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Line - organised convection putting fire to forest area of Halkidiki, Northern Greece

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The organisation of convection in a line often coincides with the end of heat waves in the Southern Balkans. This was indeed the case on the 21st of August 2006, when the tail of an eastward moving cold front put an end to the preceding heat wave and, at the same time, triggered thunderstorms and windstorms in Southern Bulgaria and Northern Greece. The associated electric activity initiated a fire in Kassandra, Halkidiki, Greece. Due to the prolonged drought and the strong winds, the fire spread quickly. It lasted for three days, costing two human lives, burning an extended forest area, as well as destroying hotels and resort facilities.

Availabla data are: i) European Centre for Medium - range Weather Forecasts (ECMWF) analyses, ii) RADAR reflectivity data from the Weather Modification Dept. of the Hellenic Agricultural Insurance Organisation and iii) surface and upper air data from the airport 'Makedonia' of Thessaloniki, Greece.

The heat wave, that affected Greece during the 5 – day period prior to the line convection, was associated with the establishment of a hot, but very stable at low levels, boundary layer, probably modified part of the Saharan air layer, advected to the area of interest. Destabilisation occurred due to surface heating, as well as upper level cold air advection. From the synoptic point of view, upward motion prevails under the inflection point of the subtropical and polar jet streams, indicating once more how important are, for upper level divergence, the curvature changes along the flow. In the meso-α scale, the line convection formed along and just ahead of a shallow, frontogenetically active cold frontal zone. Hence, the line under study may be called a squall line. It is suggested that such zones play a key role in triggering severe weather in the same area, as well as cyclogenesis in the Mediterranean area. Previous studies have shown numerous severe weather events to occur along such zones.

In the meso-β scale, the line under study fits the 2-D model of squall lines, as transverse vertical cross sections show. On the isentropic level, as the system moves eastward, warm low level air flows in from the east – southeast, whereas cold upper level air is ingested from the north. The hourly sea level pressure field exhibits pre - squall and wake lows and a meso – high, the classic features observed before, after and during the passage of a squall line, respectively. More interestingly, the succession of clouds and associated weather was typical of a squall line. Convective activity peaked suddenly to the cumulonimbus level, with no cumulus clouds observed prior to the squall line. The lack of a dense observing network, as far as upper air and even surface observations are concerned, limits the study of the meso-β features of the squall line (movement etc.). The lack of Doppler RADAR data precludes the representation of the transverse circulation across the line. However, it is hoped that the present study adds to the research on severe weather in the Mediterranean, as it highlights the crucial role of synoptic – meso-α scale features.

In view of the failure of the operational global NWP models (ECMWF, NCEP GFS) to predict squall line associated precipitation, which fell even in the form of hail, forecasters' attention is drawn upon convergence zones, especially low level frontogenetically active ones. It is suggested that summertime convection is rather dynamically than thermodynamically driven, this general rule applying even to non-frontal convection. Equivalently, convection is more likely to occur when the dynamics promote boundary layer convergence and upward motion, rather than when the thermodynamics favor air parcel ascent and saturation.