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AVHRR Infrared brightness temperatures at the cloud tops of sea breeze fronts over the Iberian Mediterranean area and the isle of Mallorca (Spain)

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The main objective of this remote sensing study is to investigate infrared (IR) brightness temperatures at the cloud tops of sea breeze fronts over the Iberian Mediterranean area and the isle of Mallorca, both in Spain. Advanced Very High Resolution Radiometer (AVHRR - HRPT) data from National Oceanic and Atmospheric Administration (NOAA) polar orbiting satellites is collected May through October 2004. We use a new daytime over land cloud detection scheme (Azorin et al., 2007) to derive cloud masks from NOAA-17 and NOAA-16 overpasses. In this study, we analyze the frequency of cloud tops that are colder than different IR threshold temperatures in order to represent areas that experience deep convection associated by sea breezes. Here we present cloud frequency composites for different IR thresholds and prevailing large-scale situations which aid in highlighting the location of hotspots. Preliminary results indicate that cloud tops associated with sea breeze convection are normally warmer than 235K, a threshold which is used in the literature for indicating deep convection. We also use surface synoptic observations with the aim to study if sea breeze storms with IR brightness temperatures >235K at 11.0 and 12.0 μm is related to severe thunderstorms (e.g. impact of hail storms on the agriculture economy). Previous studies have concluded that severe and moderate thunderstorms events can occur under sea breeze situations, even though weather reports forecast mostly clear skies. Results from this remote sensing study could have applications for short-term forecasts.