



UNIVERSITY OF
BIRMINGHAM



The Groundwater Drought Initiative (GDI):

Analysing and understanding groundwater drought across Europe

B. Brauns, B.¹, Cuba, D.², Bloomfield, J.P.¹, Hannah, D.M.³, Jackson, C.², Marchant, B.P.², Heudorfer, B.³, Van Loon, A.F.³, Bessière, H.⁴, Thunholm, B.⁵, Schubert, G.⁶

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

⁴ BRGM - Bureau de Recherches Géologiques et Minières, France,

⁵ Geological Survey of Sweden, Sweden, ⁶ Geological Survey of Austria, Austria



- Introduction to the GDI
- Background to groundwater droughts
- Methodological approach of the GDI
- Expected outputs and how to get involved

The screenshot shows the BGS website page for the European Groundwater Drought Initiative. The page has a dark navigation bar at the top with links for Home, Data, Research, Services, Contacts, Discovering geology, News and events, and Hosted sites. Below the navigation bar is a banner image of a rocky landscape with the text 'Gateway to the Earth'. The main content area is divided into three columns. The left column is a sidebar with a 'Our research' section and a 'Research areas' dropdown menu. The middle column is the main content area, featuring the title 'The European Groundwater Drought Initiative' and a detailed description of the project. The right column contains a 'Organisational programme' section with a list of topics, a 'See also' section with a list of related links, an 'External links' section with a list of external resources, a 'Data' section with a list of data products, and a 'Publications' section with a list of publications. The BGS logo is visible in the bottom right corner of the page.

Introduction of the GDI

Aims



The European Groundwater Drought Initiative is a three-year initiative started in April 2018 (lead by BGS and University of Birmingham)

Aims:

- Analyse and model groundwater level/groundwater drought status at the European scale (ideally from the 1960s to present)
- Investigate the spatio-temporal characteristics and hydrogeological and catchment controls on significant recent episodes of drought
- Undertake a series of case studies to understand the relationships and feedbacks between groundwater droughts and their societal impacts
- Develop and support a network of European researchers & stakeholders with an interest in regional- to continental-scale groundwater droughts

Introduction of the GDI

Partner and supporting institutions

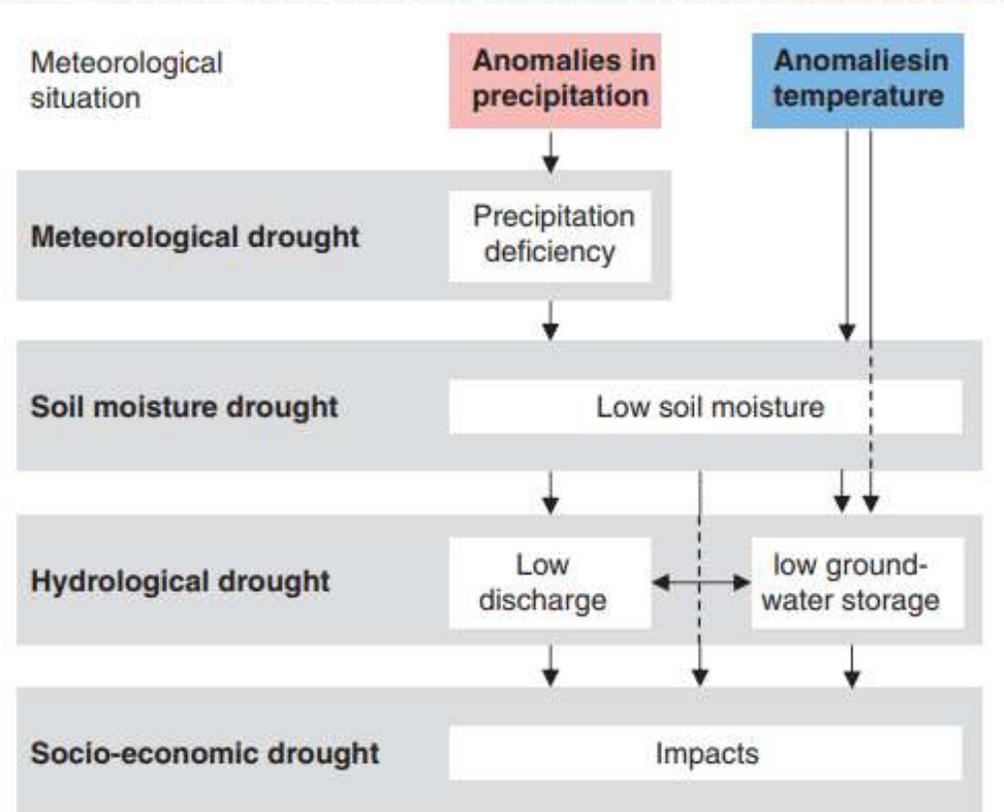


In addition to our current supporting partner institutions, the GDI is supported by the European Drought Centre (EDC), the FRIEND Low Flows & Drought network, and by IGRAC

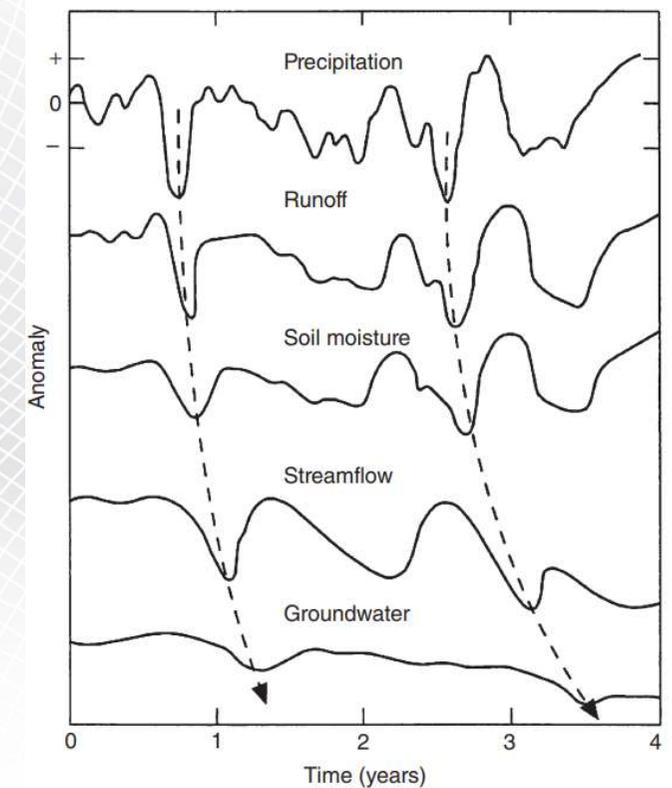


Background

Relationship between Meteorological, SW & GW Droughts



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



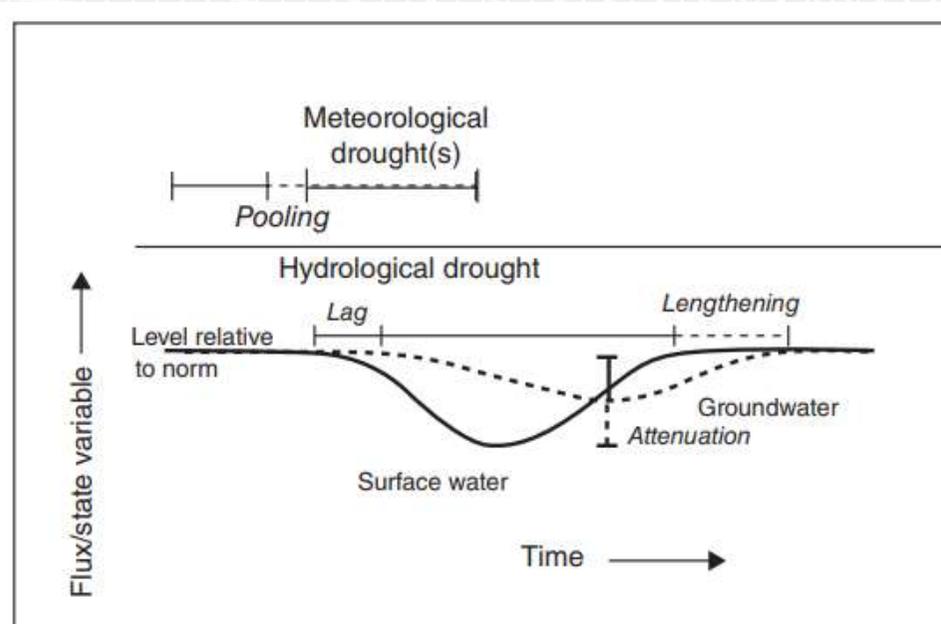
From Van Loon (2015), after Eltahir & Yeh, 1999 & Channon, 1987)

Background

Features of Groundwater Droughts

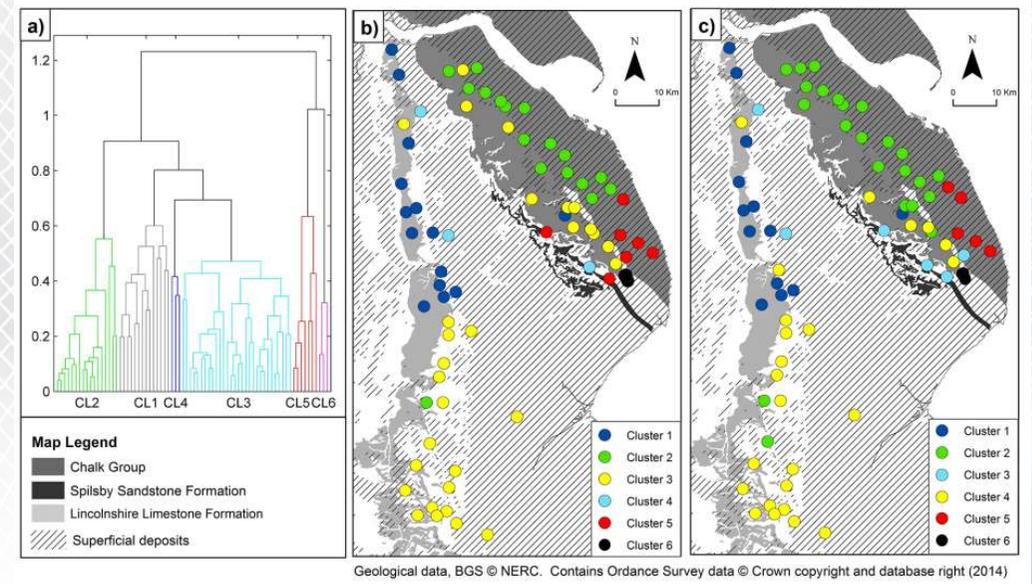


Pooling, lagging & lengthening



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

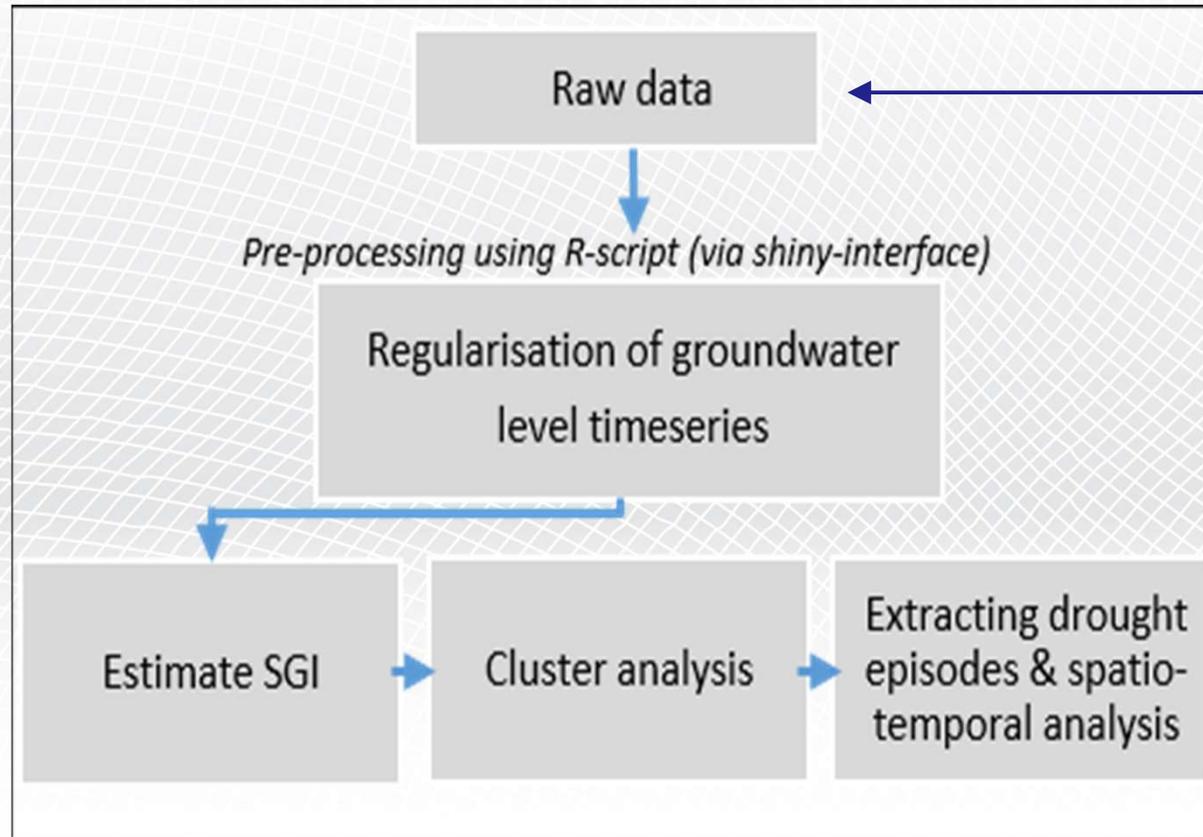
Geospatial distribution



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

Methodological approach of the GDI

Workflow



Data input:

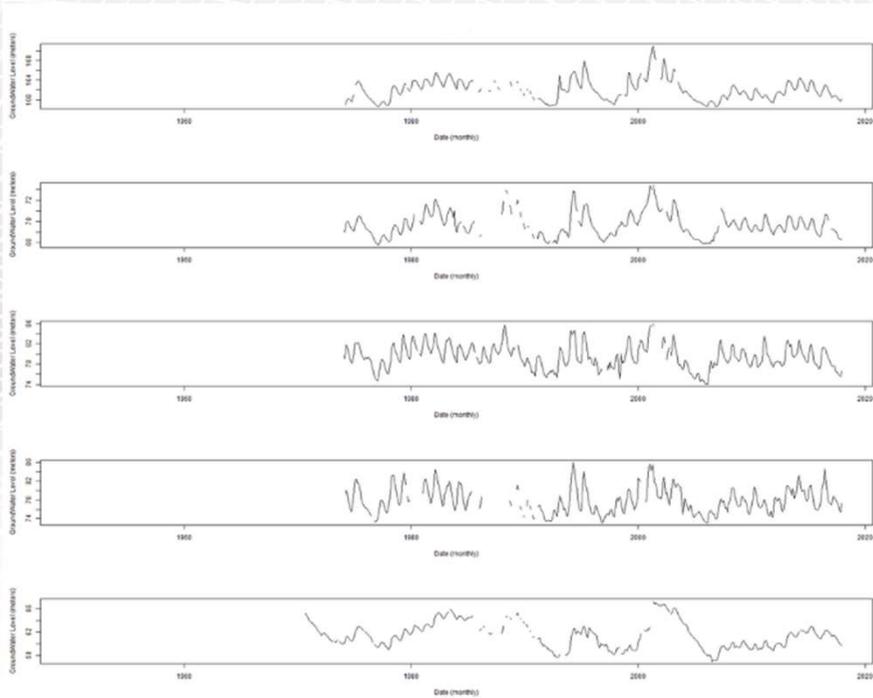
- Up to ~100 sites/country
- Long timeseries (min. 30 yrs)
- Monthly data
- Unconfined aquifers
- Little anthropogenic influence

Methodological approach of the GDI

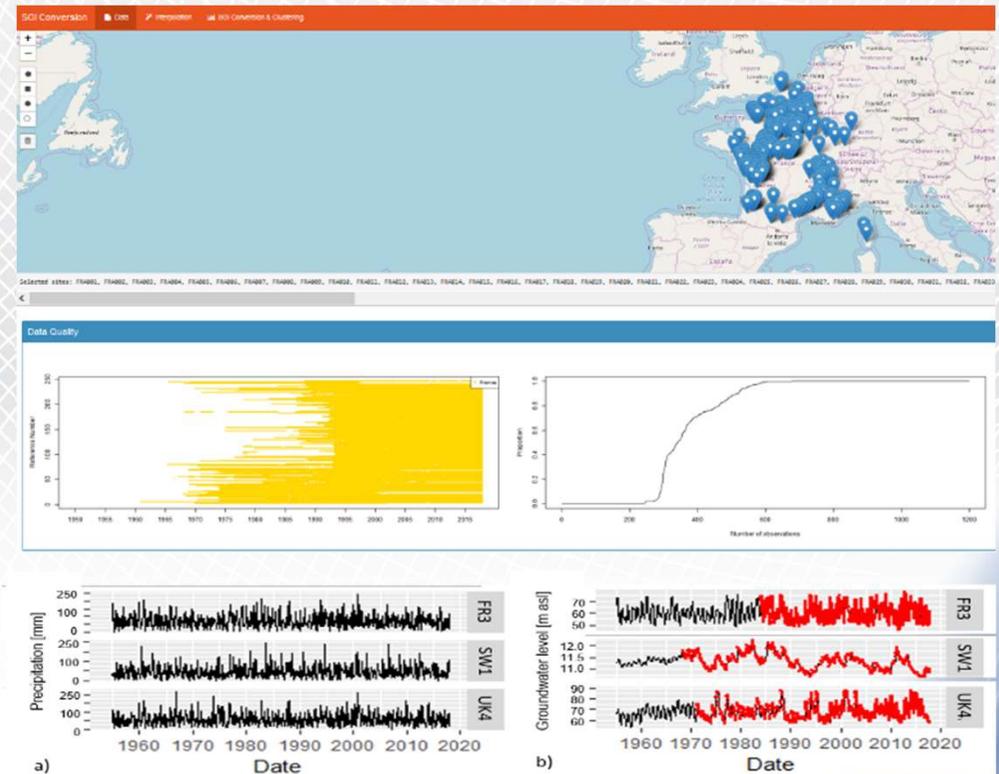
Raw data and regularisation



Raw data



Pre-processing & regularisation

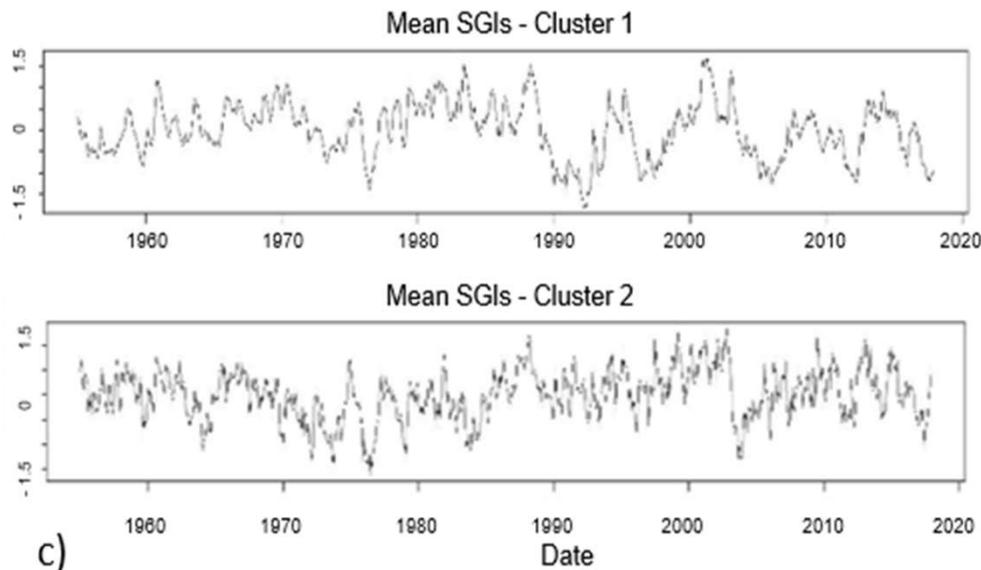


Methodological approach of the GDI

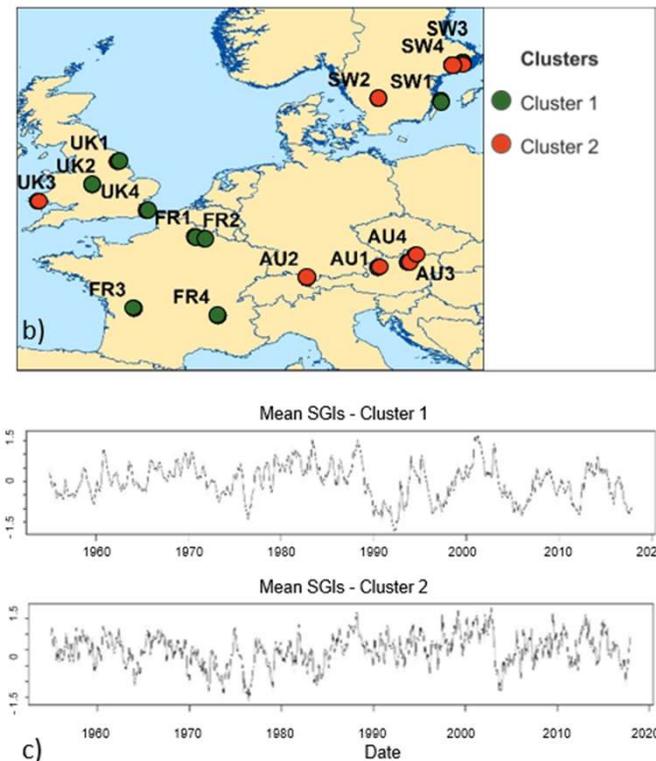
Estimating SGI and cluster analysis



SGI timeseries



Clustering



=> Cluster series as basis for extraction of drought events and statistical analysis (event frequency, duration,...)

Expected output of the GDI



- Development to continental-wide approach transferable to other geographical regions
- Scripts and tools to visualise and analyse groundwater droughts
- Understanding of transboundary groundwater level data in the European context
- Insights into the impacts of future major groundwater droughts

Why should you get involved?

Joining the GDI will:



- Give you access and support for use of scripts and tools to visualise and analyse groundwater droughts
- Enable you to place your groundwater level data in a regional- to continental-scale context
- Provide you insights into the impacts of future major groundwater droughts in your region
- Enhance your ability to predict the timing and magnitude of major episodes of groundwater drought
- Give you the opportunity to participate in (hopefully high impact) joint publications in the peer-reviewed literature
- Give you access to the expertise of a growing cohort of international groundwater drought researchers

How to get involved

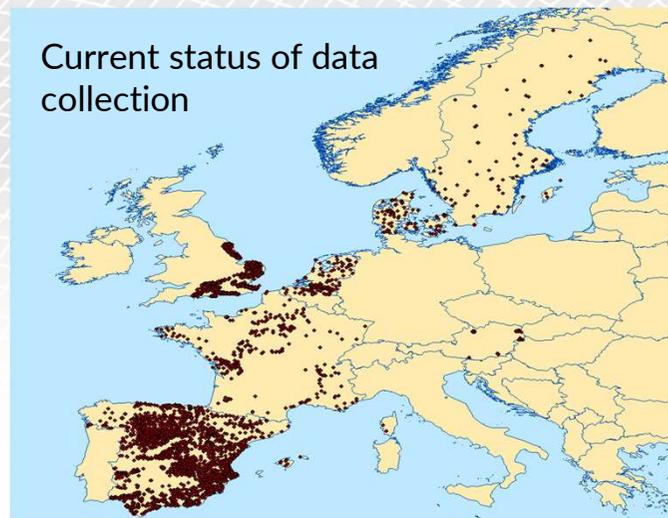
/ how to get more information



Please come and discuss or contact any of the project team. You can also visit the project website or twitter-feed:

www.bgs.ac.uk/groundwaterDrought

 @GDI_Europe



Dr John Bloomfield - jpb@bgs.ac.uk

Dr Anne Van Loon - a.f.vanloon@bham.ac.uk

Prof David Hannah - d.m.Hannah@bham.ac.uk

Dr Christopher Jackson - crja@bgs.ac.uk

Dr Ben Marchant - benmarch@bgs.ac.uk

Daniela Cuba - micu@bgs.ac.uk

Dr Benedikt Heudorfer - B.Heudorfer@bham.ac.uk

Dr Bentje Brauns (GDI Secretariat) -

ben aun@bgs.ac.uk

Thank you for you attention!