Applications of the Newly Improved Global MOD16 Evapotranspiration Algorithm at AmeriFlux Tower Site and Global Scale
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1. Methodology
The beta MOD16 ET algorithm developed by Mu et al. (2007) based on Cleugh et al. (2007) using the Penman-Monteith equation was improved to version 1.

\[
LE = \frac{sA + \rho C_p(e_{sat} - e)}{s + \gamma(1 + R_s / R_a)}
\]

2. Improvements
Major refinements include 1) the canopy and soil surfaces are divided into wet and dry surfaces. 2) The ET comprises daytime and nighttime parts. 3) The amount of soil heat flux is not neglected in version 1. 4) The methods to estimate stomatal conductance and aerodynamic resistance have been refined to account for some key dynamic processes.

3. Validation of version 1 MOD16 ET Algorithm at Eddy Flux Towers

Version 1 MOD16 ET algorithm was applied globally over 2000-2006 with global GMAO reanalysis data. The 1km global ET was smoothed to 0.05-degree. The global mean annual ET is 581.7 mm/yr. Precipitation is not an input.

4. Validations at global watersheds
Annual precipitation was subtracted by stream flow to get the pseudo ET observations (ET OBS) for the watersheds. We assume that the soil water is at equilibrium in at least five years. The MOD16 ET estimates can explain 84% of the variations of the pseudo ET observations at the 234 watersheds.

5. Global ET results

Version 1 MOD16 ET algorithm was applied globally over 2000-2006 with global GMAO reanalysis data. The 1km global ET was smoothed to 0.05-degree. The global mean annual ET is 581.7 mm/yr. Precipitation is not an input.

Reference
Mu, Q., M. Zhao, S.W. Running, Improvements and Evaluations of the MODIS Global Evapotranspiration Algorithm. (in preparation)