Analytical model of nonlinear variability of large-scale vortical processes in the earth atmosphere

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Abstract. The analytical approximation of observational data for large-scale vortical processes-intensity (LVP) like typhoons based on the differentiable functions is developed. Then this analytical model is applied to the analysis of active cyclogenesis season August-October 1998 year for the North-East part of Pacific Ocean. The structural properies of this temporal retrieval is studied. Besides the complicated structure of LVP-intensity phase plane is demonstrated. The approximation of this phase plane by the oscillator model beside the dissipation must take into account the variable system parameters like oscillator frequency and the system nonlinearity also. The parameters variability corresponds naturally the nonstationary background fields (like the ocean surface temperature) under LVP-development. The possible example of such noninear oscillator model is presented. The analysis developed is applied to study the solar-terrestrial relationships. Namely it was considered the correlation relationships between the large-scale vortical processes intensity occured in the Earth atmosphere and the solar activity variations characterized by the Wolf numbers. The complicated dynamics of these correlations is explained on the basis of oscillator model under influence of the external force when the ratio between the force frequencies and oscillator one is taken into account.