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### Distributed modeling of direct solar radiation on rugged terrain of the Yellow River Basin

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Due to the influences of local topographical factors and terrain inter-shielding, calculation of direct solar radiation (DSR) quantity of rugged terrain is very complex. Based on digital elevation model (DEM) data and meteorological observations, a distributed model for calculating DSR over rugged terrain is developed. This model gives an all-sided consideration on factors influencing DSR. Using the developed model, normals of annual DSR quantity with a resolution of 1 km × 1 km for the Yellow River Basin was generated, with DEM data as the general characterization of terrain. Characteristics of DSR quantity influenced by geographic and topographic factors over rugged terrain were analyzed thoroughly. Results suggest that: influenced by local topographic factors, i.e. azimuth, slope and so on, and annual DSR quantity over mountainous area has a clear spatial difference; annual DSR quantity of sunny slope (or southern slope) of mountains is obviously larger than that of shady slope (or northern slope). The calculated DSR quantity of the Yellow River Basin is provided in the same way as other kinds of spatial information and can be employed as basic geographic data for relevant studies as well.

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**关键词:** direct solar radiation (DSR); rugged terrain; digital elevation model (DEM); distributed model; Yellow River Basin doi: 10.1360/gso50407