Yale 耶鲁大学-南京信息工程大学大气环境中心

Yale-NUIST Center on Atmospheric Environment

Discussion on S-W model

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Jul 19, 2013

Outline

- Introduction to Shuttleworth-Wallace model;
- Data processing;
- Discussion on recent work;
- Next work.

Introduction to Shuttleworth-Wallace model

A two-source model for evapotranspiration and its controls

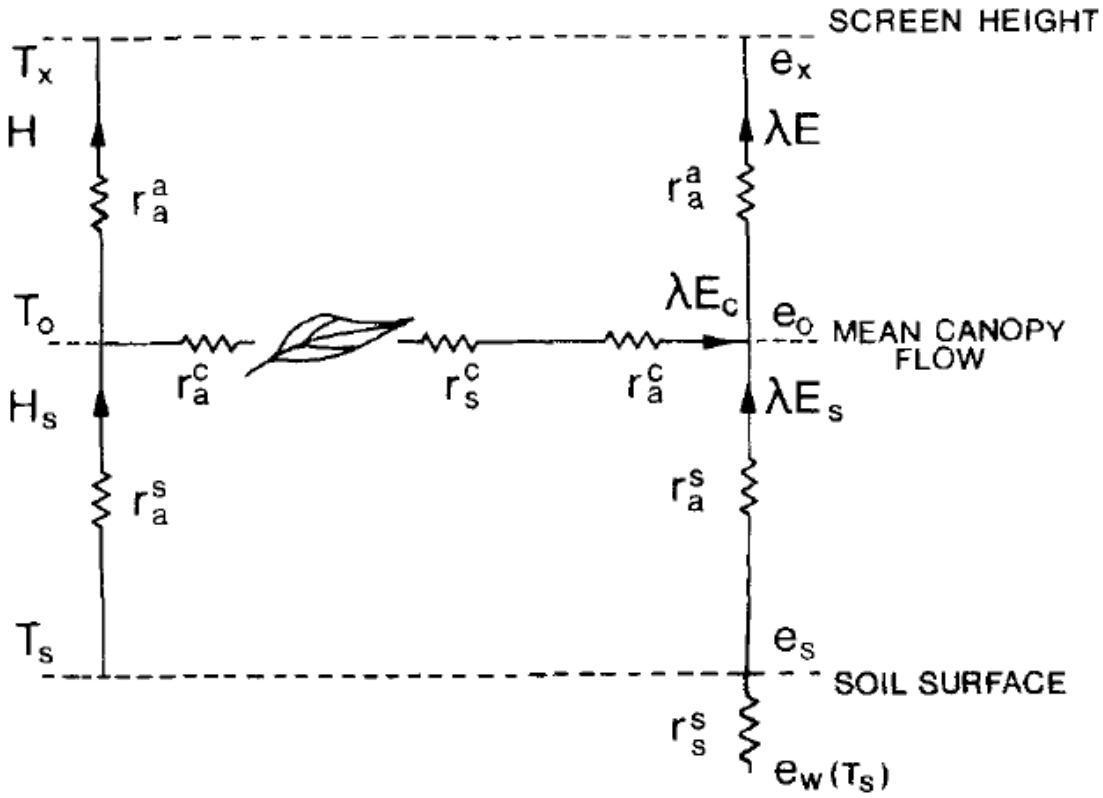

Figure 1. Schematic diagram of a one-dimensional description of energy partition for sparse crops. The nomenclature used is given in section 3(*a*).

(by W. James Shuttleworth and J. S. Wallace, 1985)

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Data processing

- 30-minute OPEC and WS data of QYZ in 2011 and 2012;
- Coordinate and WPL correction;
- Selection criteria: delete the spikes caused by instrument, raining and data in low turbulence(u_*<0.2 m s^{-1} here). (张雷明 等, 2006)
- Gap filling of GPP and ET.

Data processing

Gap filling of GPP and ET(于贵瑞 等, 2004; 张雷明 等, 2006; False et al, 2001; 徐自为 等, 2009)

$$GPP = NEE = R_0 e^{E_0\left(\frac{1}{T_r - T_0} - \frac{1}{T_k - T_0}\right)}$$

$$GPP = NEE + R_0 e^{E_0\left(\frac{1}{T_r - T_0} - \frac{1}{T_k - T_0}\right)} + \frac{\alpha Q_P P_{\max}}{\alpha Q_P + P_{\max}}$$

$$ET = a \times \left(R_n - G\right) + b$$

Tab 1.Effective NEE and ET observation numbers.

	NEE		ET
	Daytime	Nighttime	
2011	3561	1050	5659
2012	3162	969	5336

Discussion on recent work

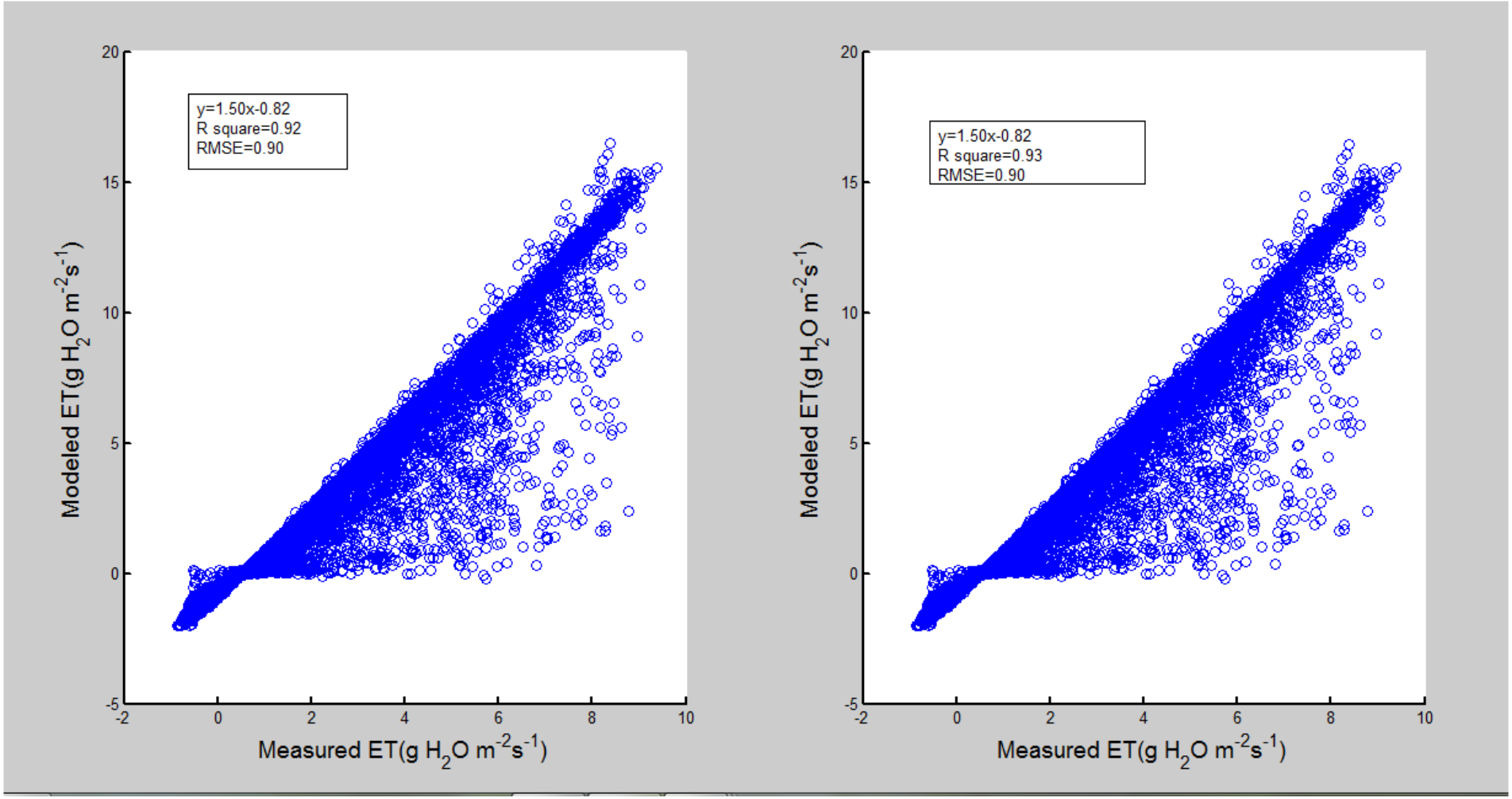

Fig 1. Comparisons between the modeled and measured ET at the half-hour time scale.

Unit: mmol H_2O m^{-2} s^{-1}

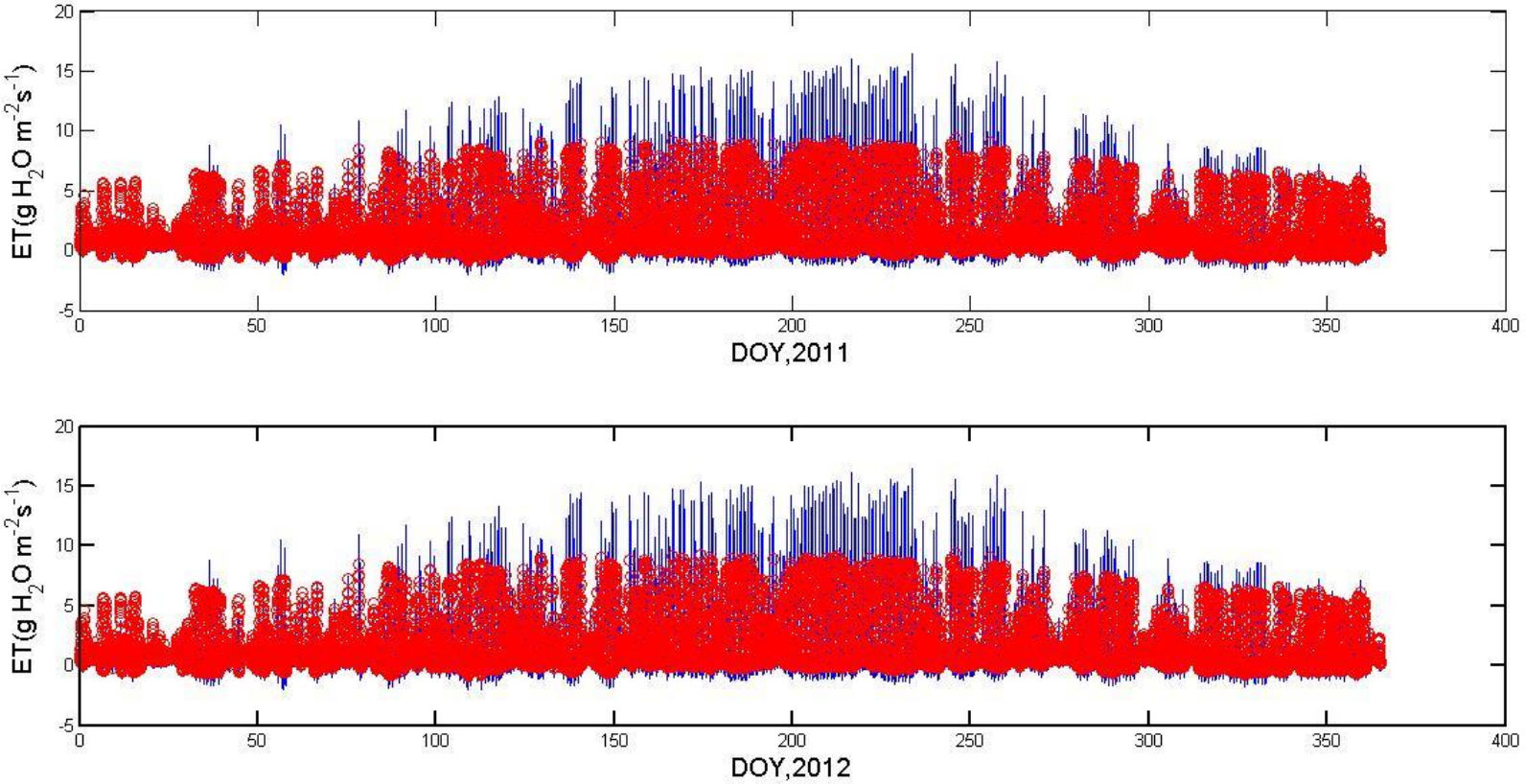

Fig 2. Diurnal variations of modeled(blue line) and measured (red circle) ET in 2011 and 2012.

ylabel: Ec/ET

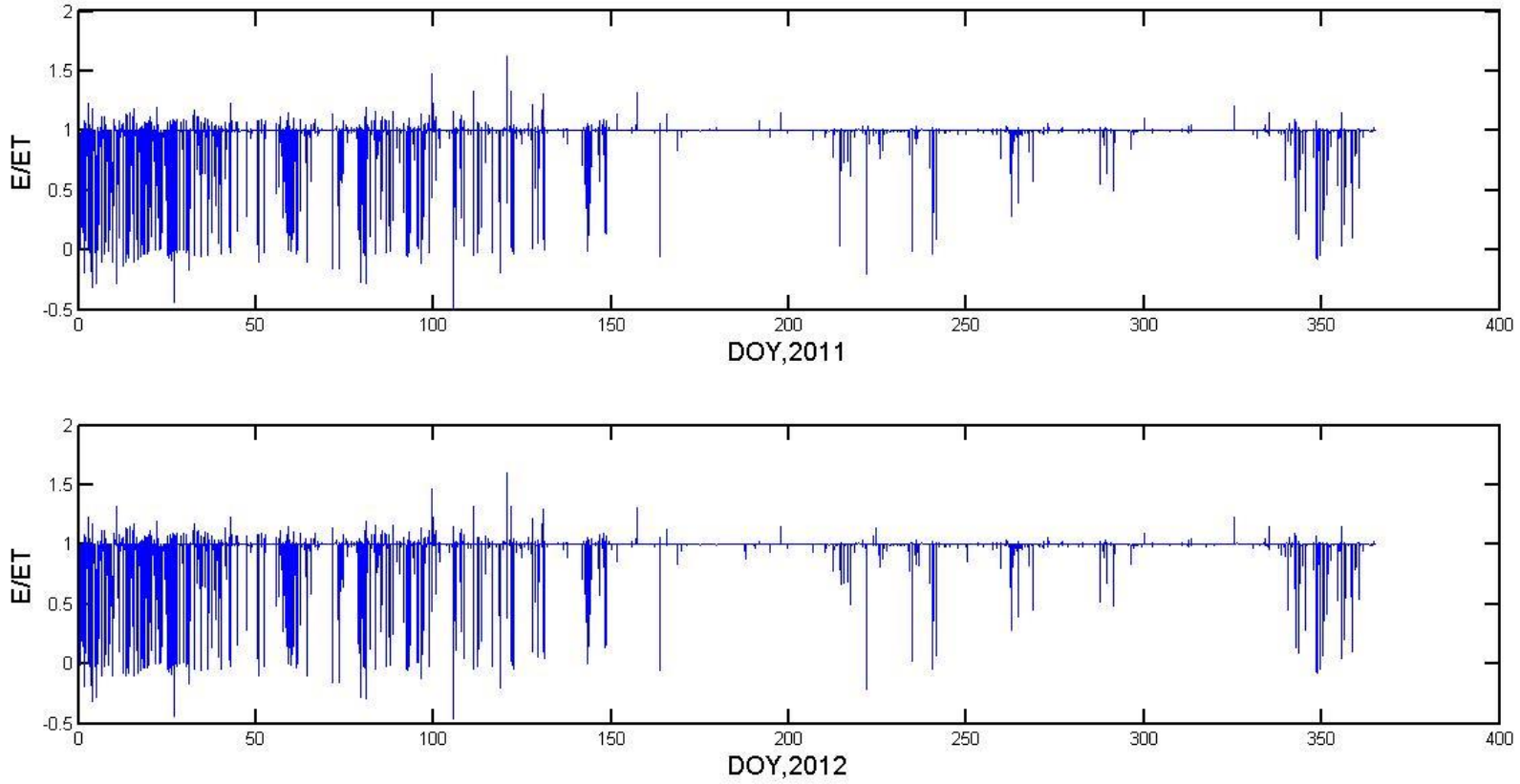

Fig 3. Diurnal variation of E/ET in 2011 and 2012.

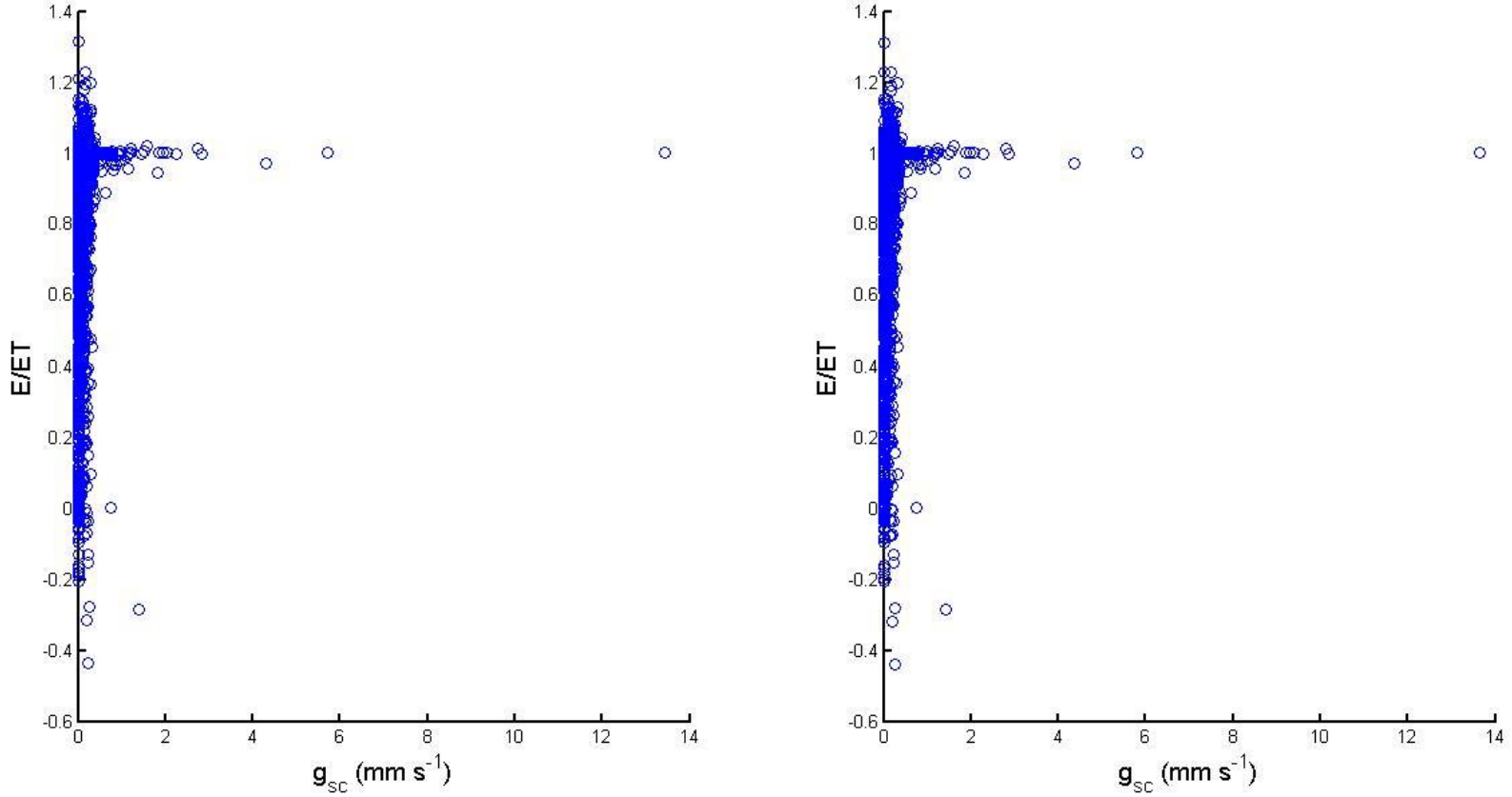

Fig 4. Effect of canopy stomatal conductance (g_{sc}) on E/ET at the half-hour time scale.

Next work

- Find better gap filling strategy for GPP and ET;
- Find better parameter for LAI and w.

THANKS FOR YOUR ATTENTION!

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