The role of horizontal rolls in rapid intensification of cyclonic vortex

Andrei Sukhanovskii and Elena Popova
ICMM of UB of RAS, Physical Hydrodynamics, Perm, Russian Federation (san@icmm.ru)

The present laboratory study is focused on the role of convective rolls in enhancement of the heat flux from the sea and triggering of the process of rapid intensification of tropical cyclones. The appearance of coherent convective structures such as thermals and rolls are registered by different optical techniques and temperature measurements. Two-dimensional velocity fields are used for the study of the structure and characteristics of the flow. The heat flux from the heating plate to the fluid is measured directly. Obtained results clearly show that rapid intensification of a laboratory analog of a tropical cyclone is tightly linked with the heat transfer process in the boundary layer. Formation of secondary convective structures strongly increases the heat transfer and intensity of convective circulation. Intensity of radial inflow is a crucial aspect for the intensification of cyclonic vortex, hence rapid variation of the heat transfer is a factor that has a substantial influence on the dynamics of a laboratory vortex.