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The response of the subglacial Lake Vostok/Antarctica on tidal and air pressure forcings: new results from field observations and remote sensing

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Subglacial lakes are complex systems of ice/water/solid earth interactions. One aspect in this context is the response of subglacial lakes to external forcings like tides and air pressure. For Lake Vostok, we study these interactions by a combined use of remote sensing, especially interferometric SAR, and GPS. The GPS observations were carried out in the Antarctic seasons 2001/2002 and 2002/2003. For SAR interferometry, data of the ERS-1/ERS-2 tandem mission were used.

For the lake area vertical surface motions in the cm-range could be observed. We present both time series of these motions from GPS as well as the spatial pattern of the surface displacements from interferometric SAR. The displacements show a good agreement with model calculations related to equilibrium tides and the differential inverted barometer effect. The consequences with respect to water mass trasport within the lake caused by these forcings will be discussed.