Weather and Climate Services on Extreme Events for the Energy Sector

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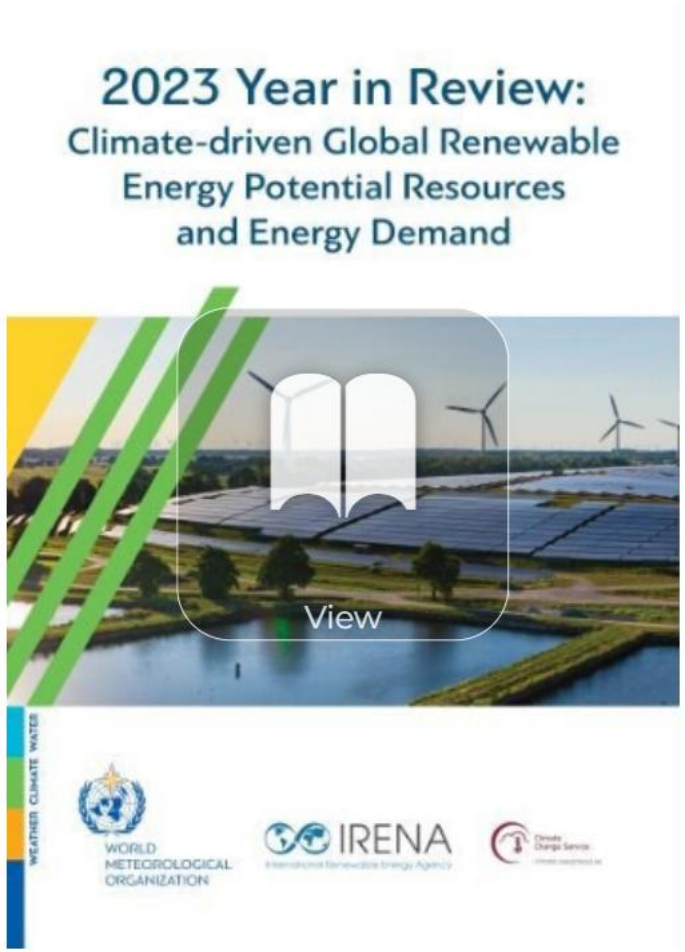
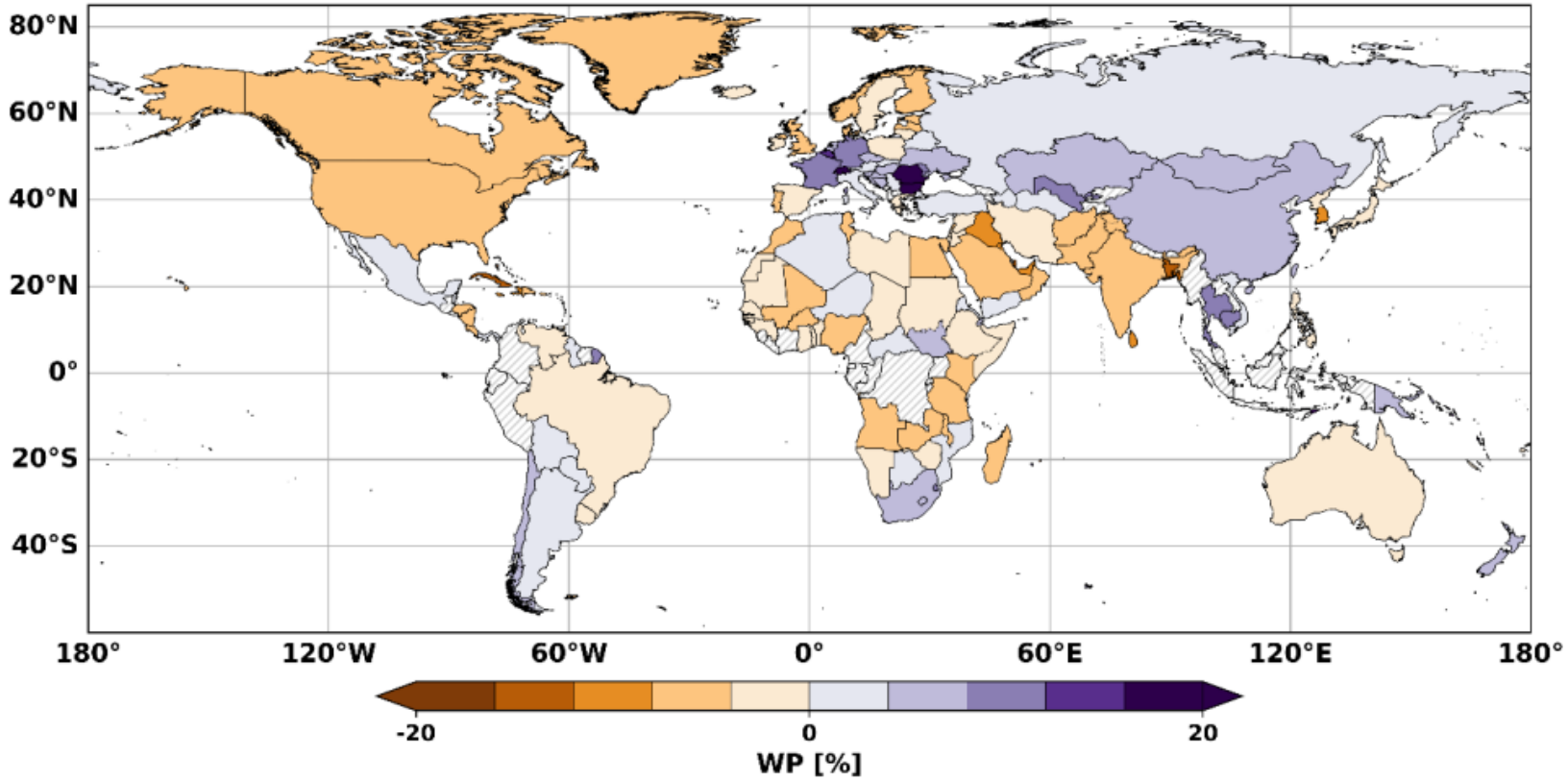
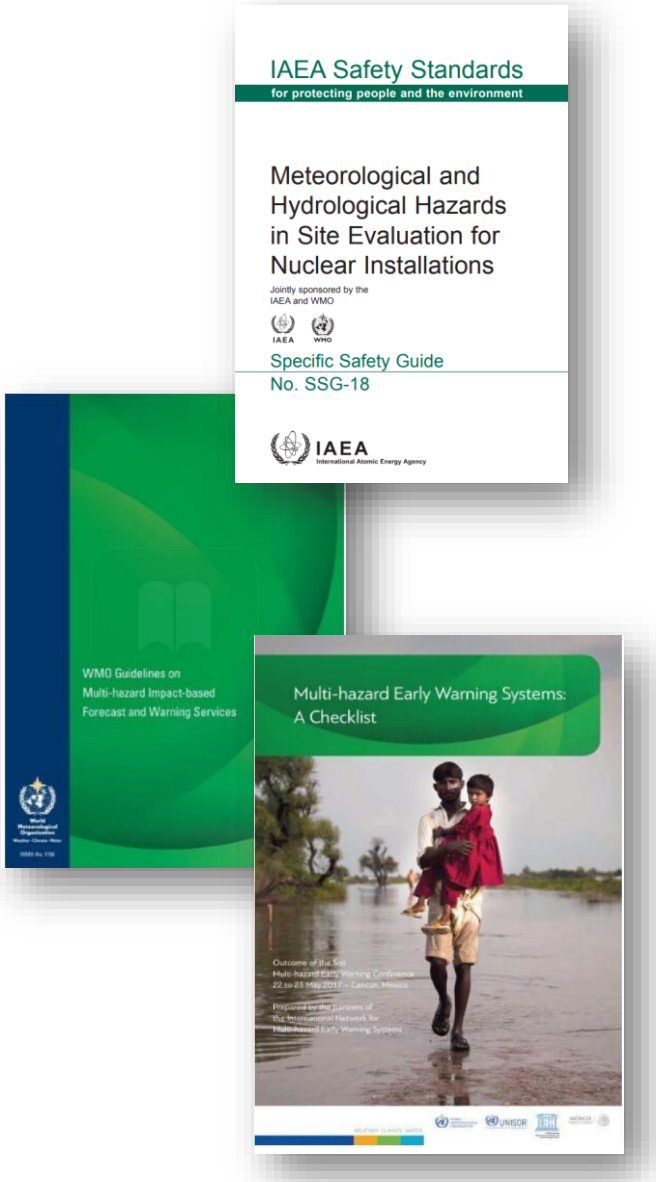
IEA Wind Task 51 - Extreme Power System Events Workshop
30th Sept- 1st Oct 2025, DWD, Offenbach, Germany





Global anomalies for the wind power (WP) capacity factor annual mean (expressed in %) for 2023 relative to the average of the 1991–2020 reference period

Hydromet Services for Extreme Events Across the Energy System Life Cycle



Site Assessment and design

Operation

Decomissioning

Extreme event analysis using historical climate data, climate projections, and archived records

- **WMO No 1310**, Guidelines on the Definition and Characterization of Extreme Weather and Climate Events (2023)
- **WMO/TD-No. 1500**, Guidelines on Analysis of extremes in a changing climate in support of informed decisions for adaptation (2009)
- **WMO-No. 1317**, Guidelines for the WMO Evaluation of Records of Weather and Climate Extremes (2023), associate to **World Weather and Climate Extremes Archive**
- **IAEA-WMO** Safety Standard Guide 18, Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations (2011)
- **Tools: Climate Information Platform (CIP) and Climpact** https://climpact-sci.org/ , climateinformation.org

EWS,forecasting, Impact-based forecasting, compound events modelling

- **WMO-No. 1150**, Guidelines on Multi-hazard Impact-based Forecast and Warning Services (2015)
- **WMO-No 1150** Part II: Putting Multi-Hazard IBFWS into Practice (2021)
- **WMO-UNESCAP**, Manual for operationalizing impact-based forecasting and warning systems (IBFWS)
- **WMO-No. 1293**, Guidelines on Implementation of a Coastal Inundation Forecasting–Early Warning System (2022)
- **WMO-No. 1286**, Assessment Guidelines for End-to-End Flood Forecasting and Early Warning Systems (2022)

To WMO website

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WMO

World Weather and Climate Extremes Archive

About Domains Visualisation

World Weather and Climate Extremes Archive / Visualisation / World Weather Climate Extremes Map

World Weather Climate Extremes

Filter by Record Type
No category selected

Filter by Region
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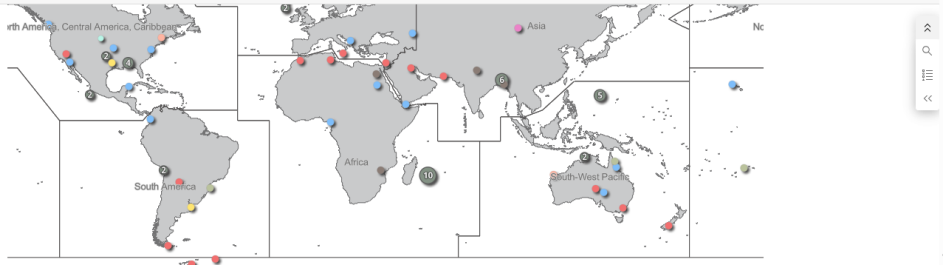
Filter by Country
No category selected

About:
The Weather and Climate Extremes Archive provides historical and geographical perspectives of observed limits of extreme weather and climate events. Such an archive is important in a changing climate where many weather and climate extremes are increasing in frequency and intensity, and the most extreme impacts come disproportionately from the most extreme events.

A record of a weather or climate variable refers to the highest value so far known for the variable, in a given geographical context, such as global, regional, national or a specific geographical domain of interest. The most popular is the highest or lowest temperature recorded so far in any place of the world.

For more information see the Guidelines for the WMO Evaluation of Records of Weather and Climate Extremes (WMO-No. 1317)



Climpact

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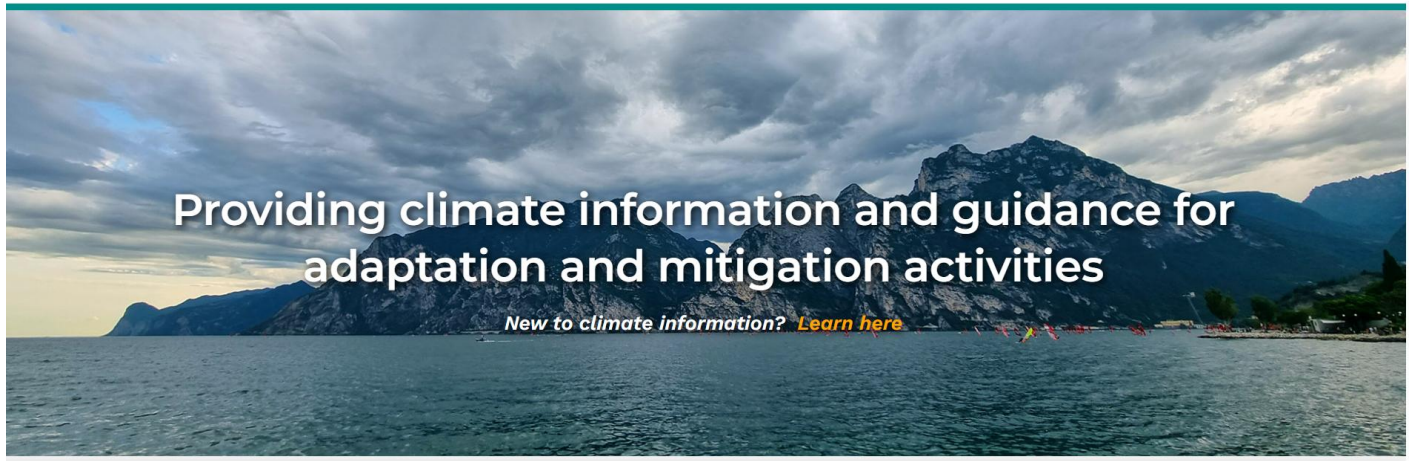
Tools Guidance Contact About

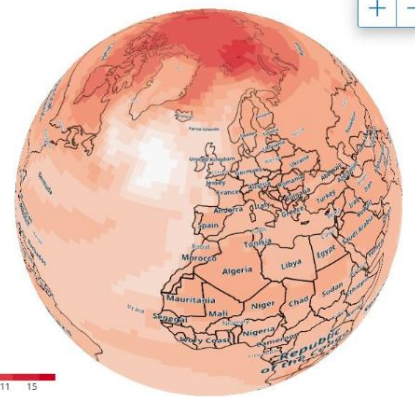


CLIMATE INFORMATION

Tool Data Go to portal

Data Access Platform

Indicator Model Past & Future

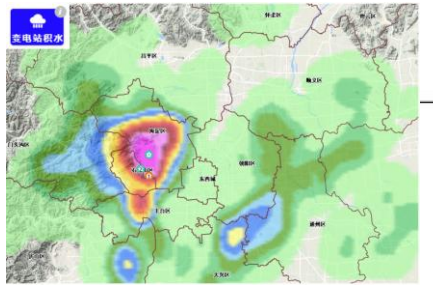


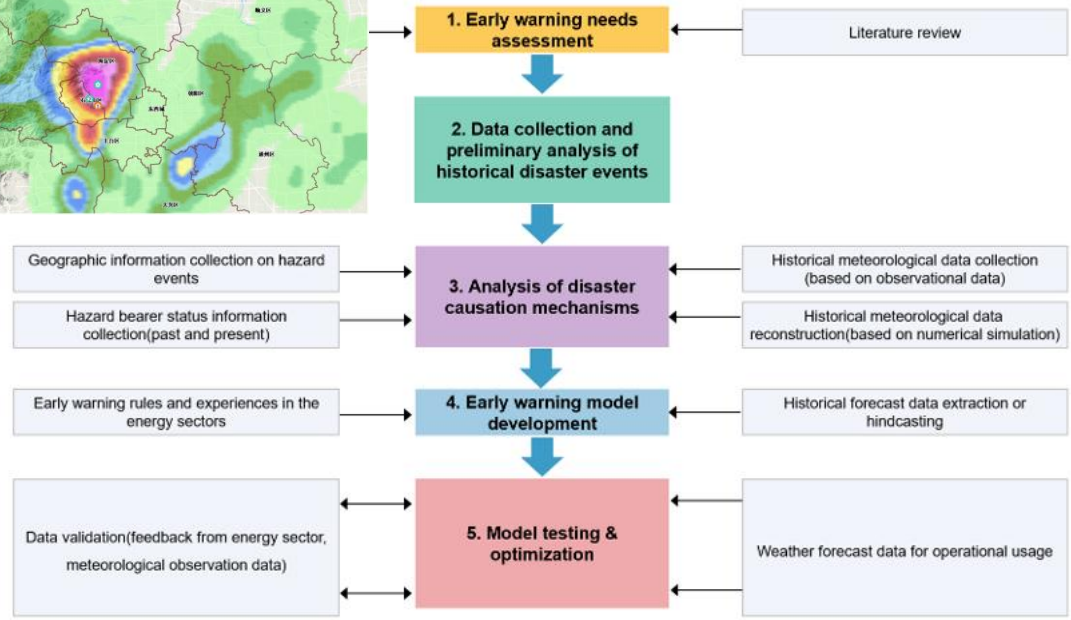
Cesium | Map data from OpenStreetMap

Indicator: Temperature, temperature (annual mean), Time Period: Future, 2071 - 2100, Emission scenario: SSP2 4.5, Model Ensemble: CMIP6 Global, Bias Adjusted: No

Best Practices on Early Warning systems for the energy sector and electricity industry: Case studies from China (upcoming)

- Short document (30 pages),
- In-kind support from China Meteorological Administration
- Content:
  - Extreme weather and climate events and their impact on the energy sector
  - Framework of the early warning system for the energy sector
  - Impact-Based Early Warning System for the Energy sector for specific hazards
    - Inundation
    - Typhoon EW for off-shore power plants
    - Icing
    - Power supply shortage EW





ENANDES

Under the WMO ENANDES+ project, a climate service toolkit for energy application with EW component is planned to be conceptualized (over the next few months).

Thank you

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