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TERENO - Towards a Network of Terrestrial Observatories in Environmental Research

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In order to address the challenges of global change, interdisciplinary research in terrestrial environmental science is of great importance. Several environmental research networks have already been established in order to monitor, analyse and predict the impact of global change on different compartments and/or matter cycles of the environment. Typically these environmental research networks have focused on specific research questions, and compartments, such as CarboEurope, FLUXNET and ILTER. The infrastructure activity TERENO (Terrestrial Environmental Observatoria) aims the establishment of a network of terrestrial observatories, defined as a system consisting of the subsurface environment, the land surface including the biosphere, the lower atmosphere and the anthroposphere. Hydrological units will be used as the basic scaling units in a hierarchy of evolving scales and structures ranging from the local scale to the regional scale for multi-disciplinary process studies. Although terrestrial systems are extremely complex, the terrestrial component in most process-based climate and biosphere models is typically represented in a very conceptual and often rudimentary way. Remedying this deficiency is therefore one of the most important challenges in environmental and terrestrial research, and we suggest that terrestrial observatories could be an important step towards a new quality in environmental and terrestrial research. The concept of TERENO is illustrated by the Lower Rhine Basin, one of three observatories planned in Germany, as a concrete example to serve as a hydrology-related prototype for terrestrial observatories. A monitoring concept for the Rur catchment -the largest catchment in the observatory- will be described that is capable of measuring the spatial-temporal variability of the main hydrological processes and interactions as well as the varying residence times of the terrestrial water stores. More detailed measurements (e.g. soil moisture network) and characterisation

of smaller, focal catchments will be embedded within progressively larger catchments, allowing the critical evaluation and development of hydrologic scaling strategies. Specific attention will be given to install novel wireless sensor technology and hydrogeophysical measurement techniques combined with local scale remote sensing methods. At the catchment scale precipitation radars will be used in combination with flying remote sensing platforms. In the framework of the FP7 the national observatory network that will consists out of three observatories, will be further developed on a European scale.