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An unusual rainfall episode north and south of the Sahara: the interaction of an extratropical disturbance with the dry-season heat low

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This study provides a synoptic and dynamical analysis of a series of unusual weather events affecting large parts of northern Africa in January 2004. These include substantial precipitation in the arid Algerian and Libyan Sahara, the formation of a Saharan cyclone that causes a major dust storm in the eastern Mediterranean region, and widespread and abundant dry-season convection in the tropical Guineo-Sudanian zone. The latter event, on which the study will focus on, had substantial impacts on the local hydrology and human activities reaching from rotting harvests to improved grazing conditions.

A synoptic-dynamic analysis of the unusual dry-season precipitation event in tropical West Africa in January 2004 reveals the following causal chain: (1) Penetration of a pronounced upper-level disturbance to subtropical northern Africa, (2) Saharan cyclogenesis, (3) break in the Harmattan cold advection and upper-level warm advection both causing a (4) northward shift and intensification of the weak wintertime heat low, (5) penetration of moist southerlies into the continent and (6) intense convection triggered by daytime heating and near-surface convective outflow.