

INTEGRATED DATA EXPLORATION

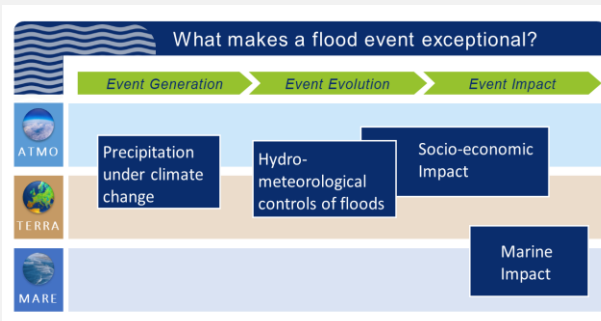


DIGITAL EARTH

Border crossing is essential

Understanding the system earth requires border crossings between the different earth science disciplines. Digital Earth provides approaches and technologies from data- and computer science to support such border crossings.

An example is the Digital Earth Flood Event Explorer to investigate floods across the atmo-, terra- and mare disciplines along the process cascade.



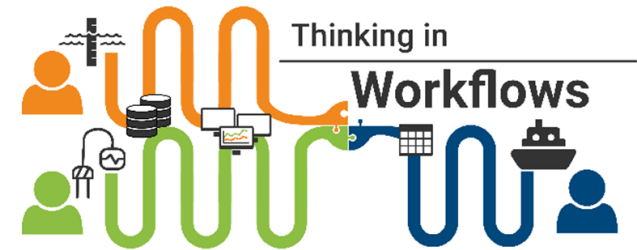
Digital Earth interdisciplinary collaboration

All eight Helmholtz Centers active in Earth and Environment are partners in Digital Earth.



Basic Idea

Cross-disciplinary research with a data-driven science approach needs novel scientific practice: **Thinking in workflows**.



Workflows are **efficient** means for border crossings.

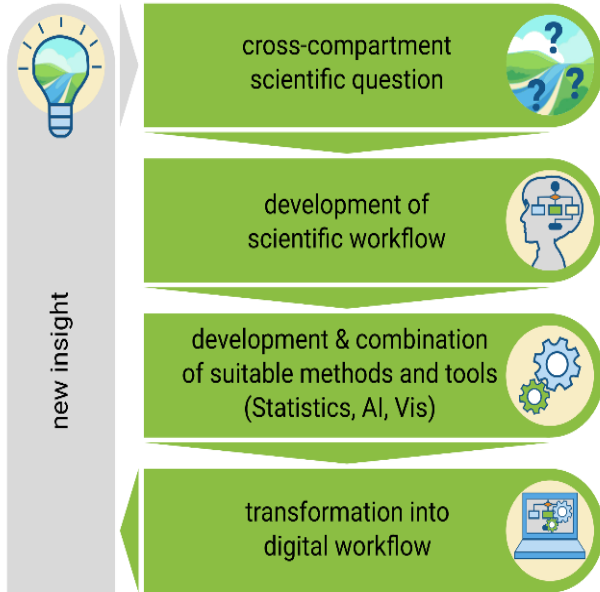
Earth scientists develop *scientific workflows* to **link** science domains.

Data- and computer scientists **transform** scientific workflows into *digital workflows*.

The outcome is methods and tools that link data and perspectives from various fields.

Objective and Approach

Digital Earth adopts and implements state-of-the-art approaches from data- and computer-science into earth system science to develop scientific and digital workflows.



Workflows are developed for two show cases and their data science requirements:

A) The analysis of flood events at the Elbe river along the process cascade event generation, evolution and impact across atmo, terra and mare disciplines.

B) Quantification of methane emission fluxes into the atmosphere from gas exploration in the North Sea.

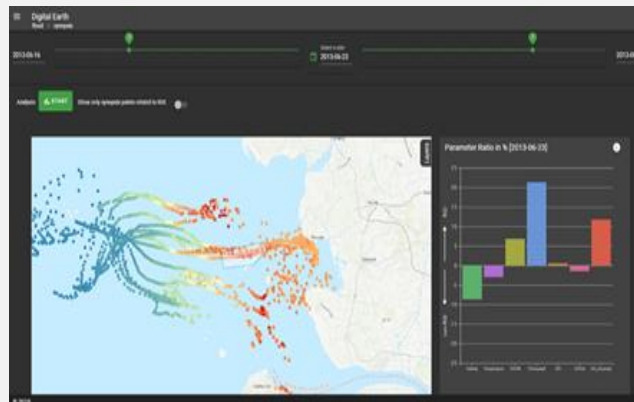
Methods and Tools

Digital Earth develops, adopts, and combines **methods and tools** from statistics, artificial intelligence, and visual data exploration. It focuses on methods to link data of various data sources (sensors, models, geological archives) characterized by heterogeneous dimensions, various spatial and temporal scales, varying accuracy, and irregular distribution in space and time.

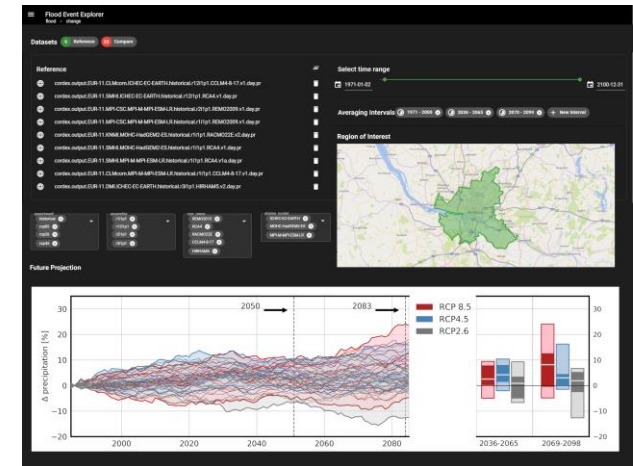
All methods and tools are implemented in **digital workflows** as reusable, modularized software components based on state-of-the-art approaches from computer science.

Selection of Results

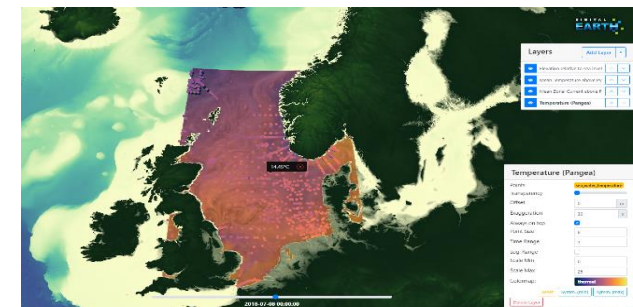
Anomaly Explorer to identify anomalies in various data sets, e.g. the Elbe flood river plume in the North Sea.



Change Explorer to compare changes, e.g. in simulations of precipitation in selected regions and historical/future time periods.



Digital Earth Viewer to cross-correlate measurements with model data over time.



Contact:

WP2 Data Exploration Framework

Prof. Dr. Doris Dransch

Remote Sensing and Geoinformatics
German Research Centre for Geosciences GFZ
14473 Potsdam

Email: doris-dransch@gfz-potsdam.de
Tel.: +49 331 288-1535