

Interactive comment on “Controls on open water evaporation” by R. J. Granger and N. Hedstrom

Anonymous Referee #2

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MS Review HESSD, 7, 2709-2726, 2010 Controls on open water evaporation Granger and Hedstrom May 27, 2010

General Major issues that if addressed would result in significant improvements: - Justification as stated in the introduction is too grandiose. - Vague, general overarching statements that are not supported. - Methodology not adequately described. - Results not placed in the context of existing literature, so the novel aspects of this research are not clear. - the two papers should be combined due to significant overlap

Specific

Page 2710 Line 3: small and medium is subjective. State size (surface area and volume, if avail.) Line 4: “. . .in Western and Northern Canada, RESPECTIVELY.” Line 6: “Temperature” Air temperature? Line 14: “..will be used. . .” change to “are used”

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Line 25: “to both objectives” Which objective does this refer to?

Page 2711 Line 1: “as a course of routine. . .limited confidence” Sentence needs to be reworded, and “limited confidence” needs explanation/citation(s). Line 3: Sentence “This is particularly true. . .” needs explanation/justification. I do not agree that factors governing boundary-layer dynamics, etc, are not well understood. Same with statement on Line 6: I disagree that there is “limited insight”. Line 10: Great Slave Lake, not Bear. Line 14: Are you refereeing to all land surfaces? Is it really that “straight-forward”? With stomata involved, how can a open-water (lake) evaporation be more complex than vegetation? What about wetlands with mix of open water and vegetation? Line 18: State the radiation wavelengths you are refereeing to. Should mention how lake (water) volume affects heat storage (ie when can it be significant?) Not significant for shallow, isothermal lakes, such as those throughout the Hudson Bay Lowland, for example. Line 29: But atmos. stability is also a function of wind (friction velocity), not just the air temperature profile. Do you mean “H positive (away from surface)” instead of “unstable”?

Page 2712 Line 7-11: Those are variables, not parameters. There is a lot of literature avail. (few of them cited) that demonstrates what you describe in that paragraph. For example, what is new in this research that one could not find in Penman, (1948)? At this point, the reader should needs to know how this research will build upon what is already known. So far, there is no evidence of this. Same for this title: I believe we have known for decades what the controls on open water evaporation are. State what is new.

Line 13: Are the 150 m, 11 km true turbulent flux fetch distances (calculated), or simply the distance from measurements to shore? State which.

Line 15-20: What are the dimensions of the island? What does “nearly” mean? What were the dates of the open water periods? Provide details of where the NWT measurements were made. What were the water depths at each location, and how did

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they compare to the means depths of the lakes? What were the surface areas, depths, volume, etc of the lakes? Need much more detail on “study sites”.

Line2 21-27: Insufficient detail here too: Need make/model of each instrument (eddy covariance equipment is far too vague). What does “At least” mean? Measurement heights, etc. How far is “Away”? There are almost no details provided on the study site and methods, therefore making it impossible to judge (recreate) the results and discussion.

Page 2713 Line 4-18: Better, but the minimum information that needs to be provide, but is missing, include: what were the effects of “Some corrections”?; 2 or 3-D rotation? Sample frequency? Detrend or not?

An 8-page intern report is not a satisfying reference for an important result. How much “quality control” and gap-filling occurred, and under what conditions (and why). If the profile data were used a lot, then results of the comparison should be included here.

Line 20: The “three conditions” really do not need to be stated in a journal. Those reading this should be well away that you need water, energy, and wind to evaporate water. Goes back to my early points – what is new here?

Page 2714 Line 5: Available energy for land is net radiation minus soil heat flux and all storage terms.

Line 8: Non-varying only when ice free.

Line 9: Net radiation is both short and long-wave lengths, so it does not penetrate the water surface. Only shortwave. Following statement “This leaves only...” depends on lake volume and resulting temperature structure. Statement not true for shallow, isotherm water bodies.

Line 21: Statements in this paragraph would be strengthened if the actual stability was calculated instead of estimating from air temperature profiles.

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Page 2715 Here, and throughout the discussion, there are almost no references to others that have found similar results (eg lines 4-13). This work needs to be placed in the context of the literature to show what new findings this work offers.

Lines 14-29: The correlation will likely vary depending on the time period the analysis is conducted (not just the length of the periods, but when that period is within the season).

Page 2716 Line 1: But wind speed and net rad are the only over-lake variables shown. How does c and d look with over-lake variables?

Line 6: How does Fig 6 show that?

Equations 1-3: Based on daily means or what? Why not show the plots? What were the associated statistics? (slope, intercept, r^2 ...)

Page 2717 Lines 1-24: How do you know that these conditions you describe were not due to the heat storage within the lake(s), and the land-water differences are correlated as opposed to causal factors?

Page 2718 Line 10: Evaporation is a form of turbulent heat exchange, so I don't understand this statement.

Figure 2: why only 2 days, and what s the frequency of the estimate? What is the seasonal behavior? Julian Date is not correct – use Day of Year or something similar.

Figure 3: How does c and d look for over-water measurements alone? Perhaps more meaningful than the differences.

Figures 4 and 5: Why are data from different years shown? (remove JD)

Figure 6: No rhs x-axis label or units.

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