Biogeosciences Discuss.,
doi:10.5194/bg-2017-69-RC6, 2017

Biogeosciences Discussions

Interactive comment on "Rainfall pattern greatly affects water use by Mongolian Scots pine on a sandy soil, in a semi-arid climate" *by* Hongzhong Dang et al.

Anonymous Referee #2

Received and published: 14 May 2017

I thank the authors for their thorough revision of the MS and responses to my earlier concerns. However, the most significant concern remains. The MS, in its current format, cannot address this concern therefore the paper still requires significant revision or it should be rejected.

The authors scale sap flow from tree to stand measurements and the majority of the results are then presented as Ts (stand sap flux, mm). However, there is a significant level of uncertainty in the measurement of sap flow and, consequently, there can be little confidence that the stand values are accurate.

The presentation of the sap flow data as Ts (mm) should be omitted from publication for the following reasons:

The authors deployed a TDP style sap flow sensor which only has a single measurement point at some point along the radial profile. The sensor is a 30mm length sensor but this does not mean sap flow is measured over the entire length of 30mm, but at some point along the length. Therefore, the first uncertainty is the actual zone, or area, of sapwood the sensor is sampling within that 30mm length. The sapwood needs to be measured at multiple points along the radial profile for accurate scaling of data from point measurements to tree and then stand measurements. Measuring one point along a ~6cm radii is inadequate.

The second point of uncertainty is the TDP sensor is uncalibrated and the authors did not attempt a calibration of their sensors. By the authors' own admission, there is at least a 10% error based on a "standard" calibration equation. The authors cite a series of publications to support the 10% error value but I can easily cite other publications where error values have been reported as high as 60% (e.g. Steppe et al 2010). And that is the point. Without a calibration, we do not know whether it is a 10% error, 60% error or something else. If the authors want to present sap flow as an absolute number, in mm, then they should have calibrated the sensors.

A third point of uncertainty is the azimuthal variability of sap flow in the sampled trees. With a single measurement point, installed on one side of the tree only, it is highly uncertain whether this captures the actual sap flow of the entire sapwood cross-section of the tree. The authors should have attempted to measure and describe the azimuthal variation in sap flow, or lack thereof, to relieve this uncertainty.

Therefore, the presentation of Ts in the current MS is, at best, a guess and the values are highly uncertain.

However, the authors can still publish their data as relative sap flow rather than absolute sap flow. Rather than presenting the sap flow results as an absolute value in mm, it is possible to present the results as a relative value or percentage value. The highest value of sap flow, across the measurement period, is the 100% maximum rate and

all the other sap flow measurements are relative to this value. Presenting the sap flow data as relative sap flow rate will overcome the issue of uncalibrated sensors and uncertainty in data values.

Any reference or presentation of data throughout the MS as Ts (mm) should be removed.

Any calculation of stand scale transpiration should be removed (e.g. section 4.5).

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2017-69, 2017.