



Ice cover of Eurasian lake and inland seas from simultaneous radar altimetry and radiometry observations

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We show how the studies of ice and snow cover of continental water bodies can benefit from the synergy of more than 15 years-long simultaneous active (radar altimeter) and passive (radiometer) observations from radar altimetric satellites (TOPEX/Poseidon, Jason-1, ENVISAT and Geosat Follow-On) and how this approach can be complemented by SSM/I passive microwave data to improve spatial and temporal coverage. Five largest Eurasian continental water bodies - Caspian and Aral seas, Baikal, Ladoga and Onega lakes are selected as examples. A step-by-step ice discrimination approach based on a combined use of the data from the four altimetric missions and SSM/I is presented, as well as validation of this approach using in situ and independent satellite data in the visible range. We also discuss drawbacks and benefits of each type of sensor and particularities of radiometric properties for each of the chosen water bodies. We then analyse the long-term evolution of ice conditions for these lakes and inland seas using historical data and recent observations from satellite radar altimetry and radiometry.