



## **“Tropical Plumes over the Middle East: Climatology and synoptic conditions”**

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A 10-yr climatological study of Tropical Plumes (TPs) observed over the Middle East was undertaken. Several tools were used to identify and analyze these mid-tropospheric elongated cloudbands: satellite images, reanalysis and radiosonde data, backward trajectories, and cluster analysis. In order to conduct an in-depth examination of the synoptic conditions controlling this tropical–extratropical phenomenon, a dual methodology was adopted. In the first analysis, the identified 45 plumes were classified to precipitative and non-precipitative. In the second analysis, backward trajectories of the plumes were clustered in order to detect their moisture origins and pathways. In addition to the well documented south-western plumes originating in West Africa, a more southern pathway was identified, in which moisture was transported from Central to East African sources. The ‘south-western’ plumes are associated with a southwards penetration of mid-latitude troughs, associated with an intensified thermal wind and a longer jet streak, extending as far as Northwestern Africa. In the ‘southern’ category the Sub-Tropical Jet is associated with an anticyclonic flow over the south of the Arabian Peninsula, serving as an essential vehicle advecting moisture from tropical origins. This moisture pathway is considerably shorter than the south-western one. Several conditions favor precipitation induced by TPs over the domain: a northward migration of the jet streak resulting in a weakening of the wind speed over the target area, a deeper trough at the 500 hPa level and a shorter moisture corridor.