

## EGU General Assembly April 2015 Vienna, Austria.

The Ferrara province is located in the Po valley, a low plain surrounded by Alps and Apennine. The area's particularity is the closeness with the Comacchio valley and sea, it is characterized by continental climate. In this work we have used the isotopic heavy element composition ( $\delta^{2}\text{H}$ ,  $\delta^{18}\text{O}$ ) of the meteoric waters picked up in six choice stations, to verify the variability composition on an extensive province area. The stations chosen for this study include several province sectors, therefore allowing to determine the isotopic range which characterizes the local meteoric waters.



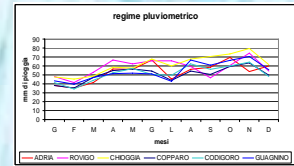
Six sites for microclimatic study, 3 in Emilia Romagna region, 3 in Veneto.

STAZIONE	G	F	M	A	M	G	L	A	S	D	N	D	TOT
ADRIA	38	35	42	57	56	67	45	56	58	70	54	60	638
ROVIGO	48	41	53	66	62	66	66	60	47	61	74	54	698
CHIOGGIA	48	45	48	58	57	68	60	68	70	73	79	61	737
COCCARO	38	35	47	55	57	54	44	55	51	59	63	49	608
COGGORO	42	34	44	52	57	51	49	62	56	60	64	48	620
GUAGNINO	43	39	47	51	52	51	43	67	61	66	70	56	647

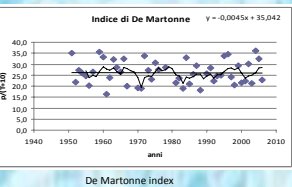
Monthly average precipitations of the six stations

### Microclimatic characterization

In the climatic study have been selected six pluviometric stations, in the attempt to evaluate a possible regionalization of the pluviometric climate and verify any climatic differentiations in the zones placed immediately to North and South of Po river, data concerning the stations of Copparo, Codigoro and Guagnino for the Emilia Romagna area and from Rovigo, Adria and Chioggia for the Veneto Region. To the meteorological study is followed a geochemical study of the meteoric waters in a wide area taking advantage of the rain gauge net of the Ferrara Drainage Consortium.



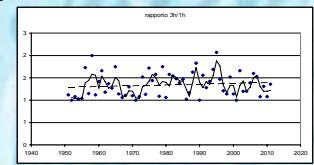
Trend of the monthly changes in the pluviometric regime



De Martonne index

"The index of Aridità" De Martonne is one of several climatic indices thermo-precipitation that can be used to define the climate of an area. It was decided to calculate the values for the station Codigoro highly representative of the normal climate. From the scatter plot, the calculated ratio between precipitation and temperature, shows a trend of between 25 and 30. According to De Martonne, the climate of the area can be defined as sub-humid.

The short and intense precipitations to 1h and 3h the signal does not show significant variations; a clear sign that the atmospheric dynamics that determines storm conditions is absolutely not changed..



Relationship precipitation 3h / 1h, in the station of Codigoro.

### Geochemical characterization.

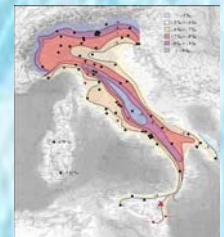
6 stations have been chosen to try to identify the average isotopic water composition in a reduced area, to be able to place to comparison between them, to verify the existence of possible variations on a local scale. In literature, the reference values for meteoric waters related area of study are extrapolated from the work of Longinello and Selmo, who reports as guidelines:

$$\delta^{18}\text{O} (\text{V-SMOW}) = -6,75$$

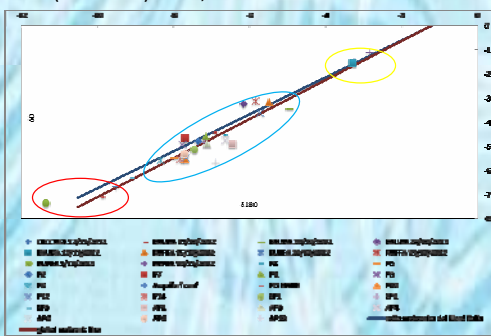
$$\delta\text{D} (\text{V-SMOW}) = -42,4$$



Six sites of geochemical study's sampling on the meteoric waters



Variation of the isotopic composition of rainwater. (Longinelli and Selmo, 2003)



Events analysed referred to the monitoring stations.

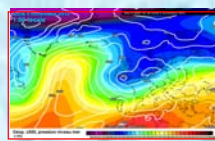


Fig.1

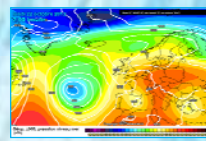


Fig.2

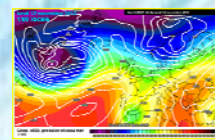


Fig.3

The images perturbations concern the three groups identified in the isotopic graphic.

Picture 1 shows the origin of the disturbance which took place on November 5, 2012, from the image it is evident that the water masses have suffered isotopic fractionation that downloaded on the Tyrrhenian side of the light isotopes, arriving at the sampling zone very enriched in heavy isotopes.

Picture 2 is a picture related to the perturbation of the October 22, 2012, chosen as representative of the central group. This shows that the event source is local, the water masses are generated by evaporation and condensation of water vapor, producing an isotopic fingerprint typical of the area.

The picture 3 shows the origin of the disturbance of November 12, 2012, this was an event of short duration and high intensity, this has resulted in isotopic concentrations lower than other samples.

Rains which fall on the interest area change in a compositional interval of -6,95 and -5,19 for the  $\delta^{18}\text{O}$ , and a mean value between -46,21 e -31,82 per il  $\delta\text{D}$ , the short and intense events are marked by values which come from the seasonal average.

The application of the isotopic techniques here outlined, is a useful contribution for a bigger knowledge of the zone represents. The study provides a specific characterization of the relationship between precipitation and isotopic compositions, providing a stimulus for research to improve understanding between the isotopic characteristics and events that generated them.

This work was funded by the WARBO project.

