

Assessing the accuracy of multi-sectoral drought hazard indicators from the OUTLAST drought monitoring and seasonal forecasting system at the global scale

Tina Trautmann, Neda Abbasi, Jan Weber, Tinh Vu, Stephan Dietrich, Petra Döll, Harald Kunstmann, Christof Lorenz, Stefan Siebert

Angaben zur Veröffentlichung / Publication details:

Trautmann, Tina, Neda Abbasi, Jan Weber, Tinh Vu, Stephan Dietrich, Petra Döll, Harald Kunstmann, Christof Lorenz, and Stefan Siebert. 2026. "Assessing the accuracy of multi-sectoral drought hazard indicators from the OUTLAST drought monitoring and seasonal forecasting system at the global scale." In *EGU General Assembly 2026, Vienna, Austria, 3–8 May 2026*, EGU26–11664. Göttingen: Copernicus. <https://doi.org/10.5194/egusphere-egu26-11664>.

Nutzungsbedingungen / Terms of use:

CC BY 4.0

Dieses Dokument wird unter folgenden Bedingungen zur Verfügung gestellt: / This document is made available under these conditions:
CC-BY 4.0: Creative Commons: Namensnennung
Weitere Informationen finden Sie unter: / For more information see:
<https://creativecommons.org/licenses/by/4.0/deed.de>



EGU26-11664, updated on 24 Jul 2026

<https://doi.org/10.5194/egusphere-egu26-11664>

EGU General Assembly 2026

© Author(s) 2026. This work is distributed under the Creative Commons Attribution 4.0 License.



Assessing the accuracy of multi-sectoral drought hazard indicators from the OUTLAST drought monitoring and seasonal forecasting system at the global scale

Tina Trautmann¹, Neda Abbasi², Jan Weber³, Tinh Vu⁴, Stephan Dietrich⁴, Petra Döll^{1,5}, Harald Kunstmann^{3,6}, Christof Lorenz³, and Stefan Siebert²

¹Institute of Physical Geography, Goethe University Frankfurt, Frankfurt am Main, Germany (tina.trautmann@em.uni-frankfurt.de)

²Department of Crop Sciences, University of Göttingen, Von-Siebold-Straße 8, 37075, Göttingen, Germany

³Institute of Meteorology and Climate Research (IMK-IFU), Karlsruhe Institute of Technology (KIT), Campus Alpin, Garmisch-Partenkirchen, Germany

⁴International Centre for Water Resources and Global Change (ICWRGC), Federal Institute of Hydrology, Koblenz, Germany

⁵Senckenberg Biodiversity and Climate Research Centre Frankfurt (SBIK-F), Senckenberganlage 25, 60325 Frankfurt am Main, Germany

⁶Center for Climate Resilience, University of Augsburg, Augsburg, Germany

With droughts increasing in frequency and severity worldwide, reliable monitoring and forecasting systems, along with transparent accuracy assessment, are crucial for effective drought management and decision-making. Here, we evaluate the performance of three drought hazard indicators (DHIs) provided by the global, multi-sectoral drought hazard monitoring and forecasting system that has been developed within the OUTLAST project and is available via the WMO's HydroSOS website. In OUTLAST, a consistent framework is applied to produce sector-specific DHIs for global monitoring and seasonal forecasts of droughts. To do so, climate data from ERA5 (for monitoring) and bias-corrected SEAS5 (for seasonal forecasts) are used to calculate meteorological DHIs as well as to force the Global Crop Water Model and the global hydrological model WaterGAP to derive agricultural and hydrological DHIs, respectively.

This study aims to assess the performance of three DHIs from multiple sectors, including (1) the standard precipitation index (SPI), (2) the rainfed crop drought hazard indicator (RFCDI), and (3) the empirical percentiles of streamflow (Q-EP), in an informative and user-friendly way. This is done by (a) a comprehensive comparison of OUTLAST DHIs against the same DHIs calculated with independent, preferably observation-based data, such as (1) remote sensing-based precipitation, (2) remote sensing-based actual and potential evapotranspiration, and (3) in-situ observed streamflow of large river basins, all for the historic period 1981-2020; and (b) a detailed evaluation of the capability of two example seasonal forecasts, issued in March 2018 and March 2022, to predict Northern Hemisphere spring and summer droughts across sectors. For each DHI, four drought classes are defined, with drought conditions being identified by a return period of at least five years.

For the historic period, the derived drought classes agree in about 50% of drought months globally (Q-EP: 49%, RFCDI: 51%), with higher agreement in the case of SPI (59%). The agreement is in general highest in temperate and cold climate zones, except for RFCDI, which performs best in arid regions (61%), where Q-EP only has a small agreement with in-situ streamflow droughts (36%). SPI has the lowest agreement in tropical regions (44%), where the agreement of RFCDI and Q-EP is slightly higher (46% resp. 47%). This low agreement of OUTLAST-SPI with remote sensing-based SPI reflects the known high uncertainties of ERA5 precipitation (which is used in OUTLAST) in the tropics, that partly propagates to modelled RFCDI and Q-EP. Differences between different DHIs and climate zones reflect the uncertainties and limitations of both the individual models used to compute the OUTLAST DHIs and the independent data sets used for comparison. At the same time, the consistent framework to produce multi-sectoral DHIs allows to analyze the effect of drought- and error-propagation in the hydrological cycle on the ability to capture observed drought conditions by model-based DHIs.

The results of these comparisons will be provided to the users of the OUTLAST drought hazard monitoring and forecasting system, and by that support informed drought management and decision-making across multiple sectors worldwide.