On the investigation of the typology of fog events in an arid environment and the link with climate patterns.


**Summary:**
This study focuses on analyzing the characteristics of fog events in the UAE and identifying the causal factors behind their initiation and dissipation. To accomplish this, ERA5 reanalysis data (1995-2018) was utilized, along with hourly meteorological data from eight stations. Radar detection of fog (rad) events was found to be dominant, with an average of 70% occurring within this category. Fog events in the UAE typically occur between 2000 and 0200 Local Time and dissipate between 0600 and 0900 Local Time. Over the period 22-23 December 2017, during a heavy fog event, the temperature and humidity were recorded as 1.2 and 0.7, respectively, an hour before the event. At 750 hPa, a dry and stable layer appeared gradually from 500 hPa, which contributed to fog development. Similar conditions were observed during the investigated fog events, indicating high correlations with specific climate patterns.

These conditions are particularly relevant during El Niño-Southern Oscillation (ENSO) patterns, which significantly influence fog occurrence. During El Niño events, western boundary layer temperatures become cooler, leading to fog occurrences during the first hours of fog initiation. During La Niña events, the warm surface layer becomes warmer, contributing to fog occurrences during the first hours of fog initiation.

This study highlights the importance of understanding fog events in arid environments and their link with climate patterns, which can have implications for environmental and economic activities in the UAE.