Earth System
Dynamics

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Supplement of

Seasonality and spatial variability of dynamic precipitation controls on the Tibetan Plateau

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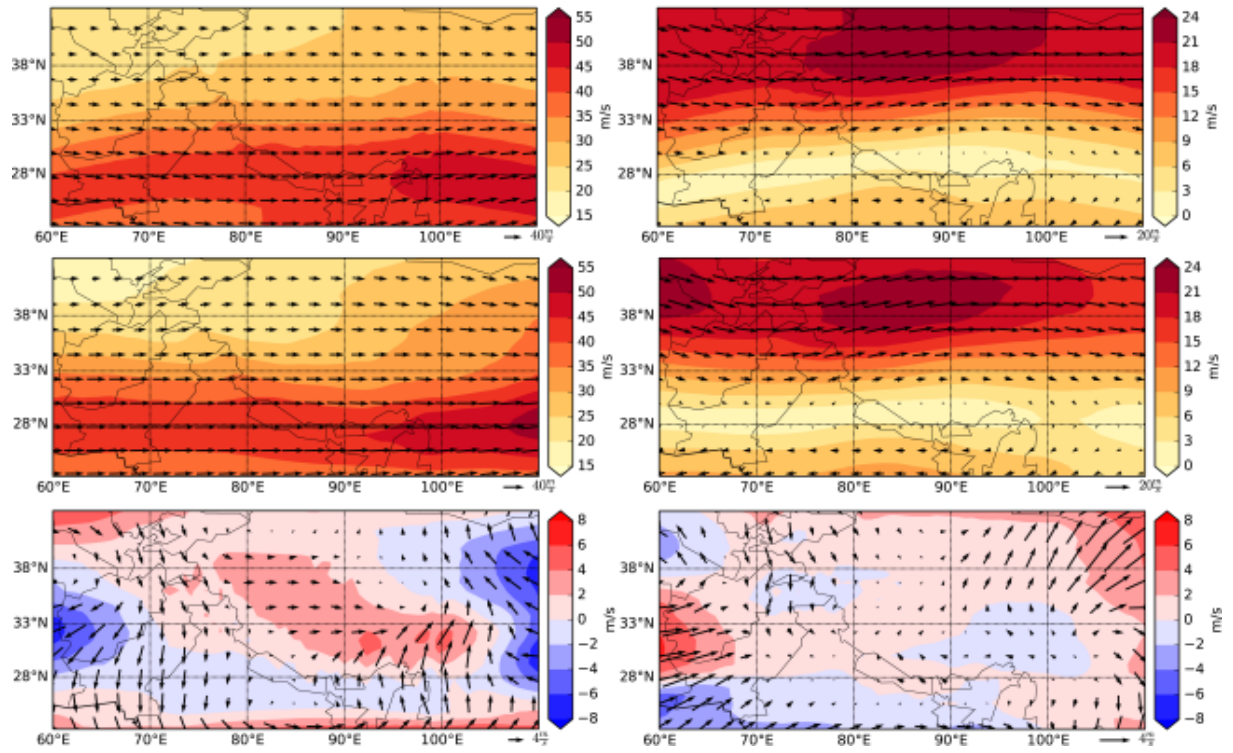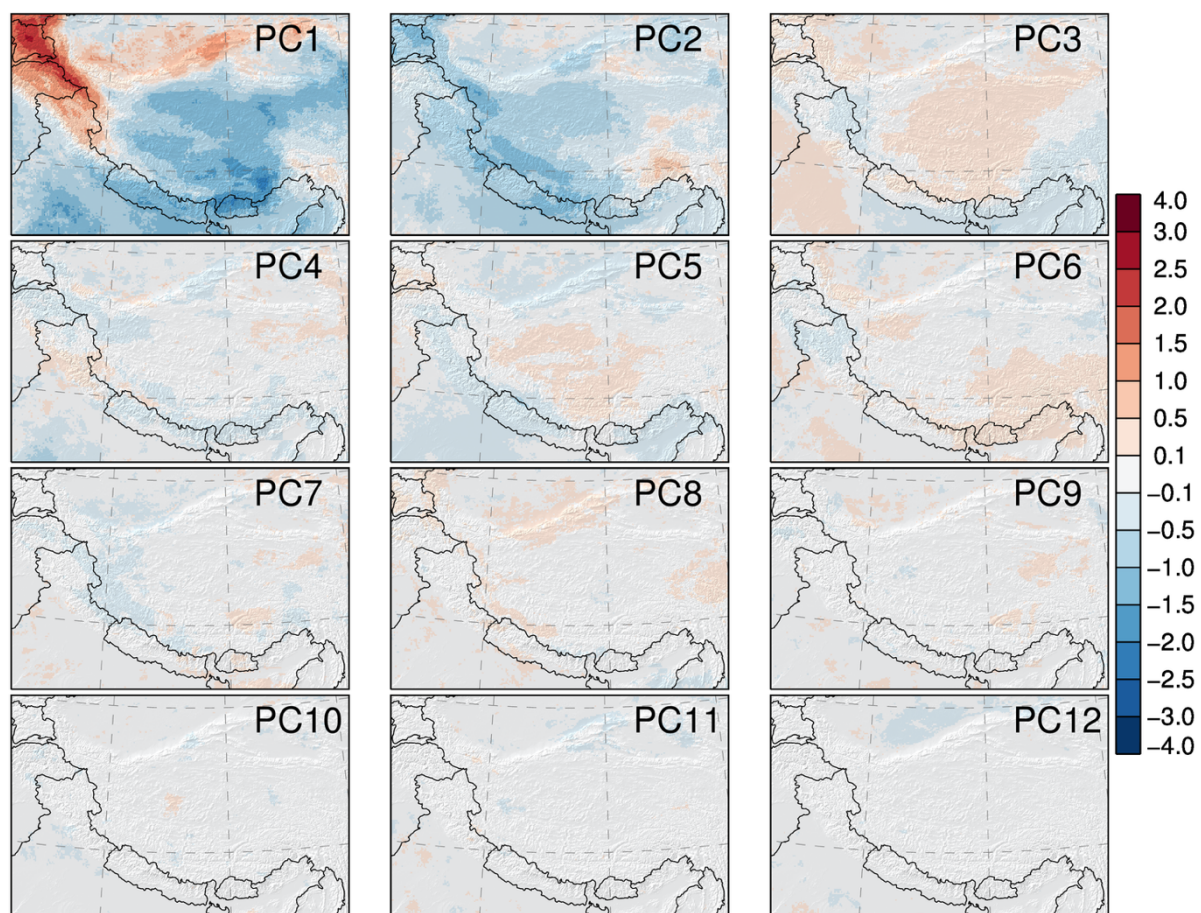*Correspondence to:* Julia Curio (julia.curio@tu-berlin.de)

Fig. S1: Mean wind speed at 300 hPa for January (left column) and July (right column) for HAR10 (top) and ERA-Interim (middle) and the differences between them (bottom).
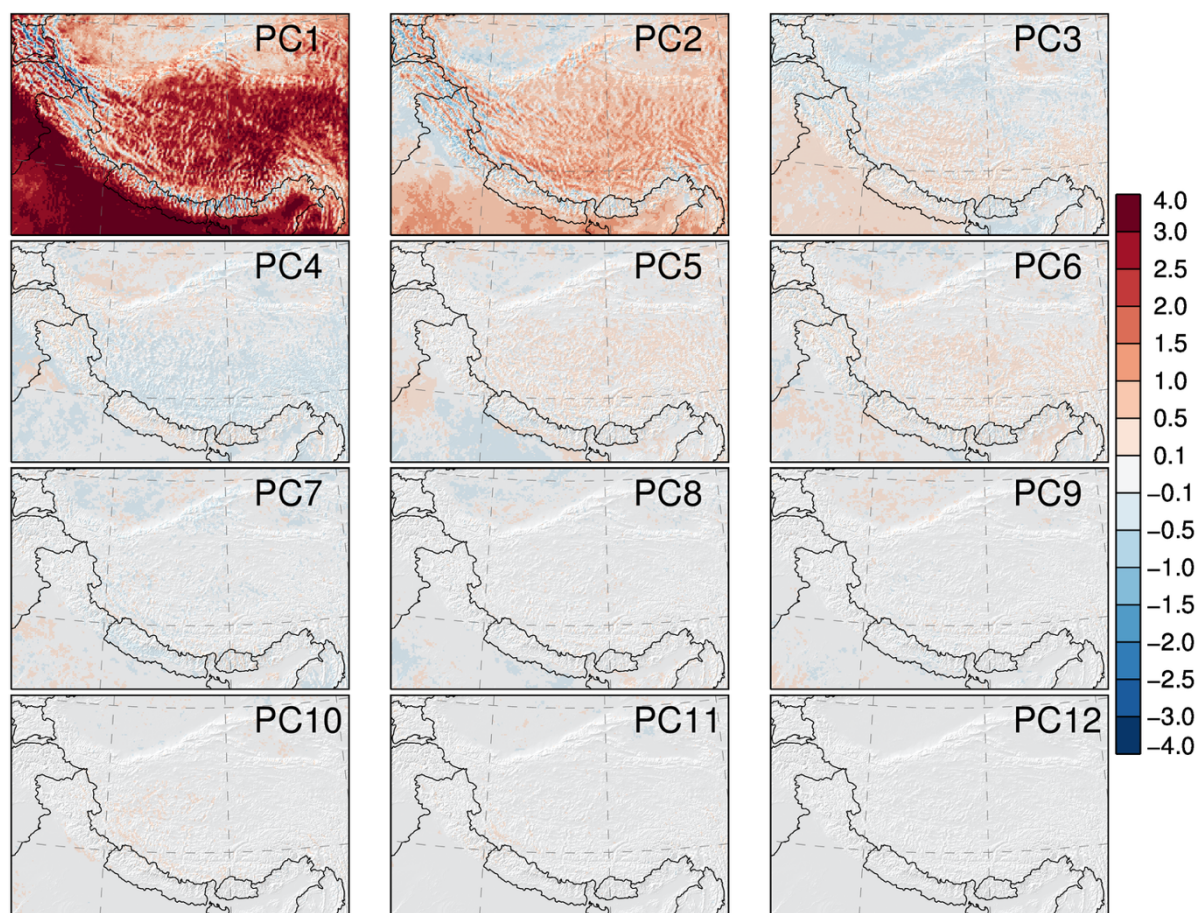
S2. Scores of all principal components (PC1-PC12) for the correlation between horizontal wind speed at 300 hPa (WS300) and precipitation. Positive values are denoted in red, while negative values are denoted in blue.
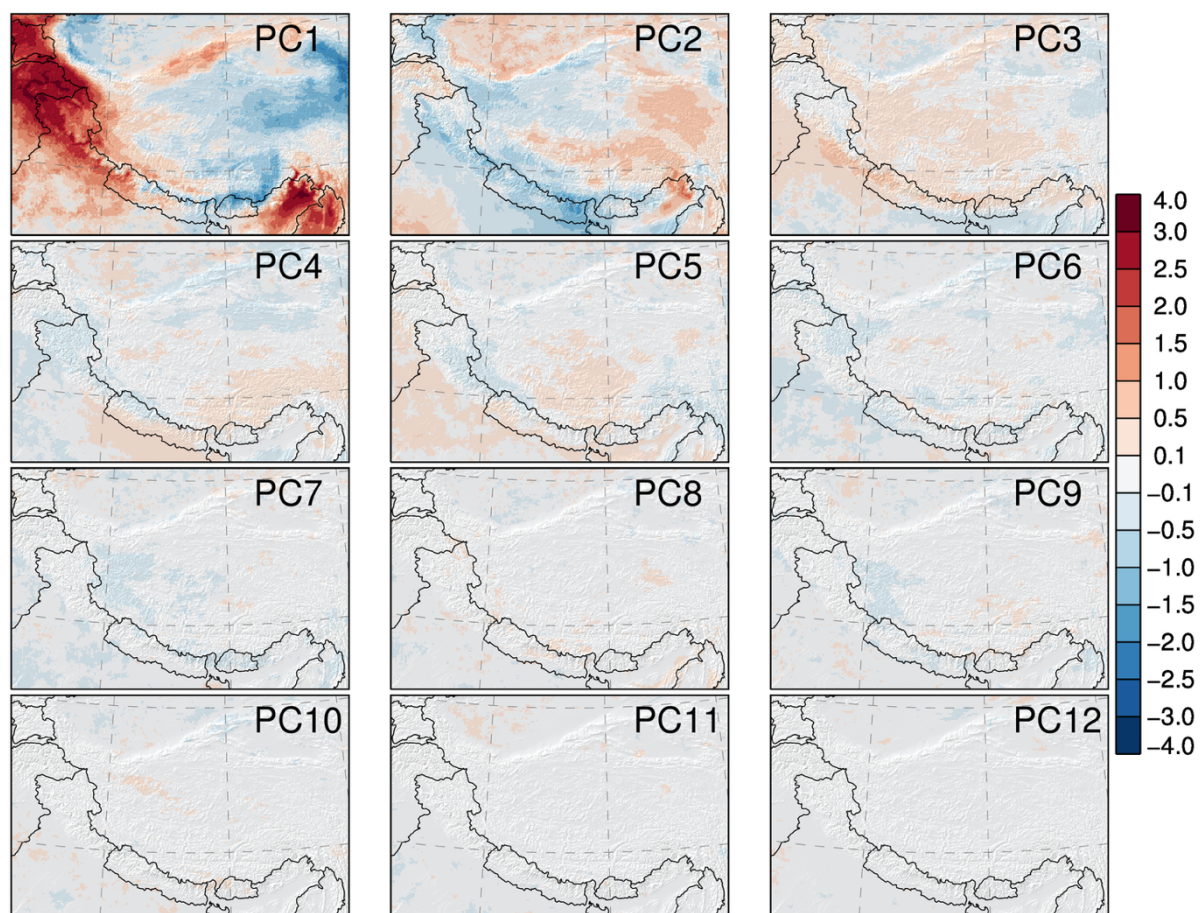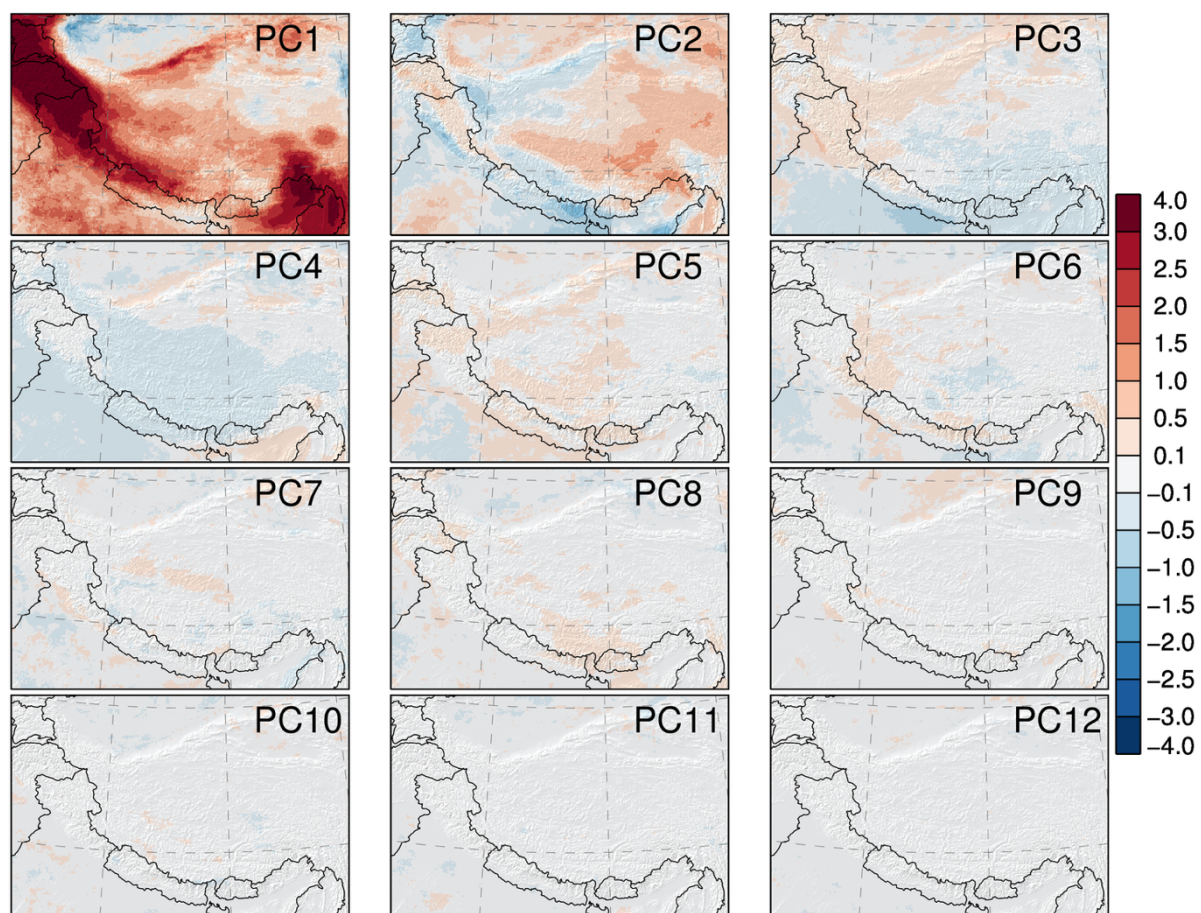
S3. Scores of all principal components (PC1-PC12) for the correlation between horizontal wind speed at model level 10 (WS10) and precipitation. Positive values are denoted in red, while negative values are denoted in blue.

S4. Scores of all principal components (PC1-PC12) for the correlation between vertical wind speed at 300 hPa (WS300) and precipitation. Positive values are denoted in red, while negative values are denoted in blue.

S5. Scores of all principal components (PC1-PC12) for the correlation between atmospheric water transport (AWT) and precipitation. Positive values are denoted in red, while negative values are denoted in blue.
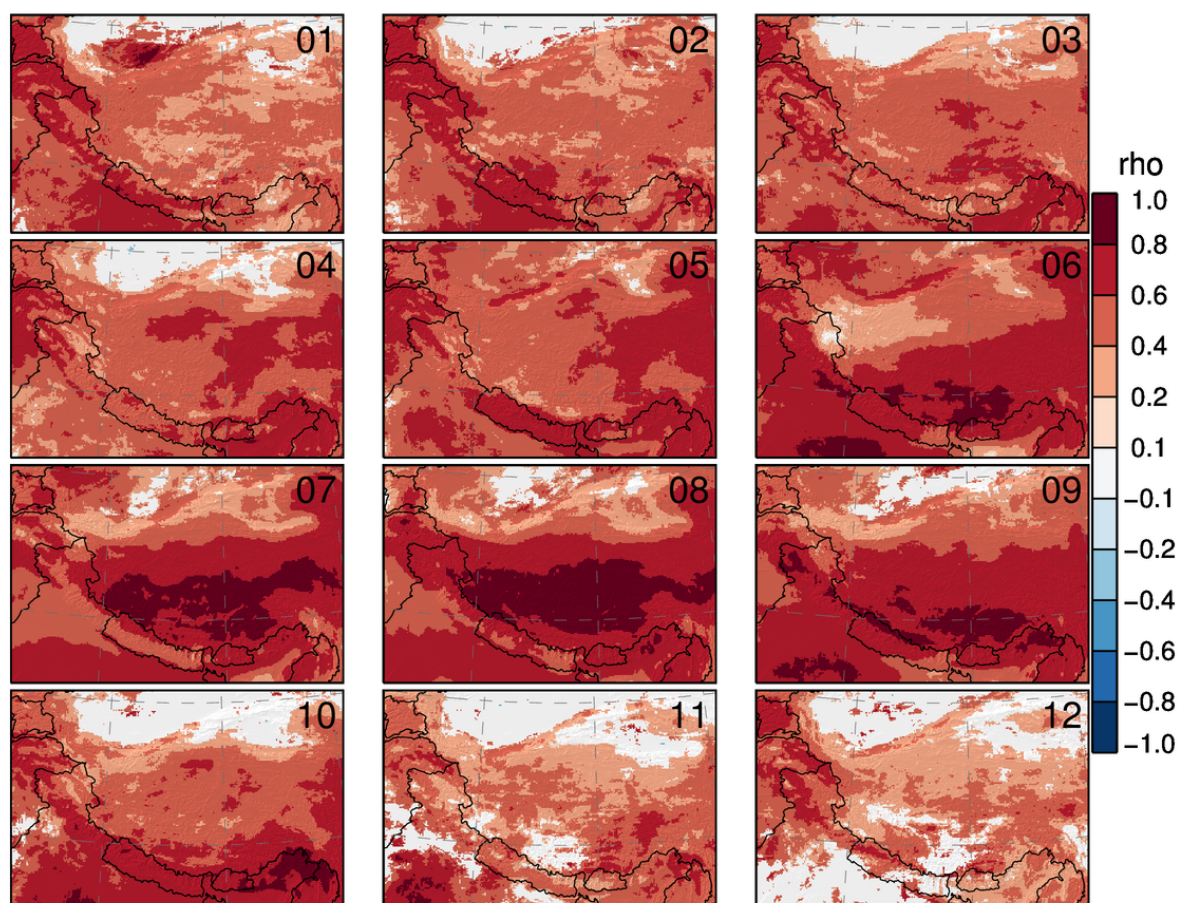
Fig. S6: Coefficient of correlation (rho) between the vertically integrated atmospheric moisture content and precipitation for all months (01-12). Positive correlations are denoted in red, while negative correlations are denoted in blue. Only correlations significant at the 0.05 significance level are shown.

Fig. S7: Coefficient of correlation (rho) between the horizontal wind speed at 200 hPa and precipitation for all months (01-12). Positive correlations are denoted in red, while negative correlations are denoted in blue. Only correlations significant at the 0.05 significance level are shown.
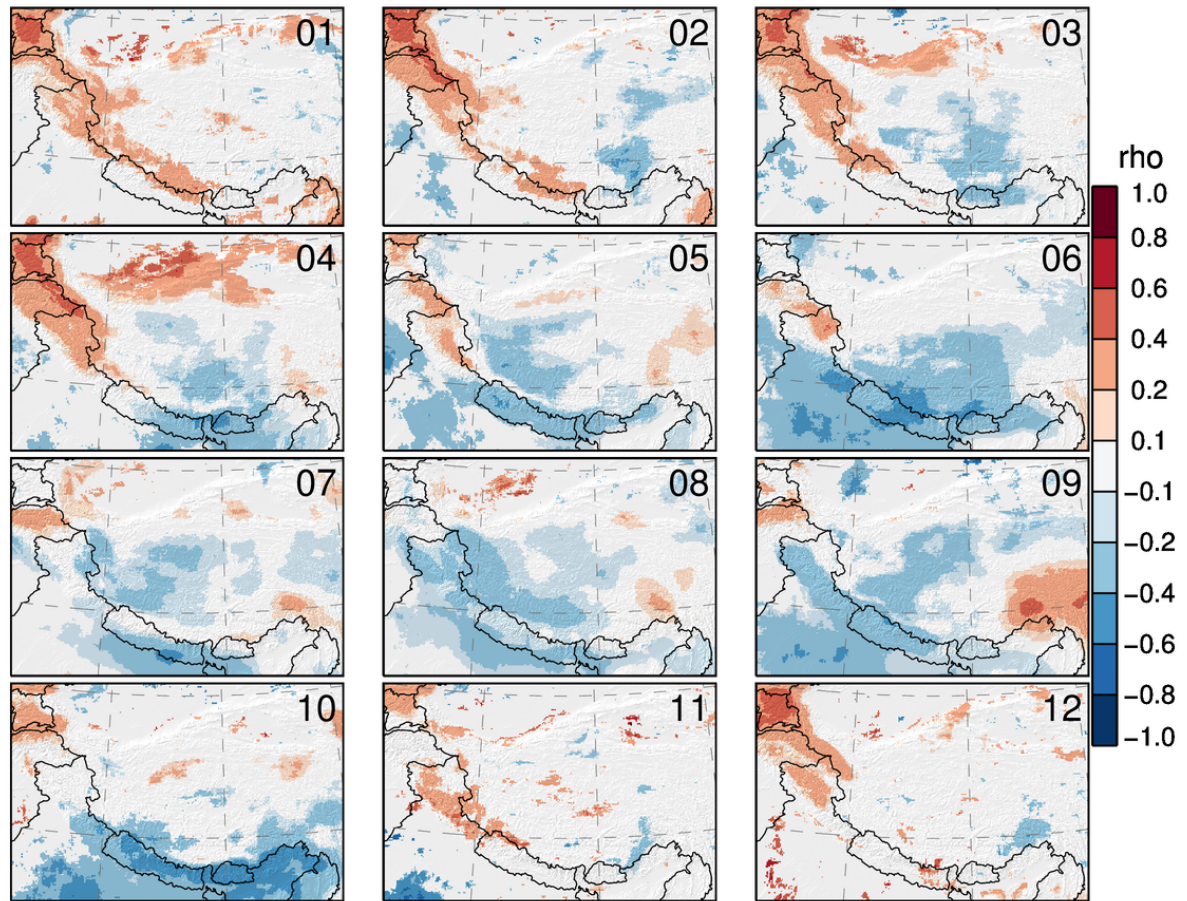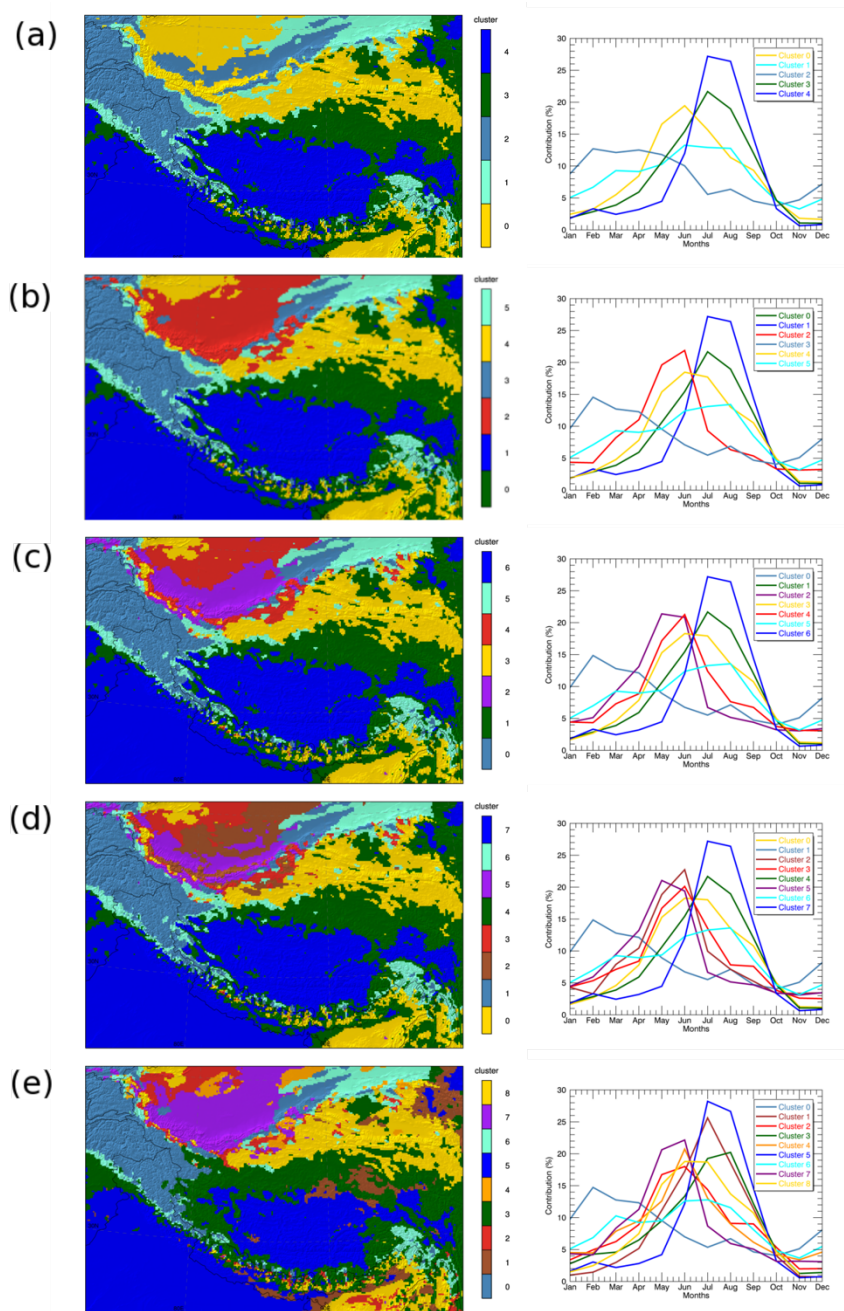
Fig. S8: Precipitation cluster (left) and the mean annual cycle of percentage contribution of monthly precipitation to annual precipitation for each cluster (right) for different numbers of clusters: 5 (a), 6 (b), 7 (c), 8 (d), 9 (e).
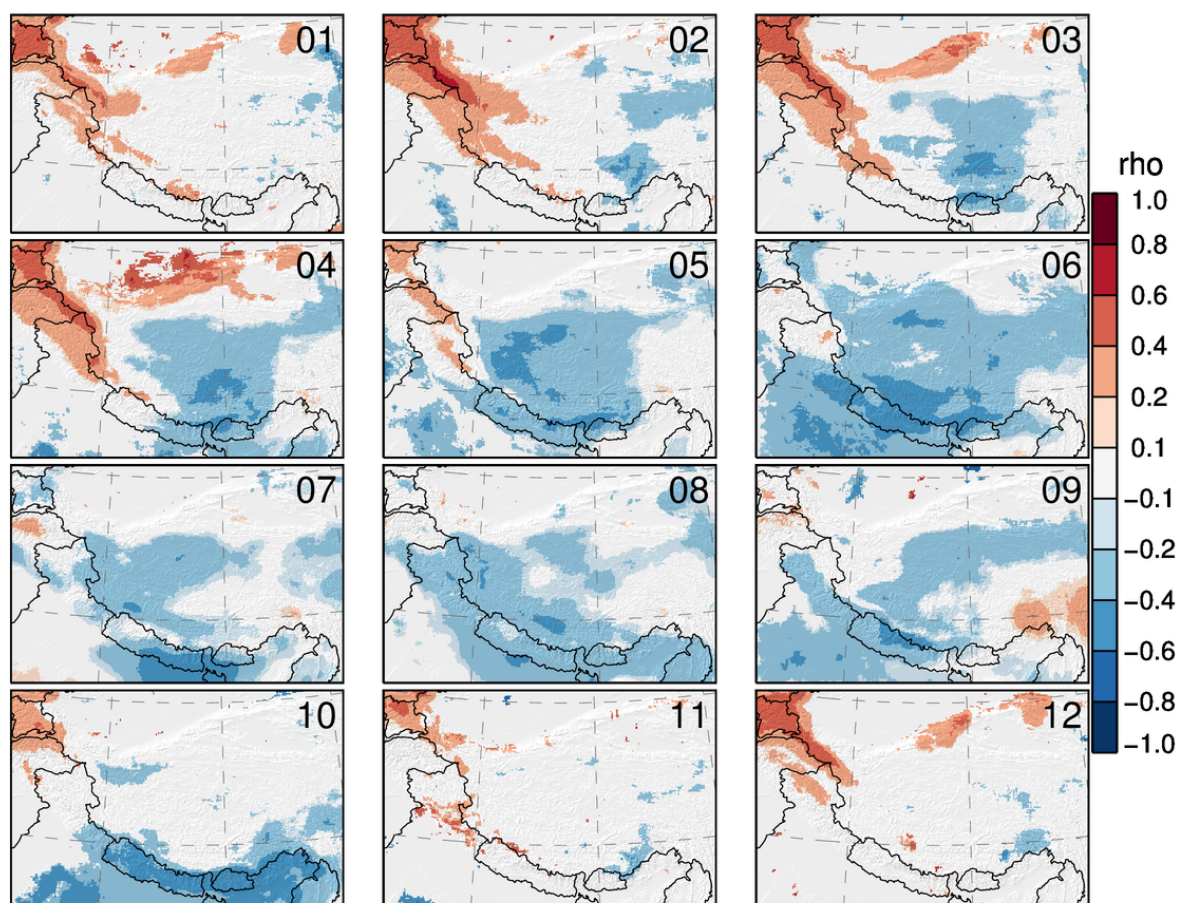
Fig. S9: Coefficient of correlation (rho) between the horizontal wind speed at 300 hPa and precipitation for all months (01-12). Positive correlations are denoted in red, while negative correlations are denoted in blue. Only correlations significant at the 0.01 significance level are shown.

Computation of significance of the correlations:

The statistical significance of the results was tested using a two tailed test to determine the deviation from zero. We used the r_correlate routine of the software IDL to compute the Spearman rank correlation and its level of significance. The source code references to the textbook "Numerical Recipes, The Art of Scientific Computing (Second Edition), Cambridge University Press, ISBN 0-521-43108-5". The pages 640-642 describe the Spearman Rank-Order Correlation Coefficient. The two-sided significance level is extracted from the t-value based on the degree of freedom (N-2) and its beta distribution. The routine returns the variable probrs, which is the p-value and gives the significance of the correlation coefficient. A small value of probrs indicates a significant correlation. This value has to be compared with the value set for the significance level in order to determine whether it is significant at the given significance level or not.

rs: Spearman rank-order correlation coefficient

N-2: degrees of freedom

t = rs * sqrt(N-2 / 1-rs2)   ;its t-value

probrs = betai(0.5 * (N-2), 0.5, (N-2) / (N-2) + t * t)   ;its significance, p-value