Electronic Auxiliary Material for

Orographic barriers, high-resolution TRMM rainfall, and relief variations along the eastern Andes

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Methods

In order to convert the remotely-sensed 2B31 rainfall rate into absolute rainfall amounts, we calibrate the scaled data with gauged rainfall data from 1970 stations throughout South America (Fig. DR1) [*GDCNV1*, 2002].
We compare each rain station with its corresponding 5x5 km TRMM grid cell. The elevation distribution of the stations suggest that we capture rainfall above 1km elevations fairly well, as nearly half of the entire station dataset is located at elevations above 1km (Fig. DR2). Despite the different spatial resolution, we obtain a good fit of the data ($y = x* 9.136 \pm 0.124$, $r^2 = 0.75$) (Fig. DR3). We fitted the data using a robust least square method. Interestingly, TRMM calibration on the Indian subcontinent and in Himalaya using 1722 stations show a similar, but slightly lower 2B31 calibration factor of 9.424 ± 0.134 with $r^2 = 0.82$ [*Bookhagen and Burbank*, submitted]. Future calibration with more stations may slightly modify the calibration factor, but relative rainfall amount will remain the same. In general, the remotely-sensed rainfall data correlates very well with the ground-control stations – even higher annual rainfall amounts above 5 m/yr are accurately depicted. This corroborates our earlier and recent findings from the Himalaya that, despite non-continuous TRMM-rainfall data series, relative values represent a valid rainfall distribution [*Bookhagen and Burbank*, 2006; submitted].

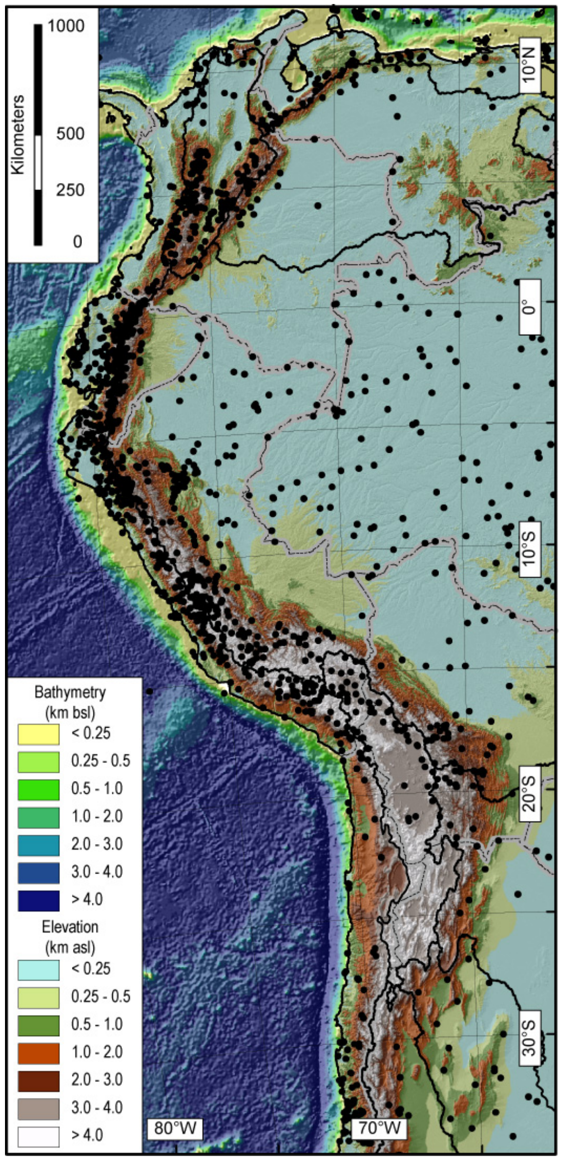

Fig. DR1: Topography and location of stations used for TRMM calibration. We utilized the Global Daily Climatology Network dataset [*GDCNV1*, 2002].

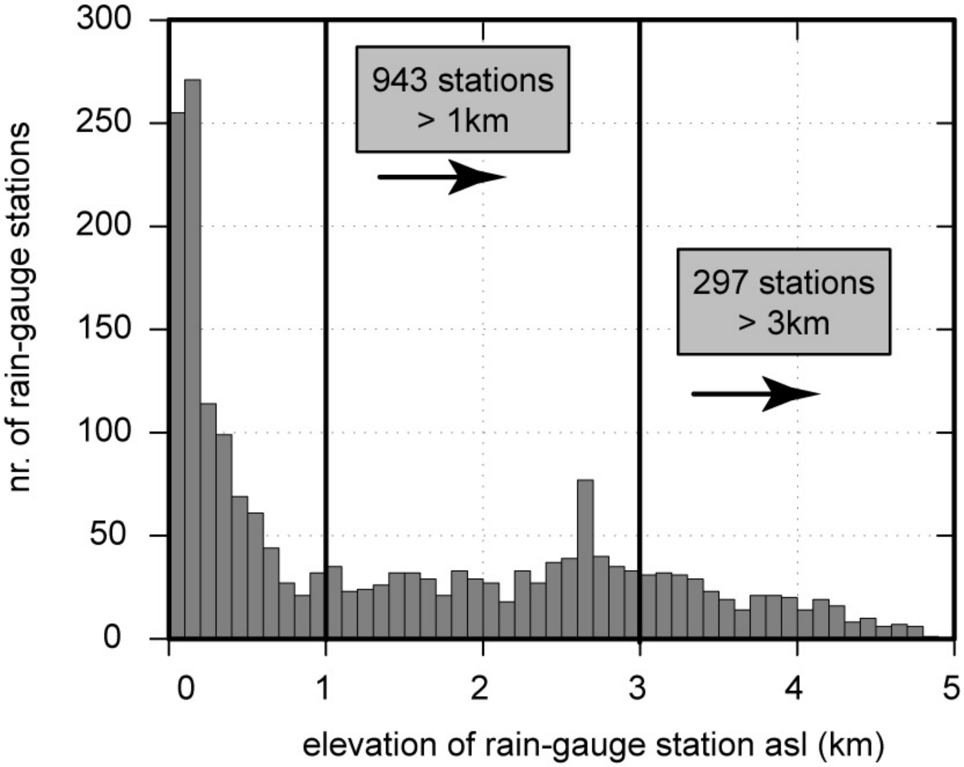

Fig. DR2: Histogram of station elevation used for TRMM-rainfall calibration. Note that 943 stations are located at elevations above 1 km and almost 300 stations are located above 3km elevations. This elevation distribution suggests that our calibration routine is robust and independent of elevation.

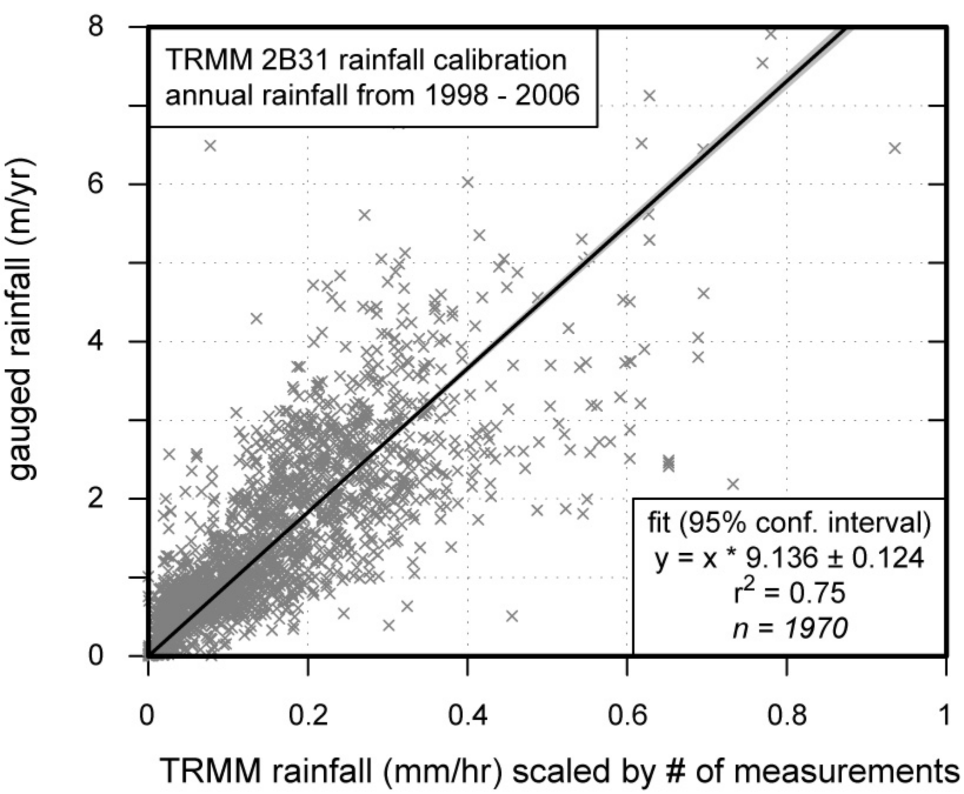

Figure DR3: Calibration of TRMM 2B31 data with gauged rainfall data. We used 1970 ground-control stations in South America and their corresponding TRMM grid cell to show the validity of the remote-sensed data. Prior to calibration, we scaled the TRMM data by their number of measurements (i.e., TRMM 2B31 rainfall intensities (mm/hr) divided by TRMM 2B31 measurements for each gridcell).

References

Bookhagen, B., and D. W. Burbank (2006), Topography, relief, and TRMM-derived rainfall variations along the Himalaya, *Geophysical Research Letters*, *33*(L08405), doi:10.1029/2006GL026037.

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GDCNV1 (2002), Global Daily Climatology Network (GDCN), V1.0, National Climatic Data Center (released July 2002), accessible at http://www.ncdc.noaa.gov/oa/climate/research/gdcn/gdcn.html.