Coastviewer: a tool to enable the visualization of marine and coastal data

Giorgio Santinelli, *Deltares, giorgio.santinelli@deltares.nl (The Netherlands)*
Fedor Baart, *Deltares, fedor.baart@deltares.nl (The Netherlands)*
**Gemma Ramaekers**, *Rijkswaterstaat, gemma.ramaekers@rws.nl (The Netherlands)*
Erik-Jan Vos, *Nelen & Schuurmans, erikjan.vos@nelen-schuurmans.nl (The Netherlands)*

Introduction

In coastal and marine environments the availability of simple, interoperable and efficient access to scientific data is of primary importance. Community managers and researchers need information at different levels of detail and with different goals. Building a single standard-based and open source toolbox that allows open data access and collection and fulfill the needs of a diverse range of people is possible and has been proven successful with the *OpenEarth* initiative. As final step of this process, a real-time web based platform for visualization that includes time varying data has been provided in order to help and encourage the dissemination of open and high-quality data.
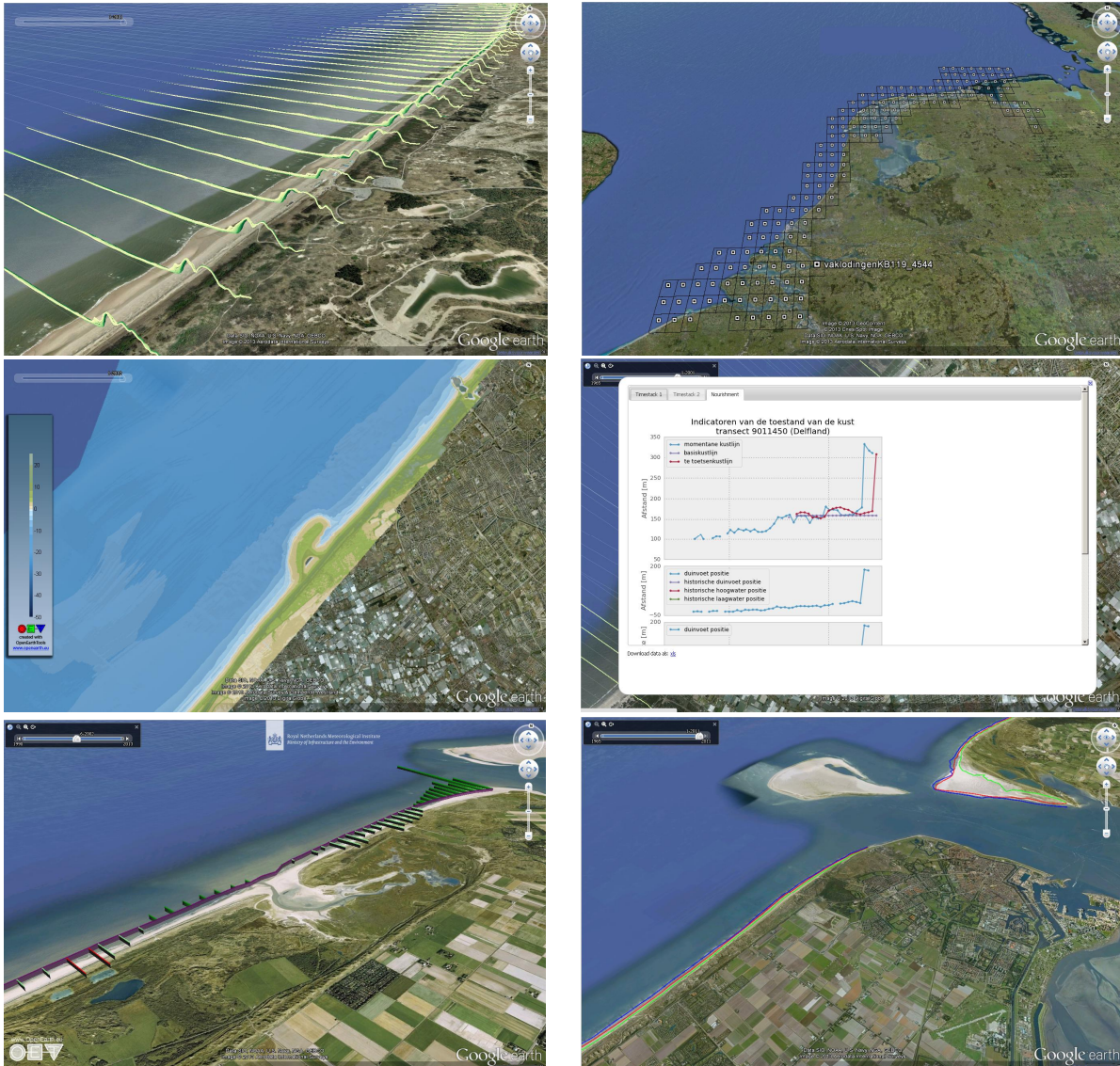
Data standards and Web Services

Dealing with scientific and geospatial data has grown from handcrafted file formats, exchanged through ftp servers for small communities to a web of open data sources that provide data in easy consumable services. International groups such as the OGC (*Open Geospatial Consortium*) and many global scientific organizations (Unidata, OpenDAP) have created the standards and software that made this transition possible. Especially 3D and time enhanced maps, curvilinear and unstructured grids are not yet properly supported by these protocols. Other challenges include real-time generated visualizations (big datasets, running models), and taking into account other extra dimensions (wave directions, spectral frequencies). The KML (*Keyhole Markup Language*) is used in the example below. Although KML language was developed for use with *Google Earth*, from 2008 it is an open standard for all geobrowsers, therefore can be used in viewers different than *Google Earth*.
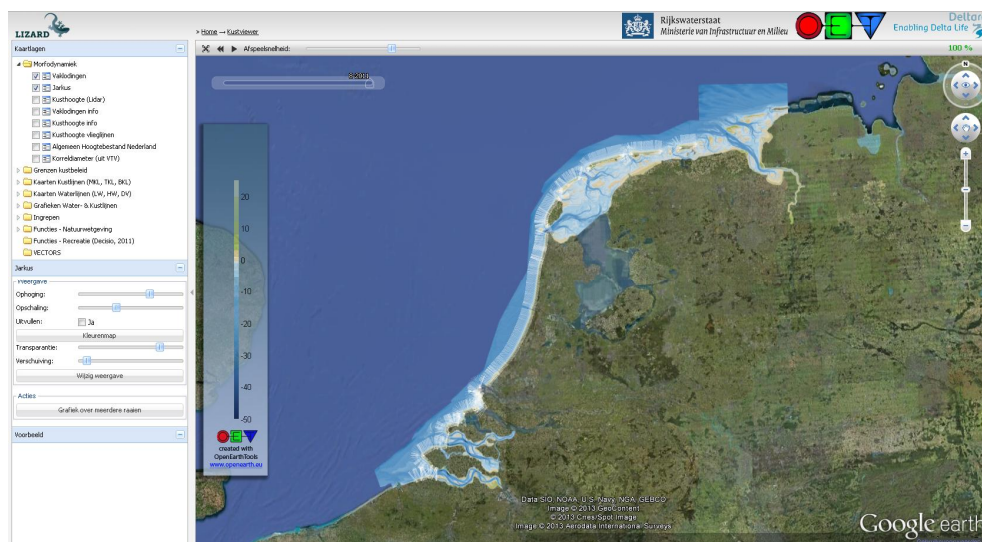
The Coastviewer

The Coastviewer leverages KML and represents a complete solution for information services, being a web based platform that enables the user to publish visualizations of measurements, coastal indicators and model results for different time intervals and different areas. The concept behind the viewer is to support the decision making of coastal managers and the building of expert advice by scientists and engineers. The source of information is standard-based data, accessible via an OPeNDAP server and queried from the viewer using a web interface. Making use of the same idea behind Real-Time Control systems, the viewer is kept up-to-date by a direct link to a database server,

which serves numerous types of datasets. The simultaneous visualization of different available data is enabled by the KML protocol which allows to present all kind of information, *e.g.* long term, large scale morphological changes due to sea level rise and large scale interventions and short term evolution of coastal indicators, safety levels and sediment distributions. Many marine and coastal datasets have already been implemented in the viewer, such as maps of grainsize distribution and geo-referenced sample properties, transect timestacks along the Dutch coast, map timestacks of multibeam eco-soundings of bathymetry and Lidar topography, water quality measurements, coastline indicators and sand nourishments carried out along the coast and offshore. Specific datasets have been augmented so the user can interact with the viewer, and modify the rendering by raising the elevation of 3D KML objects, changing the scale, choosing a colormap, setting the transparency, and save plots and download the visualized data in various formats. Screenshots of the Coastviewer are shown below.

References

Google Earth, http://earth.google.com;   KML, http://www.opengeospatial.org/standards/kml;
Coastviewer, http://test.kustviewer.lizard.net/kml/viewer/;
OGC, http://www.opengeospatial.org/standards;   OpenEarthTools, http://openearth.eu;

Acknowledgement