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Climate indices
Eastern European perspective

is-enes
INFRASTRUCTURE FOR THE EUROPEAN NETWORK
FOR EARTH SYSTEM MODELLING

Climate indices report – main conclusions

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- <u>Expected improvements related to all aspects covered by survey are equally weighted</u>

- Improved documentation on indices definition;
- More detailed description of potential application and/or on index interpretation;
- Increased data availability,
- Improved software documentation and user guides;
- More trainings on different aspects (calculation/visualization software, data access, application, etc.)

IS-ENES already contribute to some of them: documentation, software (calculation, visualization), schools, trainings.

- <u>During the online discussion and interviews some expectations are underlined</u>

- More trainings on different aspects (calculation/visualization software, data access, application etc.). There was an explicit proposal for organization of schools/trainings on climate indices and software, specifically for master and PhD students at the Eastern European Universities.
- Increased data availability is also underlined as an important aspect that can be improved.
- Detailed description of potential application and/or on index interpretation.

- Additional indices (1/4)

- Even though the existing indices lists cover a wide range of indices, a **quarter of survey respondents think that existing climate indices don't satisfy their need**. In order to meet their needs and needs of their users, several participants indicated the practice of modification of existing definitions, and/or development and the reasoning behind is that modification was motivated by additional flexibility in terms to specific time of the year or specific needs from different sectors.
- Development of indices based on other parameters like wind, radiation and humidity, that should be included in the existing lists that are most used.

- ## Additional indices (2/4)

- Proposed examples: Groundwater Drought Index, Clothing Resistance Parameter, Evapotranspiration Stress Index, Soil Moisture Availability Index.

Some of these indices are not solely based on temperature and precipitation, so their inclusion in the standard lists are in line with the request that **other variables should be considered too**. On the other hand, participants pointed out that implementation of new and complex indices, although can help to overcome some deficiency in index definitions, also requires a lot of **additional research**.

- ## Additional indices (3/4)

- No specific indicators/indices that can be used to assess the exposure to hydrometeorological hazards specific to **mountain environments** that can be exacerbated by climate change (e.g. flash floods, rapid snow melting, landslides, rain on snow events).

- Existing indices are not relevant enough in some fields or sectors, to show the impact of certain climate hazards

[example: flood related to river-ice / the exposure to river ice - as a function of freezing degree day or accumulated freezing degree day].

- Indices using sub-daily data should be defined as well taking into account the importance for some sectors, such as agriculture and energy

- ## Additional indices (4/4)

- Most of the indices represent moderate to severe extreme events, but not rare extreme events. *(maybe we also need better definition about moderate, severe, rare etc.?)*

[Many ETCCDI indices are based on percentiles with thresholds set to assess moderate extremes that typically occur a few times every year rather than high-impact, once-in-a-decade events]

- <u>Data (1/4)</u>

- Respondents consider quality control and longer time series as very important for the future. There is a necessity for increasing the density of the meteorological station network, homogenization of data and extending datasets coverage back in time.
- With regard to already calculated indices, there is a need for more metadata information e.g. information on how the input data have been manipulated.
- Common repository which could contain the information about all available datasets and other relevant information [new website or upgrade to existing one]

- ## Data (2/4)

- There is room for improvement of graphical products since the visualization of the indices is very important to communicate with the stakeholders.
- Also, the pre-computed graphical products should be made available in other formats than standard image/document formats (gif, jpg, png, pdf) such as different georeferenced raster formats for 2D plots.
- There is a need for easier data access (downloading) and stricter adherence to format convention and rules that will provide easier data handling.

[specific proposal: unification of the calendar type of the model's time axis, or some common protocol for conversion from 360 to 365 day calendar]

- <u>Software</u>

- Proposal to include some kind of benchmark data set with in the software for calculation. Benchmark data should include input data and calculated indices from input data.

- ## Additional specific suggestions

- To have the option to select the custom period of the year over which an index is calculated. For example in agriculture to determine the change that extremes occur during certain vulnerable growth stages or hydrology to have period that covers hydrological year calculations from August to July and not just from January to December;
- To have an option of Mann-Kendal and Sen's slope estimator for the trend analysis in addition to the OLS (ordinary least squares);
- To provide the dates of the events as an output (e.g. dates of heat wave occurrence);
- Specifically for ClimPACT, it creates all files regardless of whether the sites contain all the required input data or only precipitation data. Some of these files are empty or contain "missing data" which burdens the memory and disk space.

Thank you