

Data management and sharing

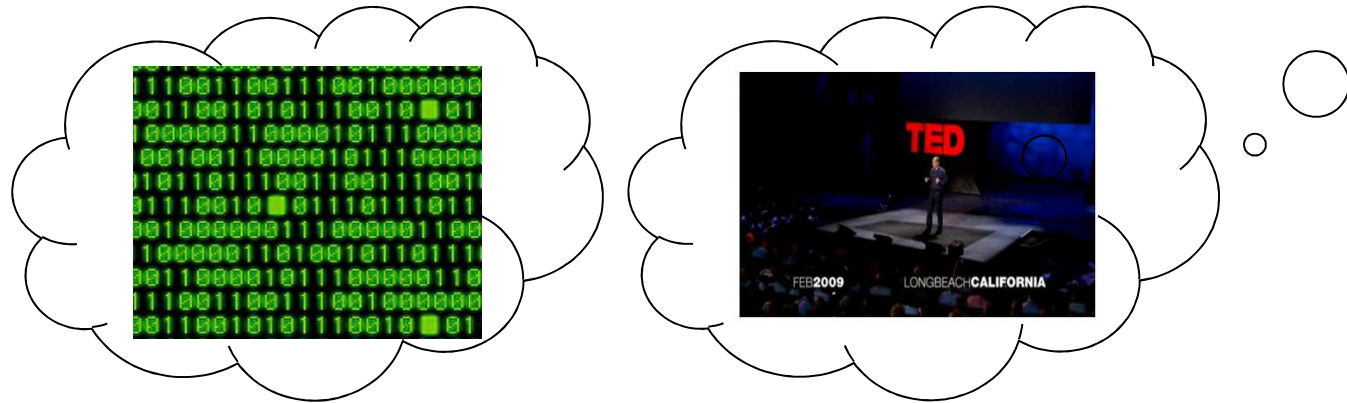
Dr. Gerben J. de Boer
Gerben.deboer@vanoord.com

- Van Oord: data scientist
- Tu Delft: visiting scientist
- MODEG: member 2010-2015

22 jun 2017
JERICO-next
summerschool

Standards: should be 100% cloud

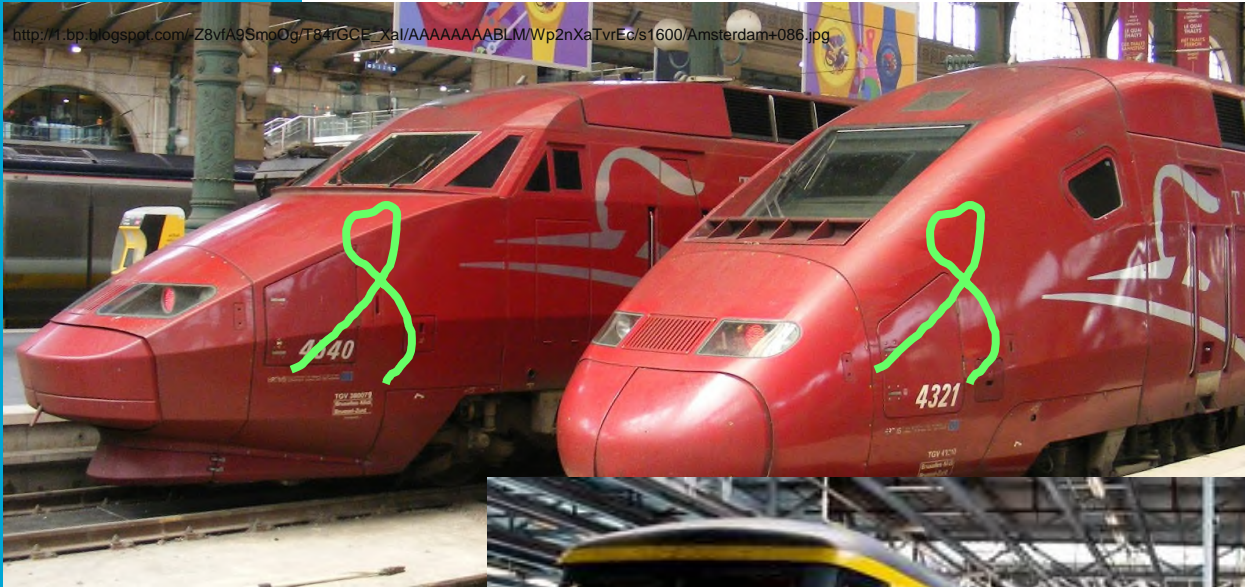
Different layers of standard inspired by WWW inventor Tim Berners-Lee: 5 ★
Open Data



Standards: *existing*

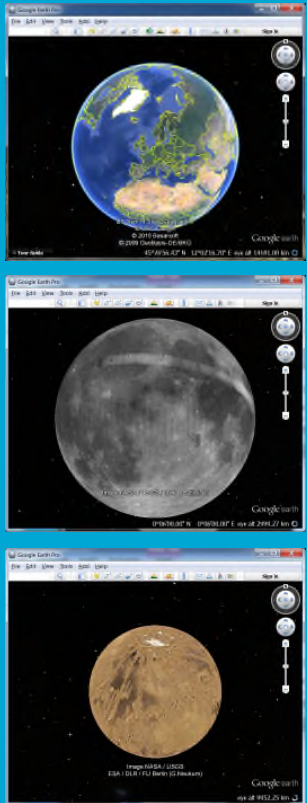


Use proven and existing technology, avoid being Guinea pig for too new standards. **netCDF:** made first in 1989. **OGC standard in 2013.**



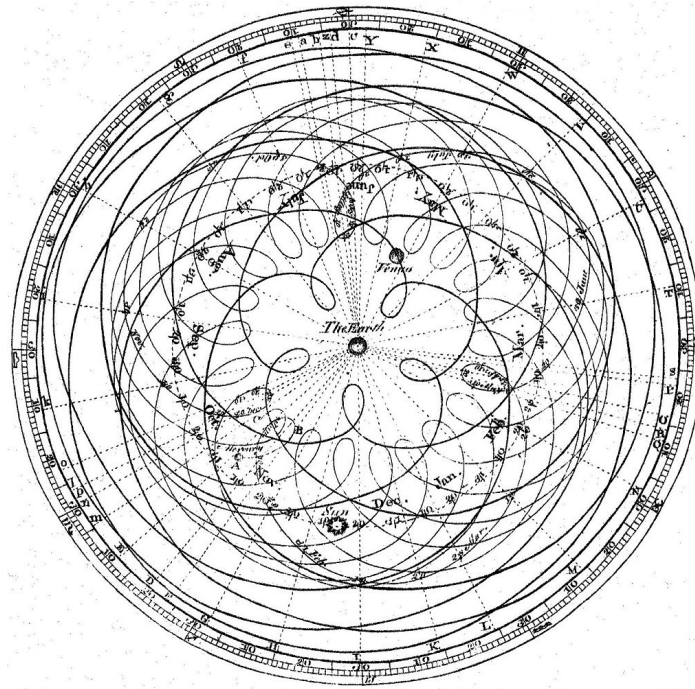
The Dutch ordered hispeed trains using the latest EU ERTMS standard. It failed and the trains were returned. The Dutch did not use older standards as back-up, even though these older standards already work. The Thalys uses a range of standards.

Google Earth can even handle multiple **planets**. Who records the planet as meta-data?

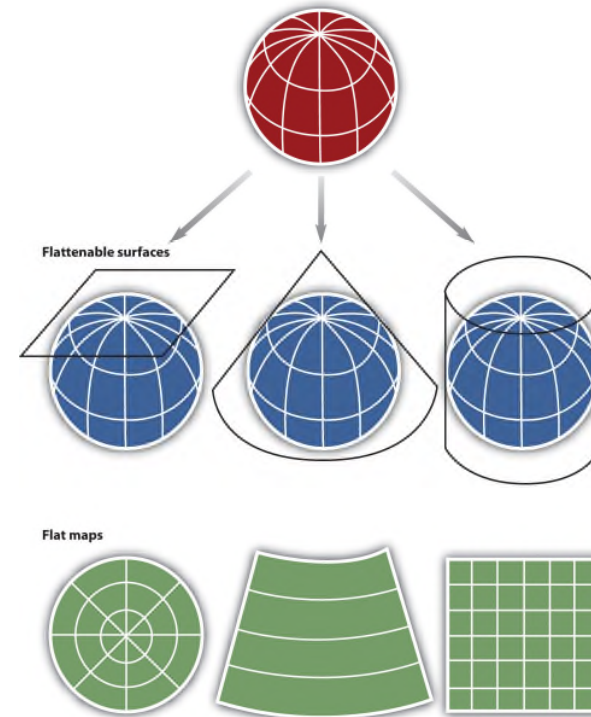


Standards: 1 earth, 1 coordinate system

Google Earth overtook all GIS sciences and standards with Google Maps and open 3D kml: use only GPS WGS84. And UTC for times.

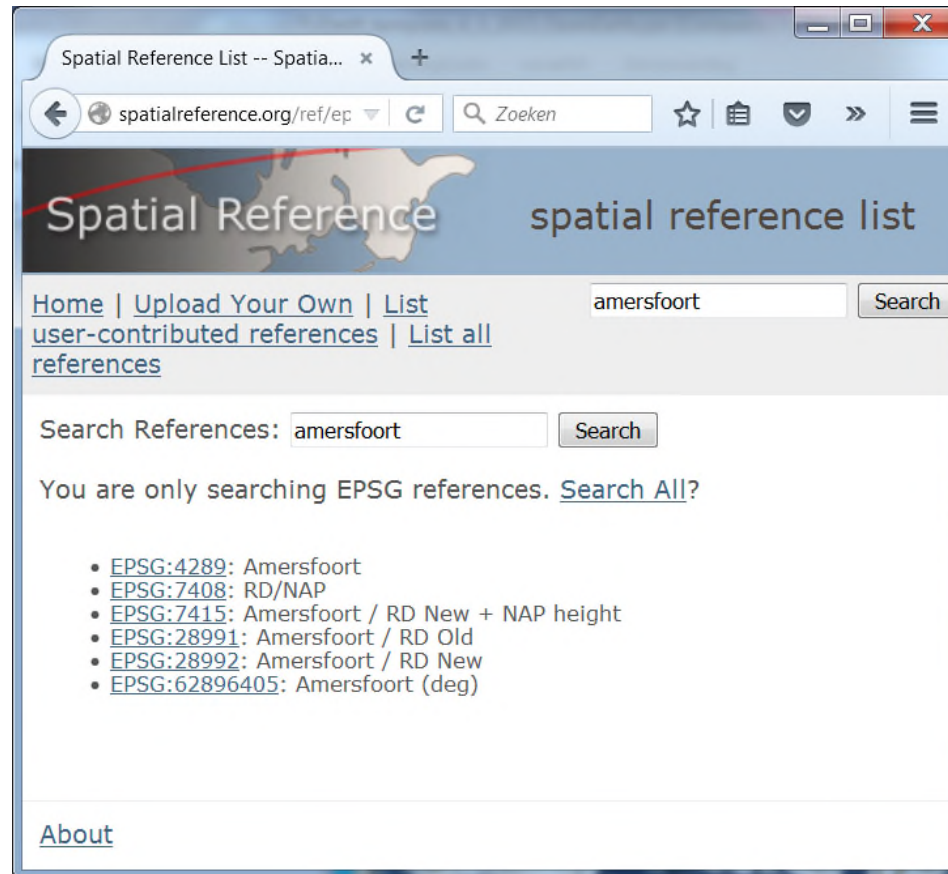


Enormous complexity of an earth-centered system became simple with a sun-centered one. Occam's razor at best.



Coordinates become easy when you ignore country-based earth systems that try to make earth flat. Use a global system for a *sphere*. 4

Standards: *flat earth standards*



If you are forced to use a flat-earth coordinates, pick one from the global EPSG list.

The EPSG code database made first by oil & gas industry.

Only later is was adopted as a standard, because it works.

Still in 2015 the Dutch government has 5 ways to map coordinates. Which one to choose ?
NONE. Use GPS + WGS84. The Earth is round

3 ~~X~~
 $3N$ ~~X~~
 $F=3$ ~~X~~
 $F = 3N$ ✓

Standards: quantities (F), units (N)

Use quantities and units from internationally agreed-upon lists.

Chemicals: CAS
 Species: WoRMS
 Quantities: P01 or CF

NERC P01

CF standard names + units

INSPIRE Registry

European Commission

British Oceanographic Data Centre (BODC)

Search...

Help us improving the Re3gistry software! Please fill our quick survey at <http://europa.eu/1Bn84Ct>

ID:
<http://inspire.ec.europa.eu/document/BODC>

This version:
<http://inspire.ec.europa.eu/document/BODC:1>

Latest version:
<http://inspire.ec.europa.eu/document/BODC>

Label:
British Oceanographic Data Centre (BODC)

Status:
Valid

External Reference Governance Body:
British Oceanographic Data Centre (BODC)

Available Languages:

CF Standard Name Table

Version 44, 23 May 2017

Refer to the [Guidelines for Construction of CF Standard Names](#) for information on how the names are constructed and interpreted, and how new names could be derived.

A note about units
The canonical units associated with each standard name are usually the SI units for the quantity. [Section 3.3 of the CF conventions](#) states: "Unless it is dimensionless, a variable with a standard_name attribute must have units which are physically equivalent (not necessarily identical) to the canonical units, possibly modified by an operation specified by either the standard_name modifier ... or by the cell_methods attribute." Furthermore, [Section 1.3 of the CF conventions](#) states: "The values of the units attributes are character strings that are recognized by UNIDATA's Uunits package [UDUNITS], (with exceptions allowed as discussed in Section 3.1, "Units")." For example, a variable with the standard name of "air_temperature" may have a units attribute of "degree_Celsius" because Celsius can be converted to Kelvin by Uunits. For the full range of supported units, refer to the [Uunits documentation](#). Refer to the [CF conventions](#) for full details of the units attribute.

Search

salinity Search Standard Names Show All Standard Names

AND OR (separate search terms with spaces)

Also search help text

Found 23 standard names matching query: salinity

View by Category

[Atmospheric Chemistry](#) [Atmosphere Dynamics](#) [Carbon Cycle](#) [Cloud](#) [Hydrology](#)
[Ocean Dynamics](#) [Radiation](#) [Sea Ice](#) [Surface](#)

Standard Name	Canonical Units	AMIP	GRIB
change over time in sea water absolute salinity	g kg-1		
change over time in sea water practical salinity	1		
change over time in sea water preformed salinity	g kg-1		

Standards: *accuracy*

Overload of metadata such as the *method* should be avoided.

Better is to have a simple quantity and capture method in as an accuracy.

This is what physics does.

The NIST Reference on Constants, Units, and Uncertainty

Fundamental Physical Constants

Planck constant

h

Value	6.626 070 040 x 10 ⁻³⁴ J s
Standard uncertainty	0.000 000 081 x 10 ⁻³⁴ J s
Relative standard uncertainty	1.2 x 10 ⁻⁸
Concise form	6.626 070 040 (81) x 10 ⁻³⁴ J s

Click [here](#) for correlation coefficient of this constant with other constants

Source: 2014 CODATA [recommended values](#) Definition of [uncertainty](#) Correlation coefficient with [any other constant](#)

[Return to List](#) or [Go to New Search](#)



Community: as large as possible

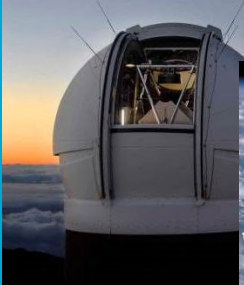
Marine/coastal scales

*6400 km:
North Atlantic
Oscillation (NAO)*

gap $10^{-6} > 10^{+6}$

*Water scarcity
Flood protection
Water pollution*

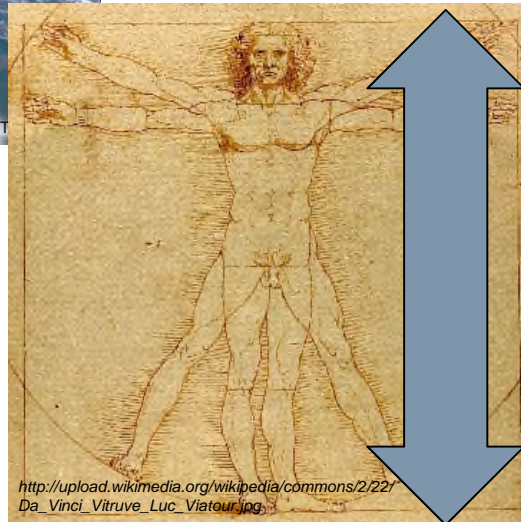
<http://nupedailynews.com/wp-content/uploads/2013/01/telescope.jpg>



SPACE

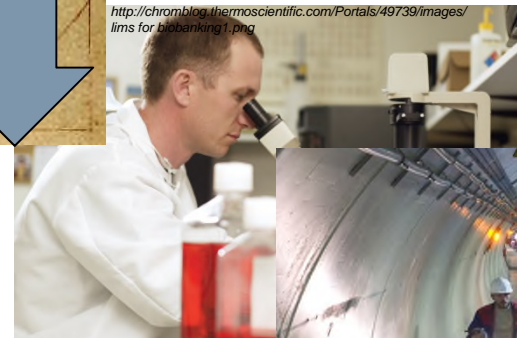


<http://oeatech.net/wp-content/uploads/2011/03/RADARSAT>



http://upload.wikimedia.org/wikipedia/commons/2/22/Da_Vinci_Vitruve_Luc_Viatour.jpg

http://chromblog.thermoscientific.com/Portals/49739/images/lims_for_biobanking1.png



CERN



*suspended
mud particle
64 μ m*



- Make **existing** data, models and tools available
 - increase efficiency of projects
 - prevent double work
 - prevent loss of previous work
 - > due to lack of archiving (no time to store)
 - > due to new bugs (no time to test)
 - make work nicer: less maintenance, more development
- **a data and source code repository**
- **a community**
a repository is useless without people using it
- **a philosophy**
a community is useless without collaboration: **cooperate!**

2 former PhD students just started OpenEarth by combining their finished work: **Mark van Koningsveld** (UT: coastal sand) & **Gerben de Boer** (TUD: marine mud)

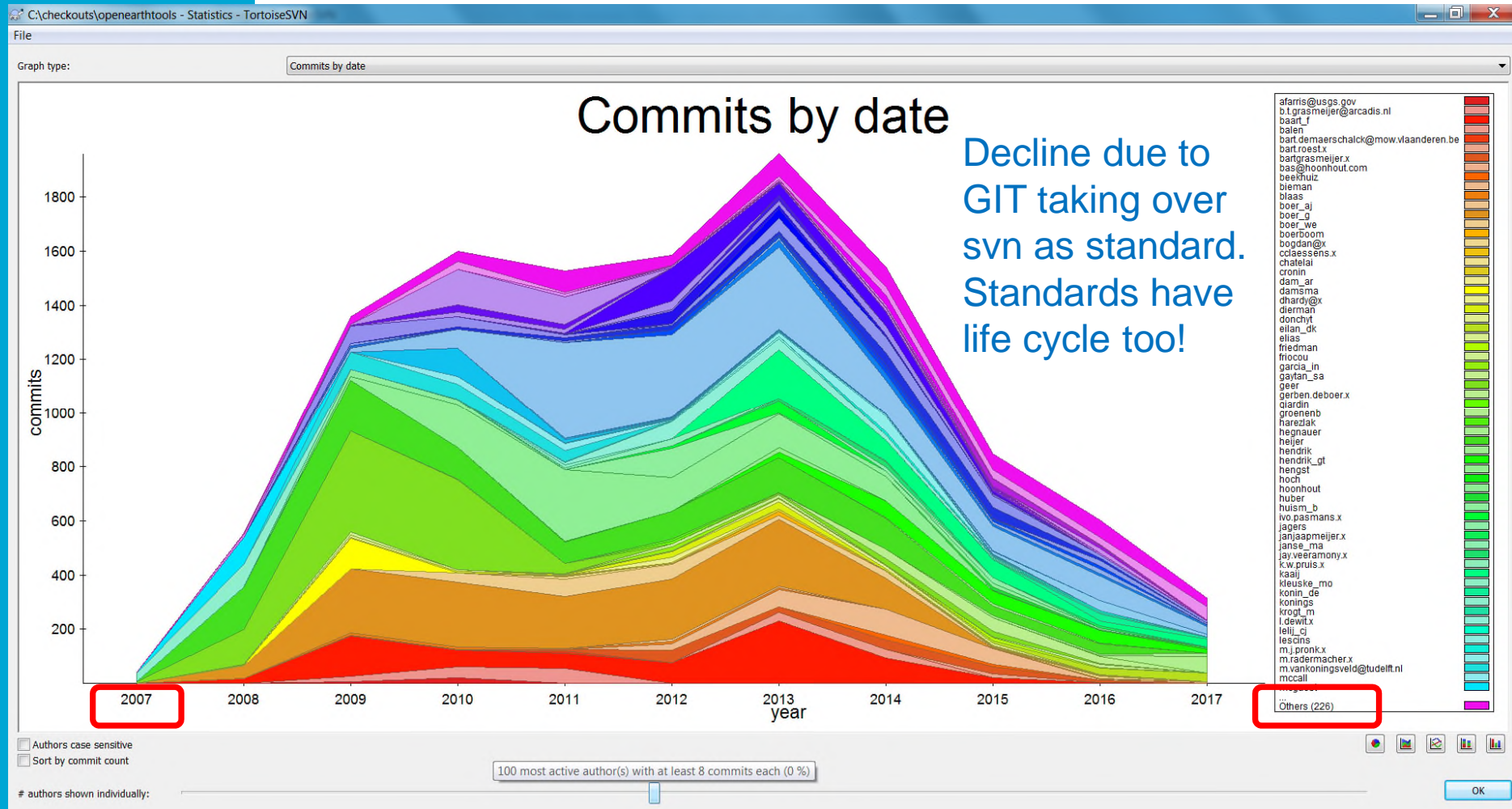
Social network has grown to **600+ users**, incl 3rd world + Fortune 500.



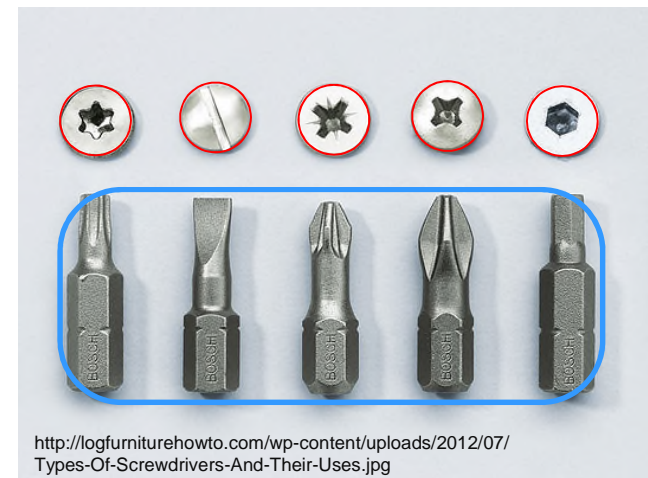
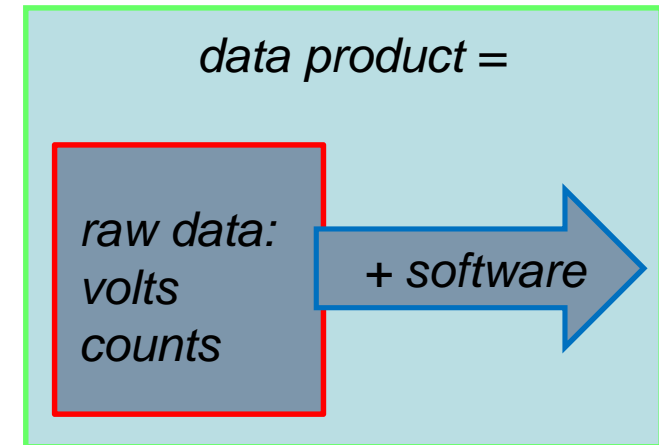
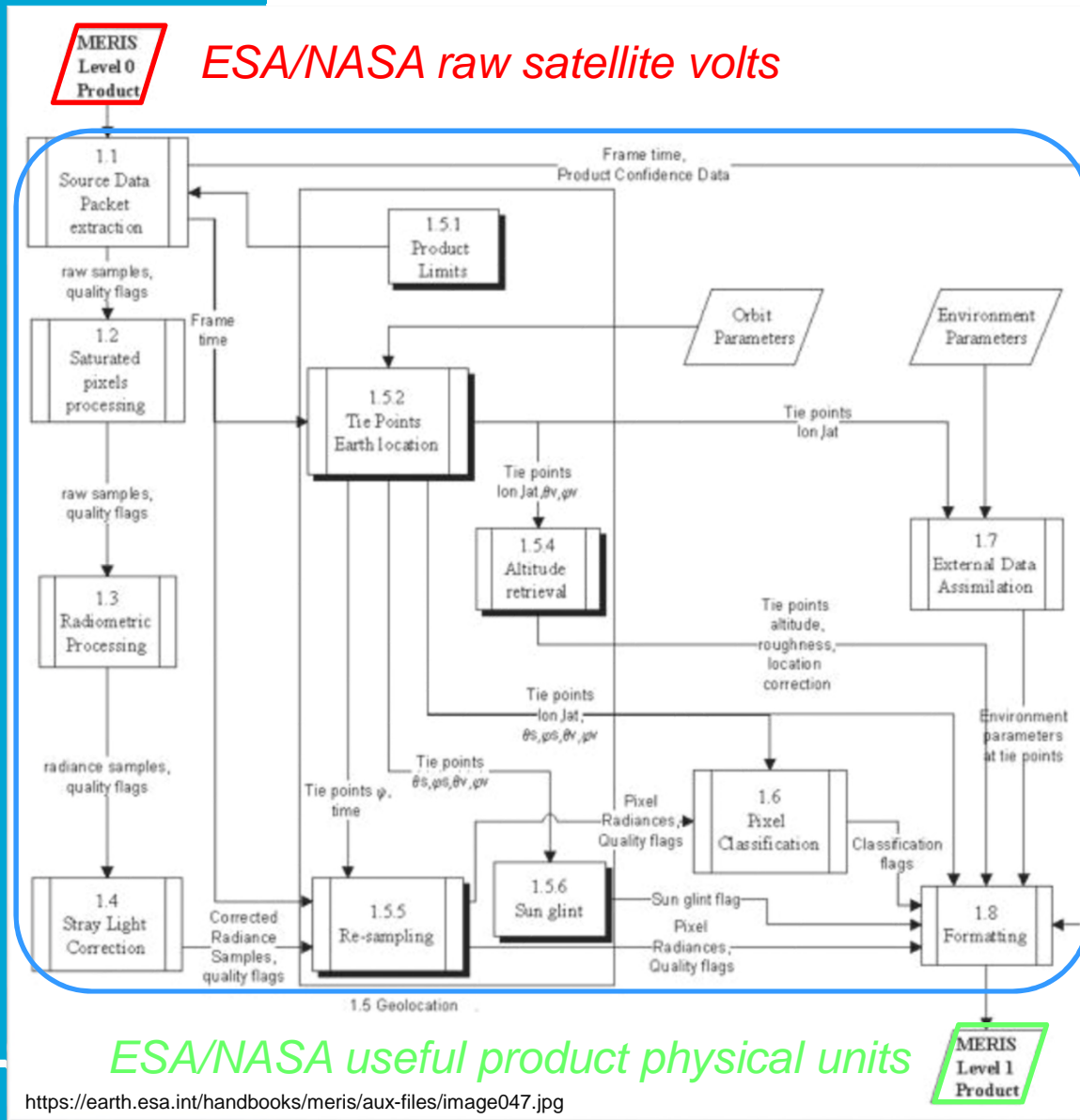
Community: social events/training

The top image shows a LinkedIn group page for 'OpenEarth' with 679 members. The middle image shows the GitHub organization page for 'OpenEarth' with pinned repositories like 'delft3d-gt-server' and 'delft3d-gt-dockerfiles'. The bottom image shows a meeting at Microsoft, Schiphol, with people sitting around a table with laptops and a whiteboard in the background.

Community: global workplace



Philosophy: data = raw data + tools



Philosophy: data = raw data + tools



*raw
data*

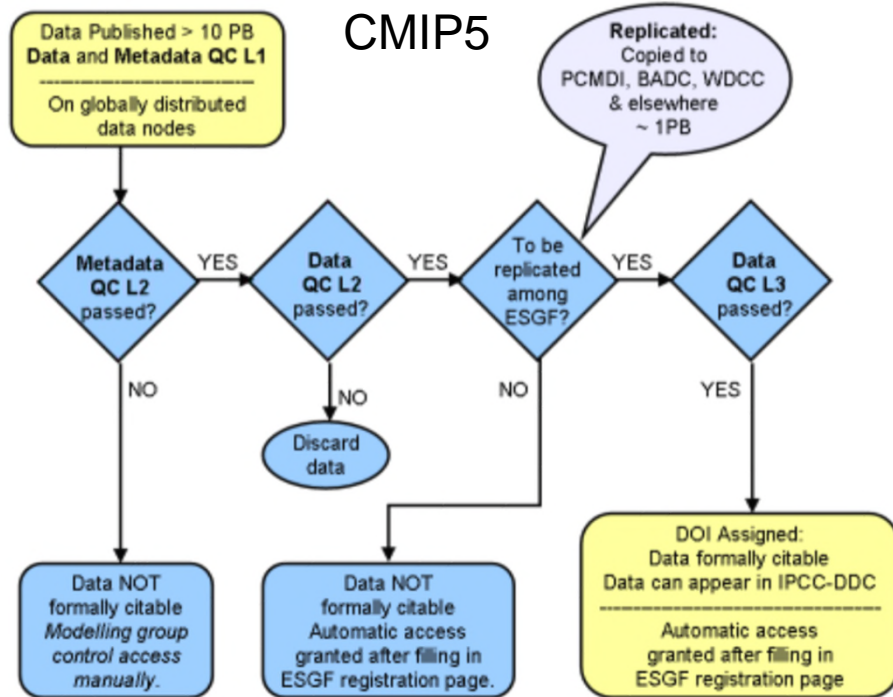
scripts



*tailored
data*

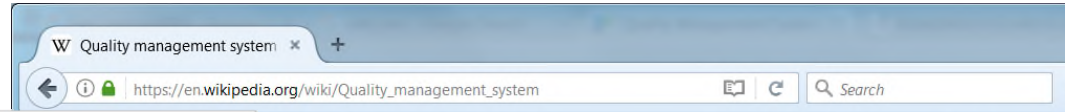


Philosophy: good process > good result



(Informal citation still requested where formal citation not available)

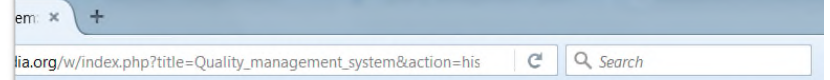
<http://cmip-pcmdi.llnl.gov/cmip5/>



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Quality management system

From Wikipedia, the free encyclopedia



Article [Talk](#) [Read](#) [Edit](#) [View history](#)

Quality management system: Revision history

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For any version listed below, click on its date to view it. For more help, see [Help:Page history](#) and [External tools: Revision history statistics](#) · [Revision history search](#) · [Edits by user](#) · [Number statistics](#) · [Fix dead links](#)

(cur) = difference from current version, (prev) = difference from preceding version,

m = minor edit, → = section edit, ← = automatic edit summary

(newest | oldest) View (newer 50 | older 50) (20 | 50 | 100 | 250 | 500)

[Compare selected revisions](#)

- (cur | prev) 20:07, 20 June 2017 [Utahabl](#) (talk | contribs) m . . (16,038 bytes) (-467) . .
- (cur | prev) 19:59, 20 June 2017 [Utahabl](#) (talk | contribs) m . . (16,505 bytes) (+26) . .
- (cur | prev) 11:41, 17 June 2017 [Ken Croucher](#) (talk | contribs) . . (16,479 bytes) (+45) . . (Tags: *Mobile edit*, *Mobile web edit*)
- (cur | prev) 16:47, 10 June 2017 [SadlySept](#) (talk | contribs) . . (16,434 bytes) (-53) . .
- (cur | prev) 16:47, 10 June 2017 [SadlySept](#) (talk | contribs) . . (16,487 bytes) (+691) . .



Philosophy: good process > good result

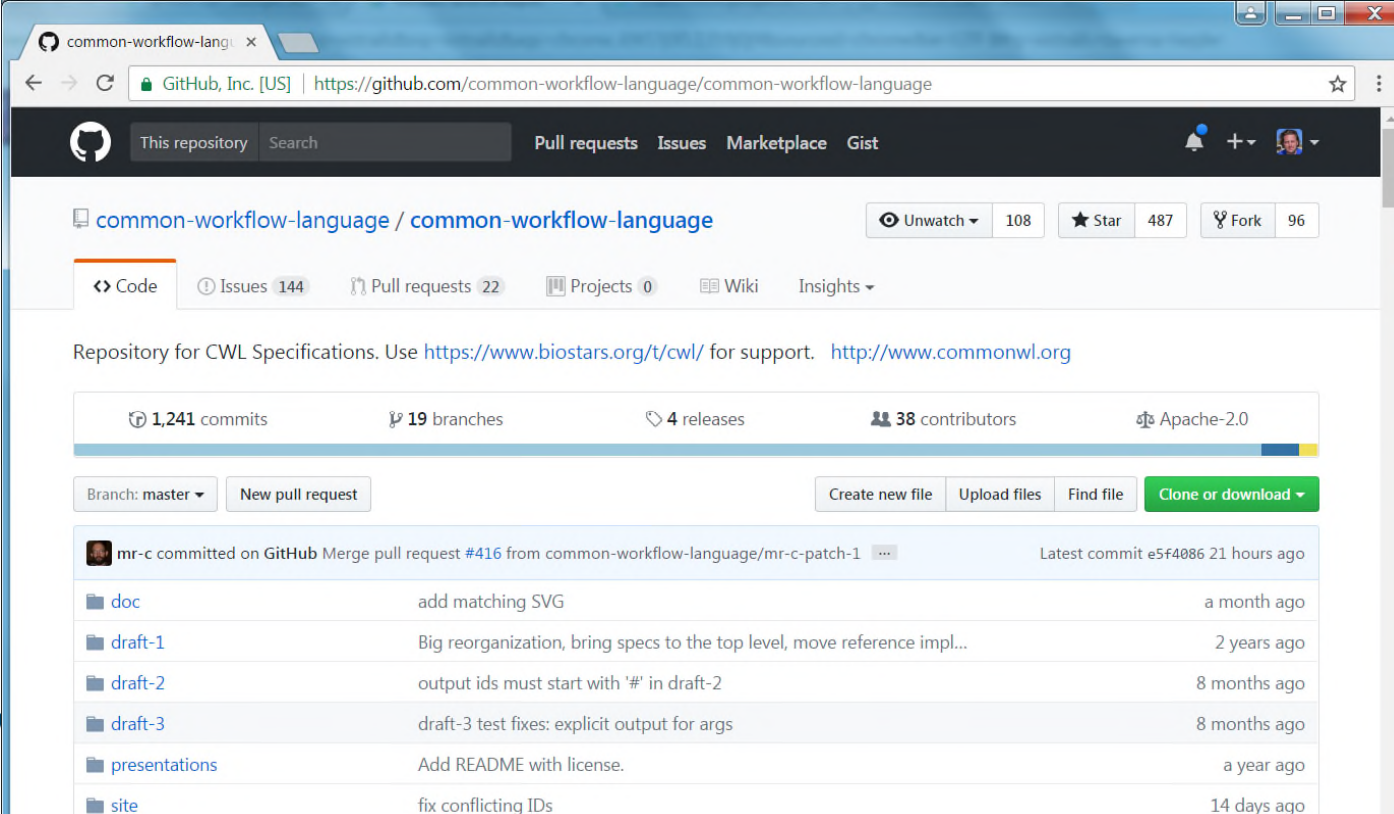


Any company needs audited ISO 9001 workflows as a license to operate. Science gets away without being audited on workflows. This needs to change.

Philosophy: tool version control

Graphical workflow tools instead of scripts

- VisTrails <https://www.vistrails.org>
- Taverna <http://www.taverna.org.uk>
- Kepler <https://kepler-project.org>
- CWL: <https://github.com/common-workflow-language>



The screenshot shows the GitHub repository page for 'common-workflow-language'. The browser address bar displays 'https://github.com/common-workflow-language/common-workflow-language'. The repository name is 'common-workflow-language / common-workflow-language'. It shows 108 Unwatch, 487 Star, and 96 Fork. The repository has 144 Issues, 22 Pull requests, 0 Projects, Wiki, and Insights. The repository description is 'Repository for CWL Specifications. Use <https://www.biostars.org/t/cwl/> for support. <http://www.commonwl.org>'. The repository statistics are: 1,241 commits, 19 branches, 4 releases, 38 contributors, and Apache-2.0 license. The current branch is 'master'. There are buttons for 'New pull request', 'Create new file', 'Upload files', 'Find file', and 'Clone or download'. The commit history shows a recent merge pull request #416 from 'common-workflow-language/mr-c-patch-1' with the latest commit 'e5f4086' 21 hours ago. The commit history table is as follows:

Commit	Description	Time
mr-c	Merge pull request #416 from common-workflow-language/mr-c-patch-1	Latest commit e5f4086 21 hours ago
doc	add matching SVG	a month ago
draft-1	Big reorganization, bring specs to the top level, move reference impl...	2 years ago
draft-2	output ids must start with '#' in draft-2	8 months ago
draft-3	draft-3 test fixes: explicit output for args	8 months ago
presentations	Add README with license.	a year ago
site	fix conflicting IDs	14 days ago

Philosophy: tool version control



Are you Peanut butter Principle Proof? (PPP)



Philosophy: tool testing

We scientist need to work on sharing our analysis tools for reproducibility, lineage etc.

Use standard unit test for your scripts.
Before you apply them to your actual raw data

- Mass conservation
- Positive definite (concentrations)
- ...

nature.com

The world's best science and medicine on your desktop

```
C:\lab>
```

```
f77 -o
```

```
data.exe
```

```
>
```

```
>
```

```
... ERROR
```

```
... why scientific programming does not  
compute
```

```
>
```

BY ZEENA MEBALI

14 OCTOBER 2010 | VOL 467 | NATURE | 775
© 2010 Macmillan Publishers Limited. All rights reserved

<http://www.nature.com/news/2010/101013/full/467775a.html>

Philosophy: ETL > ELT

Classic Business scripts: ETL

- Extract: raw data
- Transform: to standard data (SQL, netCDF)
- Load: these standard data

In Big Data, Business are moving to noSQL Databases.
This implies a swap of T and L, and skipping of standards.

- Extract: raw data
- Load: the *raw* data (*csv, json*)
- Transform: load the raw data on-the-fly to in-memory structures (Spark, Pandas DataFrame, ...)



INSPIRE downloading (3)

viewing (2)

discovery(1)

scientists

professionals

smart phone & tablet users

DAAS: Data as a Service



catalogue

- > OGC CSW
- > Google

graphics
of data

- > OGC KML
- > OGC WMS
- > OGC WFS

tailored
data

- > OGC WCS
- > OGC WFS
- > OGC SOS
- > SOAP

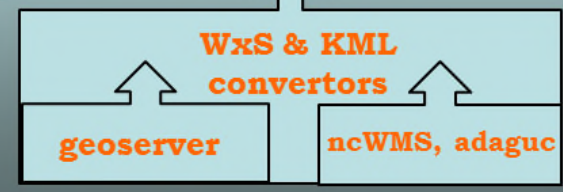
standard
data

- > OGC netCDF-CF-OPeNDAP
- > ISO SQL-PostGIS

raw
data

- > SVN
- > GIT
- > http
- > ftp

csv, json



Catalog service

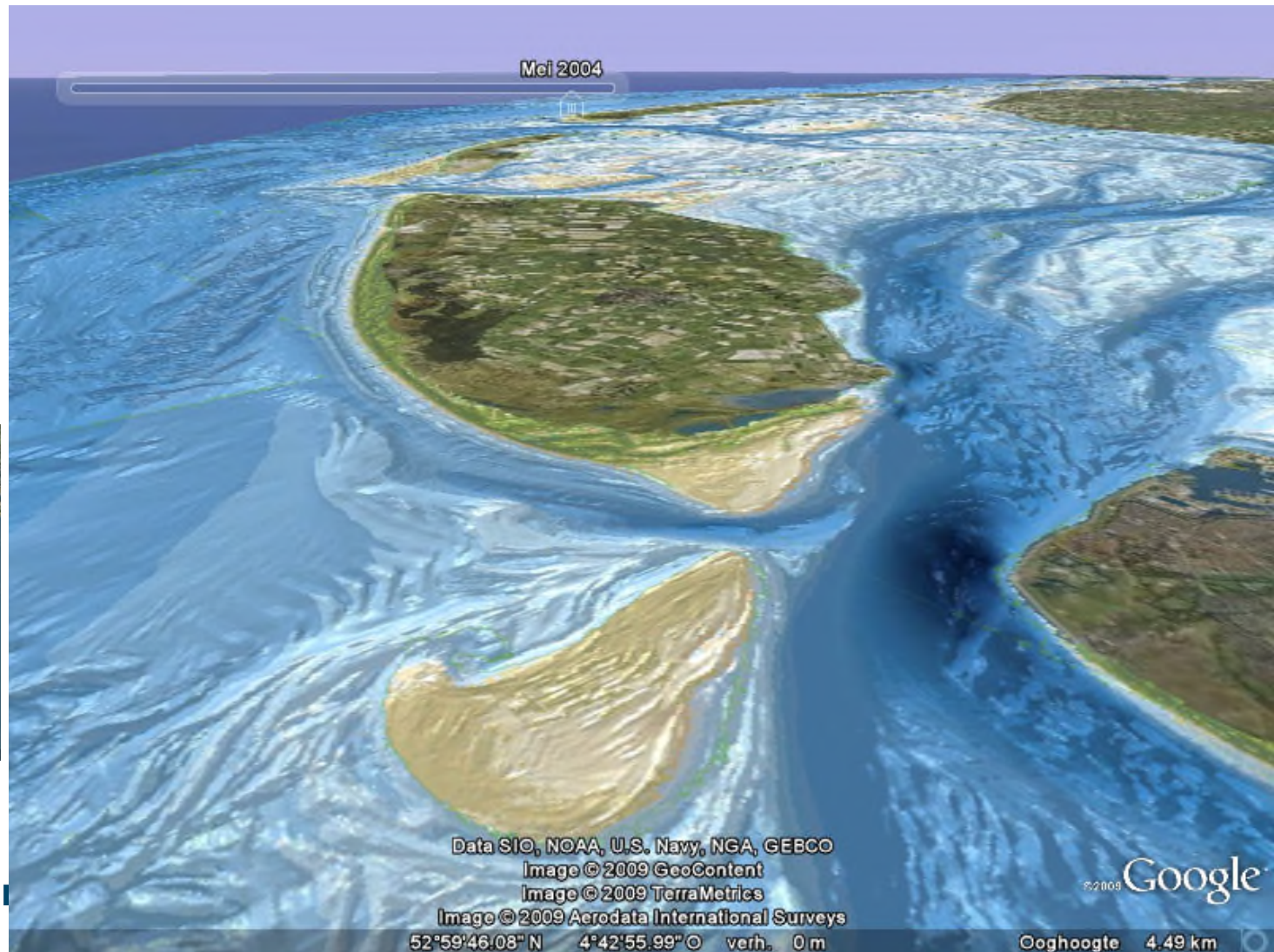
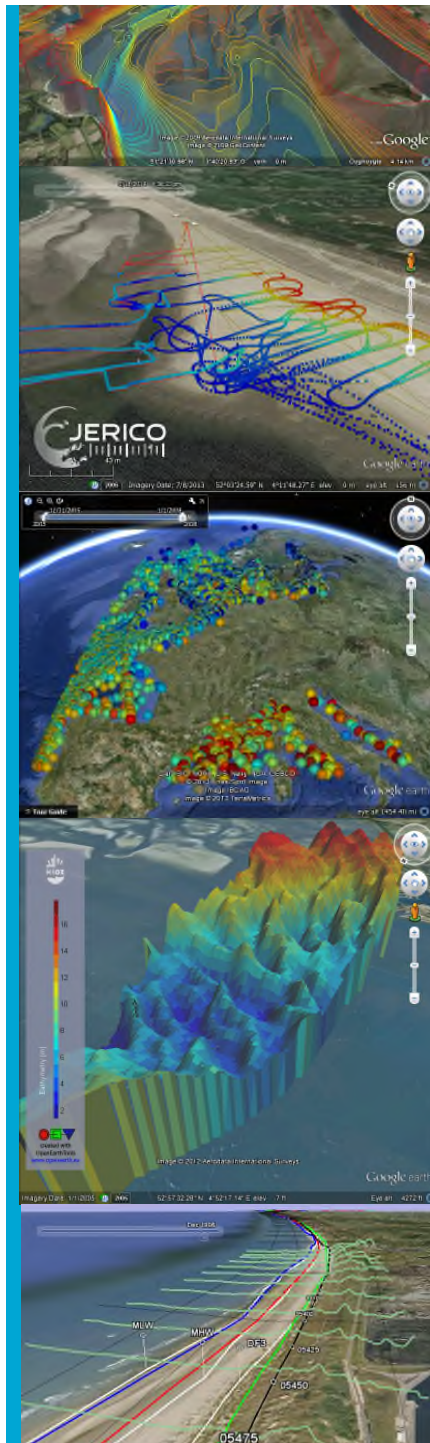
SubVersion

SAAS: Software as a Service

PAAS: Platforms as a Service

HAAS: Hardware as a Service

Powerful graphics needed to sell standards: e.g. Google Earth kml



Adopted by companies too



Van Oord has a HQ department under Engineering & Estimating dedicated to OpenEarth Data Management.

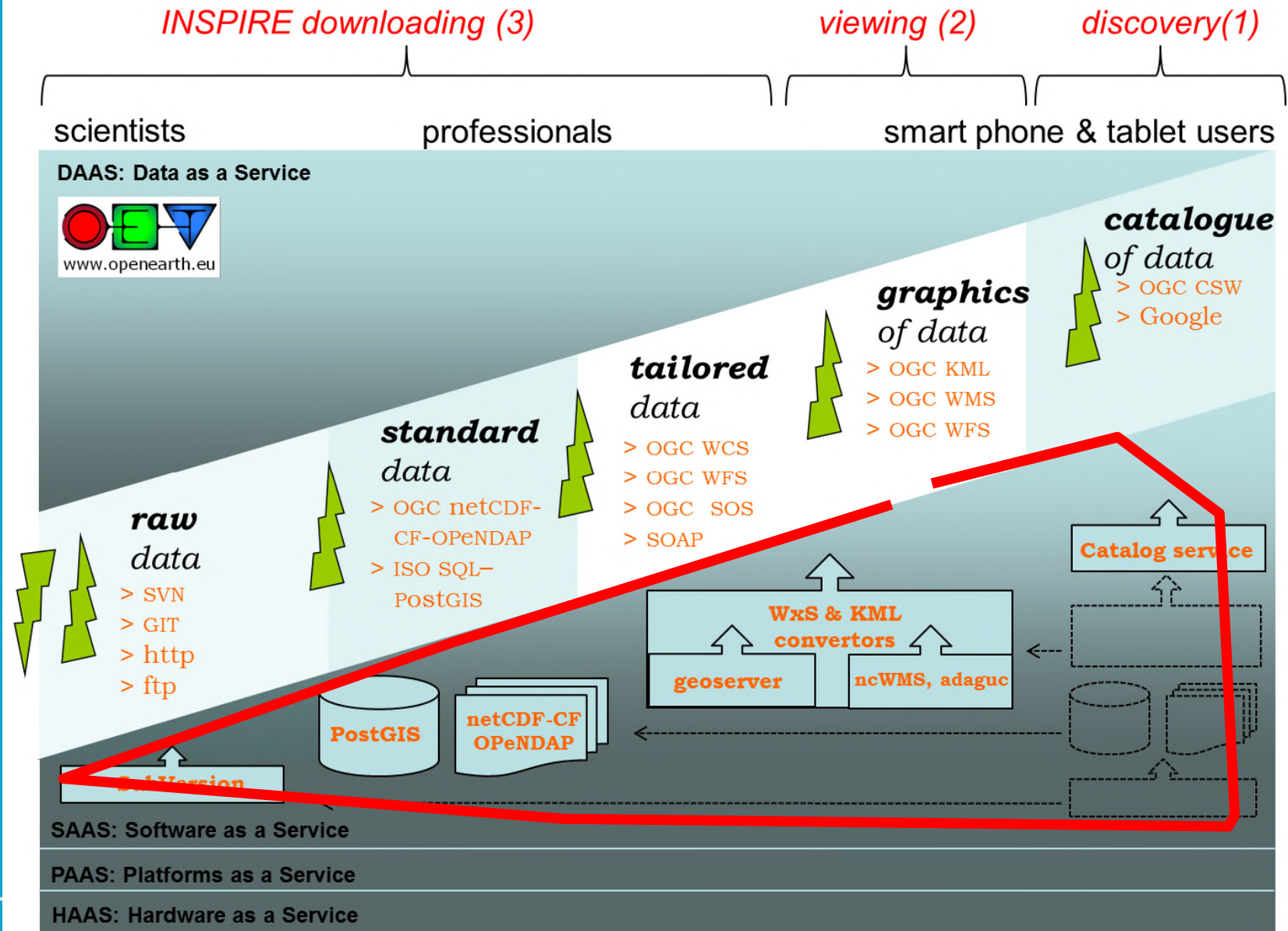
Van Oord is a marine contractor for land reclamation, dredging, oil & gas and offshore wind.

<https://www.vanoord.com>

<https://www.iadc-dredging.com/ul/cms/terraetaqua/document/3/7/3/373/373/1/article-openeartha-knowledge-management-workflow-for-dredging-projects-terra-et-aqua-131-1.pdf>



Webservices need a server stack



Server stack has components

- Geonetwork / CKAN
- Web based viewer in browser (thin client)
- Desktop Viewer (QGIS, Google Earth, ArcGIS)

catalogue
of data

Vector data:

- CartoDB
- Geoserver

Grid data:

- THREDDS ncWMS
- ADAGUC WMS

graphics
of data

tailored
data

- PostGIS (Oracle Spatial)
- PostgreSQL (Oracle)

- CF conventions
- netCDF-CDF filer

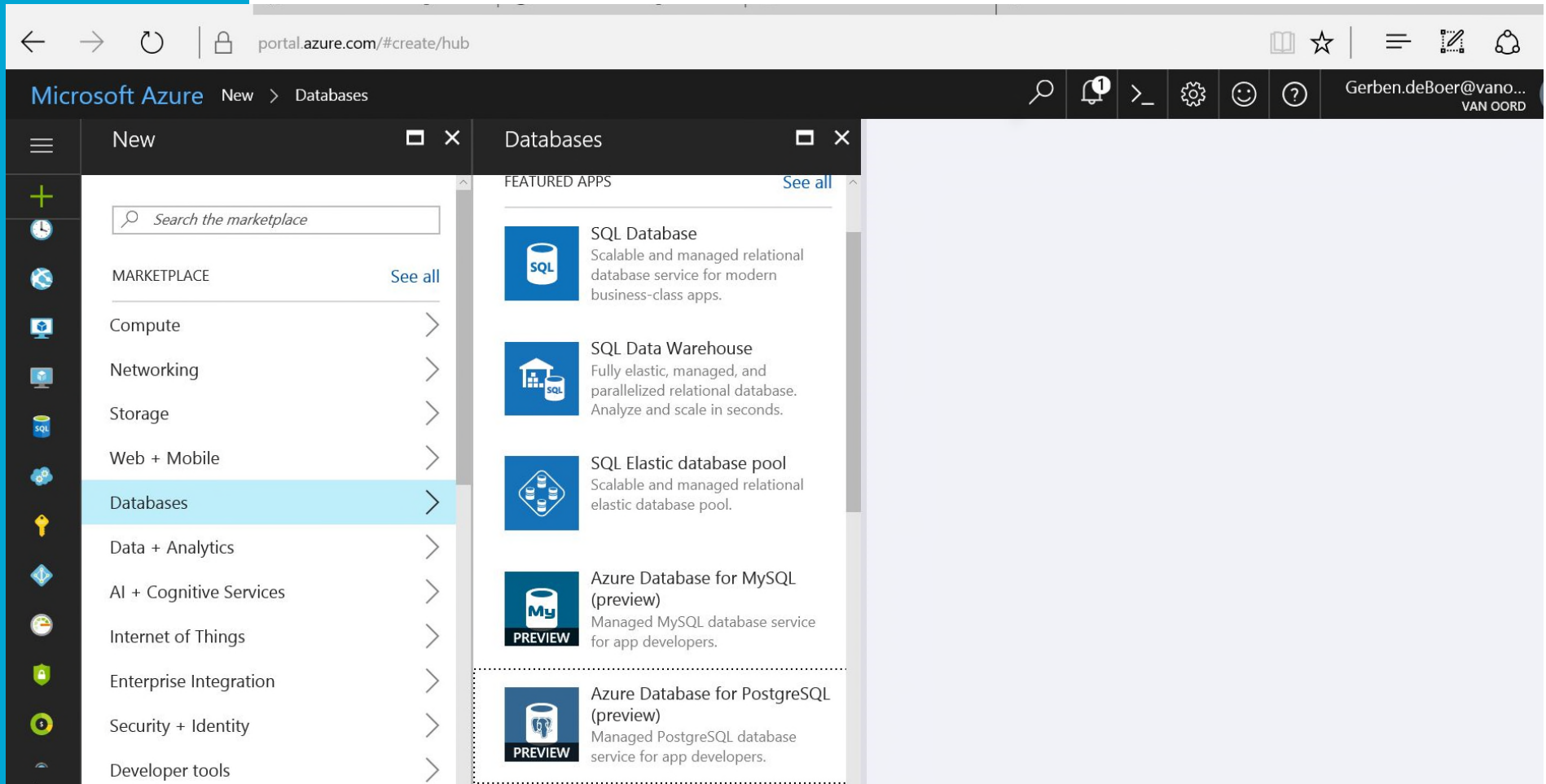
standard
data

- SubVersion
- GIT



raw
data

Server stack can be hosted in cloud




Server stack can be hosted in cloud

OpenEarth Stack

GitHub, Inc. [US] | <https://github.com/openearth-stack>

This organization Search Pull requests Issues Marketplace Gist

 **OpenEarth Stack**
Templates and provision scripts that are used to create docker images.
✉ info@openearth.nl

Repositories People 15 Teams 1 Projects 1 Settings

Search repositories... Type: All Language: All Customize pinned repository

adaguc-server
Forked from KNMI/adaguc-server
ADAGUC is a geographical information system to visualize netCDF files via the web. The software consists of a server side C++ application and a client side JavaScript application. The software provides several features to access and visualize data over the web, it uses OGC standards for data dissemination.

C++ 5 Updated 14 days ago

Top languages
● Shell ● C++

People

Beyond webservices: Datalakes

Other systems
(GEOSS, ODP,
EMODnet, ..)

Google Earth Engine Explorer interface. The search bar contains 'ahn'. The search results under 'PLACES' are:

- Ahnatal, Duitsland
- Ahnnsen, Duitsland
- Ahnnsbeck, Duitsland
- Ahneby, Duitsland
- Ahnebergen, Duitsland

Buttons for 'Data Catalog' and 'Workspace' are visible. The map shows a satellite view of a coastal area.

AWS Public Data Sets website header. The navigation bar includes: Menu, Amazon Web Services logo, Products, Solutions, Pricing, Software, Support, Customers, Partners, More, English, My Account, and a 'Create an AWS Account' button.

DATA SET CATEGORIES

- Astronomy >
- Biology >
- Chemistry >
- Climate >
- Economics >
- Encyclopedic >
- Geographic >
- Mathematics >

RELATED LINKS

- Amazon Machine Images (AMIs)
- Articles & Tutorials
- Customer Apps
- Developer Tools
- Documentation
- Release Notes

AWS Public Data Sets

Public Data Sets on AWS provides a centralized repository of public data sets that can be seamlessly integrated into AWS cloud-based applications. AWS is hosting the public data sets at no charge for the community, and like all AWS services, users pay only for the compute and storage they use for their own applications. Learn more about [Public Data Sets on AWS](#) and visit the [Public Data Sets forum](#).

CCAFS-Climate Data

High resolution climate data to help assess the impacts of climate change primarily on agriculture. These open access datasets of climate projections will help researchers make climate change impact assessments.

Last Modified: February 9, 2016

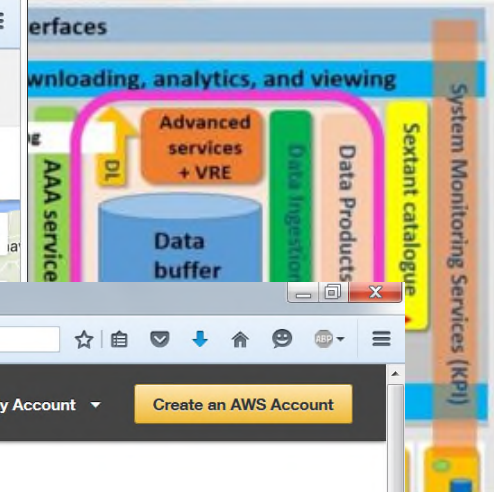
NASA NEX

Three NASA NEX datasets are now available, including climate projections and satellite images of Earth.

Last Modified: February 9, 2016

Daily Global Weather Measurements, 1929-2009 (NCDC, GSOD)

A collection of daily weather measurements (temperature, wind speed, humidity, pressure, &c.) from 9000+ weather stations around the



Beyond webservices: Notebooks

The image displays two overlapping browser windows. The background window shows a Nature article titled "Interactive notebooks: Sharing the code". The article text includes: "The free IPython notebook makes data analysis easier to record, u reproduce." and "Helen Shen" dated "05 November 2014". Below the text are buttons for "PDF" and "Rights & Permissions". The foreground window shows the "Microsoft Azure Notebooks Preview" interface with a URL of "https://notebooks.azure.com". It features navigation links for "Libraries", "FAQ", and "What's New". At the bottom right, a laptop screen displays a Lorenz attractor plot with axes ranging from -30 to 30. The plot is titled "lorenz example" and shows a complex, chaotic trajectory. The laptop's taskbar includes the Windows logo and the search bar "Ask me anything".

EXAMPLE

Mei 2004

- Rijkswaterstaat Vaklodingen
- < 20 m depth contour, 20 m resolution
- 1927-2013 with update ~8 years
- AHN2 & Dienst hydrografie use INSPIRE open
- Time dimensie too difficult for classic arcGIS

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Image © 2009 GeoContent

Image © 2009 TerraMetrics

Image © 2009 Aerodata International Surveys

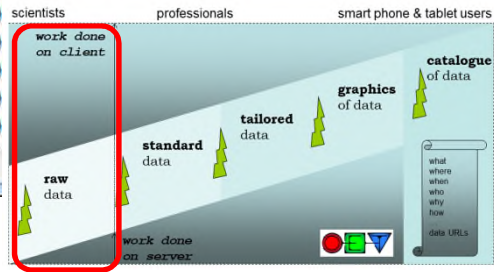
52°59'46.08" N 4°42'55.99" O verh. 0 m

© 2009 Google

Ooghoogte 4.49 km

```
ncols 1000
nrows 625
xllcorner -20000.00
yllcorner 387500.00
cellsize 20.00
nodata_value -9999.000
-.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04
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-.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04
-.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04
-.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04
-.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04 -.999900E+04
```

~ 10.000 files tiles x time



OPeNDAP Dataset Access Form

*~200 files
files = f(time)*

Tested on Netscape 4.61 and Internet Explorer 5.00.

Action:

Data URL:

Global Attributes:

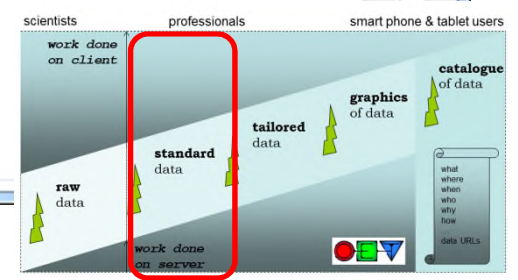
```
Metadata Conventions: CF-1.5
title: vaklodingen
summary: bathymetry and topography measurements along the Dutch coast
keywords: bathymetry, coast
keywords_vocabulary: http://www.eionet.europa.eu/gemet
standard_name_vocabulary: http://cf-pcmdi.llnl.gov/documents/cf-standard-names/
history: Created on 2012-09-11 16:11:41 by Kees den Heijer on computer
DELTAIRES\D00553 with script $Id: ncgen vaklodingen.m 5343 2012-09-11 14:11:01Z
```

Variables:

x: Array of 32 bit Integers [x = 0..499]

x:

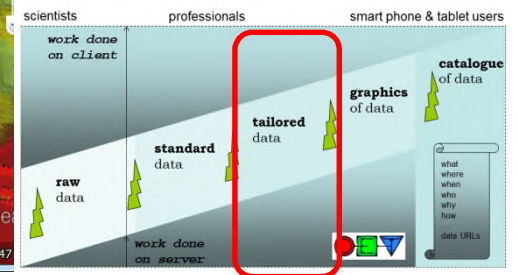
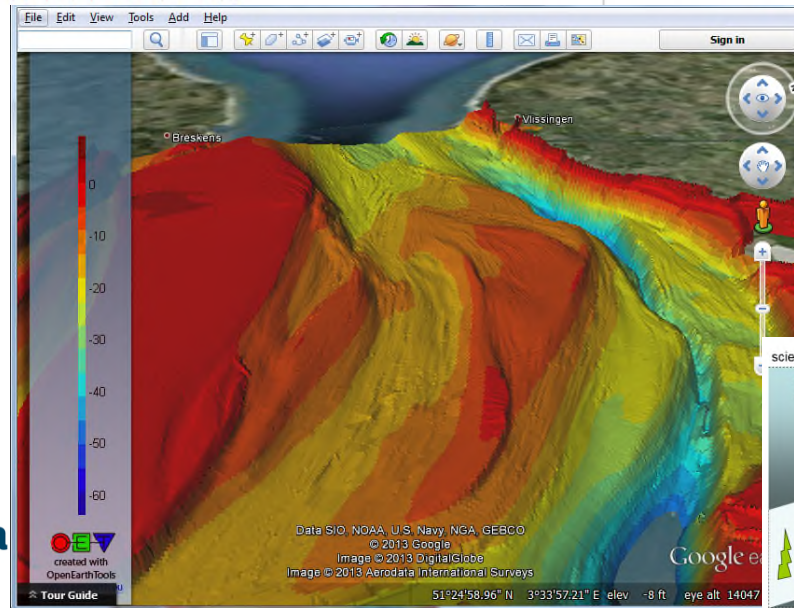
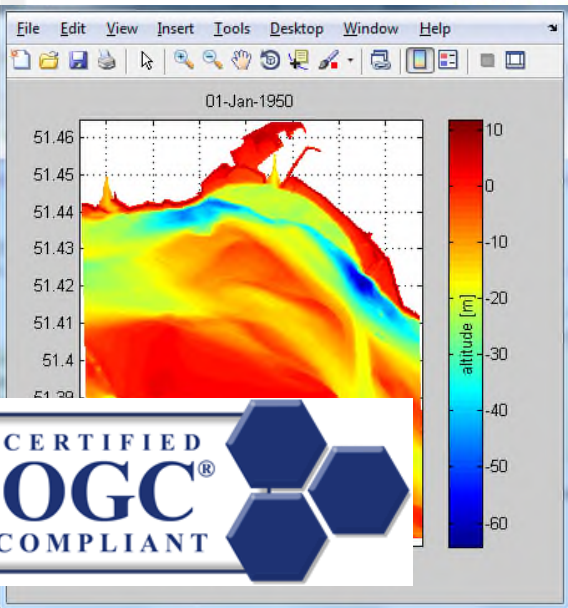
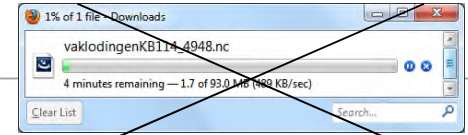
```
standard_name: projection_x_coordinate
long_name: x-coordinate
units: m
projection:
  mapping: crs
  spatial_range: 290010.0, 299990.0
  resolution: 20.0
```



HOW SCIENTISTS USE DATA

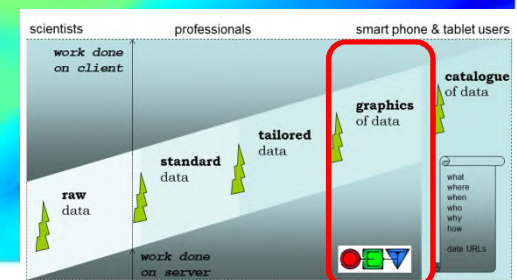
```

1  % outsettings
2  %% load web-data
3  url = 'D:/download/vaklodingenKB114_4948.nc'; % offline cache
4  url = 'http://opendap.deltares.nl/thredds/dodsC/opendap/rijkswaterstaat/vaklodingen/vaklodingenKB114_4948.nc'; % online
5  D.x      = ncread(url, 'x');
6  D.y      = ncread(url, 'y');
7  [D.x,D.y] = meshgrid(D.x,D.y);
8  [D.lon,D.lat] = convertCoordinates(D.x,D.y, 'CS1.code',28992, 'CS2.code',4326); % RD to WGS84
9  D.time    = nc_of_time(url); % 38 times
10 D.z      = ncread(url, 'z', [1 1 length(D.time)], [Inf Inf 1]); % get last z
11 D.label   = [nc_attget(url, 'z', 'long_name'), ' ', nc_attget(url, 'z', 'units'), '']
12 %% plot data
13 pcolorcorcen(D.lon,D.lat,D.z);
14 title(datestr(D.time(1)))
15 colorbarwithvtext(D.label)
16 axislat; grid on; tickmap('ll', 'fmt', '%g')
17 %% plot in Google Earth
18 KMLsurf(D.lat,D.lon,D.z, 'fileName', [vaklodingenKB114_4948, '_', datestr(D.time(end)), '.kmz'], ...
19      'zScaleFun', @(z) (z+50).*5);
  
```



WMS + TIJD + NASA COLORSCALE EXTENSION

```
http://opendap.deltares.nl/thredds/wms/opendap/  
rijkswaterstaat/vaklodingen/vaklodingenKB121_21  
20.nc?  
service=WMS  
&version=1.3.0  
&request=GetMap  
&bbox=4.5672207,52.9343465,4.7177535,53.0474114  
&layers=z  
&format=image/png  
&crs=EPSG%3A4326  
&width=800  
&height=600&  
styles=boxfill/ferret  
&TIME=2012-01-01  
&COLORSCALERANGE=-50,50
```

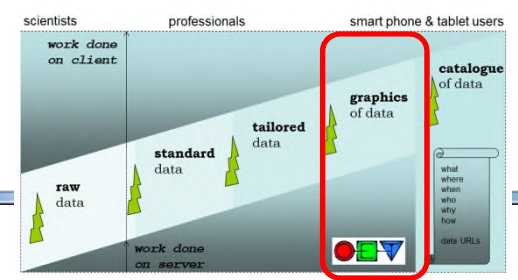


Index of /kml/rijkswaterstaat/vaklodingen/2012-01-01

- [Parent Directory](#)
- [2012-01-01_0.kml](#)
- [2012-01-01_0.png](#)
- [2012-01-01_01.kml](#)
- [2012-01-01_01.png](#)
- [2012-01-01_012.kml](#)
- [2012-01-01_012.png](#)
- [2012-01-01_0120.kml](#)
- [2012-01-01_0120.png](#)
- [2012-01-01_01202.kml](#)
- [2012-01-01_01202.png](#)
- [2012-01-01_012022.kml](#)
- [2012-01-01_012022.png](#)
- [2012-01-01_0120221.kml](#)
- [2012-01-01_0120221.png](#)
- [2012-01-01_01202210.kml](#)
- [2012-01-01_01202210.png](#)
- [2012-01-01_012022102.kml](#)
- [2012-01-01_012022102.png](#)
- [2012-01-01_0120221022.kml](#)
- [2012-01-01_0120221022.png](#)



klodingen/2012-01-01/2012-01-01_0120221022.kml



KUSTVIEWER.LIZARD.NET

1 virtual file

Firefox

Kustviewer - Lizard

test.kustviewer.lizard.net/kml/viewer/

VAKLODINGEN

LIZARD

» Home → Kustviewer

Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

Enabling Del...

Kaartlagen

- Morfodynamiek
 - Vaklodingen
 - Jarkus
 - Kusthoogte (Lidar)
 - Vaklodingen info
 - Kusthoogte info
 - Kusthoogte vlieglijnen
 - Algemeen Hoogtebestand Nederland
 - Korreldiameter (uit VTV)
- Grenzen kustbeleid
- Kaarten Kustlijnen (MKL, TKL, BKL)
- Kaarten Waterlijnen (LW, HW, DV)
- Grafieken Water- & Kustlijnen
- Ingrepen
- Functies
- VECTORS

Jarkus

Voorbeeld

Afspeelsnelheid: 1/2012

1926 4/1989 1/2012 2012

10
0
-10
-20
-30
-40

Data SIO, NOAA, U.S. Na
Image © 2013 Te

CERTIFIED OGC COMPLIANT

Marine ingenuity

scientists	professionals	smart phone & tablet users
work done on client		catalogue of data
	standard data	graphics of data
raw data	tailored data	what where when who why how data URLs
work done on server		

Firefox

https://publicwiki.deltares.nl/display/OET/Dataset+documentation+Vaklodingen

Dashboard > OpenEarth > ... > Dataset documentation
> Dataset documentation Vaklodingen

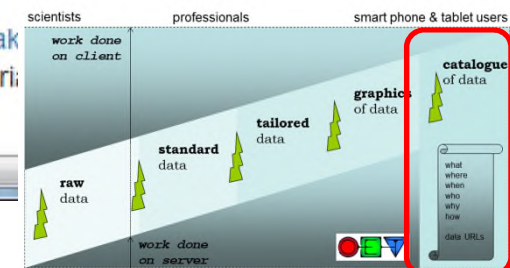
Browse ▾ Log In Sign Up Search

Dataset documentation Vaklodingen

Added by [Gerben de Boer](#), last edited by [Kees den Heijer](#) on 08-11-2012 ([view change](#))

Vaklodingen bathymetry data in OpenEarth:

1. Raw data + scripts (ascii + Matlab)
 - Raw ascii data + Matlab tools for conversion to netCDF
<https://svn.oss.deltares.nl/repos/openearthrawdata/trunk/rijkswaterstaat/vaklodingen/> (register at oss.deltares.nl)
2. Standardized data (netCDF on OPeNDAP). The netCDF files can be viewed and analyzed interactively with UCIT.
 - 2012 release: production: <http://opendap.deltares.nl/thredds/dodsC/opendap/rijkswaterstaat/vaklodingen/catalog.html>, produce the new `nc_gen` in Matlab OpenEarthTools. This new release now has 80% (37/46 items) conformity with ISO meta-data standards with `ncISO` (we'll aim for more in release 2013 next year)
 - 2011 release: production: (processed with with the generic `nc_multibeam` netCDF files toolbox with `Rijkswaterstaat` vak tile configuration in Matlab OpenEarthTools). This old release has been deleted but can be regenerated any time with the old version of the processing chain as kept in SubVersion.
 - 2010 release: production: (generated with abandoned dedicated processing line in Python). This old release has been deleted but can be regenerated any time with the old version of the processing chain as kept in SubVersion.
3. Visualized data (kml) (only 2012 release)
 - Vaklodingen overview (with links to OPeNDAP): <http://kml.deltares.nl/kml/rijkswaterstaat/vaklodingen/>
 - All Vaklodingen data as tiled pngs, the same technology that Google Earth uses for all aerial imagery: <http://kml.deltares.nl/kml/rijkswaterstaat/vaklodingen.kml>



Firefox

https://...ingen.m openearthrawda... https://...0101.asc Catalog http://o... OPeNDAP Datas... Index of /kml/rij... vaklodingen ... x +

https://www.google.nl/search?q=VAKLODINGEN&ie=utf-8&oe=utf-8&aq=t&rls=org.mc VAKLODINGEN

+Jij Zoeken Afbeeldingen Maps Play YouTube Nieuws Gmail Drive Agenda Meer -

Google VAKLODINGEN

Web Afbeeldingen Maps Shopping Meer Zoekhulpmiddelen

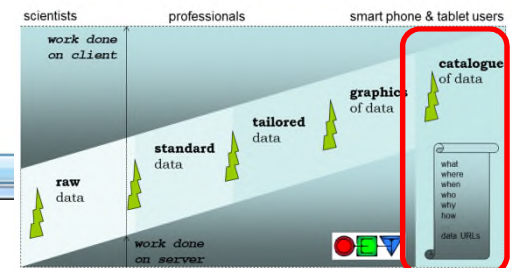
Ongeveer 8.610 resultaten (0,22 seconden)

Vaklodingen - Public Wiki - Deltares
publicwiki.deltares.nl > [OpenEarth](#) > [Data](#) > [Dataset documentation](#)
 11 aug. 2012 – **Vaklodingen** bathymetry data in OpenEarth: Raw data + scripts (ascii + Matlab). Raw ascii data + Matlab tools for conversion to netCDF ...

OpenDAP at Deltares THREDDS Data Server - OpenDAP - Deltares
opendap.deltares.nl/.../vaklodingen/catalog.html - [Vertaal deze pagina](#)
 Dataset, Size, Last Modified. Folder **vaklodingen**, -. vaklodingenKB140_1716.nc, 5.010 Mbytes, 2012-09-11 13:49:19Z. vaklodingenKB139_2120.nc, 5.010 ...

[PDF] **Opnametechnieken vaklodingen - Knowmax Link Manager ...**
linkmanager.bodemrichtlijn.nl/Connect/oulour
 Bestandsformaat: PDF/Adobe Acrobat - [Snelle weergave](#)
 27 mei 2005 – Ministerie van Verkeer en Waterstaat opq. Opnametechnieken **vaklodingen**. Vergelijking tussen verschillende inwintechieken. 27 mei 2005 ...

[PDF] **Controle en bewerking Jaarlijkse Kustmetingen en Vaklodingen ...**
www.modelit.nl/modelit/documentatieRWS/Maria/.../MariaFO.pdf
 Bestandsformaat: PDF/Adobe Acrobat - [Snelle weergave](#)



Recap

- There is a huge range of standards for 3 users types
 - Scientists > Professionals > Everyone, incl. general public
- Standard bodies are: ISO, OGC, INSPIRE, thematic groups
- Use existing de facto standards that are in general use already
- Avoid paper standard that have no reference implementation (QGIS)
- WGS84 for coordinates, avoid local systems (EPSG if you have to)
- Use UTC time coding + timezone
- Use standard lists for quantities and units: WoRMS, CAS, P01, CF
- Data = share data products and visuals
 - Raw data share also raw data
 - Scripts share your script via svn + git
- This makes guarantees lineage, traceability etc
 - be Peanut butter Principle Proof
 - NASA and ESA products work this way
 - Test your script before you apply them to raw data
- The cloud has entered science
 - Use central Data collections at Google, Amazon, Microsoft, EU
 - Use iPython notebooks to work with them
- SHARE YOUR WORK, or your work become irrelevant.

