

Water is no lubricant: Reassessment of the role of water in plate tectonics

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Water in the Earth's crust and upper mantle may not play such an important role as a lubricant of plate tectonics as previously assumed. This is a result geoscientists present in the current issue of the scientific journal *Nature* after the examination of water in the mineral olivine.

Laboratory experiments over the past three decades have suggested the presence of water greatly weakens the <u>mechanical strength</u> of the mineral olivine, a key component of the Earth's <u>upper mantle</u>. In a recent study led by the Bayerisches Geoinstitut in Bayreuth, the Secondary Ion Mass Spectrometer (SIMS) facility at the Potsdam based GFZ German Research Centre for Geosciences was used to reassess the importance of water in defining the rigidity of olivine.

While earlier studies were based on mineral aggregates, the SIMS method enabled a look at the role of water in single olivine crystals at the near-<u>atomic scale</u>.

Michael Wiedenbeck, who conducted the SIMS experiment at the GFZ: "We discovered that water has a much, much lower effect in terms of the mechanical weakening of olivine as previously believed. The new observations call for a reassessment of the role of water within the Earth's interior." One important consequence is that the earlier concept, indicating that water provides lubrication for <u>continental drift</u>, needs to be carefully reconsidered.

More information: Small effect of water on upper-mantle rheology



based on silicon self-diffusion coefficients, DOI: 10.1038/nature12193; vol 498; issue 7453; pp. 213-215

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