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The "XEGCat project" - The subsurface monitoring network for shallow geothermal research in urban areas of Catalonia

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The "XEGCat project" is a project funded by the ICGC Contract Program initiated in 2019. The objective is the implementation of instrumented boreholes designed to collect relevant scientific data on the thermal behavior of the subsoil. This data can be utilized for assessment, modeling, and the creation of maps depicting the shallow geothermal resources (SGR) on the urban scale. It also aids in the simulation and design of specific projects involving GSHP. Additionally, the project will allow long-term research on the progress of the subsurface urban heat island effect. The potential for deploying sustainable SGR schemes in the subsoil depends on the geological and hydrogeological characteristics of the subsoil, as well as the distribution of temperature at depth. Therefore, understanding these variables is crucial for assessing their potential use. The networks consist of instrumented boreholes equipped with sensors of various characteristics to measure and automatically record the subsoil temperature at different depths, and the position of the piezometric level in the existing subsoil and aquifers. The acquisition systems are equipped with dataloggers, and SIM cards powered by a 30 W photovoltaic panel. This setup enables automatic transmission of data to the ICGC server or storage on site, to be periodically collected in the field. The data is uploaded and organized by the NetMon© spatial database management system. Through a web service, the data can be consulted, analyzed, and downloaded using the ICGC viewer - Geoindex XEGCat. The data is also utilized by ICGC to develop new 3D subsoil models. By the end of 2023, up to two networks have been deployed: one in the city of Girona (NE, Catalonia) and another in the city of Tarragona (SE, Catalonia). A third specific local network has been deployed in the Aran Valley in the town of Vielha (Catalan Pyrenees). Over the next two years, there are plans to deploy a new urban network in the city of Lleida (W, Catalonia).