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Hydrological drought – processes and estimation methods for streamflow and groundwater

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Drought is a worldwide phenomenon that originates from a prolonged deficiency in precipitation, often combined with high evaporation, over an extended region. The resultant meteorological water balance deficiency may cause a hydrological drought to develop into below normal levels of streamflow, lakes, and groundwater. Contemporary knowledge and experiences from an international team of drought experts are consolidated in a textbook (Tallaksen et al., 2023), which builds on an earlier edition (URL 1), however with significant new material added. An updated synthesis was needed because of hydrological drought-issues that has been emerged over the last 15 years, particularly when much of the topic is currently dominated by climate and climatology approaches. The textbook consists of three parts; Part I (Drought as a natural hazard) discusses the drought phenomenon, its main features, regional diversity and controlling processes. Part II (Estimation methods) presents contemporary approaches to drought estimation, including data and hydrological drought characteristics, statistical analysis of drought series, incl. frequency

analysis, time series analysis and regionalization procedures, as well as process-based modelling. Part III (Living with drought) addresses aspects related to the interactions between water and people. Topics include historical and future drought, how human interventions influence drought, drought impacts and Drought Early Warning Systems. Knowledge and experiences shared in the book are from regions all over the world although somewhat biased to Europe and rivers that flow most of the year.

This presentation aims to introduce the textbook, its motivation and content to a wide audience. The textbook is supported with worked examples and self-guided tours that are elaborated more extensively on Github. Worked examples include online procedures, code, and details of the calculation procedure that enable readers to repeat calculations in a stepwise manner, either with their own data or by using online datasets, and we encourage user's feedbacks and experiences in testing these. Self-guided tours are demonstrations of advanced methodologies that involve several calculation steps and are given as an online presentations. Four datasets are included on Github; an international, a regional and two local datasets. The international dataset illustrates the drought phenomenon and its diversity across the world, whereas regional data and local aspects of drought are studied using a combination of hydroclimatological time series and catchment information. Hopefully, the textbook will contribute to an increased awareness of one of our main natural hazards, and thereby increase the preparedness and resilience of society to drought.

References

- URL 1: http://europeandroughtcentre.com/resources/hydrological-drought-1st-edition/
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