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## Lessons learned from 15 years of TERENO: the integrated TERrestrial ENvironmental Observatories in Germany

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The need to develop and provide integrated observation systems to better understand and manage global and regional environmental change is one of the major challenges facing Earth system science today. In 2008, the German Helmholtz Association took up this challenge and launched the German research infrastructure TERrestrial ENvironmental Observatories (TERENO). The aim of TERENO is to establish and to maintain a network of observatories as a basis for an interdisciplinary and long-term research programme to investigate the effects of global environmental change on terrestrial ecosystems and their socio-economic consequences. State-of-the-art methods from the field of environmental monitoring, geophysics, and remote sensing are used to record and analyze states and fluxes in different environmental compartments from groundwater through the vadose zone, surface water, and biosphere, up to the lower atmosphere. To date, four observatories are part of the network, and over the past 15 years we have gained collective experience in running a long-term observing network, thereby overcoming unexpected operational and institutional challenges, exceeding expectations and facilitating new research. Today, the TERENO network is a key pillar for environmental modelling and prediction in Germany, an information hub for regional stakeholders, a nucleus for international collaboration, an important anchor for large-scale experiments, and a trigger for methodological innovation and technological progress. We will present the main lessons learned from this 15-year endeavour, and illustrate the need to continue long-term integrated environmental monitoring programmes in the future.