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Climate Change Explorer: Extracting localized data for developing Climate Services

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Everyone, politicians, public administrations, business owners, and citizens want to know how climate changes will affect them locally. Having such knowledge offers everyone the opportunity to make informed choices and take action towards mitigation and adaptation.

In order to develop locally relevant climate service products and climate advisory services, as we do at GERICS, we must extract localized climate change information from Regional Climate Model ensemble simulations.

Common challenges associated with developing such services include the transformation of petabytes of data from physical quantities such as precipitation, temperature, or wind, into user-applicable quantities such as return periods of heavy precipitation, e.g. for legislative or construction design frequency. Other challenges include the technical and physical barriers in the use and interpretation of climate data, due to large data volume, unfamiliar software and data formats, or limited technical infrastructure. The interpretation of climate data also requires scientific background knowledge, which limit or influence the interpretation of results.

These barriers hinder the efficient and effective transformation of big data into user relevant information in a timely and reliable manner. To enable our society to adapt and become more resilient to climate change, we must overcome these barriers. In the Helmholtz funded Digital Earth project we are tackling these challenges by developing a Climate Change Workflow.

In the scope of this Workflow, the user can easily define a region of interest and extract the relevant climate data from the simulations available at the Earth System Grid Federation (ESGF). Following which, a general overview of the projected changes, in precipitation for example, for multiple climate projections is presented. It conveys the

bandwidth, i.e. the minimum/maximum range by an ensemble of regional climate model projections. We implemented the sketched workflow in a web-based tool called The Climate Change Explorer. It addresses barriers associated with extracting locally relevant climate data from petabytes of data, in unfamilar data formats, and deals with interpolation issues, using a more intuitive and user-friendly web interface.

Ultimately, the Climate Change Explorer provides concise information on the magnitude of projected climate change and the range of these changes for individually defined regions, such as found in GERICS 'Climate Fact Sheets'. This tool has the capacity to also improve other workflows of climate services, allowing them to dedicate more time in deriving user relevant climate indicies; enabling politicians, public administrations, and businesses to take action.