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Towards the definition of a new river water line for North-Eastern Italy

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In the last decades there has been active research on the relation between the stable isotopic composition of precipitation and climate variations at the regional scale. Particularly, the analysis of meteoric water lines is an important tool to understand climate processes at the local/regional scale. In this view, considering the strict relation between the isotopic composition of river water and the one of precipitation, surface running waters (i.e. rivers, streams, creeks) and their catchments can be considered as “natural pluviometers”.
In this study the analysis of the isotopic composition of surface waters was carried out in order to develop a new meteoric water line of North-East Italy. The dataset includes samples collected between 2012 and 2016 from i) small catchments, typically < 30 Km^2 (Ressi Creek, Bridge Creek and Vauz Creek, Noce Bianco stream, Posina river), where it is easier to relate the stream water isotopic composition to distinct meteoric end-members (e.g., rainfall, snowmelt and glacier melt); and ii) large basins (Adige: 12,100 Km^2 and Po: 71,000 Km^2) which integrate multiple components giving information at the regional scale.
Preliminary results show that distinct river water lines are characterized by different slopes and intercepts. The slopes vary between 5.46 and 8.02, whereas the intercepts vary between -9.15 and 11.82. In particular river meteoric water lines defined for Ressi Creek ($\delta D‰ \bar{7}.48\ \delta 18O + 10.27$, n=831; $R^2 = 0.88$) and Noce Bianco stream ($\delta D‰ \bar{7}.66\ \delta 18O + 7.27$, n=484; $R^2 = 0.95$) confirm the similarity with the meteoric line developed for northern Italy. On the contrary, the isotopic composition of streams in small (< 10 Km^2) snow-dominated catchments (Bridge Creek and Vauz Creek) deviate from the North Italy meteoric line due to the important contribution of snowmelt that is typically characterized by a different isotopic signature compared to the precipitation input. River water lines for large basins (Po and Adige) are characterized by slopes and intercepts in the range of the Global Meteoric Water Line. Finally, it is important to emphasize that the current dataset, progressively updated, represents a snapshot of a short monitoring period and that future investigations are useful to highlight seasonal variations and on-going environmental changes.