# Numerical dynamo models for magnetic field generation in the ice giants

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The magnetic fields of Uranus and Neptune are not dipole-dominated and are generally more complex than the other planetary magnetic fields in our solar system. Several hypotheses have been proposed to explain their nature. Among these, the existence of a deep stably stratified fluid layer below the dynamo region or a dynamo operating in a large Rayleigh number turbulent regime are two prominent approaches. Both yield magnetic power spectra similar to those observed at the ice giants. A stable fluid layer in the deeper interior may also explain Uranus' low luminosity and could be the signature of a super-ionic water phase (Stanley and Bloxham, 2004). Dynamo action in a turbulently convecting ice layer, on the other hand, also explains the surface heat flow pattern and zonal flow structure, which shows a retrograde equatorial jet flanked by prograde jets (Soderlund et al., 2013).
Here we present 3D numerical dynamo models based on data from recent ice giant structure models for the internal density stratification, electrical conductivity profile and aspect ratio. We aim to compare the proposed hypotheses to constrain the parameters and geometry leading to magnetic fields that are comparable to those of the ice giants in morphology and strength by particularly evaluating magnetic power spectra. Furthermore we examine the transition from prograde to retrograde equatorial jets in the turbulent models.