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A drought monitoring and forecasting system for Switzerland

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The intensity and frequency of dry spells in Switzerland have increased in recent years and are likely to increase in the future. Meanwhile, increases in water use and competition between different actors also place a greater pressure on existing water resources. Because drought has been identified as one of the main risks for various economic sectors in Switzerland, a national monitoring and forecasting system is to be established through the joint efforts of three different governmental agencies (federal offices for the environment, meteorology and climatology, and topography). The project also actively involves stakeholders in its development.

In this contribution, we introduce the Swiss national drought project with a particular focus on user-centered design, in situ and satellite-based monitoring, and the integration of sub-seasonal forecasts. Results from a user-survey revealed that even though drought is multi-dimensional and affects stakeholders in different ways, one of their primary needs is still a holistic “combined” drought index that can serve as a common ground for discussion and decision-making. Simple, local-scale-focused designs were assessed as the most efficient and useful, whereas designs showcasing nationwide maps or scientific quantities (SPI, etc.) were the least meaningful to educated but not expert users.

Further efforts include the creation of a national in situ soil moisture monitoring network with approximately 30 stations, the development of meteorological and agricultural drought products and indices, as well as the establishment of near real time, downscaled, sub-seasonal forecasts derived from existing systems (ECMWF IFS Extended). Integrating these highly heterogeneous data streams into seamless products ranging from historical observations to sub-seasonal forecasts, all within a consistent climatological baseline, is expected to represent both a major technical challenge but also a significant step forward that will greatly benefit downstream user applications. This novel meteorological basis will directly feed into impact-relevant drought indices and hydrological models, with the aim of better supporting an early warning system that has to take into consideration the needs of a very diverse user community, such as hydropower production, navigation, agriculture, forestry, artificial snow production, or ecology.