Frontogenesis in the meso-α and meso-β scales in the Mediterranean basin: From cloud arch to cloud cells.

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Many regions in the Mediterranean basin could be considered as a frontogenesis area. Considering different temporal and spatial scales, clouds and sometime precipitation bands have been observed associated to fronts, formed by different mechanisms.

By using the version 3 of WRF mesoscale model two type of fronts, with different spatial and temporal scales, formed in the Mediterranean basin by different mechanism have been simulated to analyze the dynamical mechanisms in the front formation. The first selected front was formed over the West Mediterranean Sea on 25th August 2012, within the Meso-α scale according the classification of Orlanski (1975). The WRF simulation of this event shows a cold air mass from the northwest that increases their velocity in arriving to the gulf of Lion. The advection of this cold air formed a cold front over the gulf of Lion at noon on 25th, in which an arch cloud is detected in the visible channel of the Meteosat satellite. The front expands out offshore to the Southeast. The WRF simulation reproduces a weak cloud arc at this time with the cloud base around 700 m. However, a stronger second cloud arch is simulated in the evening, with the cloud base around 800 m, when the thermal difference between the north advected air mass and the Mediterranean air mass are higher.

The second selected example of frontogenesis occurred in the west coast of Greece during the night on 2nd October 2011 within the Meso β scale. The WRF simulation shows that the origin of this front is due to the interaction between cold drainage winds and the warm and wet Mediterranean air mass. A small convergence area was formed near the coastline that moved offshore. Over this convergence area, an individual precipitation cell was simulated, approximately at the same area and time that the reflectivity radar image shows a small precipitation area.

References

Orlanski I. 1975. A rational subdivision of scales for atmospheric processes. *Bull. Amer. Meteor. Soc.* **56**: 527–530. doi:10.1029/2005GL023252, 2005