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A 59-year (1948-2006) global 0.5-degree near-surface atmospheric data for land surface modeling

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We developed daily precipitation, snowfall and specific humidity and 3-hourly temperature, shortwave radiation and longwave radiation data were developed for 59-years (1948-2006) with 0.5-degree resolution, which can be used to drive land surface models and global hydrological models; these data were created using parameters obtained from daily observations that are available in recent years. Global terrestrial snowfall was estimated by applying gauge undercatch correction for snowfall and rainfall based on daily meteorological data and gauge type. One of the advantages of this data set is that the statistical characters of the created variables are more similar to observation than those of reanalysis data (e.g., precipitation, temperature and radiation). Other advantages are the availability of data for recent years and the expectation of future extensions. Because we estimated undercatch correction using daily atmospheric data, the estimated snowfall allows to determine long-term variations of snowfall more reliably than snowfall estimates that are derived using a climatology of correction factors.
Since the daily precipitation products described in this paper were based on observed precipitation days, LSM simulations using these forcing data are expected to produce better wet and dry land surface conditions. For example, our product showed reasonable daily precipitation intensity comparing to reanalysis-based products, that overestimate the number of precipitation days and underestimate heavy precipitation days. Developed temperature and short wave radiation also showed better daily statistics than those of reanalysis-based products.
Together with its relatively high resolution (0.5-degree) and these advantages, the newly obtained data may be preferred to other forcing data sets in case of hydrological and climate change studies, in particular if the study results are sensitive to daily variations in atmospheric conditions.