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Cyclogenesis and density currents in the Middle East and the associated dust activity in September 2015

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The first 10 days of September 2015 were marked by an intense dust activity over the Middle East and the Arabian Peninsula. This study examines the atmospheric conditions at the origin of the large dust storms during this period. We particularly investigate the atmospheric dynamics leading to the development of a large dry cyclone over Iraq on 31 August 2015 which in turn generated an intense dust storm that affected most of the countries around the Arabian Gulf and lasted for 5 days. We found that the cyclone developed over Northwest Iraq as a transfer to low levels of a cut-off low which had formed two days earlier at upper levels over Turkey. Large dust loads exceeding 250 tons were emitted and moved southeast in a cyclonic shape toward the Arabian sea. The second large dust storm on 6-8 September 2015 occurred over Syria and affected all the coastal countries on the eastern side of the Mediterranean Sea. It was associated with the occurrence of a series of density currents over northeast Syria emanating from deep convection over the mountainous border between Syria and Turkey. The unusual development of deep convection over this area was associated with a blocking high and interaction with orography. Both the cut-off high and the cut-off low occurred during a period characterized by a meandering polar jet and an enhanced subtropical jet causing unstable weather over mid-latitudes which in turn led to highly polluted atmosphere by natural dust in the affected countries.
Keywords: Cut-off low; cut-off high; upper-level trough; density current; cyclone; evaporation cooling; desert areas; dust storms; polar jet; subtropical jet.