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A 10-year (2001–2010) land surface energy balance product for climate and ecohydrological studies for mainland China

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In the absence of long-term, continental observations of the components of the surface energy balance in China, we developed an algorithm to generate a dataset of land surface energy and water fluxes on a monthly timescale from 2000 to 2010 at 0.1 $\times$ 0.1 degree resolution by using multi-satellite, remotely sensed land surface data and meteorological forcing data. The dataset was validated by using 'ground-truth' observations from 12 flux tower stations in China. The validation results demonstrated that more accurate albedo and downward longwave radiation datasets are needed in order to accurately estimate turbulent fluxes and evapotranspiration when using surface energy balance model. The mean spatial pattern and the seasonal variability of surface heat fluxes were well simulated. This paper presents a benchmark for an up-scaling approach for generated land fluxes in China. Trend analysis of the land surface radiation and energy exchange signals shows that the Tibetan Plateau area is experiencing relative stronger climate changes than other parts of China. The capability of the dataset to provide critical information on continental-scale water-cycle, land–atmosphere exchanges and ecohysrological researches in China is examined.