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Experimental research basins in Italy: an inventory

Luca BROCCA
Research Institute for Geo-Hydrological Protection, National Research Council, Italy, Perugia
luca.brocca@irpi.cnr.it

The research activity on small experimental basins in Italy started in '70s mainly focusing on runoff generation processes and the hydrologic response time of the catchments. Since then, many isolated initiatives have been carried out expanding significantly research objectives activities.

In this first inventory of the Italian experimental research basins, the information for nine catchments, for which the experimental activity is still ongoing, has been collected and synthesized. Figure 1 shows the geographical location of the basins while Table 1 summarizes their main characteristics. As it can be seen, basins are mainly located in North (3) and South (5) Italy, elevations range between 60 and 3152 m a.s.l. and drainage areas between 1.1 and 72 km². The monitoring of rainfall and runoff is available for all the catchments highlighting that the knowledge of the main components of the water balance is fundamental for more detailed analyses. Additional measurements of several meteorological quantities (temperature, wind, air humidity, solar radiation) along with soil moisture, groundwater level and isotopes are used for improving the understanding on the runoff generation processes. Other basins are equipped for the monitoring of sediment yield and concentrations, bed load transport, nutrients and water quality parameters. For most basins, the monitoring started after 2000 even though a data set of more than 20 years is available for the Gallina and Margiogrande basin.

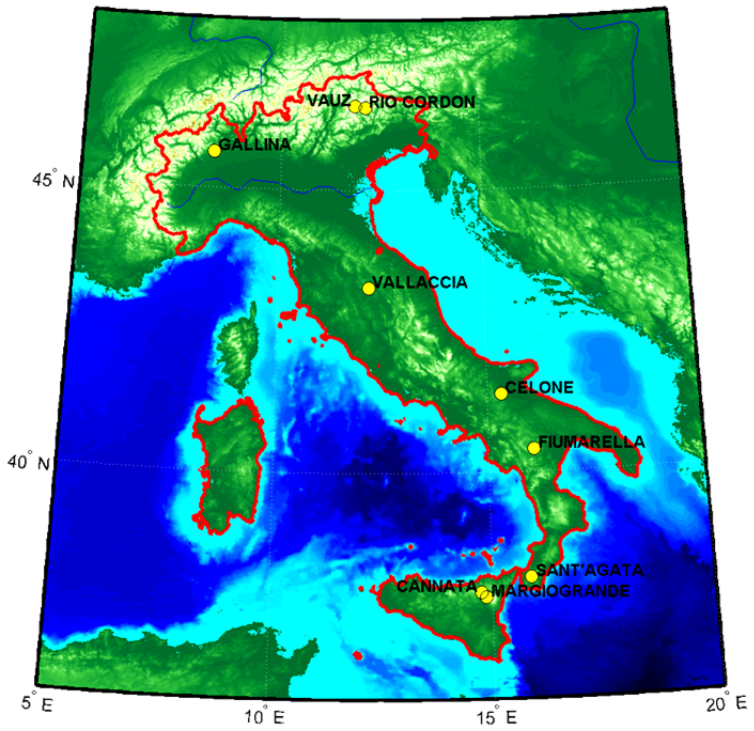

Figure 1 - Location of small experimental catchments in Italy.

For three catchments (Fiumarella, Vallaccia e Vauz), the research activities are addressed to study: (i) the runoff generation mechanisms for improving flood predictions (*Brocca et al., 2009; 2011*; *Onorati et al., 2009*; *Penna et al., 2011*), (ii) the spatial and temporal variability of soil moisture (*Penna et al., 2009; 2012*; *Brocca et al., 2010b*), and (iii) the use of remote sensing for soil moisture retrieval (*Brocca et al., 2010a*; *Manfreda et al., 2011*). These activities are carried out by using different rainfall-runoff models characterized by different complexity and spatial discretization. For two basins, several models are applied to reproduce not only the rainfall-runoff process but also water quality parameters and nutrient concentrations (Celone, *De Girolamo et al., 2011*) and soil erosion (Cannata, *Licciardello et al., 2007; 2011*). Sediment and bed load transport is investigated at the Gallina, Margiogrande and Rio Cordon (*Lenzi et al., 2004*) basins. Specifically, long-term evaluation is

carried out at Margiogrande (20 years) and Gallina (30 years) basins also to understand the possible impact of climate changing on this process (*Anselmo et al., 2011*). The estimation of river velocity and flow resistance for stepped channels is also analyzed at Rio Cordon (*Comiti et al., 2007*). Finally, the impact of check-dams on fluvial landforms and riparian vegetation is the main research activity at Sant'Agata basin (*Bombino et al., 2006; 2009*).

As it can be inferred from the brief summary reported above, investigation in small experimental basins in Italy have provided very significant data sets that allowed a better understanding of several scientific issues. This also resulted in the publication of several papers on major international scientific journals. Moreover, to our knowledge, several other small research basins are present in Italy that have not yet been included in the ERB network. It is our goal to stimulate also their participation. Future steps of this inventory will be the formation of a strong network for the harmonization of the research activities in the different experimental basins also by sharing the collected data sets. This will permit researchers to analyze a more extended database (both in time and in space) thus obtaining more robust results. Therefore, a significant advance in our understanding of the hydrological cycle is expected.

Table 1 - Main characteristics of the Italian experimental catchments (R: rainfall, T: temperature, H: air humidity, W: wind velocity/direction, Rad: solar radiation, Q: discharge, SM: soil moisture, G: groundwater level, SED: sediments concentration/yield, BL: bed load, S: snow, Nut: nutrient concentration, WQ: water quality).

Name	Area (km²)	Lat/Lon (°)	Elevation range (m a.s.l.)	Mean annual R (mm)/ T (°C)	Collected data	Start year	Main contact
Cannata	1.3	37°53'N/ 14°46'E	903-1270	690 / NA	R, Q, SED	1996	flicciar@unict.it
Celone	72.0	41°23'N/ 15°20'E	60-1150	730 / 13	R, T, Q, Nut	2009	degirolamo@ba.irsa.cnr.it
Fiumarella	32.5	40°24'N/ 16°03'E	630-1380	600 / 10	R, T, H, W, S, Rad, Q, SM	2002	salvatore.manfreda@unibas.it
Gallina	1.1	45°38'N/ 8°18'E	330-522	1280 / 11	R, T, Q, SED	1982	franca.maraga@gmail.com
Margiogrande	4.5	37°48'N/ 14°52'E	580-1030	600 / NA	R, Q, GE	1993	dzema@unirc.it
Rio Cordon	5.0	46°27'N/ 12°06'E	1763-2748	1100 / 2	R, T, H, Rad, S, Q, SED, BL, WQ	1985	marioaristidelenzi@unipd.it
Sant'Agata	61.0	38°08'N/ 15°53'E	893-1610	1350 / 11	R, Q	2003	giuseppe.bombino@unirc.it
Vallaccia	57.6	43°16'N/ 12°12'E	288-818	930 / 13	R, T, H, W, Q, SM	1988	luca.brocca@irpi.cnr.it
Vauz	1.9	46°29'N/ 11°50'E	1847-3152	1220 / 3	R, T, Q, SM, G, I	2005	daniele.penna@unipd.it

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