



## Satellite Based Climatology of (Sub-) Tropical Cylcones in Europe

Alois M. Holzer (1) and Pieter Groenemeijer (2)

(1) ESSL, European Severe Storms Laboratory, Wiener Neustadt, Austria (alois.holzer@essl.org), (2) ESSL, European Severe Storms Laboratory, Wessling, Germany (pieter.groenemeijer@essl.org)

In the waters surrounding Europe, a fully developed tropical cyclone has rarely been documented. However, in the Mediterranean Sea, and Black Sea, and in the Atlantic Ocean southwest of the Iberian Peninsula, storms that reveal a high level of subtropical or tropical cyclone type organization can be observed on satellite imagery. These storms reach storm strength and pose a threat to shipping, tourist industry and the coastal communities. Moreover, their frequency and intensity may change within a changing global climate.

Before this study, a sound objective baseline climatology of such systems, or methods to obtain such a climatology, were lacking in Europe - even though this would have direct applications to risk management, e.g. on behalf of shipping companies. To obtain such climatology, the manual Dvorak-Method was applied to Meteosat 1 imagery, back to the onset of the operational meteorological satellite era in Europe.

This work presents the outcomes, researching (sub-)tropical cyclones in the waters surrounding Europe. For these systems we assessed their

1. climatological frequency,
2. geographical distribution and
3. typical characteristics in various channels, using METEOSAT satellite imagery.

According to the Dvorak method suspect systems were classified as (sub-) tropical depressions, storms or cyclones via assigning T-numbers (T for tropical) related to the satellite appearance of the system. The goal was to identify every (sub-) tropical storm while digging through the archive. In a second step the single cases were studied in depths.

Climatology was finally set up, containing the general number of systems in each of the three basins, their seasonal occurrence, mean peak intensity, peak intensity distribution, and lifetime.

We will not only present the data, but also examples of imagery and the most prominent storms.