Kinetic theory of jet dynamics in planetary turbulence

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Geophysical turbulent flows are characterized by their self-organisation into large scale coherent structures, in particular parallel jets. We will present a theory in order to describe the effective statistics and dynamics of these jets. We prove that this closure is exact in the limit of a time scale separation between the forcing and the inertial dynamics. The equation obtained describes the attractors for the dynamics (alternating zonal jets), and the relaxation towards those attractors. At first order, these attractors are the same as the ones obtained from a second order closure, already studied (SSST, CE2). It also goes beyond, indeed it describes the stationnary distribution of the jets (fluctuations and large deviations), and predicts the corrections to the quasi-linear approximation. We will also discuss possible generalisations to non-zonal coherent structures.