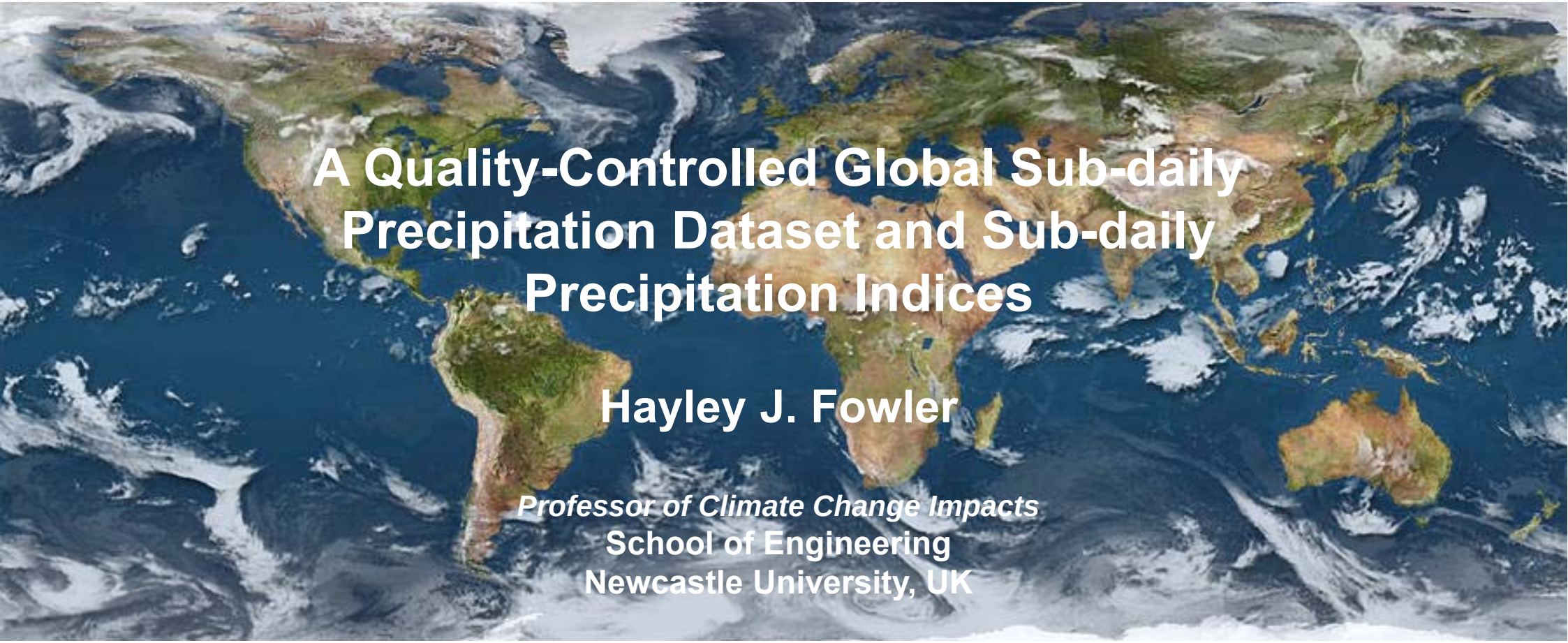
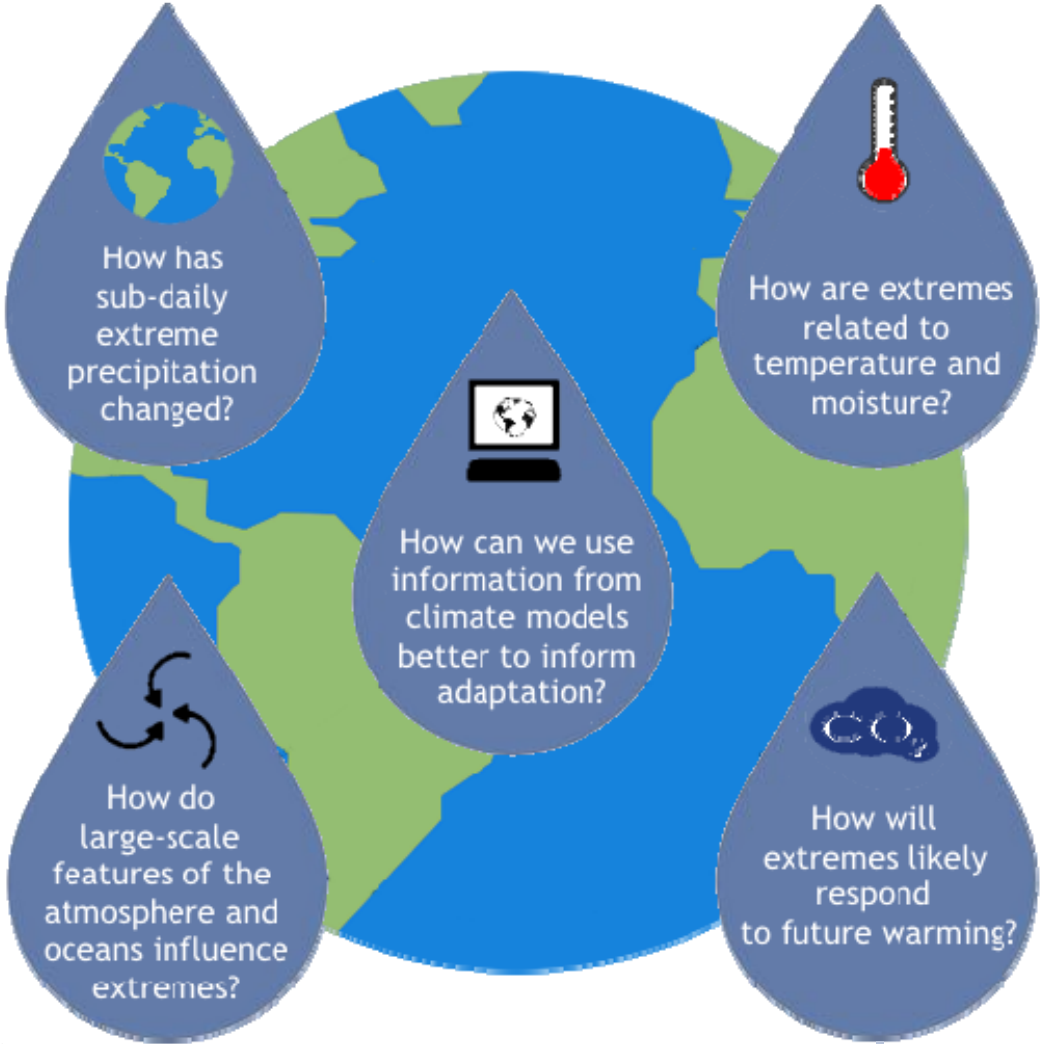


A Quality-Controlled Global Sub-daily Precipitation Dataset and Sub-daily Precipitation Indices

Hayley J. Fowler

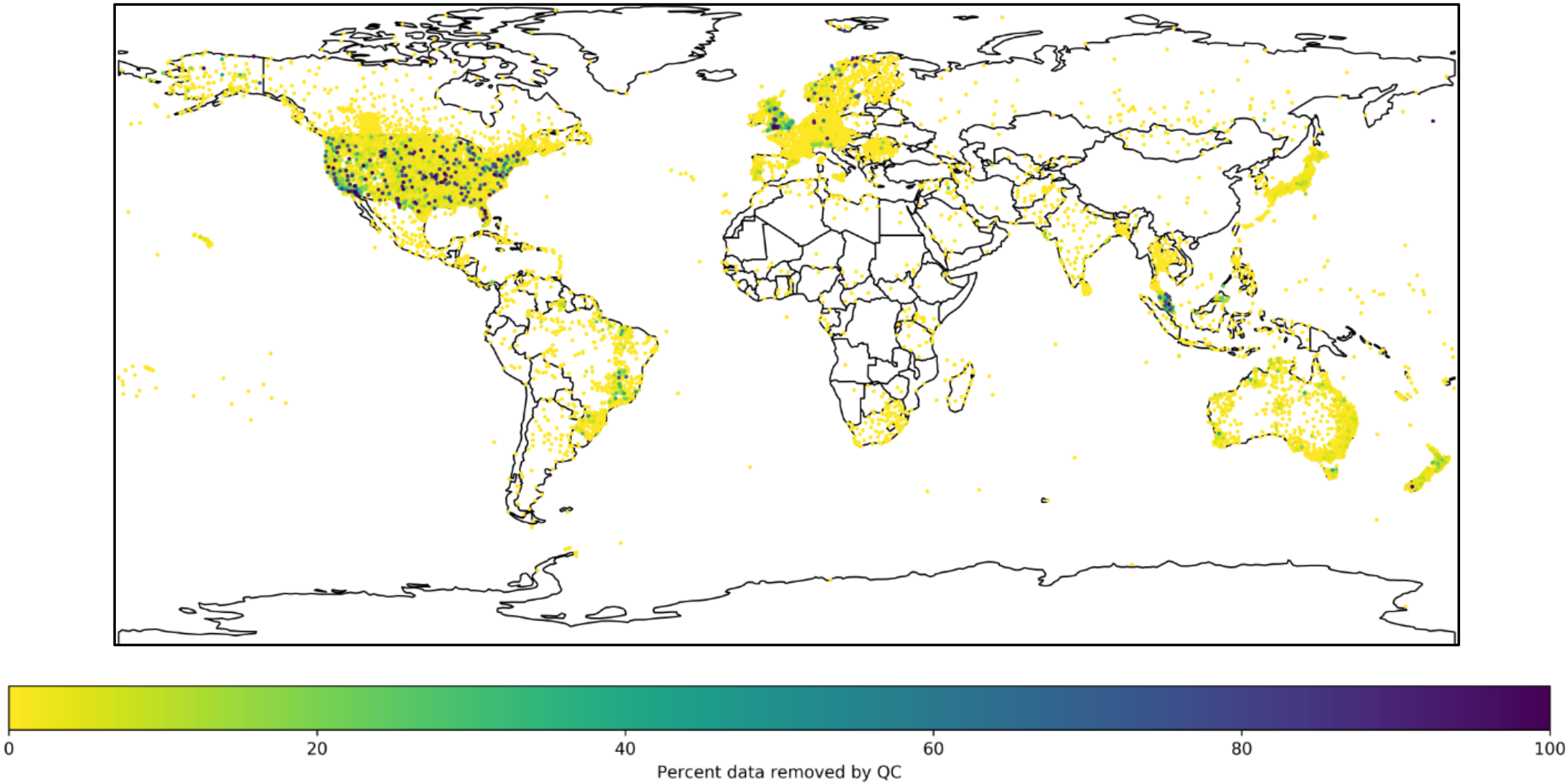
Professor of Climate Change Impacts
School of Engineering
Newcastle University, UK

INTENSE aimed to understand the nature and drivers of extreme sub-daily rainfall



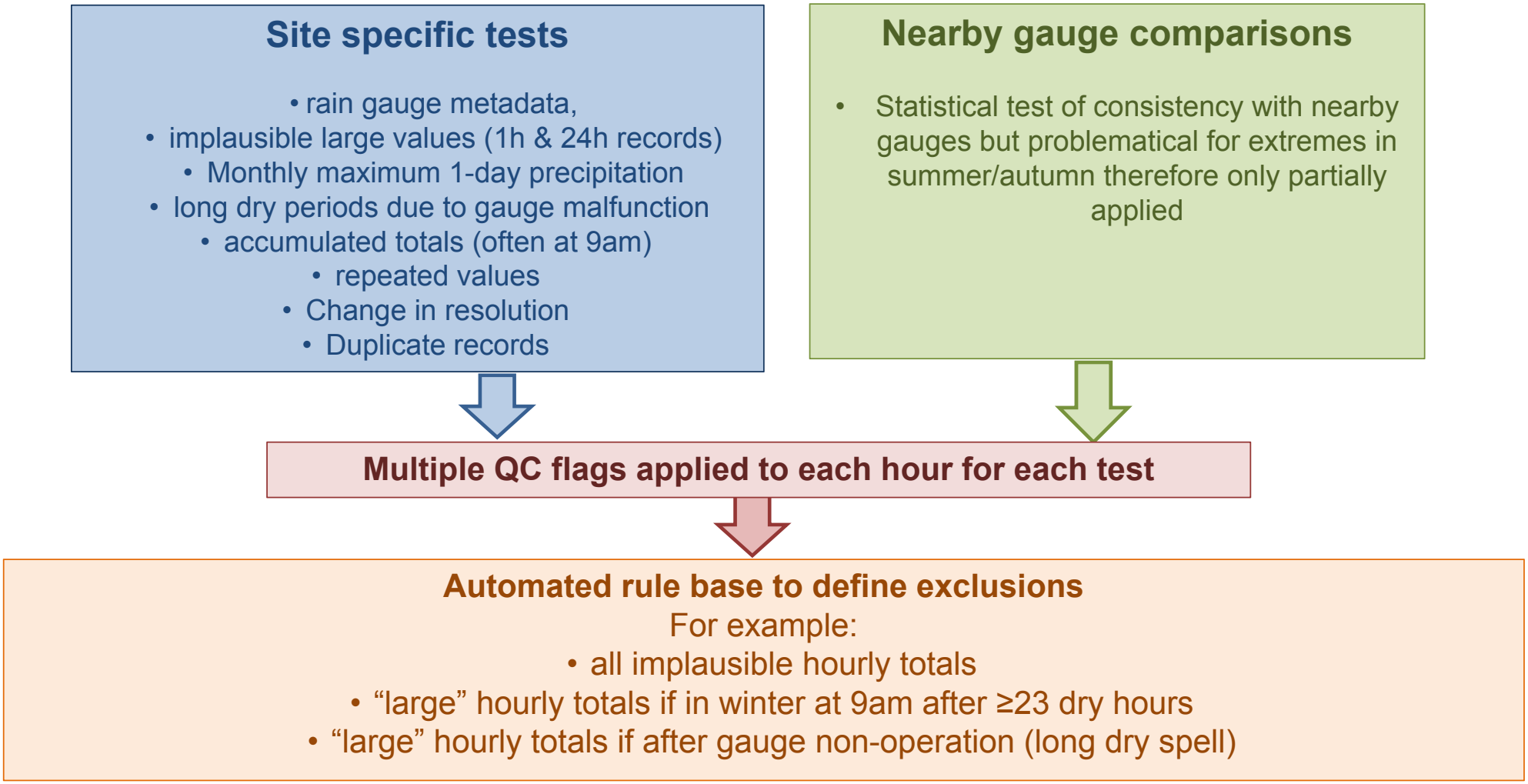
- Lizzie Kendon and team, Robert Dunn, Nigel Roberts **(UK Met Office)**
- Stephen Blenkinsop, Steven Chan, Liz Lewis, Selma Guerreiro, Xiao-Feng Li, Haider Ali, Renaud Barbero, David Pritchard, Roberto Villalobos Herrera **(Newcastle University)**
- Geert Lenderink, Jessica Loriaux, Kai Lochbihler **(KNMI)**
- Other INTENSE partners

GSDR- Global Sub-Daily Rainfall dataset -~26,000 stations (Lewis et al. 2019)



1. Quality control of hourly data (Blenkinsop et al., 2017; IJC & Lewis et al., 2018, JH)

2. Adapted checks to work globally using ETCCDI daily indices (Lewis et al., submitted)



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Research papers

A rule based quality control method for hourly rainfall data and a 1 km resolution gridded hourly rainfall dataset for Great Britain: CEH-GEAR1hr

Elizabeth Lewis[a,*], Niall Quinn[b], Stephen Blenkinsop[a], Hayley J. Fowler[a], Jim Freer[b,c], Maliko Tanguy[d], Olivia Hitt[d], Gemma Coxon[b], Paul Bates[b,c], Ross Woods[c,e]

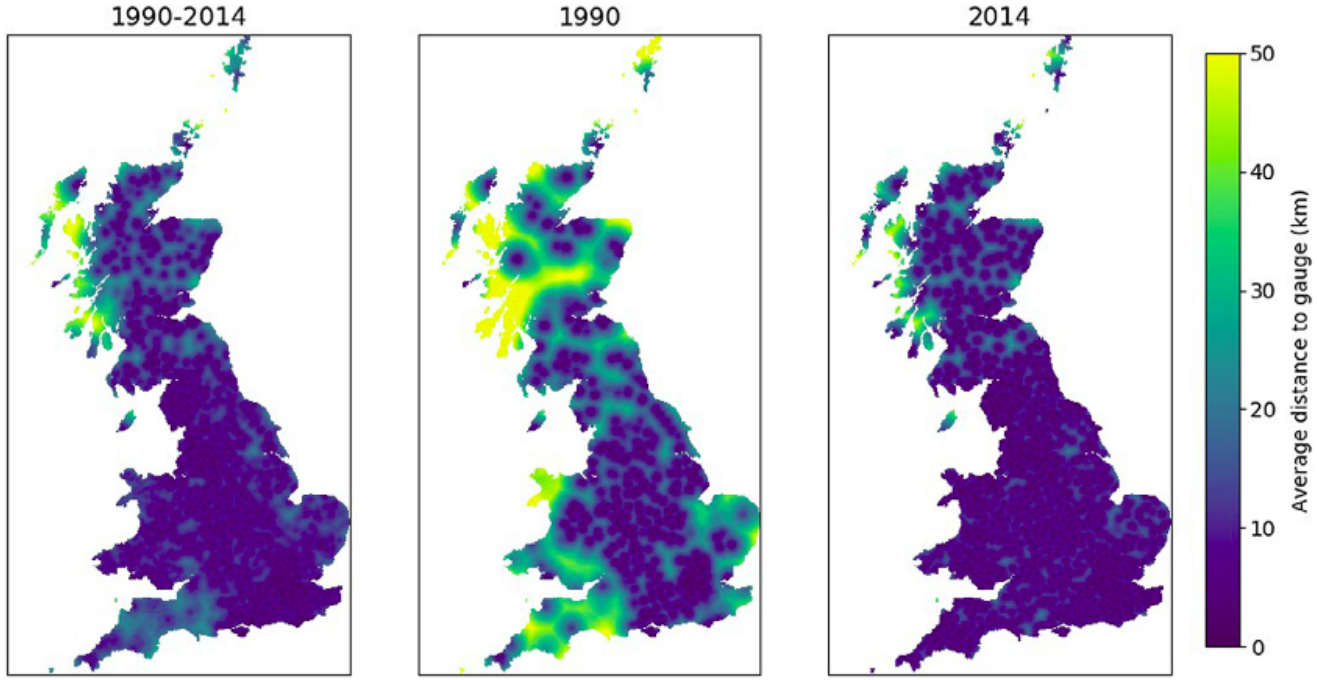
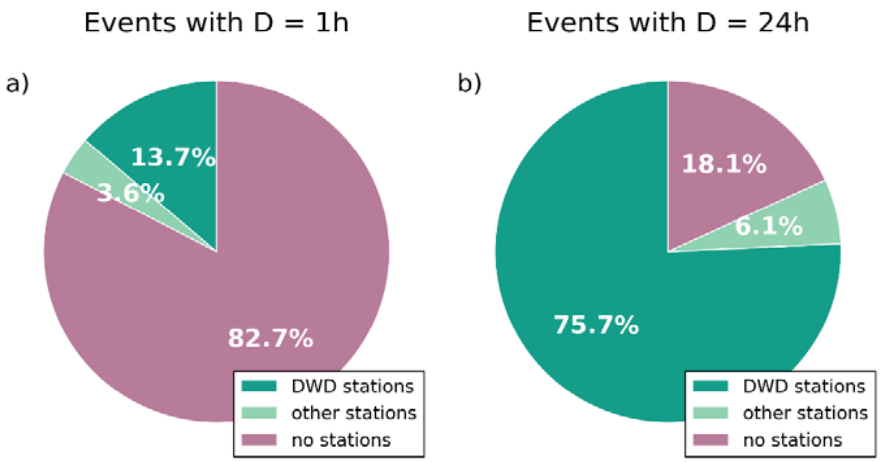


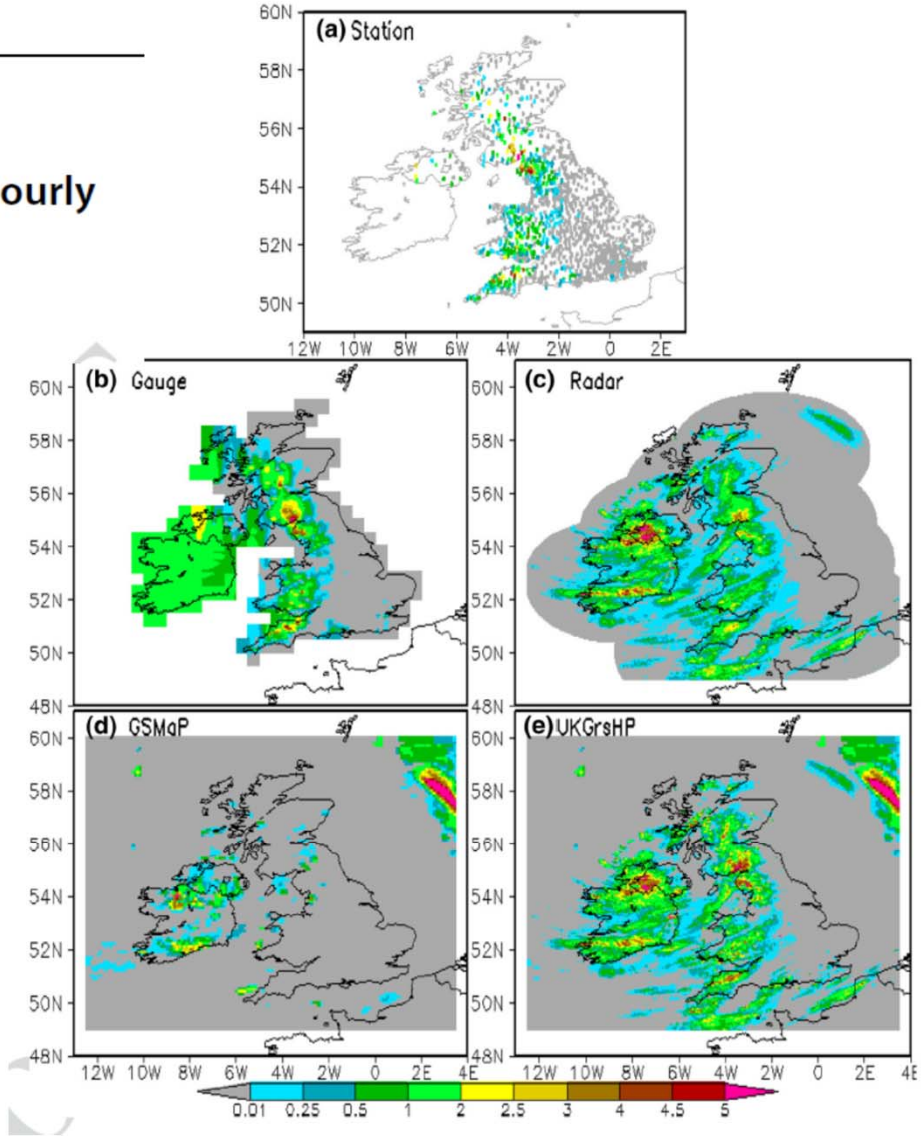
Fig. 11. Average distance to an hourly gauge for each grid square over the period 1990–2014 and for the years 1990 and 2014 respectively.

Climate Dynamics
https://doi.org/10.1007/s00382-020-05144-2

UKGrsHP: a UK high-resolution gauge–radar–satellite merged hourly precipitation analysis

Jingjing Yu[1] · Xiao-Feng Li[1] · Elizabeth Lewis[1] · Stephen Blenkinsop[1] · Hayley J. Fowler[1]

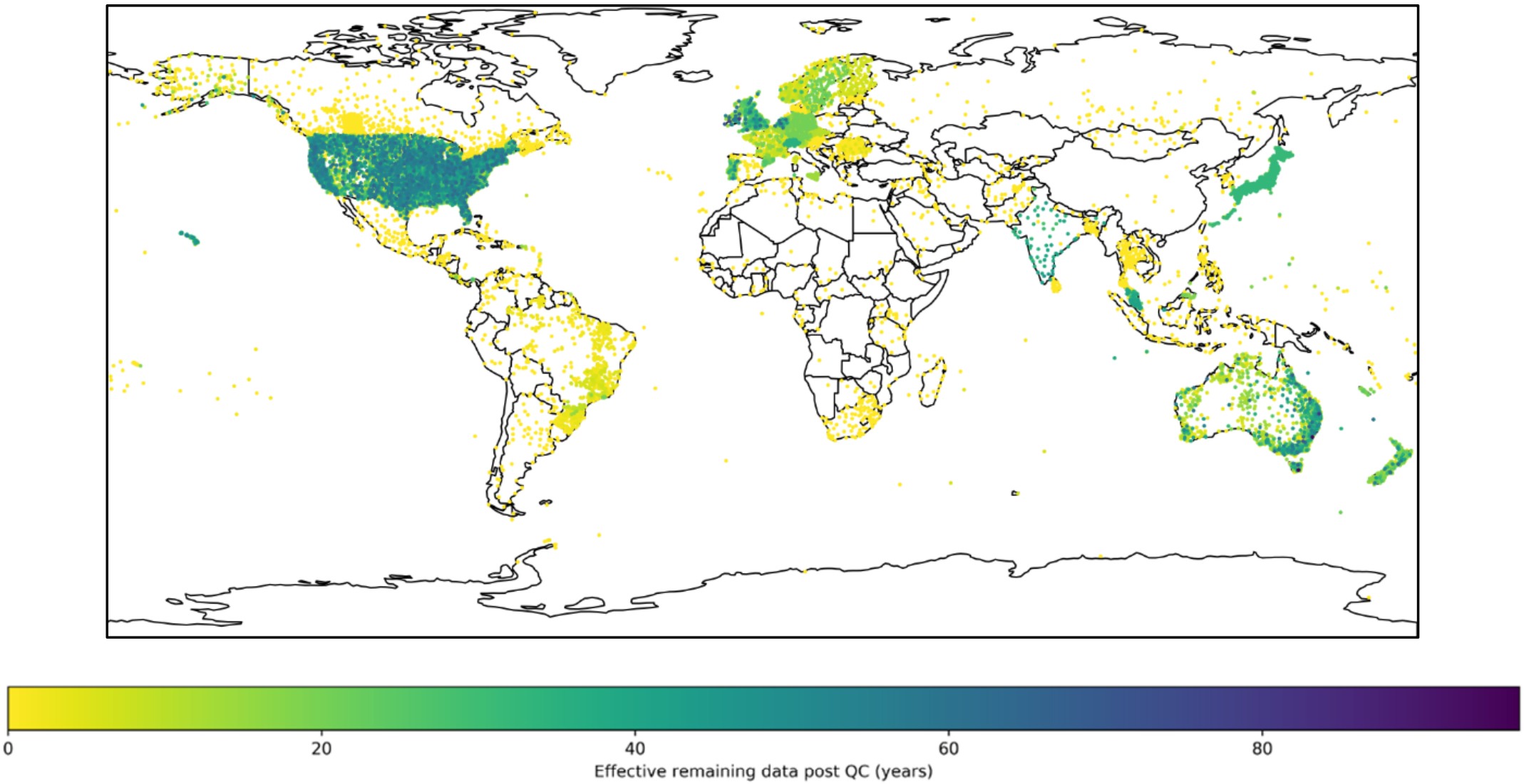




Use of radar data for extreme precipitation at fine scales and short durations

Katharina Lengfeld[1], Pierre-Emmanuel Kirstetter[2,3,4,5] , Hayley J. Fowler[6], Jingjing Yu[6] , Andreas Becker[1], Zachary Flamig[7], and Jonathan Gourley[5]

GSDR- Global Sub-Daily Rainfall dataset -~26,000 stations (Lewis et al. 2019)



Sub-Daily Extreme Precipitation Indices

Maximum indices

- Monthly and annual maximum 1-hour precipitation
- Monthly and annual maximum 3-hour precipitation
- Monthly and annual maximum 6-hour precipitation
- Percentage of daily total that fell in the monthly maximum 1-hour precipitation

Percentile indices

- Monthly and annual 95th percentile (1-, 3-, 6-hour)
- Monthly and annual 99th percentile (1-, 3-, 6-hour)
- Monthly and annual total from hours > 95th percentile (1-, 3-, 6-hour)
- Monthly and annual total from hours > 99th percentile (1-, 3-, 6-hour)

Diurnal cycle indices

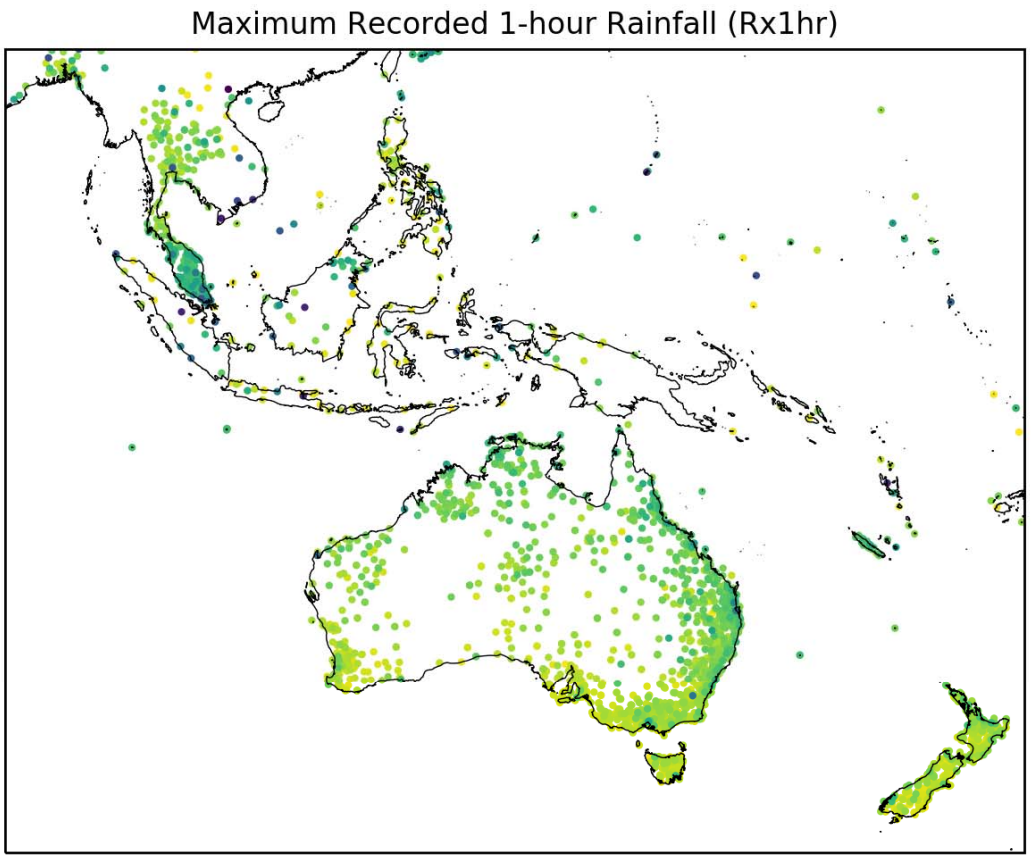
- Monthly likely wettest hour within a day
- Monthly likely driest hour within a day
- Dispersion around monthly likely wettest hour within a day
- Simple hourly precipitation intensity index
- Maximum length of wet spell, maximum number of consecutive hours ≥ 1mm

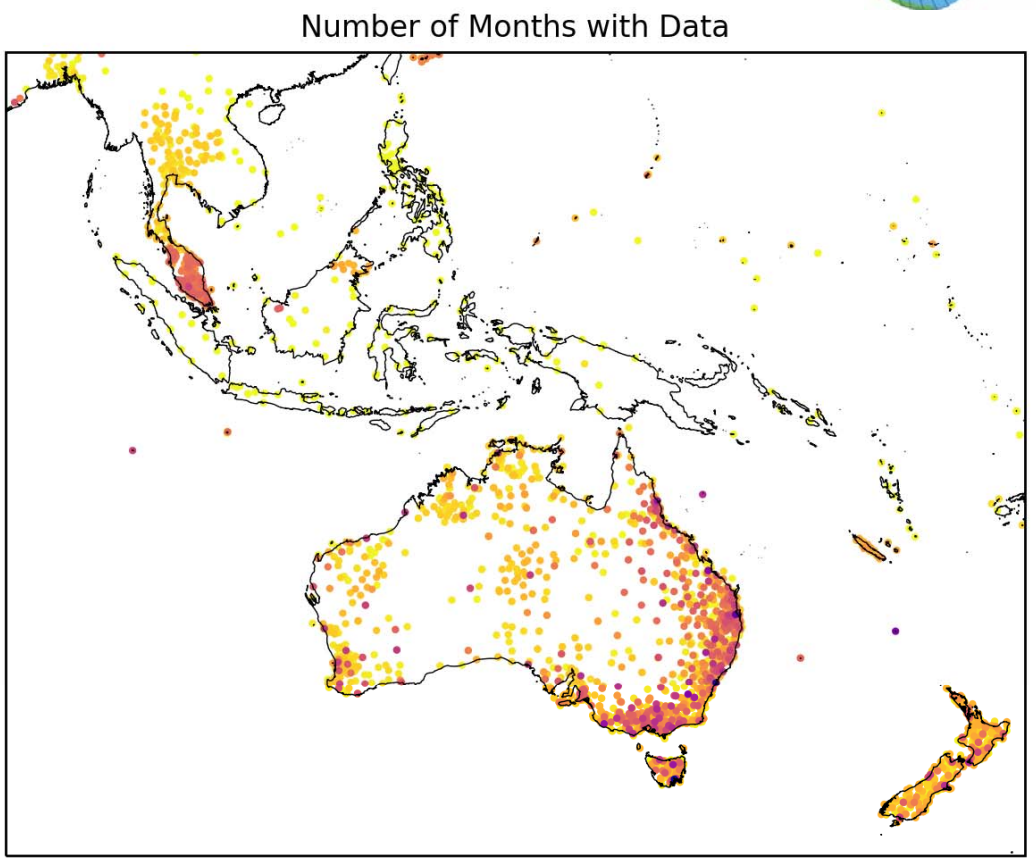
Frequency/threshold indices

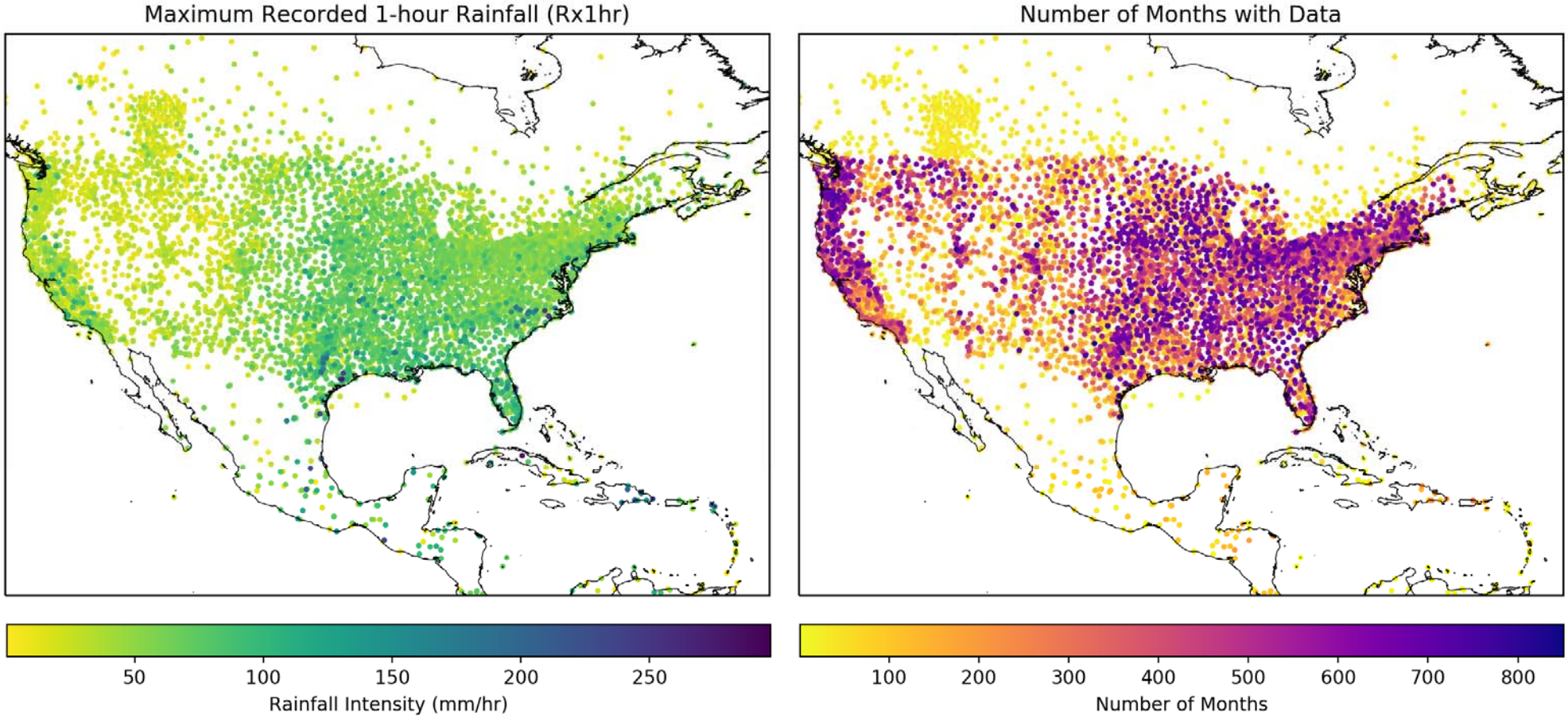
- Monthly and annual count of hours ≥ 10mm
- Monthly and annual count of hours ≥ 20mm

General indices

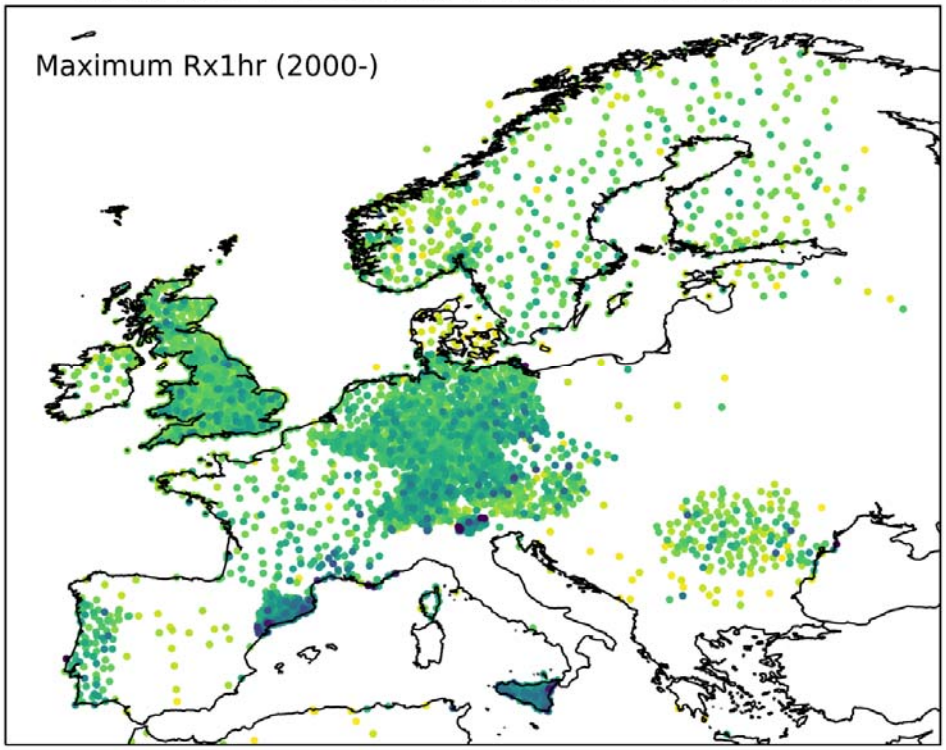
- Monthly and annual total precipitation in wet hours
- Monthly and annual number of wet hours

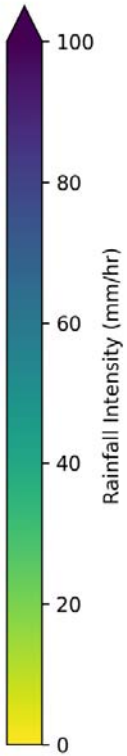

Maximum Recorded 1-hour Rainfall (Rx1hr)
50
100
150
200
250
Rainfall Intensity (mm/hr)


Number of Months with Data
200
400
600
800
1000
1200
Number of Months

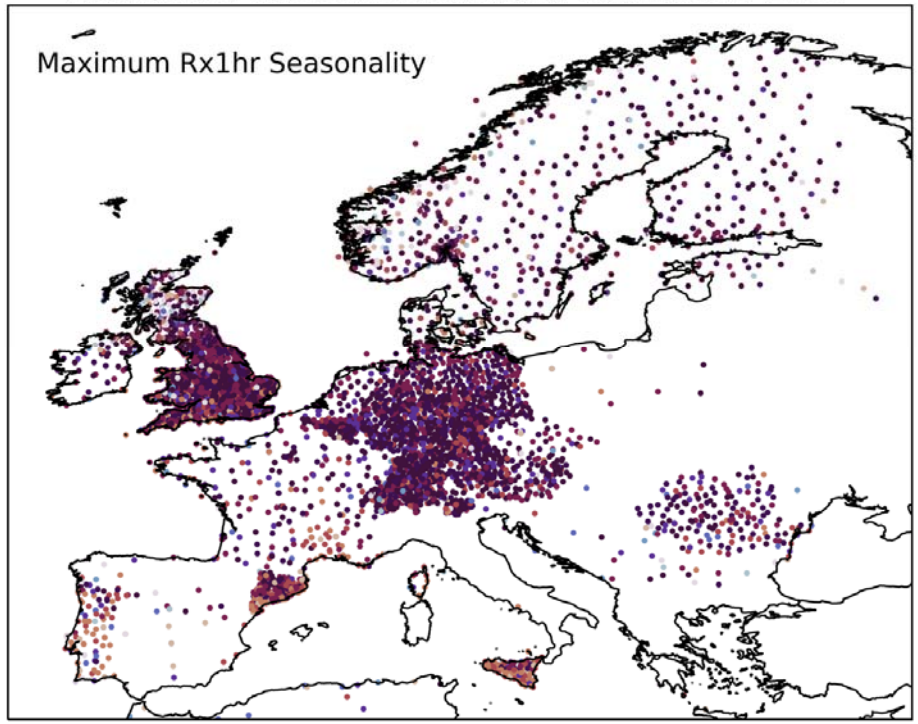

Maximum Recorded 1-hour Rainfall (Rx1hr)
50
100
150
200
250
Rainfall Intensity (mm/hr)
Number of Months with Data
100
200
300
400
500
600
700
800
Number of Months

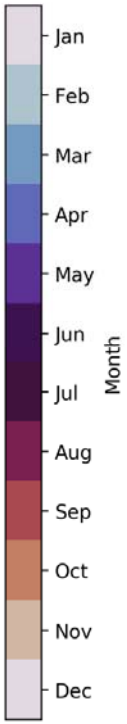
Monthly Rx1hr Time Series and Timing of Maximum Rx1hr (2000-)





Monthly Rx1hr Time Series and Timing of Maximum Rx1hr (2000-)





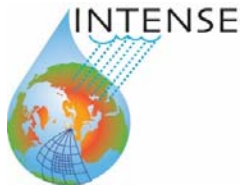
Summary

We have collected a global sub-daily precipitation dataset, and applied automated quality control

- We have ~16,000 gauge records > 1yr data, ~11,000 > 10yr data
- We have calculated sub-daily extreme precipitation indices at the station-level and gridded indices under development to be hosted on the DWD and CLIMDEX websites
- We are developing a set of climate model evaluation metrics/indices for assessment of high resolution simulations and satellite data products
- Hourly observations have contributed to correcting a new blended 3hr precipitation product
- DWD and Copernicus are hosting the hourly gauge data (most not public) and an associated website with metadata (in progress).

There is great potential for further analysis and development of scientific studies using this new dataset

INTENSE publications (2020)



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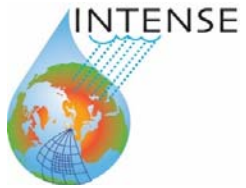
INTENSE publications (2019a)



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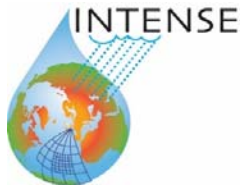
INTENSE publications (2019b)



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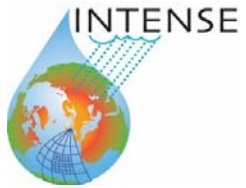
INTENSE publications (2018a)



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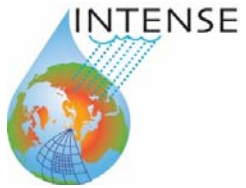
INTENSE publications (2018b)



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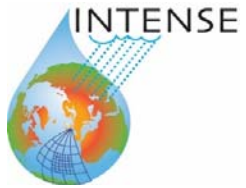
INTENSE publications (2016-17)



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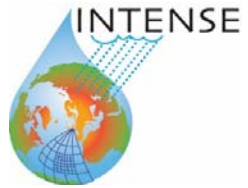
INTENSE publications (2014-15)



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