

# The Groundwater Drought Initiative (GDI):

# Analysis of European groundwater drought

Bentje Brauns<sup>1</sup>, John P. Bloomfield<sup>1</sup>, Daniela Cuba<sup>2</sup>, David M. Hannah<sup>3</sup>, Christopher R. Jackson<sup>2</sup>, Benedikt Heudorfer<sup>3</sup>, Ben P. Marchant<sup>2</sup>, Anne Van Loon<sup>3</sup>

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<sup>1</sup>British Geological Survey (BGS), Wallingford, UK, <sup>2</sup>BGS, Keyworth, UK, <sup>3</sup>University of Birmingham, UK,



# Overview of the GDI (2018-2021)



- What
- How
- Expected outputs

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# Why are we interested in pan-European groundwater events?

- Good overview of European meteorological and surface water drought
- Missing equivalent for groundwater drought



Vicente-Serrano et. al, 2014, Environmental Research Letters (SPI and SPEI time series shown in plot)

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The biggest drought events in Europe from 1950 to 2012



Jonathan Spinoni<sup>a,\*</sup>, Gustavo Naumann<sup>b</sup>, Jürgen V. Vogt<sup>a</sup>, Paulo Barbosa<sup>a</sup>

\* European Commission, Joint Research Centre, Institute for Environment and Sustainability, 21027 Ispra. VA, Italy b CONICET, National Scientific Technical and Research Council, Buenos Aires, Argentina

#### ARTICLE INFO ABSTRACT

Study region: Europe, including European Russia, but excluding Greenland Received 13 December 2014 Received in revised form 9 January 2015 Accepted 11 January 2015 Available online 24 March 2015

the Canary Islands, the Azores, and Madeira. Study focus: Drought is a complex climate-related phenomenon that can affect different sectors causing economic, social, and environmental impacts. We focus on meteorological and hydrological droughts, defined as shortage of

Keywords Climate Drought Europe SPI SPEI RDI

Article history

precipitation over several months and we discuss the biggest drought events in 1950-2012. To define such drought events we computed three drought indicators, the Standardized Precipitation Index, the Standardized Precipitation tion Evanotranspiration Index and the Reconnaissance Drought Index and we merged them into a combined indicator at 3-month scale for meteorological and 12-month for hydrological droughts. The indicators have been calculated using the E-OBS gridded data (0.25° × 0.25°).

New hydrological insights for the region: Europe has been subdivided into thirteen regions and for each region we determined a list of drought events. The events have been characterized by the time, duration, severity, average area involved, peak month, and area involved at the peak month. We com-





### WHY Specific characteristics of groundwater droughts

#### Pooling, lagging & lengthening



Van Loon AF. 2015. Hydrological drought explained. WIREs Water, 2, 359-392

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Bloomfield et al. 2015. Regional analysis of groundwater droughts using hydrograph classification. HESS, 19, 4327-4344.

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# WHAT Pan-European groundwater level analysis

- Collecting groundwater data
- Standardise (SGI) & analyse (scripts, shiny app)
- Clustering data to identify spatial patterns
- Case studies to understand the relationships between groundwater droughts and their societal impacts







### HOW Analysis approach





#### HOW Raw data and regularisation

Pre-processing & regularisation

#### Raw data





#### (preliminary) OUTPUT Data selection







#### (preliminary) OUTPUT Data selection





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European drought centre, http://www.geo.uio.no/edc/droughtdb/edr/spidates.php

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### Summary and further work

70°N

A very first look at processed data seems to indicate meaningful spatial coherence

#### Ongoing work

- Add to existing dataset
- Improve data selection
- Fine-tune analysis (e.g. clustering)
- Add temperature data
- Analyse spatially with respect to controlling factors and include statistical analysis
- Compare to existing review of met. and surface water drought
- Increase network activities (meeting next year)



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#### Thank you for you attention and questions are very welcome!



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Please get involved!

#### **Benefits:**

- access to scripts
- discussions about data
- joint workshops / groundwater drought conference
- building a network of groundwater drought researchers
- joint publications



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