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HYDRO-NET: Hydro-telemetric Network for surface waters – Innovations and Prospects

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The Hydro-telemetric Network, *HYDRO-NET*, is a pilot streamflow monitoring network established and operated by the Institute for Environmental Research and Sustainable Development of the National Observatory of Athens (NOA) within the HYDRO-NET Project (2018-2021): *Hydro-Telemetric Network of Surface Waters: Gauging instruments, smart technologies, installation and operation*. An aim of the project is that HYDRO-NETs' principles of design, installation and operation will guide establishing of hydrometric networks in the Hellenic territory. HYDRO-NET provides a comprehensive framework for collection, transmission, handling and free use of data that combines technological innovations and advanced scientific methods with efficient use of resources. It particularly responds to the need of estimating the discharge at cross-sections of streams *where no prior data exist by inexpensive means*.

Technological innovations concern the design and construction of a prototype hydro-telemetry system that combines custom built firmware and intelligent measuring technologies with telecommunication at low cost, ~50% the price of a commercial station. This prototype is equipped with an ultrasonic sensor for measuring stage, a thermometer, a GPRS modem, a camera and a data logger (it can also receive input from a rain gauge), and is powered by a solar panel; data and photos are transmitted to NOA's server via mobile internet. The systems' additional advantages are flexibility in programming, low maintenance costs, and the possibility of *extending its monitoring capabilities with additional sensors (e.g. for monitoring water quality, video camera)*.

Progress in streamflow estimation is achieved through the development of a maximum-entropy based method that calculates the discharge, at a cross-section of known bathymetry, using measurements of water stage and surface velocity by SVR (Surface Velocity Radar) and/or video cameras. Rating curves at monitoring stations can be thus constructed by inexpensive field campaigns, and safely under flooding.

HYDRO-NET currently operates 16 hydro-telemetric stations, six of which are of NOA's design, in the Peloponnese and in Attica, Greece. Measured data are transmitted to NOA's Server, where they are automatically processed (Quality Controlled) and stored in a Data Base; the data are freely available to users through the OpenHi.net platform (openhi.net), or upon request

(hydronet@noa.gr). A prime service prospect of the HYDRO-NET system, with its real-time observations, is Flood Warning.

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