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A new indicator of ecosystem water use efficiency based on surfacesoil moisture retrieved from remote sensing

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Ecosystem water use efficiency is an important indicator of carbon and water cycle coupling. This studypresents a new measure of water use efficiency, soil water use efficiency (SWUE), based on gross primaryproduction and surface soil moisture derived from remote sensing products (ECV-SM). Variation in SWUEamong biomes, climate conditions, and latitudes from 2000 to 2014 was comprehensively assessed. Aver-age global SWUE over this 15-year period was approximately 3.47 gC/kgH_2O. SWUE was relatively highfor ecosystems near the equator and decreased gradually with increasing latitude. At the biome level,high SWUE was measured in evergreen broadleaf forests, and lower values were found in shrublands.Compared with two other commonly used indicators of water use efficiency, EWUE (ratio of gross primaryproduction to evapotranspiration) and RUE (ratio of gross primary production to precipitation), averageSWUE from 2000 to 2014 was significantly higher and had the largest range of values. In addition, spa-tial distributions of these three indicators varied greatly. The new indicator SWUE will help promoteunderstanding of soil water use in various ecosystems.