

Dear Anonymous Reviewer, thank you for your review and very constructive comments.

Reviewer: The word composition of the title is not clear “ . . . forest water balance. . . ” is it partitioning of water balance in boreal forest, or partitioning forest-water balance?

Authors: We have changed the title to: “Partitioning growing season water balance within a forested boreal catchment using sapflux, eddy covariance and a process-based model”.

Abstract:

Reviewer: It would be nice to see water balance ways more specific to boreal forests to get a clearer picture how this work is worthy for readers

Authors: In the abstract, we will make it clear that few studies have partitioned ET into its individual flux components in boreal forests. Also, in the introduction we will highlight the considerable variation in the relative importance of ET in boreal forests, ranging between 45-85 % of incoming P. Thus, quantifying the magnitude and spatiotemporal variation in transpiration and evaporation is crucial to better understand ET and its importance in boreal forests.

Reviewer: In line 20, it reads “water is lost”; this is very confusing wording all over the paper. 1) water cannot be lost from a system, 2) I assume this paper deals with water balance, so water “flows” from one state/regime to next, and that is not lost, 3) there could be some cases where ET can be referred as lost; that is when rainfall is dealt as “gain”

Authors: We agree that ET is a water flux and that it may be misleading, and potentially confusing, to consider ET as a “loss”. We will therefore carefully go through the manuscript and replaced “loss” with ET and its component fluxes and no longer refer to ET as a “water loss”

Reviewer: Line 30 change “water loss pathway” to “water balance component”

Authors: We will change “water loss pathway” to “water balance components”.

Reviewer: Line 32 Canopy ‘ interception is not part of ET, it should be rather evaporation from canopy

Authors: We agree that interception is not part of ET, but rather evaporation of intercepted water in canopy trees. We will rewrite this sentence to make this clear.

Reviewer: Line 33- 34, the numbers do not add up 70, check

Authors: We agree that the numbers in line 33-34 do not add up to 70. However, the number presented in lines 33-34 represented the percentage of T and IL to total ET, whereas the 70 % is in reference to T and IL being equal to ca. 70 % on the incoming precipitation during the growing season. We will rewrite this sentence to make this clear.

Introduction:

Reviewer: The study has got no clear ' definition of hypothesis or purpose of the study

Authors: The objectives of the study are stated in the final paragraph of the introduction: The main objective of this study was to *i*) constrain the absolute and relative magnitudes of *ET* flux components by using both empirical data and model simulations, *ii*) to explore how they vary during the course of the growing season, *iii*) to compare different *ET* flux components to other water balance components (*i.e.*, stream runoff) and *iv*) directly assess the important role trees play in the boreal hydrological cycle during the growing season.

Reviewer: Line 51-52, I don't agree that most ' studies treat ET as a single water flux pathway

Authors: We will remove this sentence from the manuscript.

Reviewer: Line 62-63, I think, rather there ' are dozens of experimental studies for decades

Authors: We will rewrite this sentence to acknowledge the long history of research on *ET* as suggested by reviewer #1 as well as highlight the number of different approaches and methodology to partition *ET* into its individual flux components, which includes numerous empirical measurements as well as modeling approaches.

Reviewer: Line 73, what does it mean by ' "few investigation on water balance at catchment scale"?

Authors: We are trying to highlight that the majority of *ET* partitioning studies have been done at the stand and/or plot scale and thus are not able to directly compare the magnitude of *ET* and its flux components to other water pathways (*i.e.*, steam runoff). We will rewrite this sentence to make this clearer.

Reviewer: The paragraph after line ' 90 better fits above the previous paragraph

Authors: We agree and will move this section to the previous paragraph.

Reviewer: Line 114, what is the state-of-the-art ' of hydrological measurements at the study site? Give some details of measurements done which of course respective to this study

Authors: We are trying to highlight that this study builds upon the rich history of long-term hydrological measurements within the Krycklan catchment. We will remove “state-of-the-art” from this sentence and make this point clearer.

Methods:

Reviewer: Line 147-148, not clear

Authors: We will remove “spanning from after the spring flood until leaf senescence for deciduous species” from the sentence.

Reviewer: Line 153-155, not clear

Authors: We will remove this sentence from the manuscript.

Reviewer: Line 157, what are the environmental data, give the ' details or examples

Authors: We will provide details about the instruments used to measure environmental data.

Reviewer: Paragraph line 165-175, Too much information. Please classify ' with instruments, data, how processed, calibrated, purpose – this might help readers to understand

Authors: We will reorganize and streamline the description of the eddy covariance measurements as suggested.

Reviewer: Line 179, what does it mean by “non-stationarity” this word commonly ' used in statistical description not in instrumentation

Authors: We will rewrite this sentence to more clearly describe how the ET data was filtered using the EddyPro quality check and flagging policy. More specifically, we will replace “non-stationarity” with “tests on steady state”.

Reviewer: Assumptions described in line ' 188-190 are wrong, re-write (it should be IL = GP-TF-SF)

Authors: We are aware that stemflow (SF) is often included when calculating canopy interception losses (i.e., IL = GP – TF – SF). However, previous work within the Krycklan catchment has shown no SF in forest stands dominated by spruce and pine trees during the summer months (Venzke, 1990). Thus, we have omitted SF when calculating IL in our study. We will add a sentence in the methods sections that highlights this previous observation which in turn provides justification for our calculation of IL as the difference between GP and IL.

Venzke, J. F. (1990) Beiträge zur Geoökologie der borealen Landschaftszone. Geländeeklimatologische und pedologische Studien in Nord-Schweden, Verlag Ferdinand

Schöningh, Paderborn, Germany.

Results and discussion

Reviewer: Are mixed up and not well structured: please take rendering sentences from results to discussion

Authors: We will carefully go through the results and discussion section to better improve its structure as well as make sure that all interpretation of the data is moved to the discussion section.