



Inland sea breeze penetration and its impact on air temperature and humidity in Sfax (Middle-Eastern Tunisia)

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The mesoscale sea breeze has been studied by meteorologists and atmospheric scientists for many years. The sea breeze system occurs at coastal locations throughout the world and consists of many spatially and temporally nested phenomena. Cool marine air propagates inland when a cross-shore mesoscale pressure gradient is created by daytime differential heating. The passage of sea breeze front is an important meteorological factor in the understanding of severe air pollution phenomena. Sea breezes are known to be fairly frequent in the Mediterranean region, especially in coastal plane. Let us cite for instance Sfax, located in middle-eastern Tunisia. This study focuses on the observation of the sea breeze front that passed through Sfax. Also, we examine the change in air temperature, humidity, wind speed and direction caused by the arrival of sea breeze.

33 years (1970-2002) archive of hourly continuous wind direction and speed records at Sfax El Maou observatory are used to determine the frequency of sea breeze days. This local wind is more frequent during summer's months (May-September) with likely more than tow-third of days. Analyses of NOAA-AVHRR imagery as well as surface meteorological data recorded by four automatic weather stations (Davis) are used to localize sea breeze front and assess the change in air characteristics after inland penetration of sea breeze. These stations are aligned perpendicularly to the shore: the first is installed under a boat at 3 km at broad and the fourth at 25 km from the coastline. The analysis of many sea breeze events in summer days is presented.

During the measurement period (25 June to 10 august 2006), the weather was generally clear and the synoptic pressure gradient was weak. The time variation of the

surface wind clearly indicates the sea/land breeze alternation. The first channel of NOAA-AVHRR image shows a cloud band oriented roughly parallel to the shore. Thermal channels (4 and 5) show a significant temperature differences between the over land air and the adjacent over sea air. The arrival of the sea breeze can be seen at the four experimental sites. It is marked by an abrupt rise of wind speed and a deviation of its direction. On the basis of Davis station data, the sea breeze front exists at sea prior to its arrival at shoreline at 10 h. It was detected at about 1 pm in the fourth station (at 25 km from the coastline). Near the shore, the arrival of the sea breeze is associated with moisture rise and temperature decrease. The speed of sea breeze front is estimated to be about 4 m/s at midday. At 14 h the breeze covered the whole Sfax metropolitan area.