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Hydrology and Earth System Sciences
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Discussions

Interactive comment on "Assessing the capabilities of the SWOT mission for large lake water surface elevation monitoring under different wind conditions" *by* Jean Bergeron et al.

Jean Bergeron et al.

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Italicized text: Reviewer's comment

Blue text: Authors' response

This article investigates the capabilities of SWOT to retrieve water surface elevation (WSE) over lakes under various wind conditions and SWOT spatial coverages. The effect of wind on lake WSE can be very important in some cases (several times the expected measurement error), and since lake WSE will be a main product provided by SWOT, it is essential to quantify these effects on the SWOT-derived SWE. The

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study is quite short, but very well presented and the results and analyses clearly lead to the conclusions drawn by the authors. I only have a few minor suggestions that the authors should be able to address before publication.

L261. Is there any other assumption concerning the second vector? Is it assumed horizontal?

It is assumed that the perpendicular lines are isolines such that all points that lie on the same line share the same value (see fig. 1 below).

L286. Could you explain how the wind speed is accounted for in the SWOT-HR simulator? Is this to simulate ripples at the lake surface that may impact the SWOT signal?

Wind speed does affect the simulated backscattered signal (sigma 0) through what would be the overall effect of ripples or waves, or lack thereof. Regions with little or no wind will therefore generate areas of dark water. However, there is currently a mismatch between the wind used for the hydrodynamic model and the SWOT-HR simulator. The SWOT-HR simulator uses a fixed wind field over every region in the world and not the wind speed specified in the hydrodynamic model. The mean wind speed value extracted for the region is used to generate spatially-correlated random wind fields, which in turn affect the backscattered signal. This is why scenarios like the zero wind speed one contains nearly as many pixels with data as the other scenarios. In reality, most of the lake would likely be mostly covered by dark water pixels for the no wind scenario, except for areas with vegetation. This is an important point to consider in the evaluation of real expected error. Additional clarifications have been added to sections 4.2, 5.2 and the conclusion of the revised manuscript to address this issue.

Also, it is not clear to me how a "constant hypothetic average wind speed" may cause the differences shown in Fig. 6.

The comment about the constant hypothetic average wind speed was meant to explain why the classification of pixels were similar, not why there were differences. The differences are caused by the different WSE generated by the different speeds, which can have a small impact on the classification through the different resulting angle of incidence for example. The sentences have been modified added in the updated version of the manuscript for clarity.

Fig 5 and Fig 7. An arrow showing the direction of the wind for each simulation could be added in each subplot.

An arrow showing the direction of the incoming wind has been added in the updated version of the manuscript.

Fig 9 and Fig 10. Could you add a zero-line in each subplot?

A zero-line has been added in the updated version of the manuscript.

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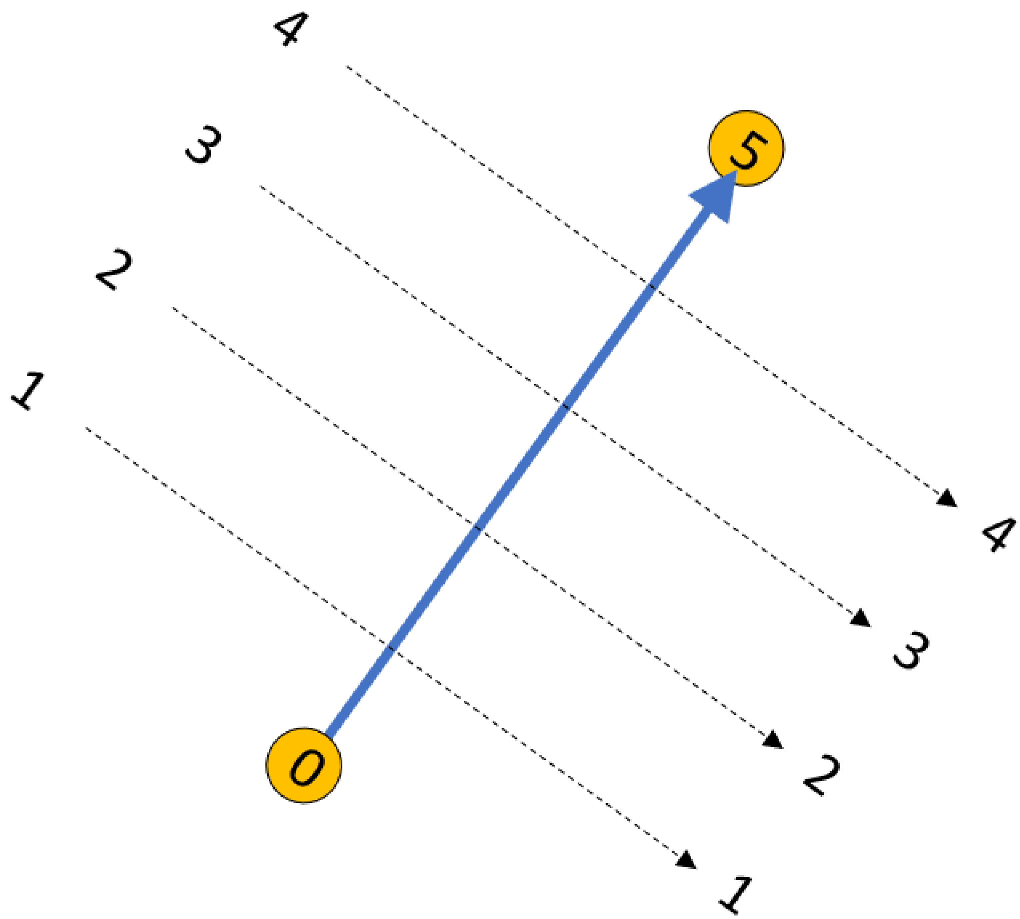

Fig. 1. Perpendicular lines are isolines such that all points that lie on the same (dotted) isoline share the same value