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OZCAR: the French network of Critical Zone Observatories: principles and scientific objectives

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This contribution aims at presenting the principles that underlined the creation of the OZCAR research infrastructure, gathering various Critical Zone Observatories in France, and the scientific questions that drives the observation settings.
The Critical Zone includes the fine zone between the lower atmosphere at the top of the canopy down to the bedrock-soil interface. This lithosphere-atmosphere boundary is critical for the availability of life-sustaining resources and critical for humanity because this is the zone where we live, where we build our cities, from which we extract our food and our water and where we release most of our wastes. This is the fragile zone on which the natural ecosystem relies because this is where nutrients are being released from the rocks.
OZCAR is a distributed research infrastructure gathering instrumented sites and catchments on continental surfaces all dedicated to the observation and monitoring of the different compartments of the Critical Zone at the national scale. All these observatories (more that 40) were all built up on specific questions (acid deposition, flood prediction, urban hydrology…), some of them more than 50 years ago, but they have all in common to be highly instrumented, permanently funded as infrastructures. They all share the same overarching goal of understanding and predicting the Critical Zone in a changing world. OZCAR gathers instrumented catchments, hydrogeological sites, peatlands, glacier and permafrost regions and a spatial observatory under the common umbrella of understanding water and biogeochemical cycles and the associated fluxes of energy by using natural gradients and experimentation. Based on the collaboration with Southern Countries, OZCAR's sites have a global coverage including tropical areas and high mountainous regions in the Andes and the Himalaya.
OZCAR benefits from a French investments project called CRITEX (Innovative equipment for the critical zone, https://www.critex.fr/critex-3/observatories/) that is centered on the development and deployment of innovative instrumentation in the sites.
OZCAR was launched in 2016 under the leadership of the French Ministry in charge of Higher Education and Research, assembling all French Research Institutions involved in environmental studies and with the ambition of facilitating interdisciplinary research in terrestrial surfaces, stimulating instrumental development and being visible at the international level.
The paper will presents the main common scientific questions, challenges in terms of instrumentation and experimentation deployment, in particular in terms of co-location of sites, data base and modelling activities that the OZCAR network plan to address in the next years.