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Upper-troposphere effects of hurricane Olga (2001) in the development of conditions for torrential rains over the southeastern Mediterranean

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During the period from end of November to early December 2001, a sequence of extremely intense synoptic developments occurred over the area from the Atlantic to Mediterranean. These included the formation of Hurricane Olga, an intensification of the Icelandic Low, strengthening of the subtropical westerly jet stream (STJ) over North Africa, formation of the Red Sea Trough (RST) and Cyprus Low cyclones, which resulted in torrential rains in Israel on December 4-5. The evolution of the synoptic processes over a large area from the Atlantic to Western Europe and the Mediterranean region during November 25 - December 5 was investigated with the help of dynamic tropopause patterns calculated based on reanalysis data and results of the simulation of the case with MM5. The chain of extreme weather events was triggered by the acceleration of a coherent tropopause disturbance (CTD) over the Labrador Sea. Two branches of the process were distinguished, southern and northern. The southern one was associated with the transformation of a tropical storm into Hurricane Olga, strengthening of the STJ and eventually the formation of the RST cyclone. The RST contributed to the intensification of the transport of moist auir masses from equatorial Africa to the Mediterranean region. The northern branch was determined by an eastward drift of the CTD, moist air mass transport from the area of the hurricane to the North Atlantic and the European-Mediterranean region, strengthening of the Icelandic Low and formation of an upper troposphere potential vorticity-streamer system over western Scandinavia. Displacement of the streamer to the Mediterranean region and its interaction with the RST system played a major role in the development of the powerful Cyprus Low cyclone over the northeastern Mediterranean region. Intense transport

of moist air masses by the two synoptic systems from the atmosphere over the Atlantic and Arabian Seas, and seclusion of the moist air over the eastern Mediterranean region followed by the latent heat release processes determined the precipitation intensity of the case.

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