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Turbulent lithosphere deformation in Tibetan Plateau

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In this work, we show that the Tibetan Plateau deformation demonstrates a turbulence-like statistics, e.g., spatial invariance cross continuous scales. A dual-power-law behavior is evident to show the existence of two conversation laws for the enstrophy-like cascade on the range $500 \lesssim r \lesssim 2,000\,km$ and energy-like cascade on the range $50 \lesssim r \lesssim 500\,km$. The measured second-order structure-function scaling exponents $\zeta(2)$ are similar with the counterpart of the Fourier scaling exponents observed in the atmosphere, where in the latter case the earth rotation is relevant. The turbulent statistics observed here is favor interpreting by the geostrophic turbulence theory. Moreover, the intermittency correction is recognized. The intensity of intermittency is found to be close the one of the hydrodynamic turbulence, implying a universal scaling feature of quite different turbulent flows. Our results not only shed new light on the debate regarding the mechanism of the Tibetan Plateau deformation, but also lead to new challenge for the geophysical modelling that the observed turbulent features have to be taken into account.