



The HZG Model Analysis Tool

The Institute of Coastal Research at the Helmholtz Centre for Materials and Coastal Research (HZG) in Geesthacht has taken a major step forward with a new tool complementing its data model processing. Researchers get enabled with easy and interactive access to complex spatio-temporal timeseries analytics. Based on the *rasdaman* datacube technology HZG has expanded its service-oriented infrastructure opening up a series of new perspectives for new applications.

coastMap is the marine Geoportal of the Institute of Coastal Research.



It combines analyses and model

data on seafloor conditions with those in the water column above.

Geographic focus is on the North Sea and the atmosphere. The portal offers campaign data, model analyses and biogeochemistry thematic maps. Users can freely select and visualize models covering remarkable amounts of geographic areas and time periods without download.

In the investigations on global and regional changes of coastal zones model evaluations with timeseries analytics are particularly valuable. However, researchers face significant challenges due to the data complexity and enormous volumes – an issue HZG shares with researchers all over the world.

„rasdaman is an exciting technology for accessing and managing Big Data.“

Ulrike Kleeberg
Dipl.-Geographer
Helmholtz Centre
Institute of Coastal Research

CASE STUDY

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In addressing this challenge HZG has decided to use the rasdaman Big Data engine. This platform, which is completely based on open standards, complements coastMap with unified, flexible and scalable data management. Fast access and analysis of model data is provided via homogenized, user-friendly spatio-temporal datacubes. Altogether 190 datacubes are currently available in rasdaman and available open and free of cost.

difference between water temperature and air temperature on ground, or the weighted sum of the water volume. Currently researchers are working on comparing different data models against each other. The data come from model runs done by the Helmholtz Centre, the German Federal Maritime and Hydrographic Agency (BSH), and Hamburg University.

Sizes of the coast systems to be assessed are different, depending on the respective

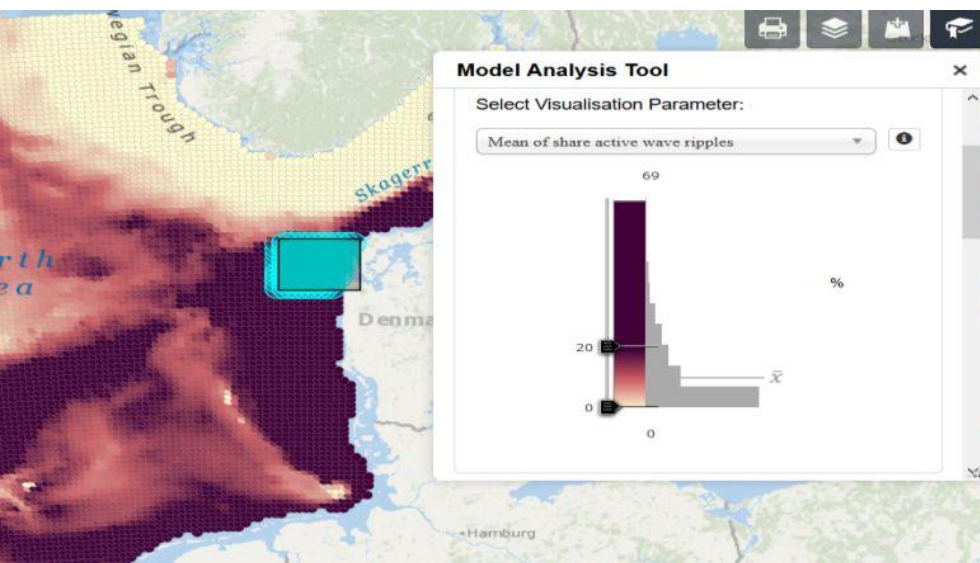
„rasdaman offers fast online access and analysis of large model data sets via Web applications.“

Ulrike Kleeberg

data formats, ready for further processing through tools like R, python, Matlab or ArcGIS. For instance, netCDF is popular for handling multi-dimensional data whereas JSON is well suited for 1D time-series diagrams. This format variety is particularly attractive for experts not coming from the modelling community as it gives access in each expert's favourite format.

Coastal Biogeochemistry

Biogeochemistry in coastal seas plays a big role at the Institute of coastal research. Scientists investigate the origin, conversion, and fate of chemical substances in the transition zone between land and sea. A large range of efficient analytical instruments and state of the art laboratory infrastructure are available for examining air, water and sediment samples as well as biota from the marine environment. All these data are available from the marine geoportal, coastMap.



A wide variety of scenarios is freely accessible via the HZG Model Analysis Tool:
https://coastmap.hzg.de/coastmap/modeldata/MODEL_ANALYSIS_TOOL/

Tools like this close the gap between modelling scientists and experts of other fields. Via an intuitive interface users can perform statistical evaluation and selectively download derived data, such as the

models. For example, atmospheric models cover Europe whereas the oceanographic ones span North Sea and Baltic Sea.

Results can be downloaded using one of a broad range of

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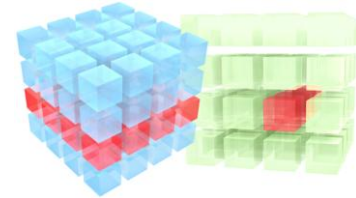


With rasdaman as the „Big Data workhorse“ HZG is in good shape to face future challenges. The Helmholtz Coastal Data Center (HCDC) currently under construction will use rasdaman, too. Heterogeneous data from coastal and maritime observatories, ship campaigns, and numerical coastal research models will be combined and made available to science and the general public. Here rasdaman plays a substantial role

because its architecture ensures not only fast and easy access on arbitrary-size datacubes, but additionally homogenizes the variety of data during ingestion into the database.

Data and information get derived from research results establishing the knowledge managing the coastal zones and maritime environment. For sustainable open access to the data generated by its coastal and oceanographic research HCDC is establishing a powerful digital infrastructure to collect, process, and distribute observation and model

data as well as research output of the Institute of Coastal Research and its partners.



Looking into the future, a maritime data center federation is on the agenda. In Bremerhaven, the Alfred Wegener Institute for Polar and Marine Research, another Helmholtz-Centre, likewise has large data archives accessible through the rasdaman datacube engine.



The coast Map Model Analysis Tool allows for fast, flexible product generation from the datacubes, including statistical evaluations, timeseries analysis, and datacube fusion.

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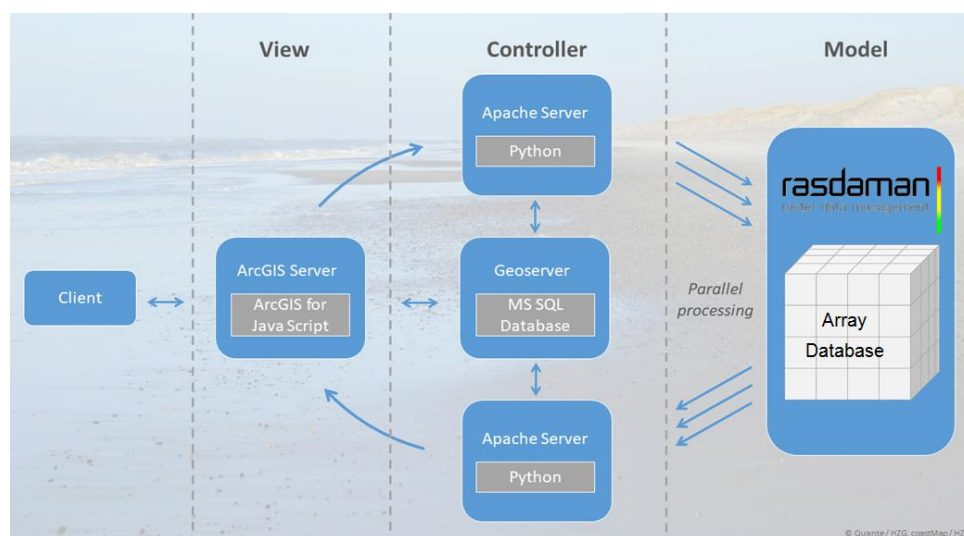
A coupling of the archives of HZG, AWI, plus CODE-DE, the German Sentinel-Hub, will generate a single integrated information space. Users may analyse and combine arbitrary data, independently from where the data actually sit.

Technology is in place: inter-continental federations exceeding 2.5 Petabytes have been deployed via rasdaman, with federation partners in Europe, Taiwan and Australia. This way, HZG, AWI, and CODE-DE will form the nucleus of the forthcoming „Big

Datacube Federation“, allowing users any query, any time on a common data pool. Through the consequent use of open standards users may individually continue using their familiar tools while working on the federation of „Big Datacubes“.

„Physical oceanography, ecosystem models, biogeochemistry models, atmospheric models and observation data, interpolated to grids: rasdaman’s portfolio is impressive.“

Ulrike Kleeberg



Homogenized data management based on datacubes builds a flexible platform enabling users of accessing data with standard tools. So rasdaman embeds itself seamlessly into HZG’s existing IT-Infrastructure.

About rasdaman

With rasdaman, the paradigm of actionable spatio-temporal datacubes has been invented, documented by patents and scientific publications. The innovative datacube query language enables „any query, any time, on any volume“, making rasdaman blueprint for the datacube standards of ISO, OGC and INSPIRE. Rasdaman is standing out through its flexibility, scalability and performance, security, and the consequent support of open datacube standards. Rasdaman is official reference implementation, its technological lead has been acknowledged by a series of high-ranking national and international innovation awards.

The technology is continuously being advanced by rasdaman GmbH and Jacobs University and defines the state of the art in datacubes in science and engineering.

More about rasdaman

Learn more about rasdaman and datacubes on www.rasdaman.com
or contact our rasdaman Team: contact@rasdaman.com

