

## **Recurring features of extreme rainfall events close to Veneto coast during autumn**

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Climate of Veneto (north-east Italy) is characterized by significant differences between specific areas: mountains, plane, coast, etc. Such differences are particularly strong as far as precipitation is concerned. Mean annual rainfall on the coast is approximately 700-1000mm, whereas quantities more than double are measured on Prealps, only 100 km apart. Such differences are mainly related to crucial role of reliefs and with their interaction with southerly warm and humid fluxes coming from the Mediterranean Sea.

A more detailed analysis of rainfall distribution highlights some interesting features, associated with a more localized role of the Adriatic Sea. Among others, it is noticeable that coastal area of Veneto is well subject to extreme events even if, as already mentioned, total annual amount of rain is the lowest in the region.

Referring to the coast of Veneto, present work deals with:

- a) Climate study including seasonal and monthly distributions of precipitation;
- b) Contribution of extreme events to annual total;
- c) Analyses of recent extreme events happened in September during last four years.

In fact for that area of Veneto, September is the most rainy month. Furthermore during September maximum of daily rainfall values were recorded (period of analyses 1993-2009); in particular, during the last four months of September, from 2006 to 2009, every year an extreme event occurred.

Final goal was to understand main factors that caused such particular episodes in the same period of the year. Referring to four recent events happened during last four months of September, a detailed analysis was carried out including:

- synoptic analyses both at surface than aloft;
- study on mesoscale information derived from ground dense network, weather radar, etc.

All events evidenced some common features:

- deep trough aloft between North Atlantic Ocean and Central Mediterranean, with possible formation of low-level cyclone on Gulf of Genoa;
- low-level advection of moist and warm air coming from Adriatic sea, that is still warm (sea surface temperature above 20°C) in September;
- previous weather conditions (7-10 days) with anticyclonic situation (frequently a ridge from north-Africa) with temperatures higher than usual.

During most intense phases, recurring features were evidenced:

- convective rains with significant thunderstorm activity; such systems are often associated to regeneration of cells, in the same coastal area;
- convergence lines at low levels associated with winds coming from SE (from the sea) on the coast, and from NE (from the plane) immediately inland.

It is particularly important to underline that rainfall values on short periods were extremely high if compared with mean annual amount: during last four episodes, rainfall amounts between 130 and 320 mm were recorded in 12 hours, i.e. during half a day something like 1/8 and 1/3 of total mean annual amount has fallen.

Remarkable also intensity of rainfall: values like 90 mm in half an hour, or 125 mm in 1 hour were recorded.

The final goal of this study was to better understand meteorological conditions associated with such events to improve forecasting and nowcasting skill. This is a crucial benefit for a Regional Met Service that must alert and support civil defence system properly, as is the case for Meteorological Centre of ARPAV in Veneto. Furthermore it is important to underline the fact that coastal area of Veneto is densely populated and it is one of the most important areas of Italian tourism, including the city of Venice and several seaside resorts with more than twenty millions of presences per year.