# *Supplement of*

# Sensitivity of precipitation in the highlands and lowlands of Peru to physics parameterization options in WRFV3.8.1

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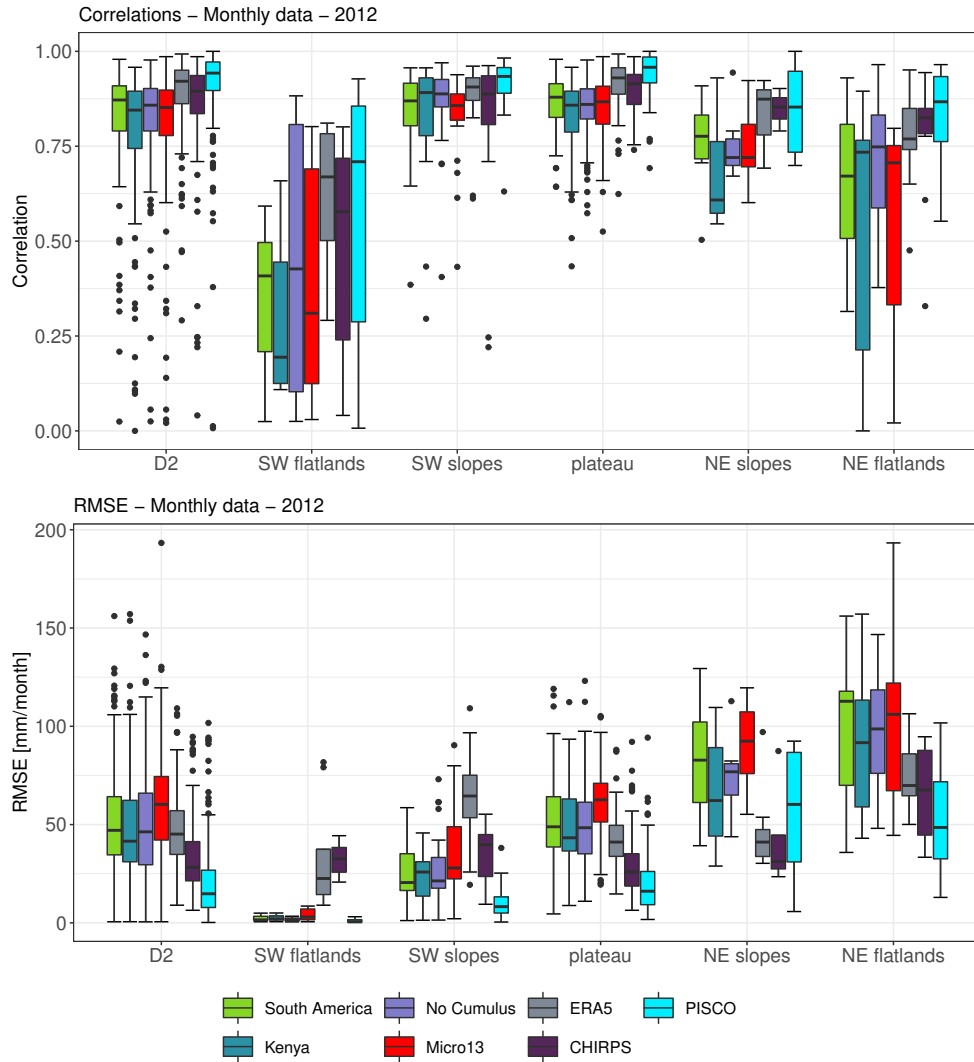
**Figure S1.** Box and whisker plots showing the (a) temporal Spearman correlation and (b) RMSE (in millimetres per month) for precipitation in 2012 against weather station data. The box and whiskers are divided into six groups according to the elevation of each station and location related to the Andean mountain range: the entire domain, the SW flatlands, the SW slopes, the plateau, the NE slopes, and the NE flatlands.
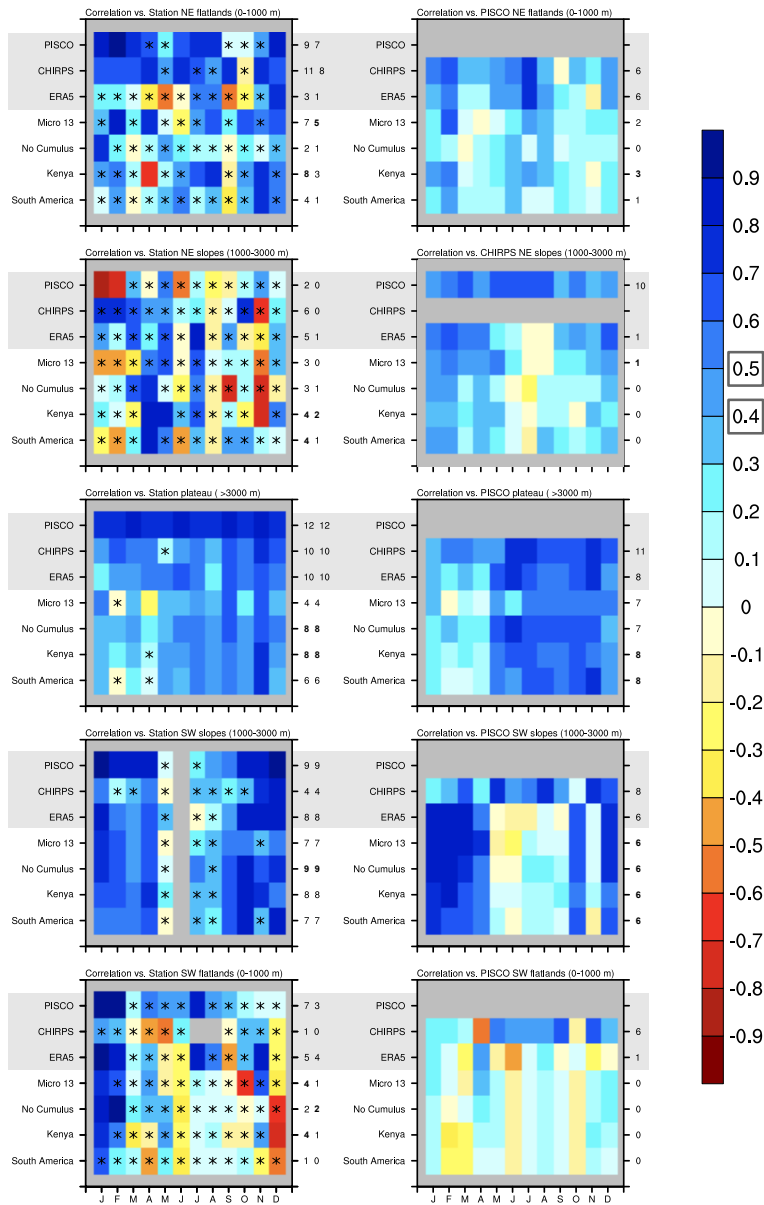
**Figure S2.** Spearman pattern correlation for year 2012 compared to weather station data (left column) and compared to PISCO (right column) and CHIRPS (only second row, right column). The five rows represent stations and data points in the northeastern flatlands (< 1000 metres a.s.l.), along the northeastern slopes of the Andes (1000–3000 metres a.s.l.), on the plateau (> 3000 metres a.s.l.), along the southwestern slopes of the Andes (1000–3000 metres a.s.l.), and in the southwestern flatlands (< 1000 metres a.s.l.), respectively. The light grey shading denotes satellite based or reanalysis data, and facilitates the separation from the WRF simulations. Asterisks inside the pixels indicate non significance at $\alpha = 5\ \%$. The numbers in the first column of the right y-axis indicates the number of months that result in a correlation larger than 0.5 compared to weather station data (left panels) and 0.4 in comparison to PISCO and CHIRPS data (right panels). The second column of the right y-axis considers only months that are statistically significant (left panels only). The bold numbers indicate the best option for each region.
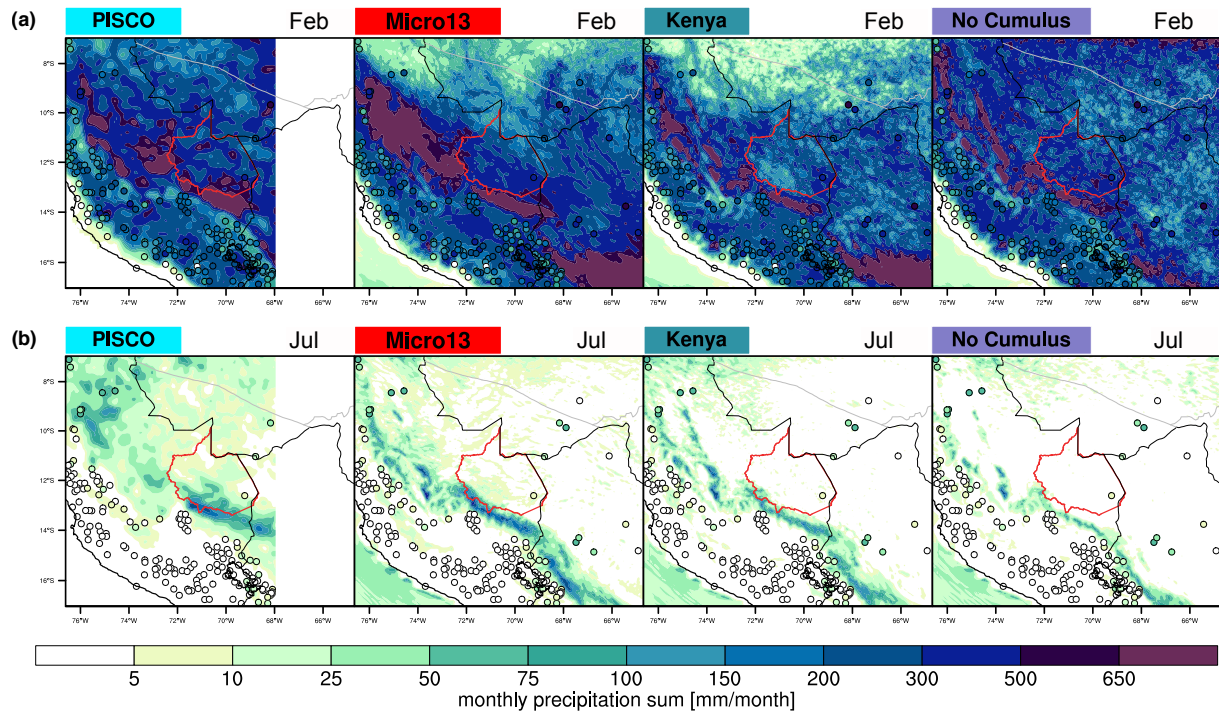
**Figure S3.** Monthly precipitation sums in millimetres per month for (a) February 2012 – a month in the rainy season and (b) July 2012 – a month in the dry season are shown for the gridded observational data set PISCO and the parameterization options Micro13, Kenya, and No Cumulus. February 2012 also represents a month in which the measured precipitation amounts exceeded the inter-quartile range of the climatology (see Fig. 2). The circles on the map indicate the monthly precipitation sums recorded at the respective weather station.