

The Italian FLOod and Catchment Atlas (FOCA)

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In recent years, various national databases of geomorphoclimatic watershed attributes have been released. Notable examples include the CAMELS datasets, developed for countries like the United States, the United Kingdom, Australia, Chile, Brazil, Switzerland, France, and Germany (now integrated into Caravan), as well as LamaH-CE (related to the areas of the upper Danube up to the Austrian-Slovakian borders and some nearby catchments).

In Italy, as of today, only partial-coverage datasets (both in terms of spatial extent and number of variables) are available. One of the reasons behind this lack is the dismantlement of the National Hydrographic Service named "Servizio Mareografico e Idrografico Nazionale" (SIMN), that has led to a federated management of the national monitoring network by 21 different administrative agencies.

This work introduces FOCA (Italian FLOod and Catchment Atlas), a comprehensive national-scale compilation featuring 631 Italian river basins. These basins have been thoroughly characterized, offering a wealth of information comprising over 100 attributes related to geomorphology, soil, land cover, NDVI, climate, and precipitation extremes. Basin boundaries are provided as a key information of the dataset, empowering users to incorporate additional descriptors using their models or datasets.

The catchment selection criterion adopted in this work stems from the purpose to improve a national-scale inventory named "Catalogo delle Piene dei Corsi d'acqua Italiani" (Claps et al., 2020a, 2020b, 2020c), a result of a data rescue initiative that merged recent digital data with historical information available in printed documents. The 631 chosen catchments are those for which peak or daily discharges are available, and therefore all included in Claps et al. (2020a, 2020b, 2020c). The spatial distribution of the basin is visible in Figure 1.

The inclusion of descriptors in FOCA adheres to three key criteria:

- a. national spatial coverage;
- b. absence of regional or local distortions;
- c. adequate spatial resolution.

Preference was accorded to local sources, with global data utilized only as last option. Even if the use of global datasets facilitates the comparison of the results obtained in large-scale hydrology works, local datasets are, without doubts, characterized by higher-quality information.

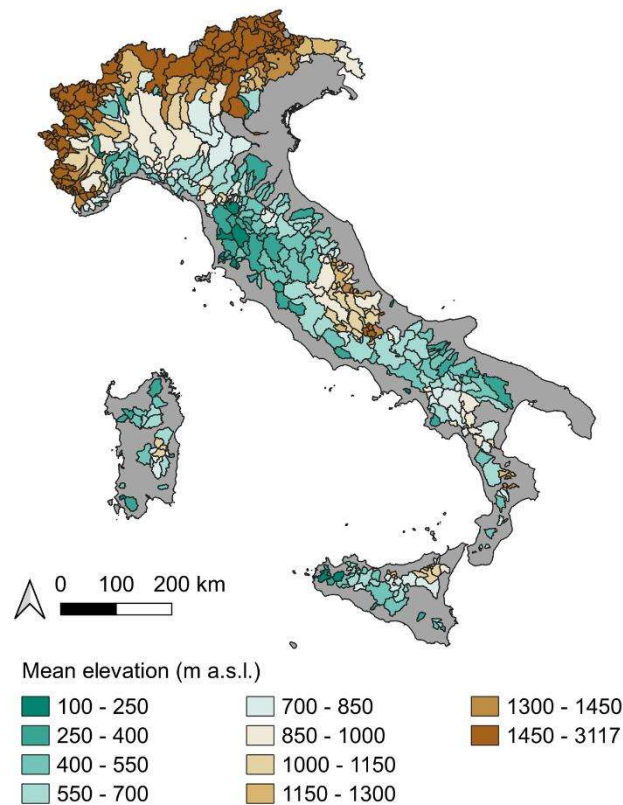


Figure 1 – Mean elevation of the 631 river basins included in FOCA.

FOCA distinguishes itself from other national datasets through its robust collection of geomorphological descriptors, computed using the *r.basin* algorithm of GRASS GIS and subjected to meticulous quality controls. Another distinctive feature is the inclusion of extreme rainfall characteristics, calculated using station data rather than reanalysis data (the latter is the approach used in the development of CAMELS datasets). For this purpose, the Improved Italian - Rainfall Extreme Dataset (I^2 -RED; Mazzoglio et al., 2020) has been used. I^2 -RED is a national collection of rainfall extremes measured by over 5000 rain gauges from 1916 to the present.

This nationwide data collection opens the door to a myriad of environmental applications, particularly in the field of flood studies.

References

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