Spectral data from across Europe shared on PEARL PV platform

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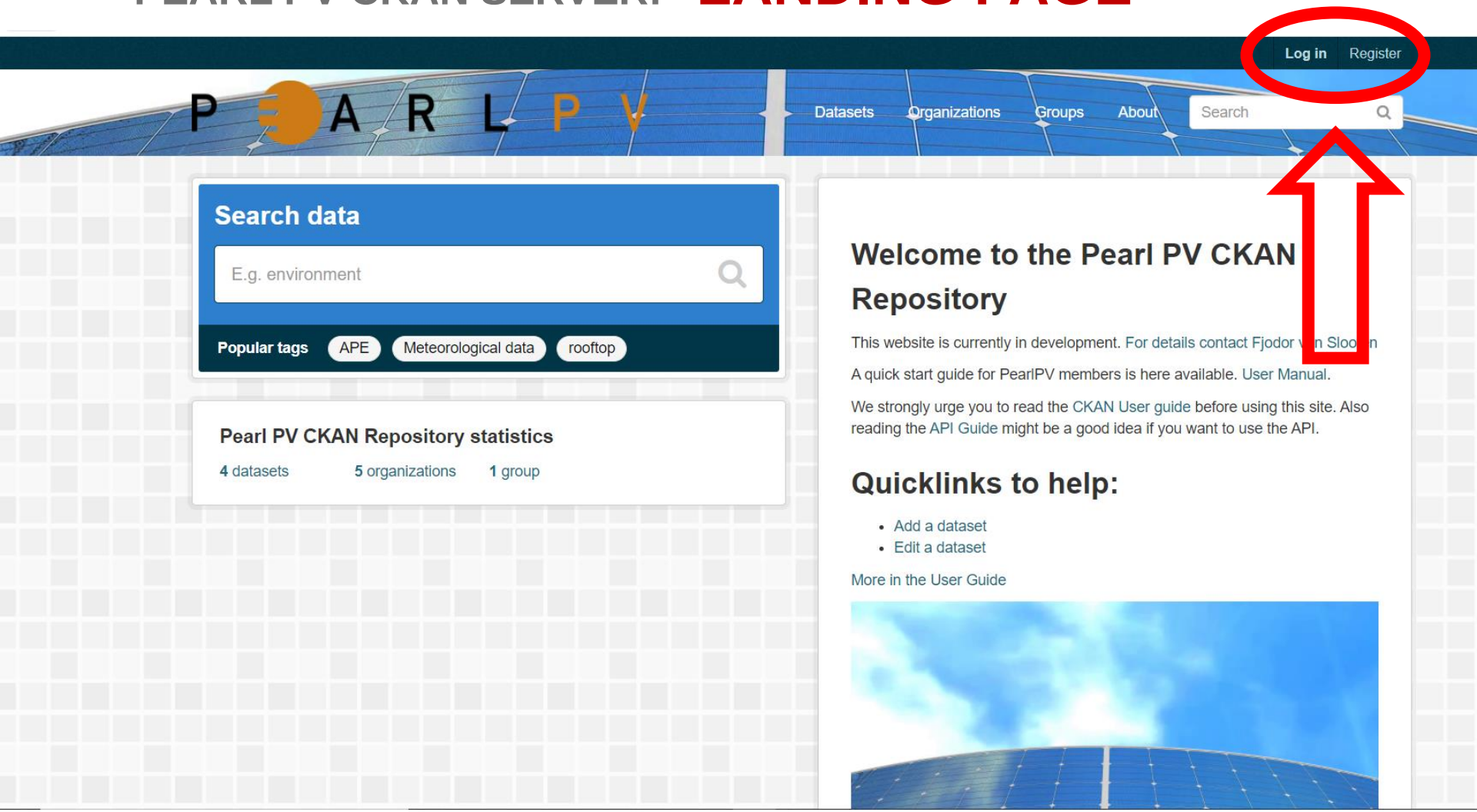
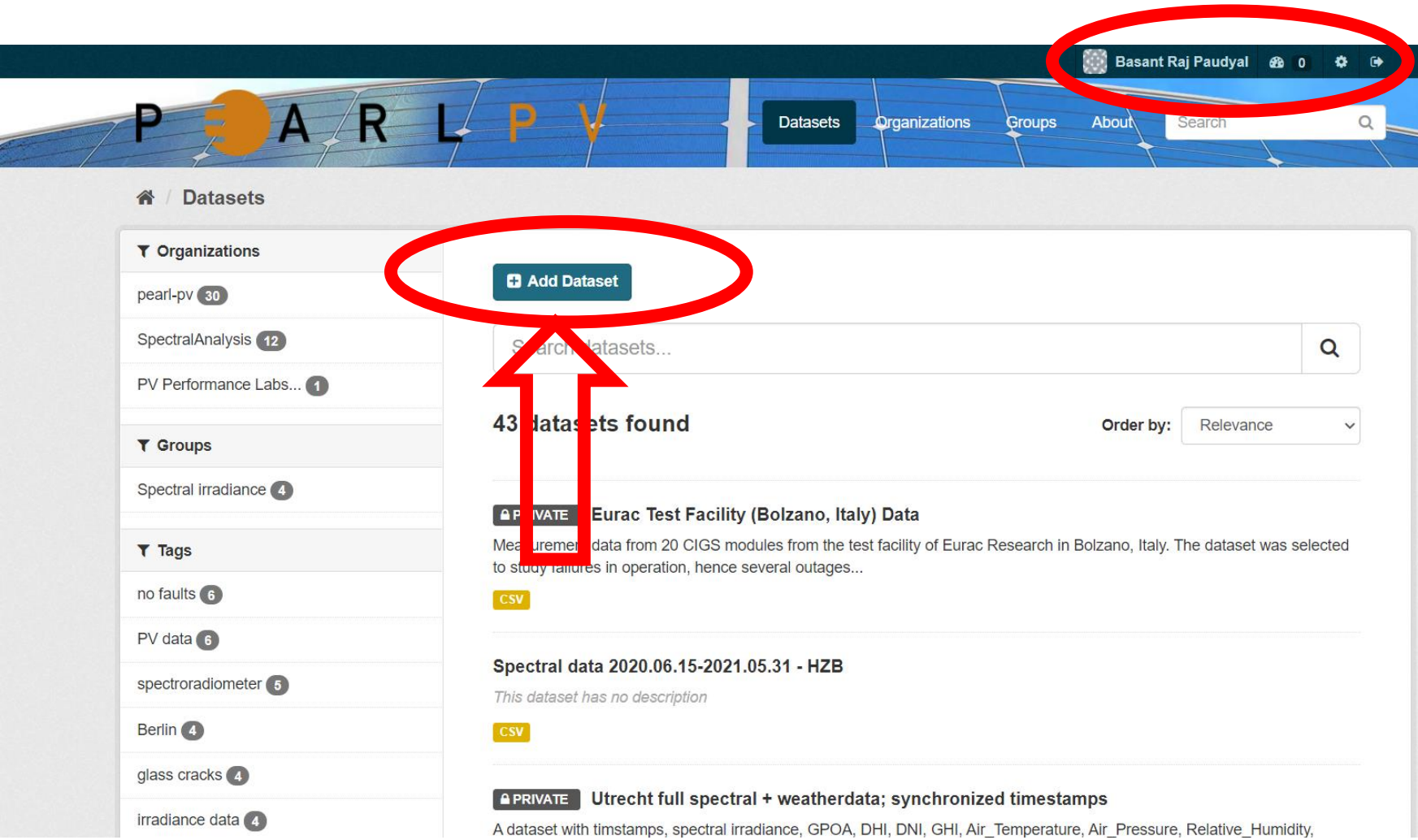
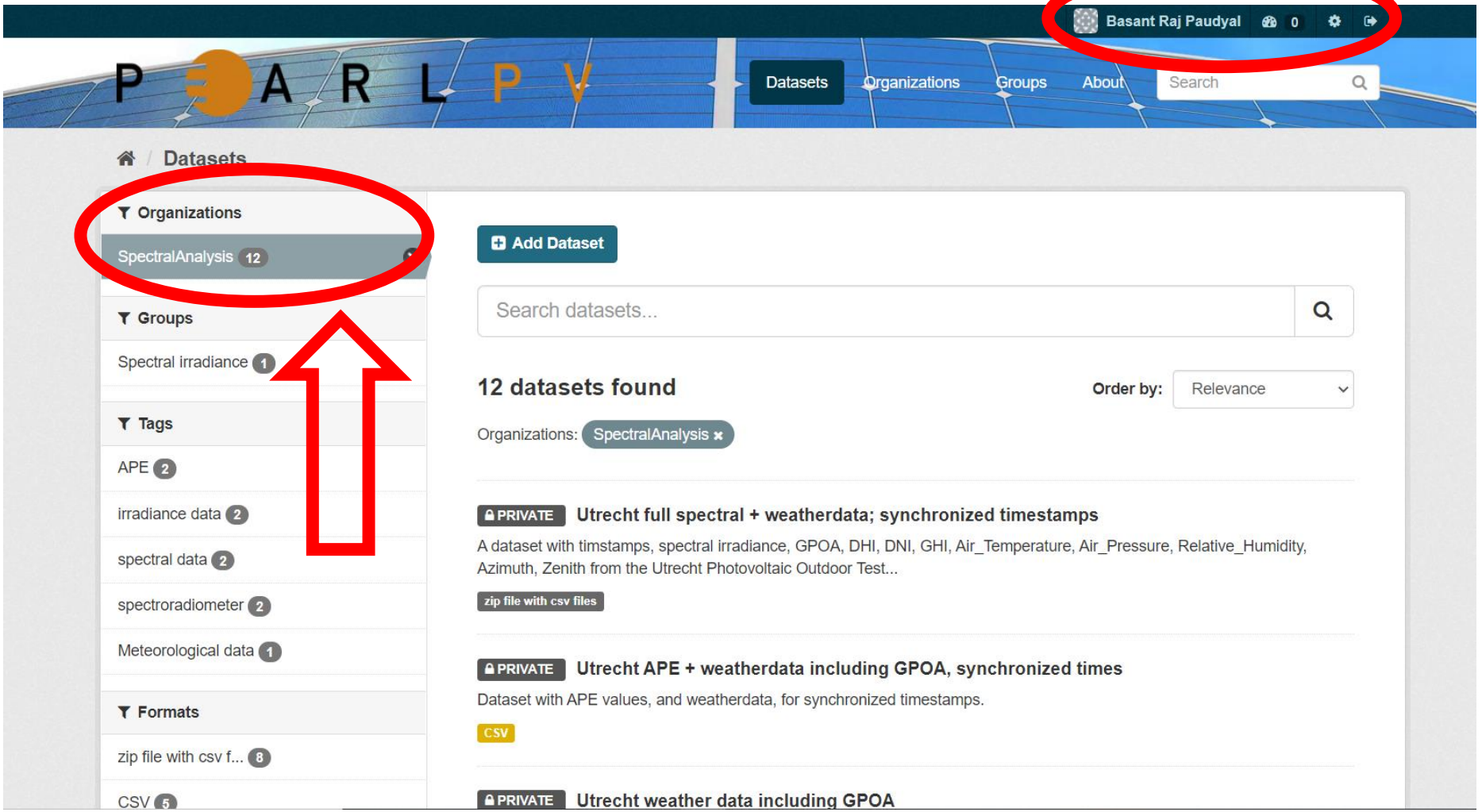


https://ckan.pearlpv-cost.eu/

PEARL PV CKAN SERVER: UPLOADING DATA



PEARL PV CKAN SERVER: SPECTRAL ANALYSIS



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SPECTRAL DATA INTER-COMPARISON:

Common grounds of intercomparison:

- APE as a parameter
- 350-1050 nm wavelength range

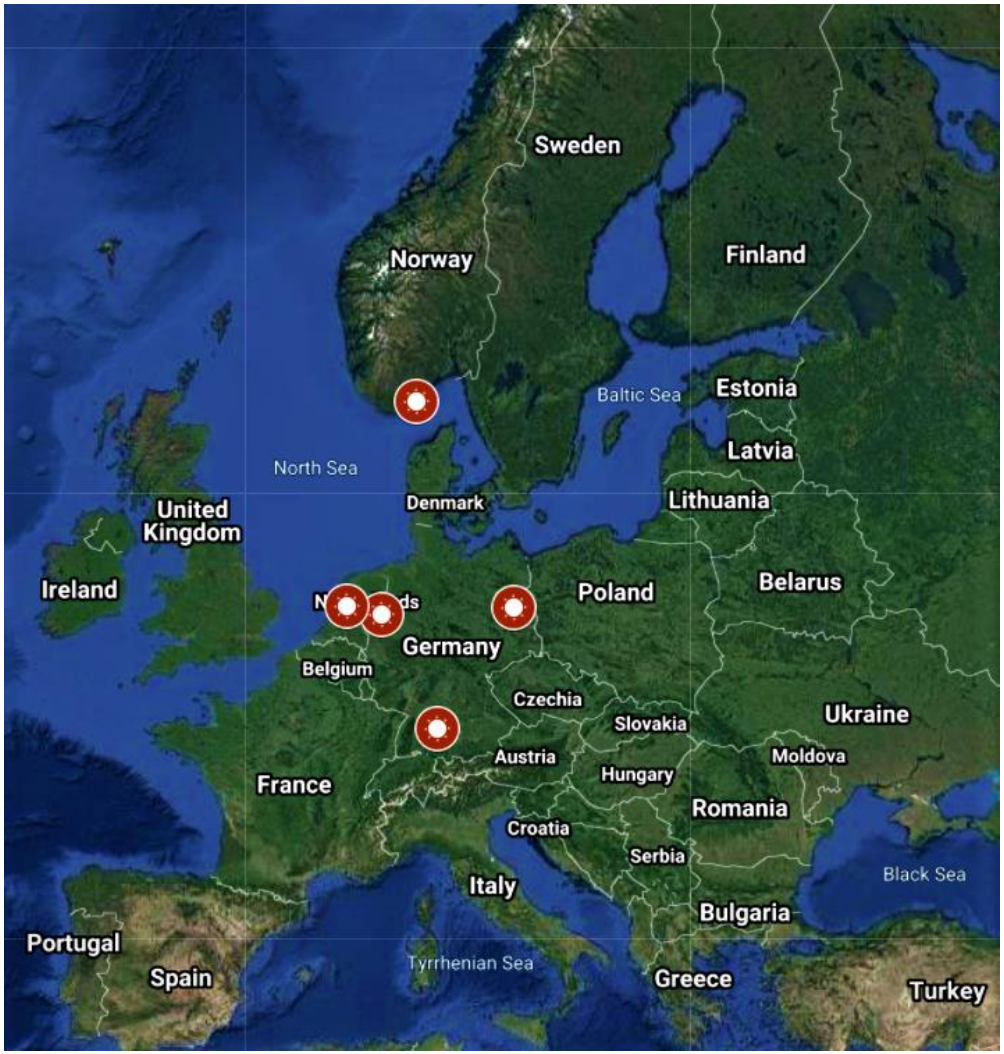

Fig. Participating locations in this study

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SPECTRAL DATA - BERLIN

Parameters	Values
Latitude	52.43°
Longitude	13.52°
KG Climate	Cfb
Climate type	Urban, Inland
Instrument	EKO Wiser
Spectral range	300-1700 nm
Time series	2018 - 2021
Temporal resolution	5 min
Angular orientation	35° S

SPECTRAL DATA - BERLIN

Data availability : 2020 June 15- 2021 June 30

Filtering used: GPOA > 25Wm-2

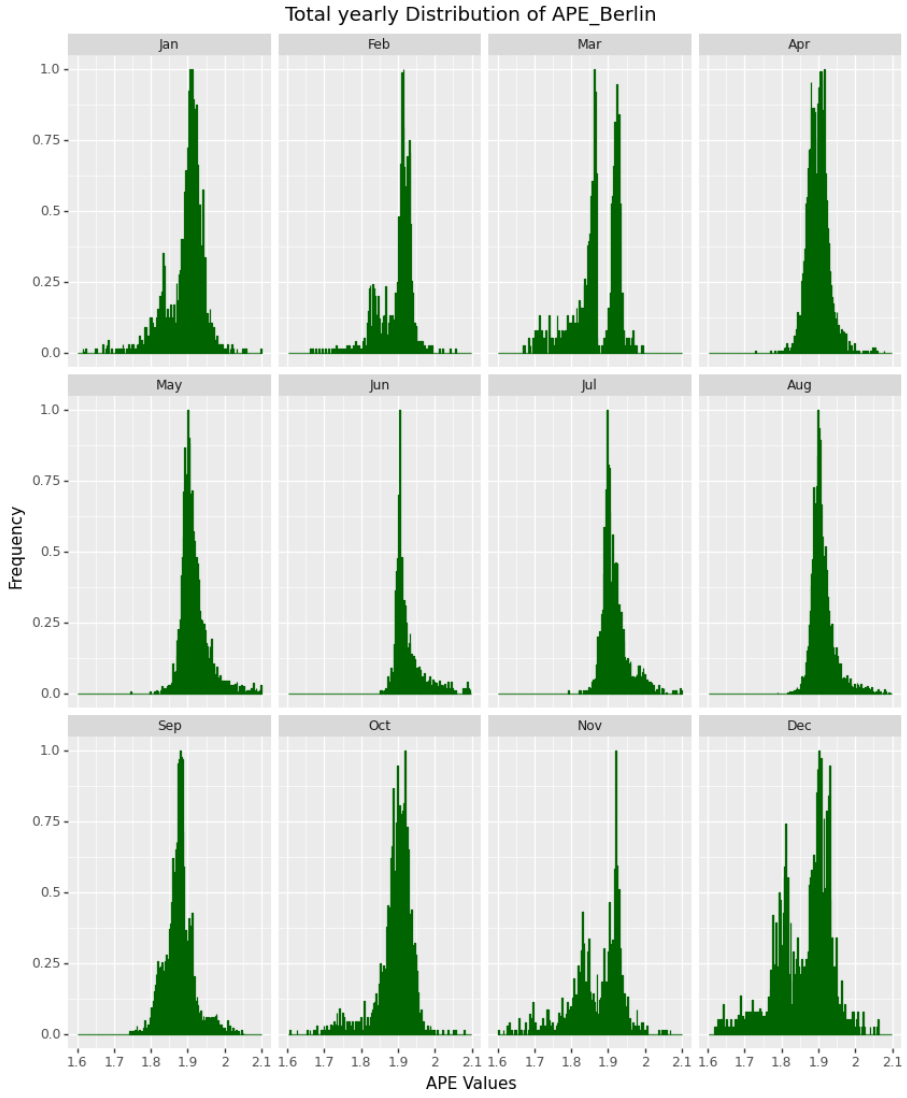
Data points: 82,114

Comments:

Average annual APE:
1.90 eV

Highest monthly average APE:
June - 1.93 eV

Lowest monthly average APE:
December - 1.85 eV



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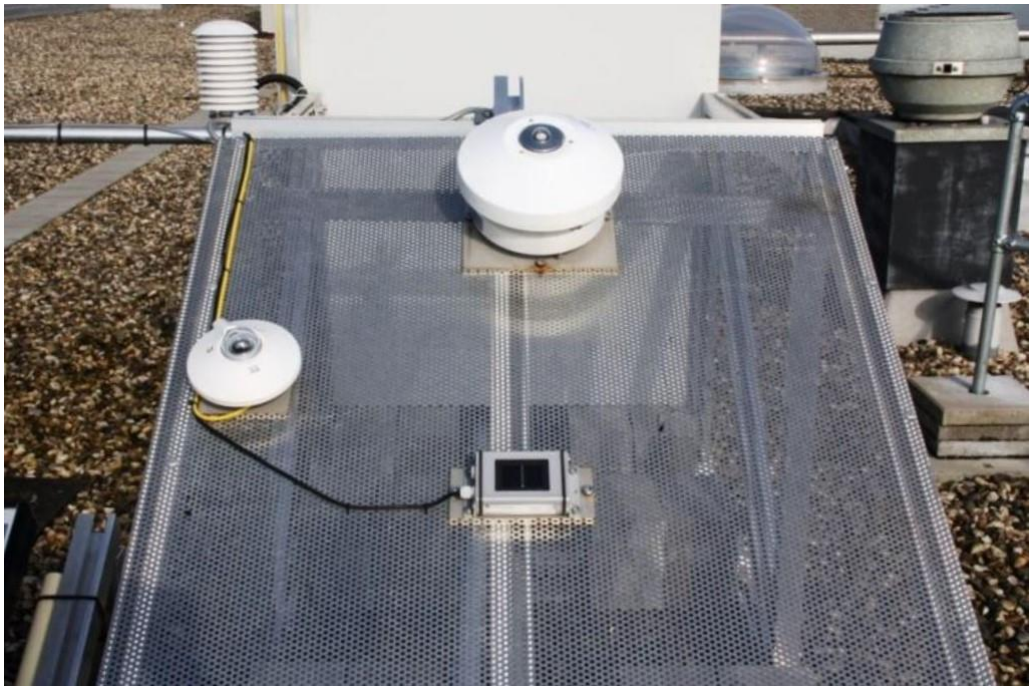
SPECTRAL DATA – ENSCHEDE



Parameters	Values
Latitude	52.23°
Longitude	6.85°
KG Climate	Cfb
Climate type	Sub-Urban, Inland
Instrument	EKO MS700
Spectral range	350-1050 nm
Time series	2014 - 2019
Temporal resolution	1 min
Angular orientation	30° S

SPECTRAL DATA - ENSCHEDE

Data availability : 2014 Jan 08-2019 December 31

Filtering used: GPOA > 25Wm-2

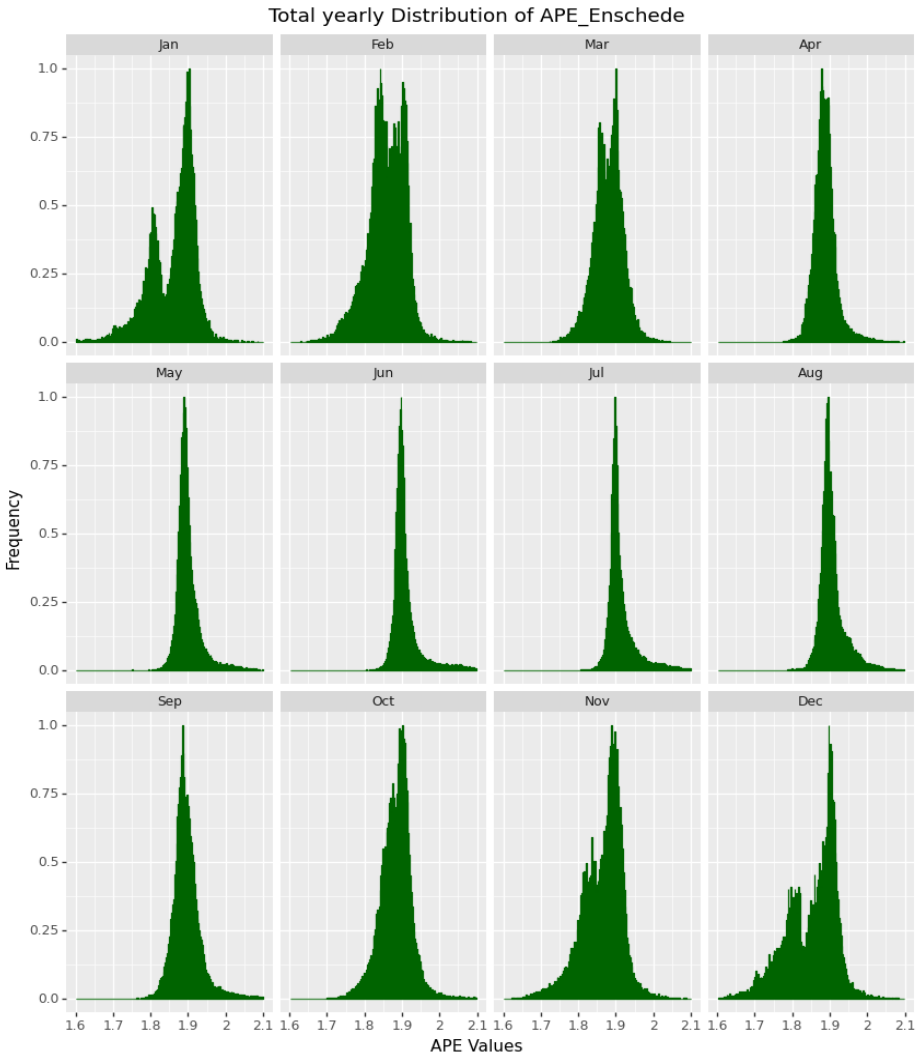
Data points: 1,311,403

Comments:

Average annual APE:
1.89 eV

Highest monthly average APE:
July - 1.91 eV

Lowest monthly average APE:
December - 1.84 eV



SPECTRAL DATA - GRIMSTAD

Parameters	Values
Latitude	58.33°
Longitude	8.58°
KG Climate	Cfb
Climate type	Sub-urban, Coastal
Instrument	Spectrafy SolarSIM-G
Spectral range	280-4000 nm
Time series	2019 - 2021
Temporal resolution	1 min
Angular orientation	45° S

SPECTRAL DATA - GRIMSTAD

Data availability : 2020 Jan 1- 2020 Dec 31

Filtering used: GPOA > 25Wm-2

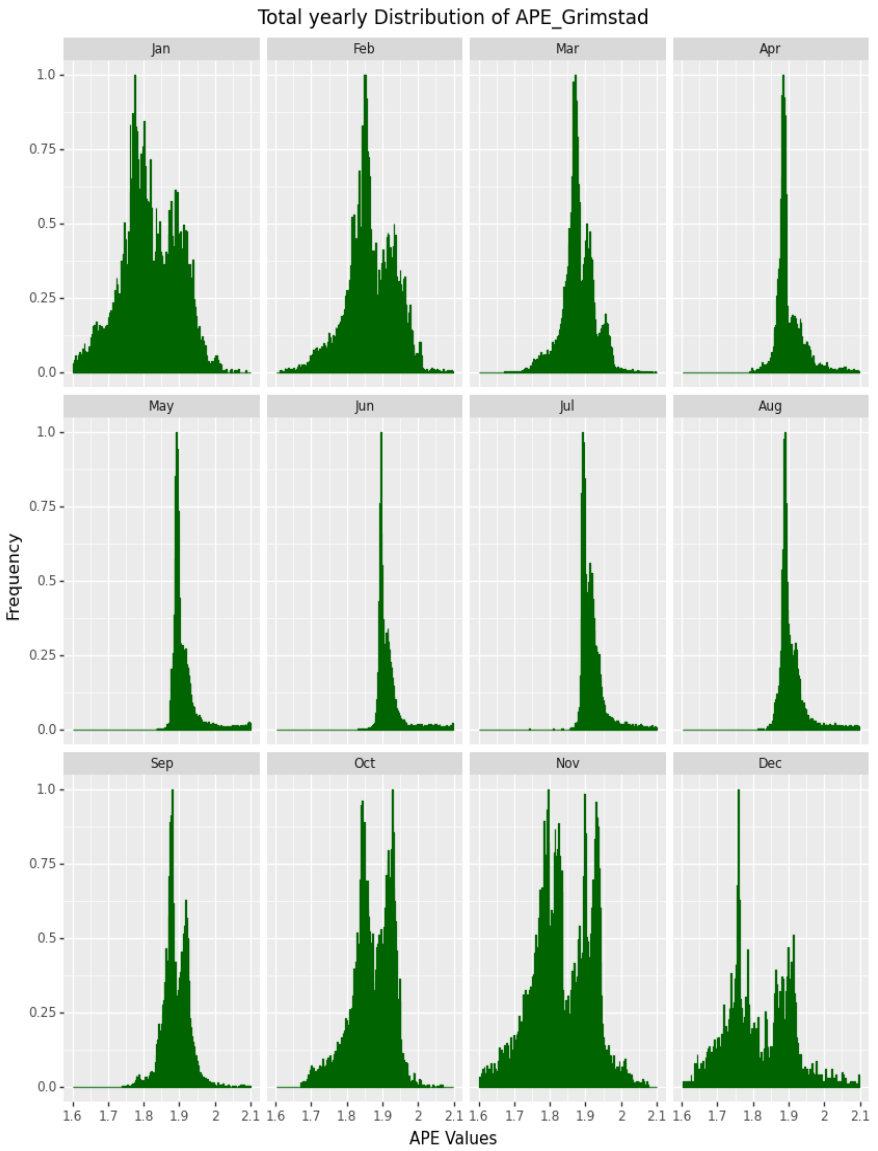
Data points: 265,420

Comments:

Average annual APE:
1.90 eV

Highest monthly average APE:
July - 1.93 eV

Lowest monthly average APE:
January - 1.81 eV



SPECTRAL DATA - MERKLINGEN

Parameters	Values
Latitude	48.53°
Longitude	9.71°
KG Climate	Cfb
Climate type	Rural, Inland
Instrument	EKO MS700
Spectral range	350-1050 nm
Time series	2014 - 2020
Temporal resolution	1 min
Angular orientation	40° S

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SPECTRAL DATA - MERKLINGEN

Data availability : 2014 Jan – 2020 Dec 31

Filtering used: GPOA > 25Wm-2

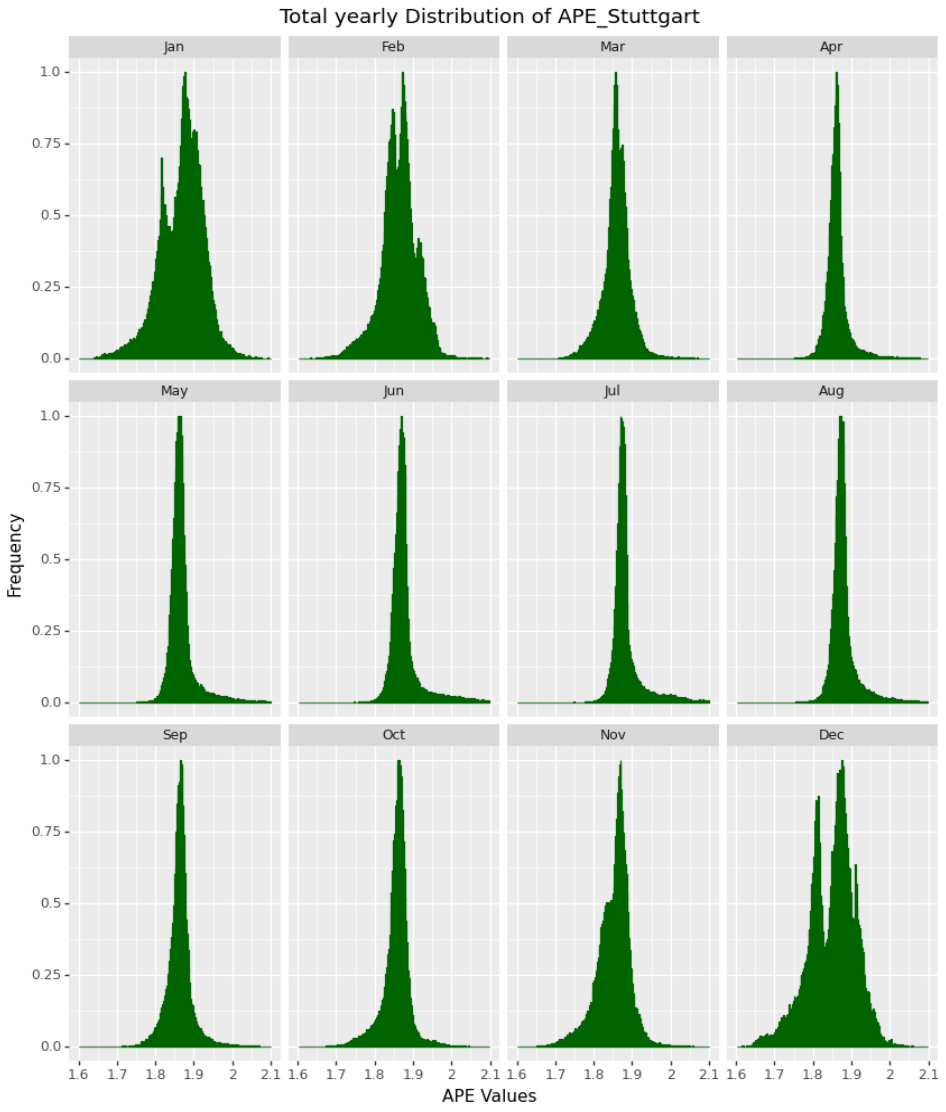
Data points: 1,822,200

Comments:

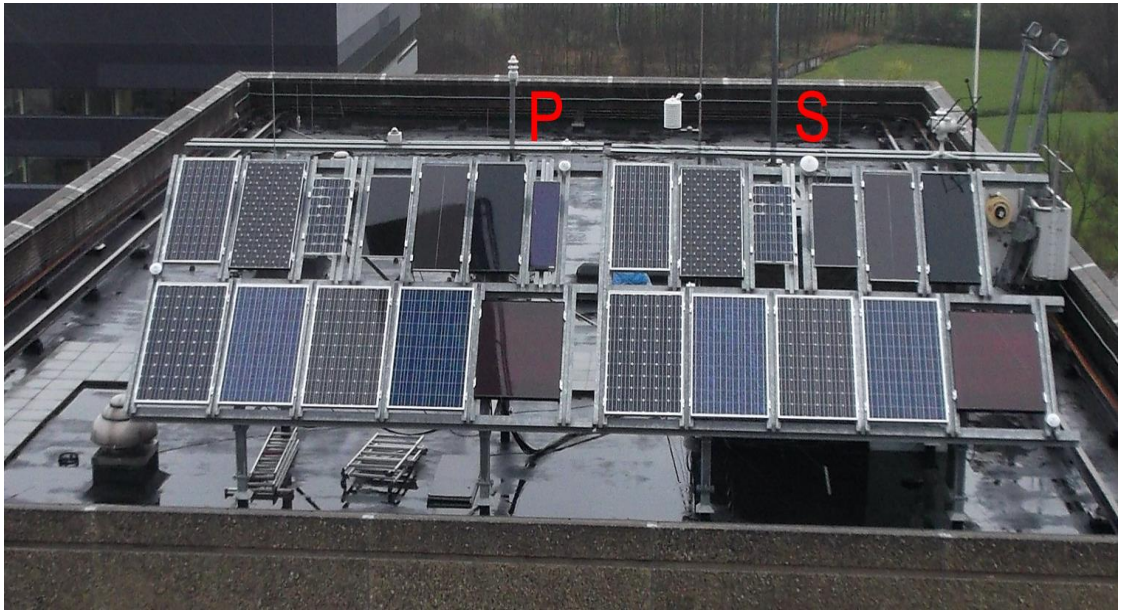
Average annual APE:
1.86 eV

Highest monthly average APE:
July - 1.88 eV

Lowest monthly average APE:
December - 1.84 eV



SPECTRAL DATA - UTRECHT



Parameters	Values
Latitude	52.5°
Longitude	5.10°
KG Climate	Cfb
Climate type	Sub-urban, Inland
Instrument	EKO MS700
Spectral range	350-1050 nm
Time series	2014 - 2017
Temporal resolution	30 sec
Angular orientation	37° S

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SPECTRAL DATA - UTRECHT

Data availability : 2014 Jul 19-2018 Jan 08

Filtering used: GPOA > 25Wm-2

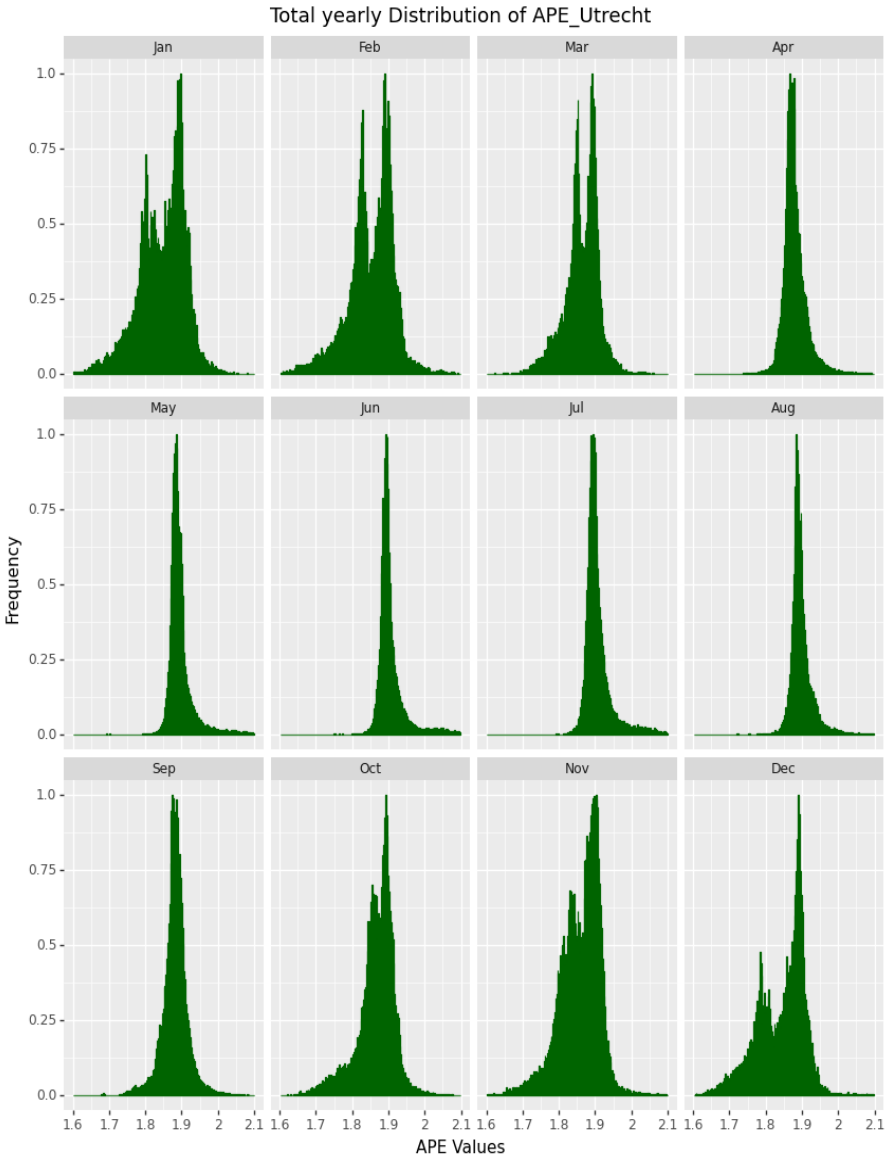
Data points: 1,147,156

Comments:

Average annual APE:
1.88 eV

Highest monthly average APE:
July - 1.91 eV

Lowest monthly average APE:
December - 1.84 eV



Solar Eclipse and Spectral variations

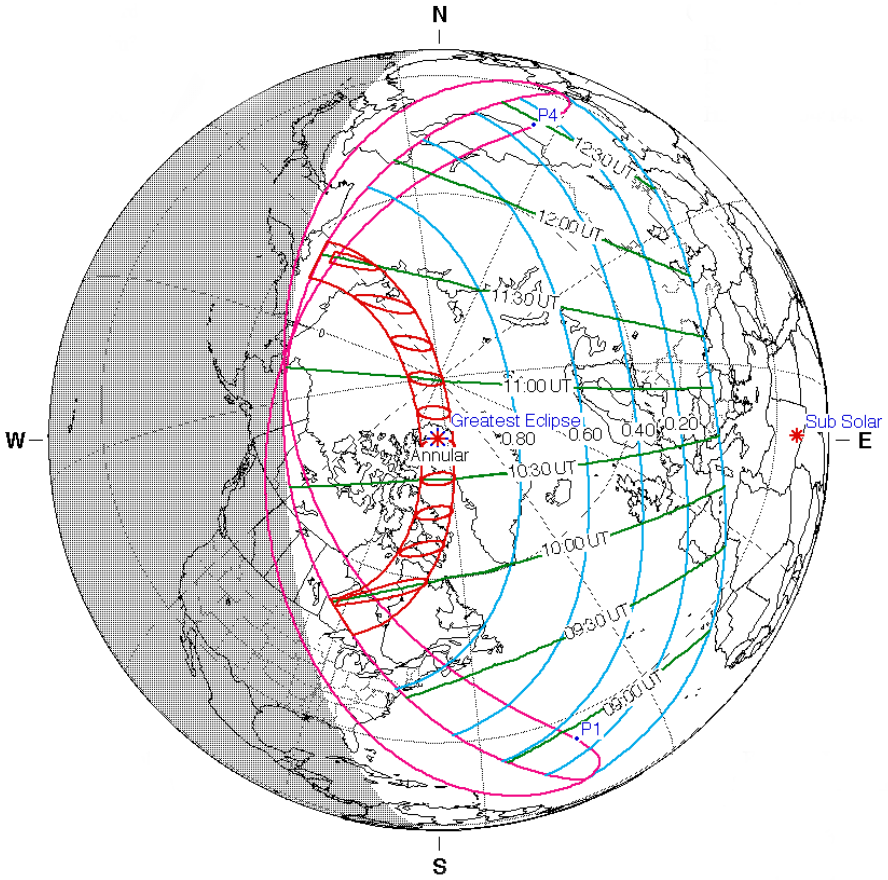


Fig. Annular solar eclipse path for 10th June 2021

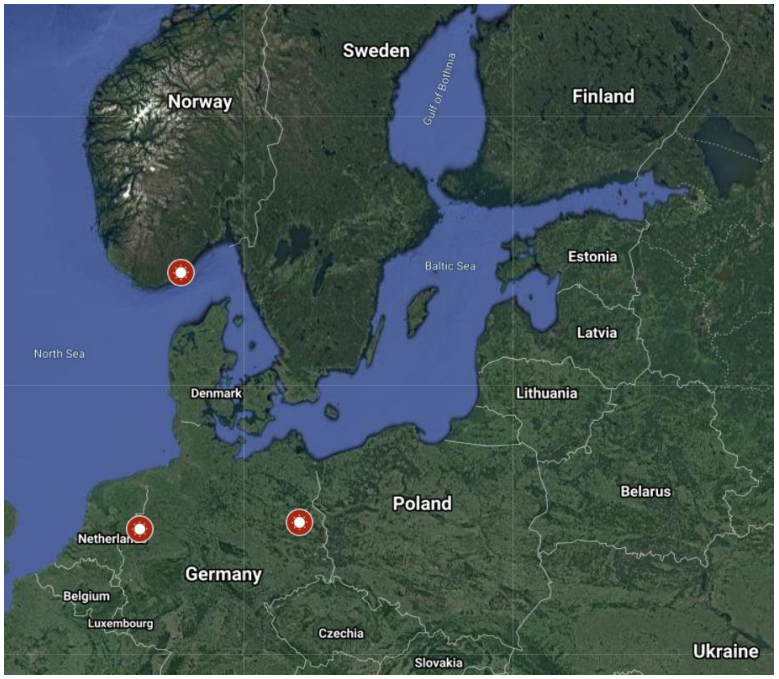
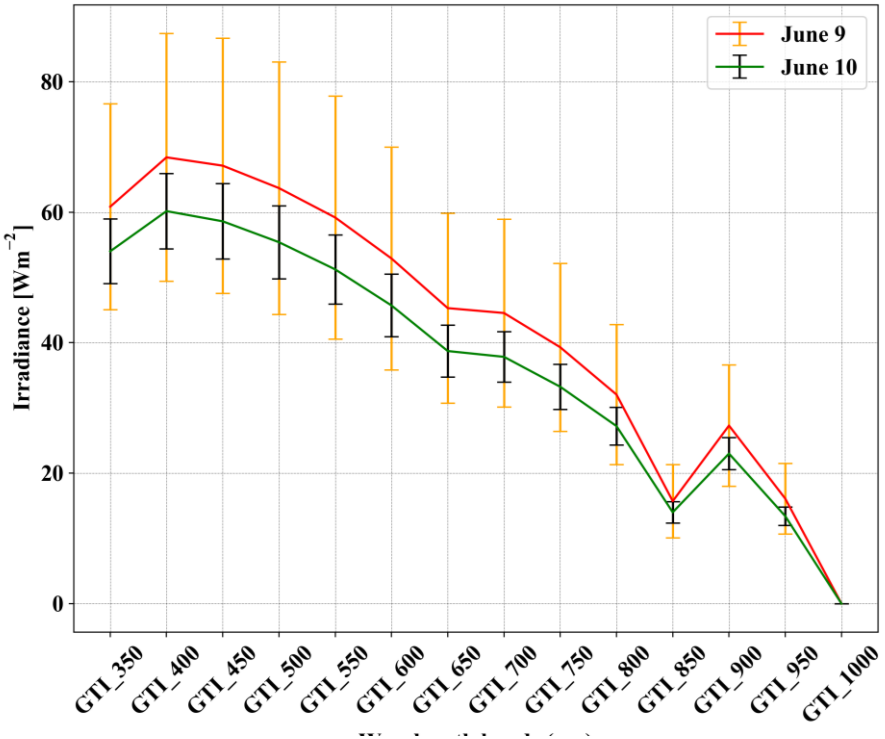


Fig. Locations under consideration

Solar Eclipse and Spectral variations



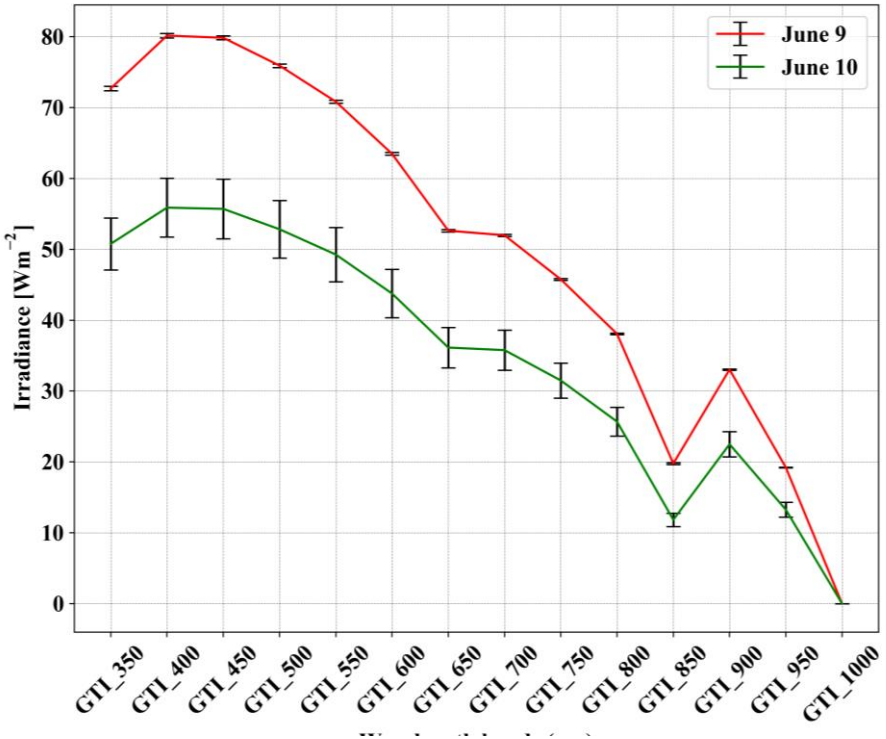


Fig. Spectral irradiance distribution on 50 nm bins within 12:00h CEST - 13:00h CEST for Enschede and Grimstad on 9th and 10th June 2021, respectively.

Future directions

- Gather more data from the southern European locations and compare the spectral distributions
- Quantify the impact of these ‘measured’ spectral distribution on PV performance
- Quantify the spectral distributions into a ‘number’ that can be used into existing PV modeling tools like PVsyst, Pvlib etc..

Thank you for your attention !!

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