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Kinetic energy transport in Rayleigh-Bénard convection KLAUS PETSCHEL, STEPHAN STELLMACH, Institut für Geophysik, Westfälische Wilhelms-Universität Münster, Germany, MICHAEL WILCZEK, Department of Mechanical Engineering, The Johns Hopkins University, Baltimore, USA, JOHANNES LÜLFF, Institut für Theoretische Physik, Westfälische Wilhelms-Universität Münster, Germany, ULRICH HANSEN, Institut für Geophysik, Westfälische Wilhelms-Universität Münster, Germany — Convective systems are often characterized by scaling laws for the heat transport. Several studies have indicated that these scaling laws are inextricably linked to the viscous dissipation rate and therefore to the kinetic energy balance. In the present study, direct numerical simulations of turbulent Rayleigh-Bénard convection are analyzed with respect to the horizontally averaged kinetic energy balance. Based on this budget equation, distinct regions where energy is produced, dissipated and transported by several flux processes are identified. These regions depend strongly on the Prandtl number, which gives new insights into the flow dynamics in the different Prandtl number regimes.

Klaus Petschel
Institut für Geophysik, Westfälische Wilhelms-Universität Münster, Germany

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