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climdex-kit: an open software for climate index calculation, sharing and analysis towards tailored climate services

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Climate change and transformation is urging scientific communities and decision makers around the world to better understand and handle such systemic shift and its consequences at different levels and to instill a gradual societal adaptation and change into the population.

The availability of tailored and robust information about current climate and climate change at local, regional or national scales is an increasing requirement in a wide range of end-user applications and as a decision-support basis in the fields of risk reduction and adaptation planning.

Numerous European and national portals have been recently developed to ease access to climate data, visualize precomputed information and promote climate change communication. At the same time, a wide range of ready-to-use packages written in popular programming languages and published in open-source code repositories, e.g., GitHub, have been released with the aim of enabling end users to derive customized data for specific applications, e.g., climate indices for sector-oriented analyses, or to further integrate the utilities into tailored climate services.

However, open-source packages completely integrating all steps composing a service-oriented application –from the calculation of climate information to the open-access publication in repositories, the metadata curation, and customizable analyses –are still missing.

In this framework, with the aim of answering to the increasing need of elaborating climate data for research activities as well as practice-oriented applications we developed an open-source tool called climdex-kit [1] and published in the official Python Package Index (PyPI, https://pypi.org/). The package is designed to support users with some programming skills carrying out research in the field of climate change and impact prediction, to support dissemination and educational activities through effective visualization or to develop more complex architectures for operational platforms addressing a broad audience. The tool is written in Python and integrates utilities from the well-established Climate Data Operators (CDO) and NetCDF Operators (NCO) libraries. climdex-kit provides utilities to implement the whole pipeline of calculation, orchestrate parallelized processing over multiple climate data, publish and analyze climate indices as well as to shape the visualization of results based on user needs. The current version offers the calculation of 37 climate indices, while the package can be easily extended to support other indices and more unforeseen operators, thanks to thorough documentation for developers available in the source repository.

We will present and discuss the climdex-kit functionalities as well as its potential integration into local applications by applying the software to a dataset of climate projections for the Italian region Trentino-South Tyrol, used as study case.

[1] https://pypi.org/project/climdex-kit/

Topic

Environmental informatics: Climate Change/Environment

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