



## **Can downwelling at the top of the Earth's core be detected in the geomagnetic secular variation?**

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It has been argued based on recent seismic and mineral physics studies that the top of Earth's liquid outer core is stably stratified. Here I analyze persistent geomagnetic secular variation features on the core-mantle boundary to examine whether a kinematic signature of core fluid upwelling/downwelling can be detected. I focus on regions of intense high-latitude geomagnetic flux patches that may be maintained by fluid downwelling. In order to identify persistent patterns, the radial field and its secular variation are stacked in the flux patch moving reference frame. These stacked images are compared with forward solutions to the radial induction equation based on idealized field-flow models. Clear advective secular variation signature below North America indicates that these intense flux patches may exhibit significant mobility. Stretching signature in the form of persistent positive secular variation correlated with the intense flux patch below the Southern Indian Ocean may be considered as regional scale geomagnetic evidence for whole core convection, although pure toroidal flow cannot be ruled out.