

Tornadoes and waterspouts: phenomena that (also) occur in Italy

When we talk about tornadoes, our thoughts immediately go to the immense American plains and the area known as “*tornado alley*”, a vast corridor extending over several states in the central region of the USA, where tornadoes very frequently form.

Yet in **Italy** too, on average around **100 tornadoes**, roughly divided into **37 tornadoes and 71 waterspouts** occur every year. This is the result of [recent research](#) published in the *International Journal of Climatology*, in which Mario Marcello Miglietta, a researcher at the Italian National Research Council's Institute of Atmospheric Sciences and Climate (CNR-ISAC), and Ioannis Matsangouras, of the Greek National Meteorological Service, have analysed ten years of data on the formation of waterspouts and whirlwinds that have hit our country.

The research reveals that, in some areas of Italy, tornadoes and whirlwinds occur at a frequency comparable to the most frequently hit areas in the United States.

In Italy, however, to date the phenomenon of tornadoes has rarely been studied because, as the authors themselves explain, the whirlwinds that form over Italy have limited effects. For example, Miglietta mentions the whirlwind that occurred in Puglia some years ago: “*The Taranto whirlwind in 2012 involved an area around 300 metres wide and ten or so kilometres long. Very limited, therefore, as compared to other meteorological phenomena like flooding, hailstorms or intense rain storms, but in any case sufficient to cause substantial damage when tornadoes hit a built-up area or a production area like the ILVA steelworks.*” At the time, in fact, the toll of the tornado was one casualty (a worker at ILVA), several injured people and damage worth millions of Euro.



A tornado that formed on dry land. Credits: flickr.com



When a tornado develops over the sea we call it a waterspout. Credits: flickr.com

The figures for the phenomenon

The two researchers have analysed data related to a ten-year period, from 2007 to 2016, on tornadoes and waterspouts in Italy in terms of geographical and temporal distribution, starting from the *European severe weather database* (available at the following link eswd.eu). The database includes phenomena ranging from those of limited magnitude to more intense whirlwinds, able to produce significant damage. The data available in this dataset have been integrated with those from other sources: news items reported by the media, direct reports by witnesses and forums of meteorology enthusiasts. In this way a “map” was drawn up showing the extension of the phenomenon and the areas of Italy hardest hit by these extreme events. The research shows that, on average, each year 37 whirlwinds and 71 waterspouts of varying intensity occurred, with a peak in 2014, in which no less than 141 whirlwinds and 76 waterspouts were recorded in Italy. Fortunately, in most cases, these were phenomena with a rather low intensity, both in terms of intensity and duration, but in the decade investigated, 24 events were equal or higher than the level 2 on the **Enhanced Fujita** scale (EF 2), that is able to cause significant damage to property and people, such as tearing roofs off buildings, lifting cars off the ground, uprooting trees and damaging masonry buildings.

The areas most at risk

Waterspouts develop principally along the **coasts of the Tyrrhenian Sea** and along the Ionian Coast of **Puglia**. Most waterspouts, around 43%, occur in the autumn, while 33% are formed during the summer, with an average density of almost one event each year for every 100 km of coast. There is, however, strong variation at regional level, with peaks of five events in some zones of the Tyrrhenian Coast. Almost a quarter of the waterspouts hit dry land and then become tornadoes. In this case, peninsular areas have the highest probability of being hit at the end of the summer and in the autumn. With regard to tornadoes generated on dry land, there is a higher frequency during the summer and late spring and the areas worst hit are the coasts of **Lazio**, **Tuscany** and **Salento** (when banks of warm air come into contact with the surface of the sea that is still quite warm) and the **Veneto plain** (when the warm air arriving from the Po Valley Plain

encounters cold air arriving from the Alps): in these regions the density of the events is comparable to that of the worst hit areas of the United States. What distinguishes Italian phenomena, however, is their lower intensity as compared to American tornadoes.

Interest for this type of event must not be limited to meteorology, but must also take into account its effect in terms of **emergency** procedures and **risk communication**. We must ask ourselves how to cope with events of this kind and how to behave to avoid putting our safety at risk when we encounter a whirlwind. The Italian researcher concludes: *“Unfortunately, tornado warning procedures exist in only a few European countries. Given the seriousness of the damage that they may cause, it would be advisable for there to be greater attention to such events in the future.”*



Events catalogued in Italy in 2014, an anomalous year with regard to weather, in which 141 whirlwinds and 76 waterspouts were recorded. Source: European Severe Weather Database

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