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Integrated Hydro-geomorphological Monitoring System of the Upper Bussento river basin (Cilento and Vallo Diano Geopark, S-Italy)

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The Mediterranean river ecosystem functionings are supported by river-aquifer interactions. The assessment of their ecological services requires interdisciplinary scientific approaches, integrate monitoring systems and inter-institutional planning and management. This poster illustrates the Hydro-geomorphological Monitoring System build-up in the Upper Bussento river basin by the University of Salerno, in agreement with the local Basin Autorities and in extension to the other river basins located in the Cilento and Vallo Diano National Park (southern Italy), recently accepted in the European Geopark Network. The Monitoring System is based on a hierarchical Hydro-geomorphological Model (HGM), improved in a multiscale, nested and object-oriented Hydro-geomorphological Informative System (HGIS, Figure 1). Hydro-objects are topologically linked and functionally bounded by Hydro-elements at various levels of homogeneity (Table 1). Spatial Hydro-geomorpho-system, HG-complex and HG–unit support respectively areal Hydro-objects, as basin, sector and catchment and linear Hydro-objects, as river, segment, reach and section. Runoff initiation points, springs, disappearing points, junctions, gaining and water losing points complete the Hydro-systems. An automatic procedure use the Pfafstetter coding to hierarchically divide a terrain into arbitrarily small hydro-geomorphological units (basin, interfluve, headwater and no-contribution areas, each with a unique label with hierarchical topological properties. To obtain a hierarchy of hydro-geomorphological units, the method is then applied recursively on each basin and interbasin, and labels of the subdivided regions are appended to the existing label of the original region. The monitoring stations are ranked consequently in main, secondary, temporary and random and located progressively at the points or sections representative for the hydro-geomorphological responses by validation control and modeling calibration. The datasets are organized into a relational geodatabase supporting tracer testings, space-time analysis and hydrological modeling. At the moment, three main station for hourly streamflow measurements are located at the terminal sections of the main basin and the two main sub-basin; secondary stations for weekly discharge measurements are located along the Upper Bussento river segment, upstream and downstream of each river reach or tributary catchments or karst spring inflow. Temporary stations are located in the representative sections of the catchments to detect stream flow losses into alluvial beds or experimental parcels in the bare karst and forested sandstone headwaters. Streamflow measurements are combined with geochemical survey and water sampling for Radon activity concentration measurements. Results of measurement campains in Radon space-time distribution within the basin are given in other contribution of same EGU session. Monitoring results confirm the hourly, daily, weekly and monthly hydrological data and validate outcomes of semi-distributed hydrological models based on previously time series, allowing both academic consultants and institutional subject to extend the Integrated Hydro-geomorphological Monitoring System to the surrounding drainage areas of the Cilento and Vallo di Diano Geopark.

Keywords: River-aquifer interaction, Upper Bussento river basin, monitoring system, hydro-geomorphology, semi-distributed hydrological model.

Table 1: Comparative, hierarchical Hydro-morpho-climate entities

Hierarchy level	**Area** (Km^2)	**Scale**	**Orography Entity**	**Climate Entity**	**Morfological Entity**	**Areal Drainage Entity**
VIII	10^6	1:15E6	Orogen	Macroscale α	Morphological Region	Hydrological Regi
VII	10^5	1:10E6	Chain Sistem	Macroscale β	Morphological Province	Hydrological Prov
VI	10^4	1:5E5	Chain	Mesoscale α	Morphological Sistem	Basin
V	10^3	1:2,5E5	Chain Segment	Mesoscale β	Morphological Sub-system	Sub-Basin
IV	100	1:1,0E5	Orographic Group	Mesoscale γ	Morphological Complex	Basin Sector
III	10	1: 5E4	Orographic System	Microscale α	Morphological Unit	Watershed
II	1	1:2,5E3	Orographic Complex	Microscale β	Morphological Component	Catchment
I	10^{-2}	1:5E3	Orographic Unit	Microscale γ	Morphological Element	Hollow