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Increasing the availability of Italian daily hydrological measurements with a citizen science approach: the SIREN project

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In Italy, the National Hydrological Service named "Servizio Idrografico e Mareografico Nazionale" (SIMN) was established to collect hydro-meteorological measurements. This Service was also in charge of publishing the Hydrological Yearbooks, a standardized collection of validated measurements available in printed volumes. The dismantlement of the SIMN, performed about 30 years ago, led to the decentralization of data collection to the regional level. This shift has resulted in challenges related to the availability of comprehensive national-scale datasets since historical hydrological measurements are usually available only in the printed Yearbooks. These volumes have seen limited efforts towards digitization over time, increasing the risk of losing a large (but, so far, little exploited) wealth of information related to the hydrology of the last century.

Despite advancements in Optical Character Recognition (OCR) software, machine learning, and artificial intelligence, manual transcription remains the most accurate digitization method in certain conditions, e.g., when the ink is partially damaged or when handwritten corrections are reported. Within the SIREN (Saving Italian hydRological mEasuremeNts) project, a citizen science initiative developed on the Zooniverse platform (https://www.zooniverse.org/projects/siren-project/siren-project), hundreds of volunteers are contributing to digitizing this amount of data. Being an expert is not fundamental for being part of this citizen science project: a tutorial automatically pops out when a volunteer enters the workflow, illustrating all the key characteristics of the Yearbooks and how to interpret them, enriched with a step-by-step description of all the phases of the digitization workflow. To minimize digitization errors, each table is digitized by at least 2 different volunteers, and discrepancies are manually checked and corrected.

The time series collected up to now are currently undergoing a detailed quality control procedure to ensure the reliability of the dataset that will be created. The final dataset will be made available on Zenodo in the upcoming months.

The SIREN project represents thus a collaborative effort to bridge the historical hydrological data gap, offering valuable insights for both local and national-scale analyses and aiding in the refinement of models predicting current and future hydrological trends.