference is clearer for precipitation, where the PC1 precipitation loadings have a max in November and a min in May/June, whereas the precipitation seasonal cycle has a max in August and a min in February. That is, the annual cycle of the precipitation distance-to-the-coast effect is nearly orthogonal to the season cycle of precipitation itself – high values of PC1 do not describe a climate in which precipitation is similar throughout the year!"**




The aim of PCA is to explain variance, so there is high correlation with seasonal variance, not seasonal mean values.

3. **Details on interpolation methodology. "Finally, the methods section is missing important information: What interpolation method was used? What grid did you interpolate onto? what resolution ENSEMBLES simulations were used? did you bias-correct each pixel from each RCM separately? How did you deal with cases where there are more than one station corresponding to a given RCM pixel (if you used 50km resolution simulations, this must have happened a lot?)"**

This is explained in detail in the article that we referenced: Sennikovs, J., Bethers, U.: Statistical downscaling method of regional climate model results for hydrological modelling, Proc.18th World IMACS / MODSIM Congress, Cairns, Australia 13-17, 2009.

We will consider adding more information about the methodology in the revised version of the article.

4. **“Table 4, 5 and Figure 7 contain essentially the same information; not sure it is worth having all three.”**

Will be considered in the revised version. There is purpose for each table/figure. Table 4 defines climate indices (this table probably can be considered for removal). In table 5 correlation coefficients are calculated. They are similar to loadings, but there are differences that make them more suited for interpretation of the results. And figure 7 is required to show that acquired climate indices hold there meaning also in future (alternative was table of correlation coefficients for future, but figure was both more illustrative and felt less redundant). We will consider adding more explanation in revision of paper on use of correlation coefficients.