Classification of Cyclogenesis over the Apennine Mountains and Adriatic Sea

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Cyclones that appear in the basin of Adriatic Sea strongly influence the climate and weather conditions in the area. In particular, apart from the usually mild climate, cyclonic activity in the Adriatic and Central Mediterranean provide the main hydrological forcing as well as trigger mechanisms for a range of extreme weather phenomena. Therefore, a basic understanding of the cyclogenesis over the Adriatic Sea is essential. In particular, the classification of different types of cyclogenesis in the area is fundamental since it will help the understanding and prediction of the relevant weather phenomena. In this study, based on the analysis of four year (2002 – 2005) operational ECMWF T511 dataset, we classify various types of cyclone tracks as well as isolate the mesocyclogenesis areas in the vicinity of Adriatic basin.

Our analysis indicates that four types of cyclogenesis over the Adriatic Sea can be identified: (1) Type A: cyclones connected with pre-existing Genoa cyclones. Two subcategories are found: (I) continuous track: Genoa cyclones crossing over the Apennines to the Adriatic Sea and (II) discontinuous track: new surface cyclones generated over the Adriatic Sea under the influence of a parent cyclone generated in the Gulf of Genoa (Genoa cyclones) and moving towards Adriatic but blocked by the Apennines; (2) Type B: cyclones developed in situ over the Adriatic Sea without any connections with other pre-existing cyclones in the surrounding area; (3) Type AB: mixed types A and B cyclones. In this type of cyclones, two cyclones co-exist and stride over the Apennines (twin or eyeglass cyclones); and (4) Type C: cyclones moving from Mediterranean Sea, but not from the Gulf of Genoa (non-Genoa cyclones). Two subcategories are found: (I) continuous track: a non-Genoa cyclone is able to cross over the Apennines to the Adriatic Sea continuously and (II) discontinuous track: a non-Genoa cyclone is blocked by the Apennines and a new surface cyclone is generated over the Adriatic Sea. The relevant dynamics of the above types of cyclones are discussed along with characteristics of the cyclones and their synoptic situations at lower and upper troposphere.