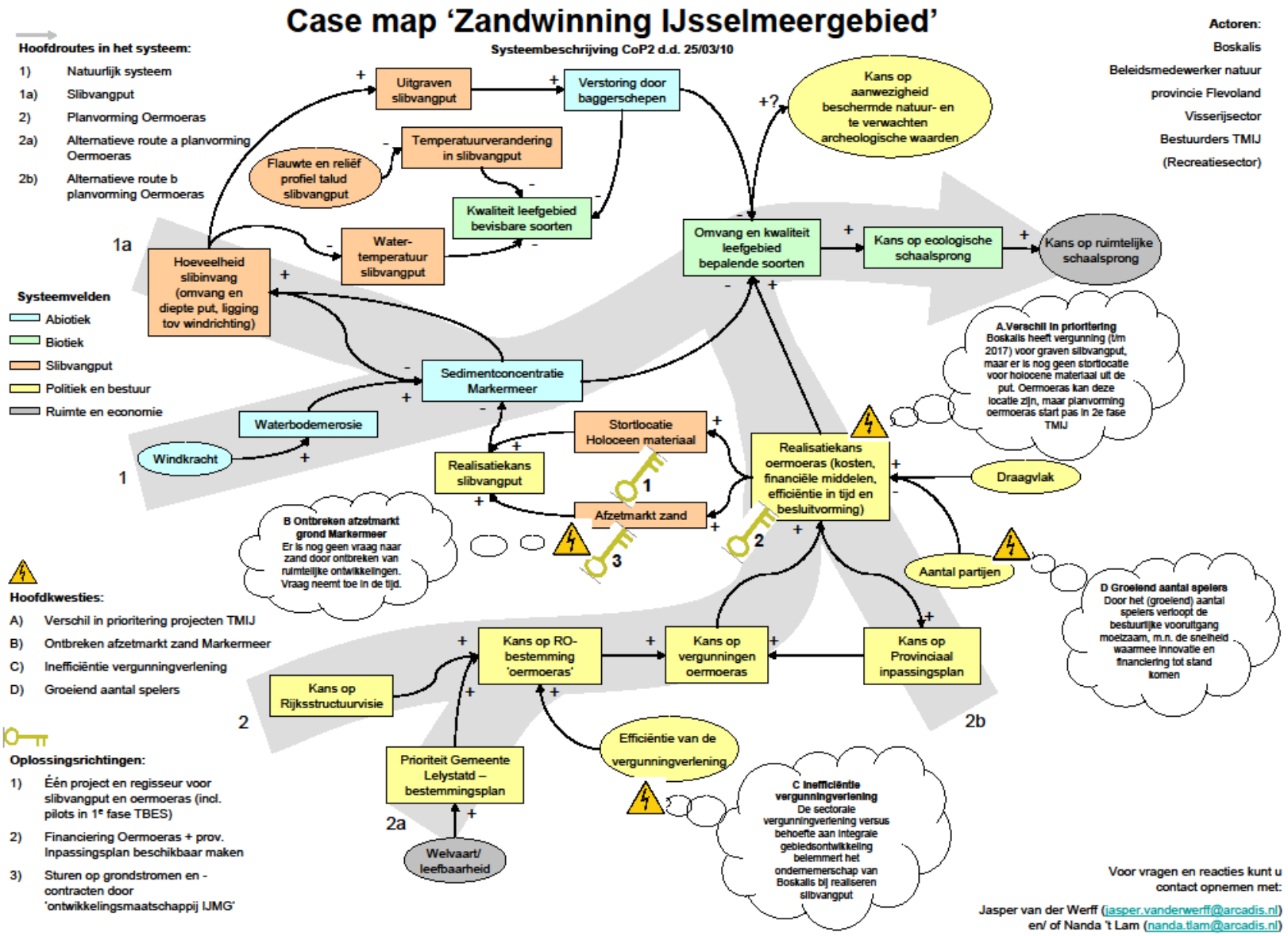
OpenEarth and EDD-Tools

Anneke Hibma

EDD-Tools development

- Eco mind maps / causal loop diagrams / **system design**
- **Map Table**
- BwN in system engineering
- Valuation of nature/ecology
- **Valuation of nature in SCBA**
- Dealing with uncertainties in SCBA
- BwN in Project Cost estimates Infrastructure (PRI-methodology)



System design from Community of Practice

Map Table

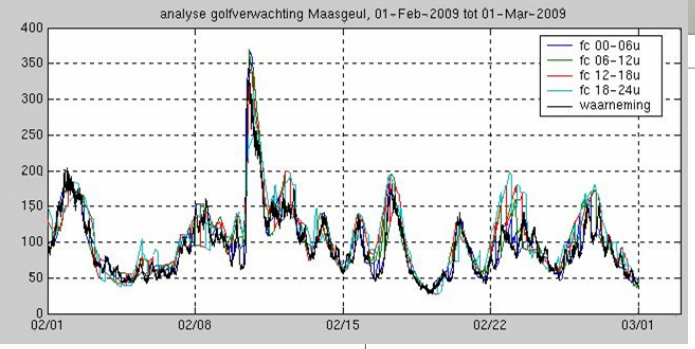
- A digital design table that is used as an instrument in spatial planning processes.
- Its purpose is to give insight in the impact of spatial measures, by combining knowledge of participants, spatial databases and models that can predict impacts.
- Map Table makes it possible to design in an interactive way.

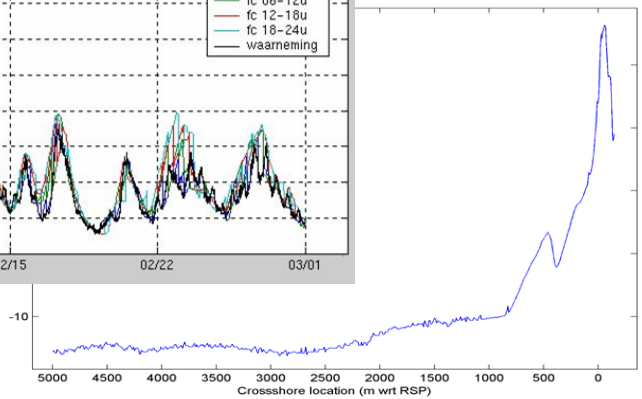
Valuation of nature in SCBA

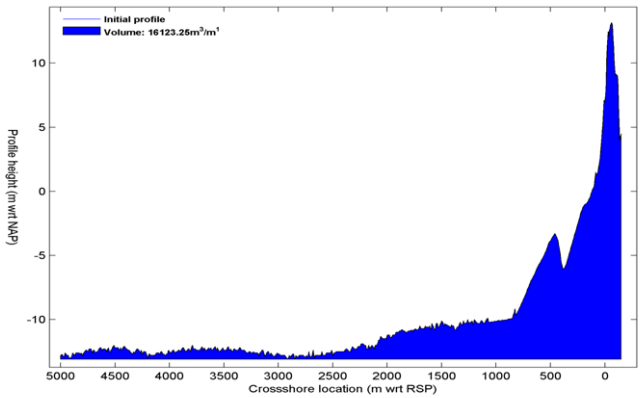
- Socioeconomic cost benefit analysis (SCBA) tool values the change in non-economic value due to BwN-projects as SCBA does not only include regular (financial) costs and benefits but also public goods like nature benefits and recreation aspects.
- This tool facilitates decision makers in how to value the BwN concepts to be able to compare the BwN advantages to the additional costs that might be involved.
- A SCBA gives a strong argument to start a project when the benefits for society exceed the costs.
- BwN aims to obtain price tags for nature services as bequest value and recreational perception.

OpenEarth – Inter-company management of: data, models, tools & knowledge

Mark van Koningsveld (Van Oord/TUD)
Gerben de Boer (Deltares/TUD)



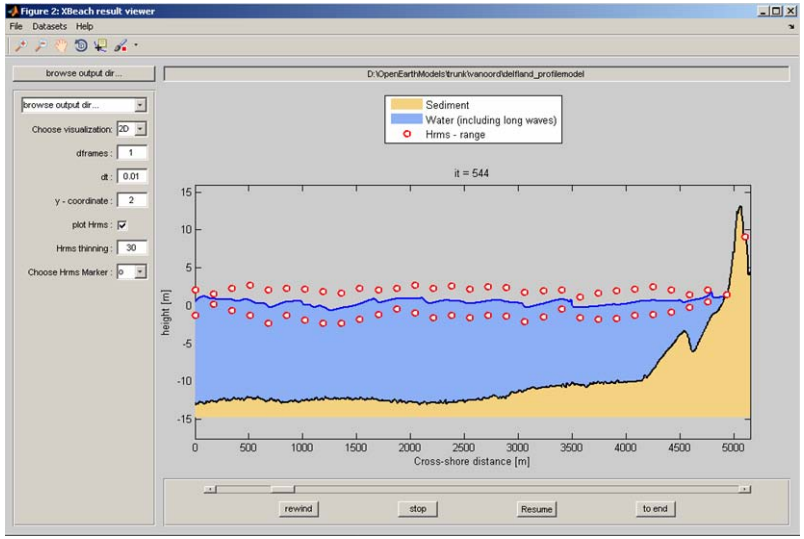




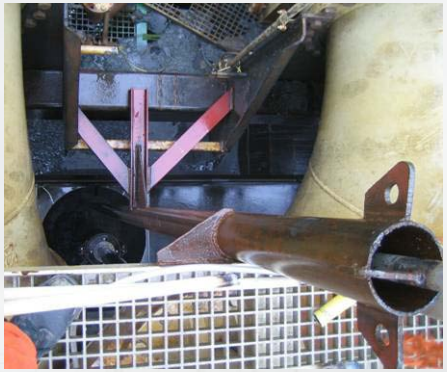
Volume calculation

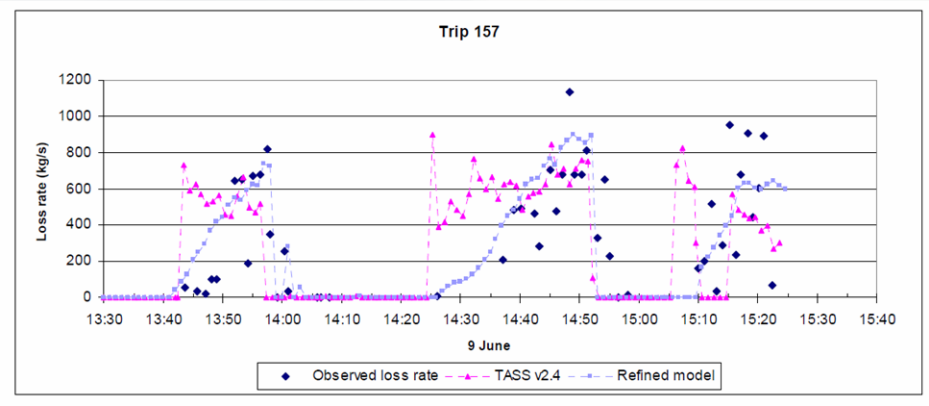
Data ⟷ **Tools**

Models



XBeach



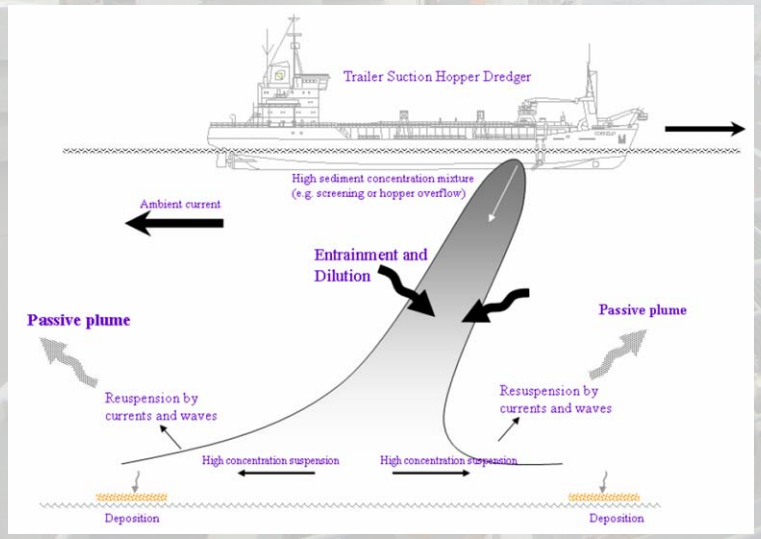


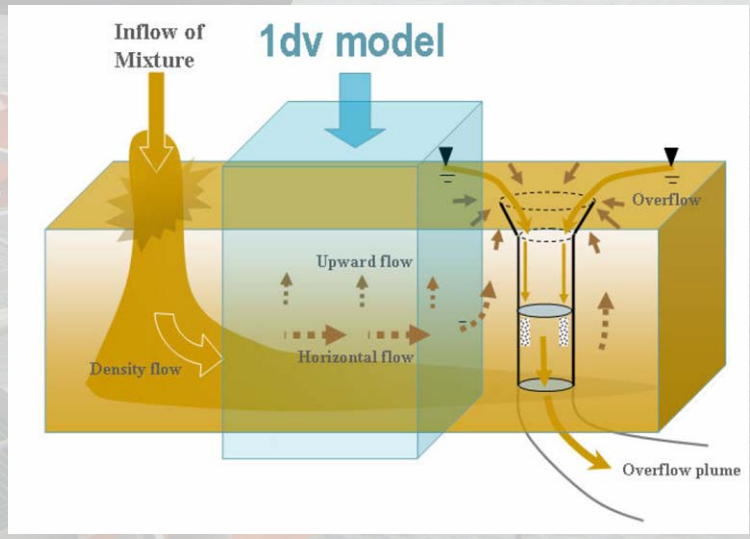
Model validation

Data ⟷ **Tools**

Data ⟷ **Models**

Tools ⟷ **Models**





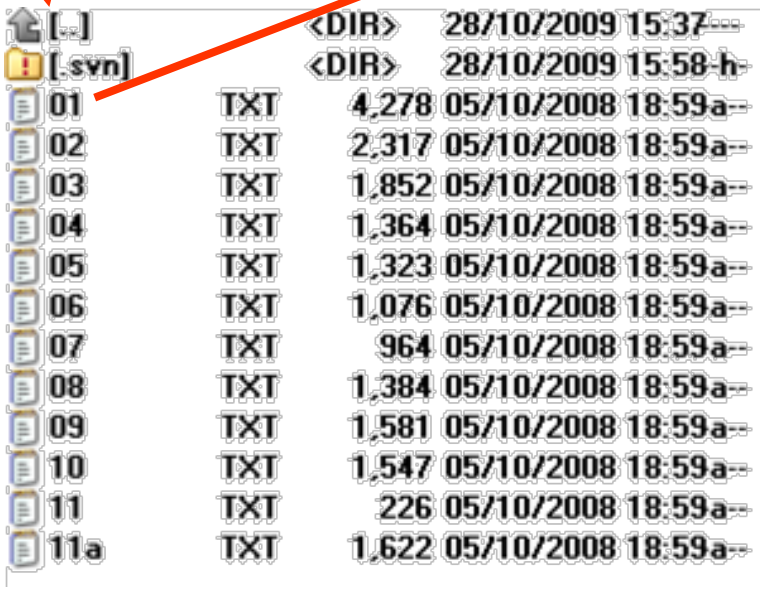
Recognisable frustrations?

- hmm, what was measured here?
- huh, where was it measured exactly?
- oops, when was it measured?
- aarghh, is there still someone around who knows what was done there?

- ohhh, why does it take so long to collect data!
- #$*!, has that data been deleted?!?
- ah yeah, yet another data format … again!!!
- sigh, this problem must have been solved by someone else before me!

- oh oh, I used an old version of this tool!
- euh, what/where is the most recent version of this tool?
- why is everybody using a different tool for the same analysis?
- oh no, we've made the same mistake again!

- WHY CAN'T I BUILD ON THE HERITAGE OF PREVIOUS PROJECTS?



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```
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 2   0.52  995
 3   0.52  995
 4   0.52  996
 5   0.52  996
 6   0.52  997
 7   0.52  996
 8   0.52  994
 9   0.52  995
10   0.52  995
11   0.52  995
12   0.52  995
13   0.53  996
14   0.53  997
15   0.53  995
16   0.55  995
17   0.57  996
18   0.58  996
19   0.58  996
20   0.61  996
21   0.64  996
22   0.66  996
23   0.67  995
24   0.69  996
25   0.70  996
26   0.70  996
27   0.72  996
28   0.73  995
29   0.73  995
30   0.74  996
```

Example 1

Poor data description:

- **What is measured?**
- **What units?**
- **What locations?**
- **Which projection?**
- **When measured?**
- **With what instrument?**
- **With what settings?**

EcoShape

Example 2

Poor data description:

- Projection?
- Transparency?

```
EcoVIEW Hollandsch Diep

File      81_20070406_SQ121.txt
Date      06-APR-2007
Operator        jdyk
Vessel    Jacoba 6
Area      Sassenplaat
Start Time      13:19:40
Serial number YSI1
Serial number YSI2

Fix/D   Ens/V   Bin/Dir Time    Longitude       Latitude        ADCP    Cmg     course  Longitude       Latitude        Depth
No/m    No/mps  No/deg  hh:mm:ss       m       m       deg     Dgr     m       m       ntu     ntu     ntu
5       5       17      13:19:41        5149.53725      40781.00000     17.71   0.13    0.1     5149.53725      443.69282
1.71    1.11    117.37  188     194     186     202
2.71    1.39    129.36  163     167     175     185
3.71    0.81    145.63  143     146     161     142
4.71    0.23    203.63  132     130     151     124
5.71    0.52    91.53   121     121     139     113
6.71    0.73    80.64   120     122     138     115
7.71    0.72    108.74  115     118     130     108
8.71    0.35    28.75   107     107     122     98
9.71    0.46    70.63   98      99      110     86
10.71   0.40    75.00   89      92      101     79
11.71   0.51    67.61   83      84      93      69
15.71   0.83    65.04   58      61      75      67
16.71   0.76    92.03   67      71      71      64
17.71   0.77    105.90  65      66      71      64
```

```
% Coordinate transformation
% Interpretation: 5155.54385 = 51 gr 55.54385 min (to be checked)
if size(d6,2)==9; d6 = [repmat(' ',size(d6,1),1) d6]; end; % Add blanks (for the sake of consistency)
if size(d7,2)==9; d7 = [repmat(' ',size(d7,1),1) d7]; end; % idem

Lat = str2num(d6(:,1:2))+str2num(d6(:,3:end))/60;
Lon = str2num(d7(:,1:2))+str2num(d7(:,3:end))/60;

[x,y,utmzone] = deg2utm(Lat,Lon);  % WGS84 transformatie
x2 = x+92.57; % Ad-hoc, local conversion to ED50
y2 = y+209.84;
```

Similar examples can be provided of tools

- Poor version control on various tools (be it: Excel spreadsheets, Matlab tools, Fortran codes etc.)
- Setup of software architecture such that the software is very hard to maintain and improve (e.g. no modular setup)
- Reinventing the wheel between departments (rather developing something new from scratch than merging efforts and collaborate)
- Hard to identify in reports which version of a tool was used (undesirable from a quality perspective)

The overall poor quality and availability of data, models, tools and knowledge inhibits knowledge development and progress!

OpenEarth: the standard for handling data, models, tools and information?

OpenEarth is:

- A robust community of users …
- that cooperate from the philosophy …
- that data, models, tools and information …
- should be exchanged as freely and openly as possible …
- across the boundary of projects (and even organisations?).

OpenEarth: the standard for handling data, models, tools and information?

OpenEarth stimulates effective cooperation by:

- Offering a **free infrastructure** built from the best available open source components (third generation – ongoing development since 2003):
    - Backup, version control and web access
    - Broadly accepted international standards (netCDF, EPSG, CF, etc)
- Exchanging all data, models, tools and information from OpenEarth projects via one **shared repository**
- Providing easy access to **training materials** for (minimal) capacity building with potential users to enable effective cooperation within the OpenEarth community

OpenEarth

Infrastructure & Workflow

Key elements:

- version control & web access
- data = raw data + script
- one data format vs. many
- central storage vs. decentral
- open source standards

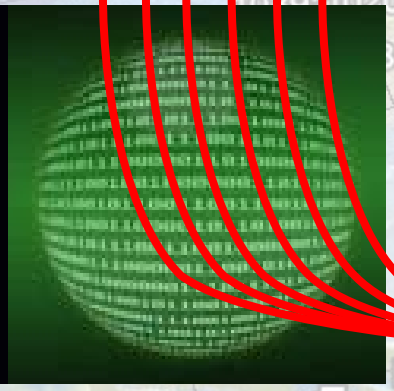
tools

data

① Web access to version control and backup

tools

data & scripts



② Web access to datasets

from pluriform to standard format!

③ Web access to visualisation

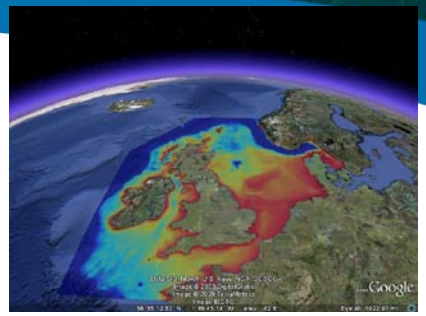
open source software

Internet

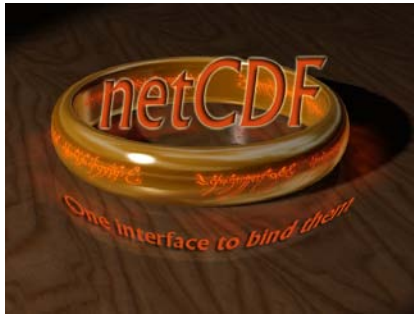
VO Intranet

Web Server

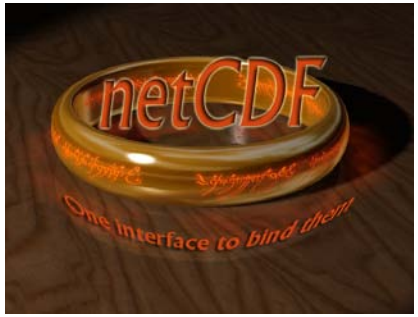
Web Server



OPeNDAP Server



OPeNDAP Server



VO User

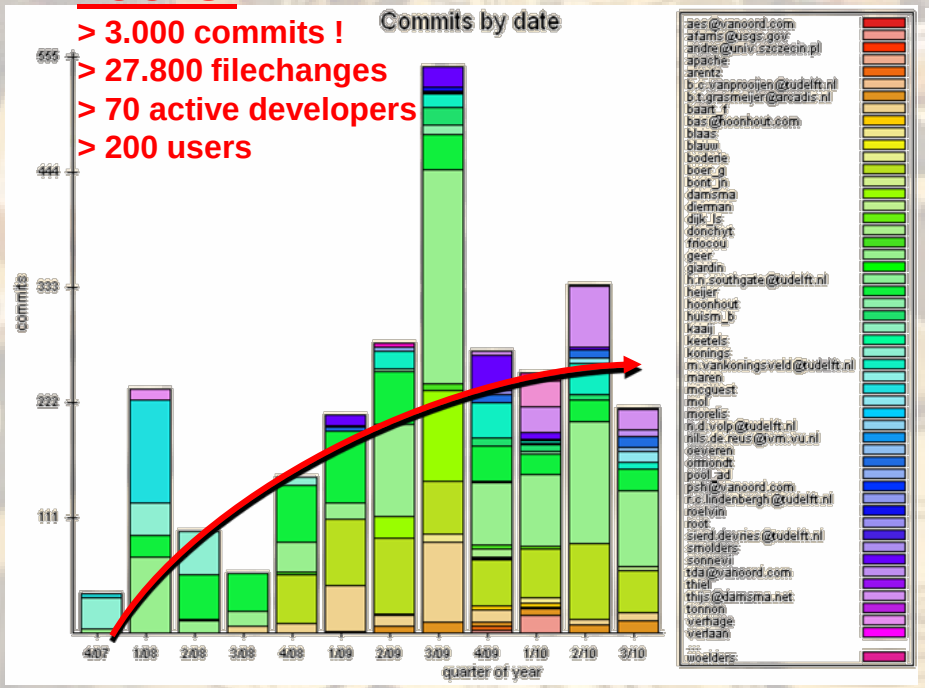
SubVersion Server

SubVersion Server


micore
EcoShape
Building with nature
IMDC
International Marine & Dredging Consultants
Deltares
Enabling Delta Life
TU Delft
Delft University of Technology
Alkyon
Hydraulic Consultancy & Research
Witteveen + Bos
UNIWERSYTET SZCZECIŃSKI
Port of Rotterdam
ARCADIS
UCA
Universidad de Cádiz
UNIVERSITY OF PLYMOUTH
UAlg
UNIVERSIDADE DO ALGARVE
Regione Emilia-Romagna
UNIVERSIDAD PABLO DE OLAVIDE
SEVILLA
arpa
agenzia regionale prevenzione e ambiente dell'emilia-romagna
Servizio Idro Meteo Clima
brgm
Géosciences pour une Terre durable
USGS
science for a changing world
Universiteit Twente
de ondernemende universiteit

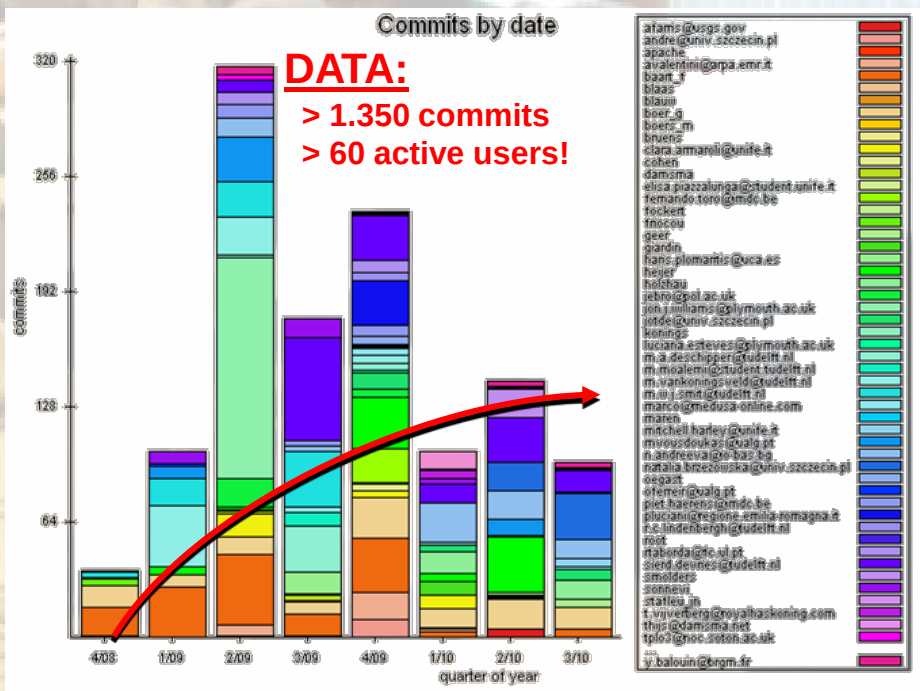
TOOLS:

> 3.000 commits !
> 27.800 filechanges
> 70 active developers
> 200 users

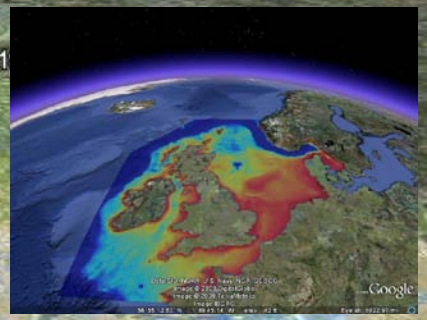


DATA:

> 1.350 commits
> 60 active users!



Grids



Jan 1987 Jun 1

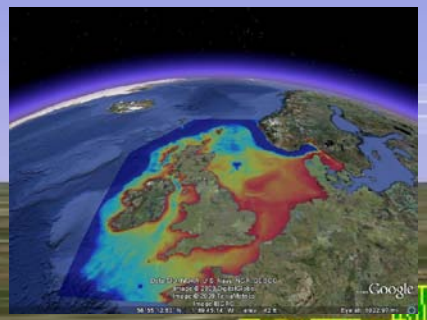
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Image © 2009 Aerodata International Surveys

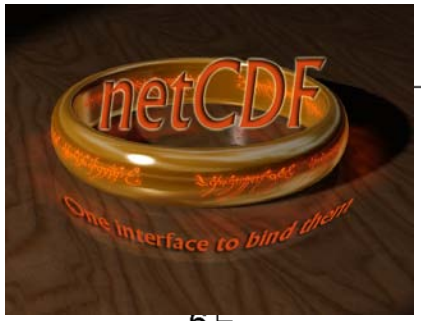
Google

51°47'52.08" N 3°52'33.44" E elev 0 m Eye alt 27.00 km

Raaien



Jan 2008
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2009 Aerodata International Surveys
Google
Datum van beeldmateriaal: 2005
52°40'11.38" N
4°37'49.33" O
Ooghoogte
97 m



Jarkus transect: Noord-Holland, 3800, 2008

Elevation [m w.r.t. NAP]

6
4
2
0
-2
-4
-6
-8
-10

1000
800
600
400
200
0
-200

Crossshore distance [m w.r.t. RSP]

Jarkus transect: Noord-Holland, 3800, 2008
Volume is: 5452.85 m3/m

```
[Volume result Boundaries] = getVolume('x', x, 'z',z);
```

Elevation [m w.r.t. NAP]

6
4
2
0
-2
-4
-6
-8
-10

1000
800
600
400
200
0
-200

Crossshore distance [m w.r.t. RSP]

Jarkus transect: Noord-Holland, 3800, 2008
Volume is: 3688.35 m3/m

```
[Volume result Boundaries] = getVolume('x', x, 'z', z, ...
    'LowerBoundary', -8, ...
    'LandwardBoundary',-10, ...
    'SeawardBoundary', 800);
```

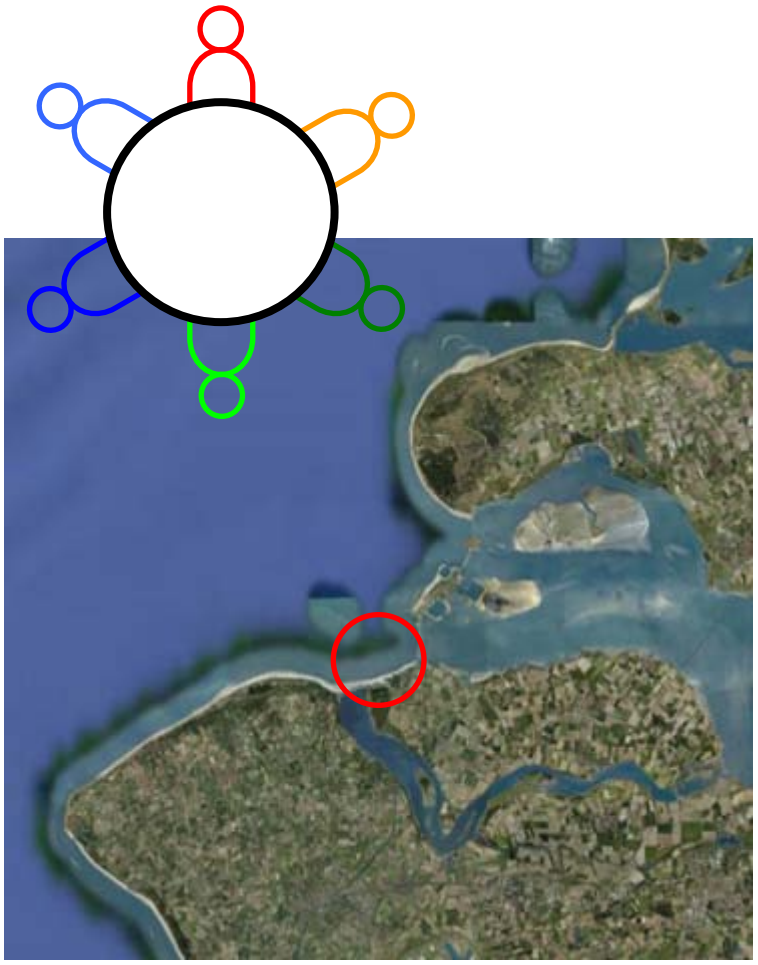
Elevation [m w.r.t. NAP]

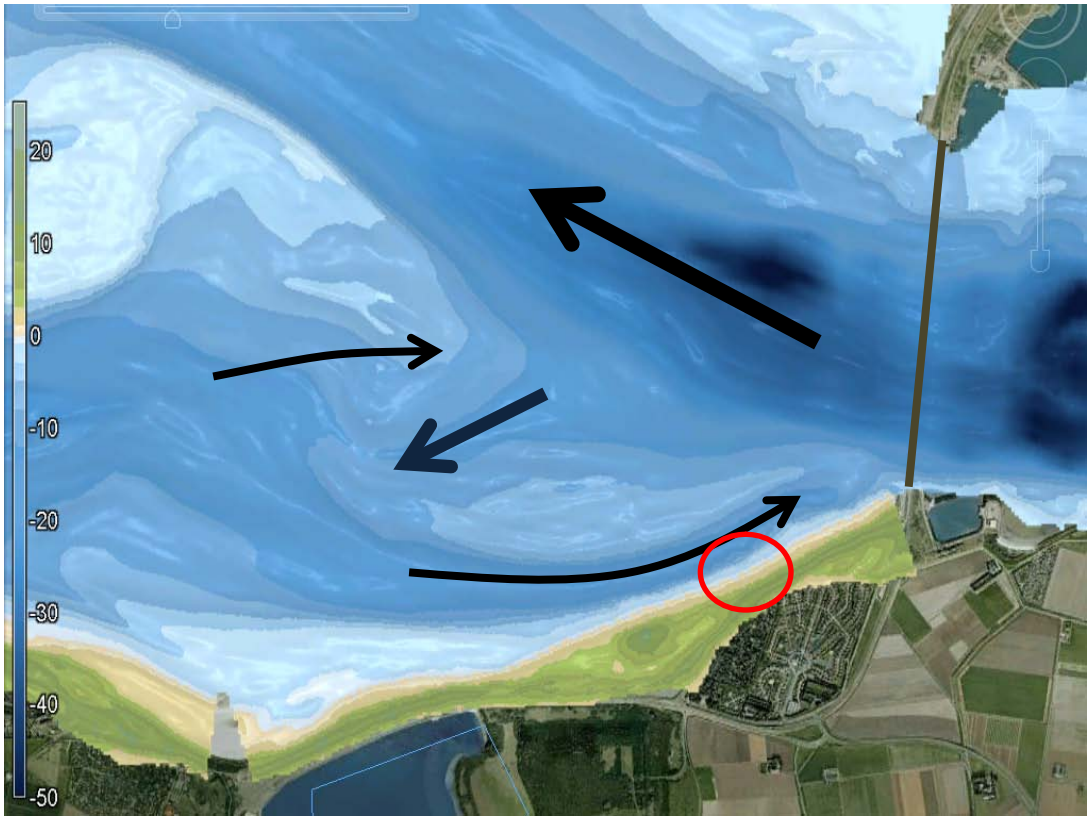
6
4
2
0
-2
-4
-6
-8
-10

1000
800
600
400
200
0
-200

Crossshore distance [m w.r.t. RSP]

EDD workshops





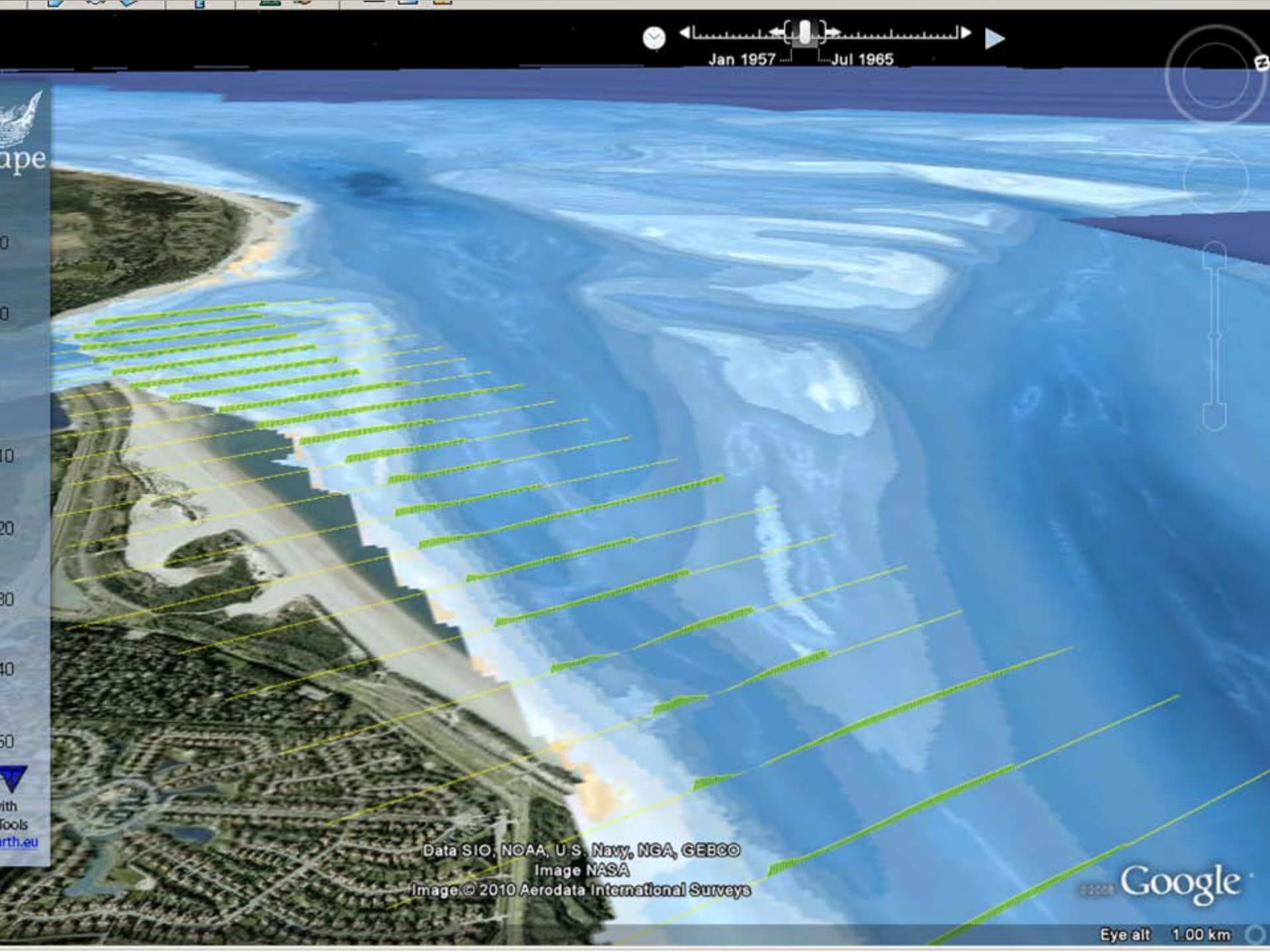

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Image NASA
Image © 2010 Aerodata International Surveys
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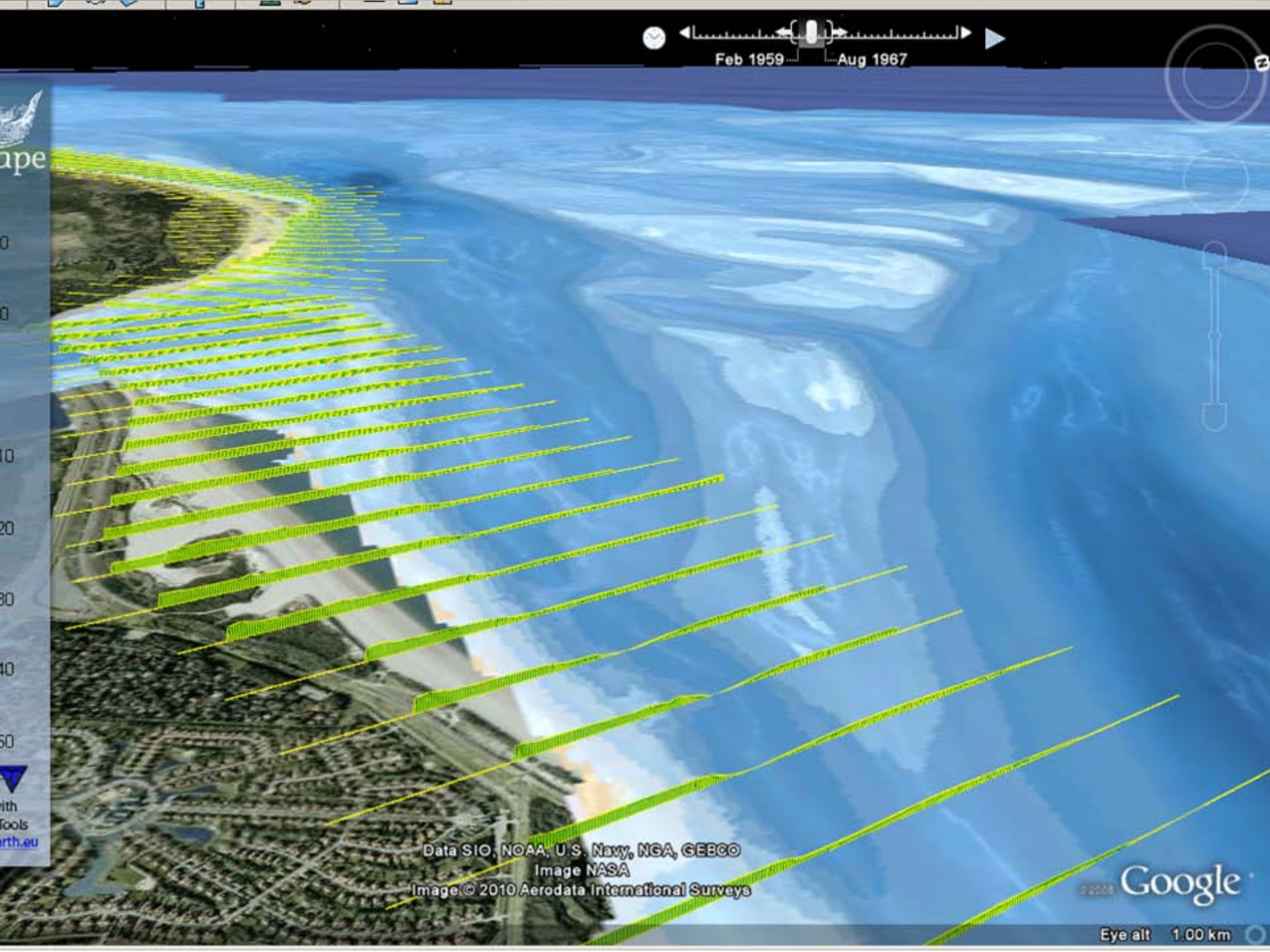
Eye alt 1.00 km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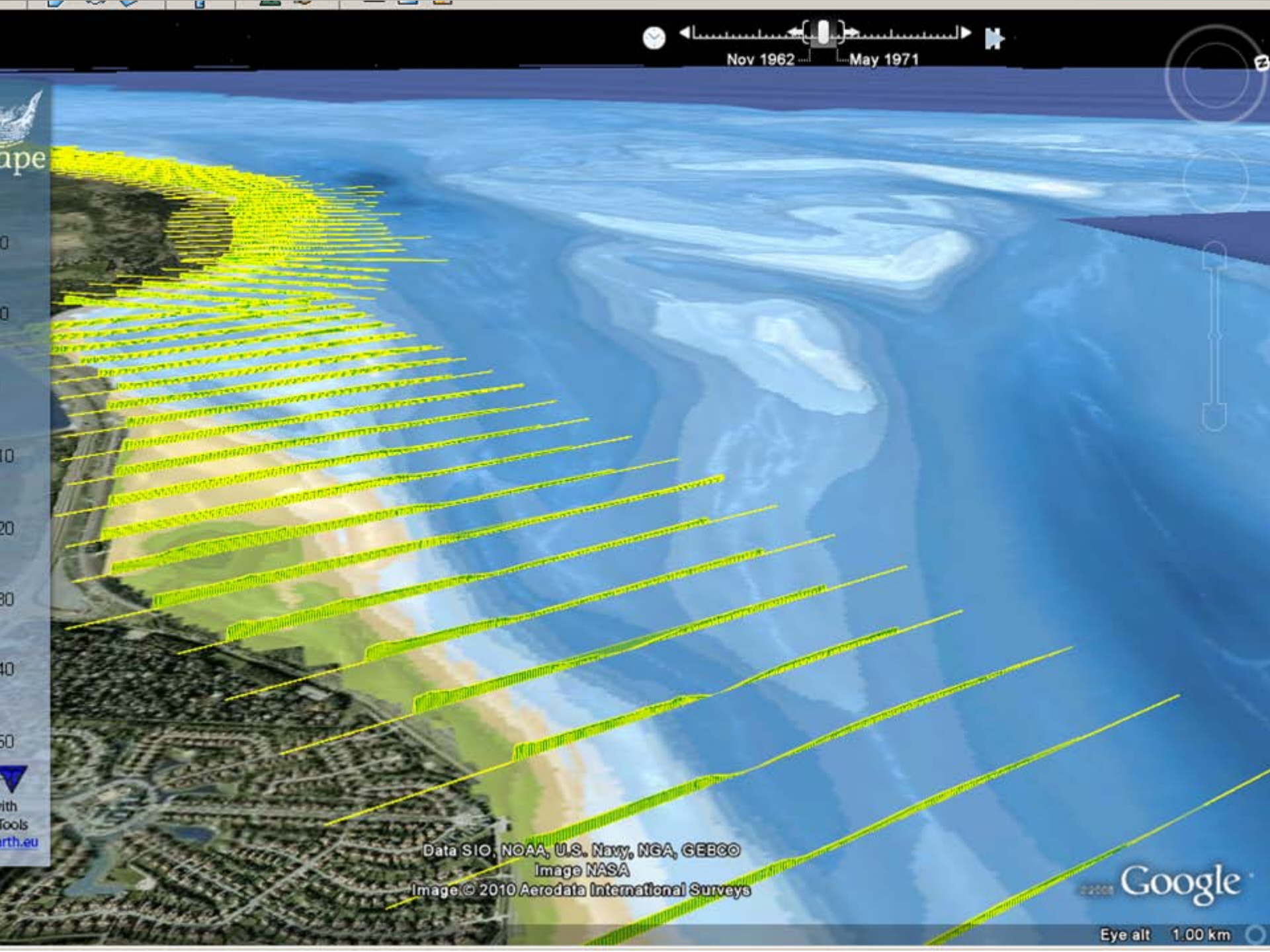
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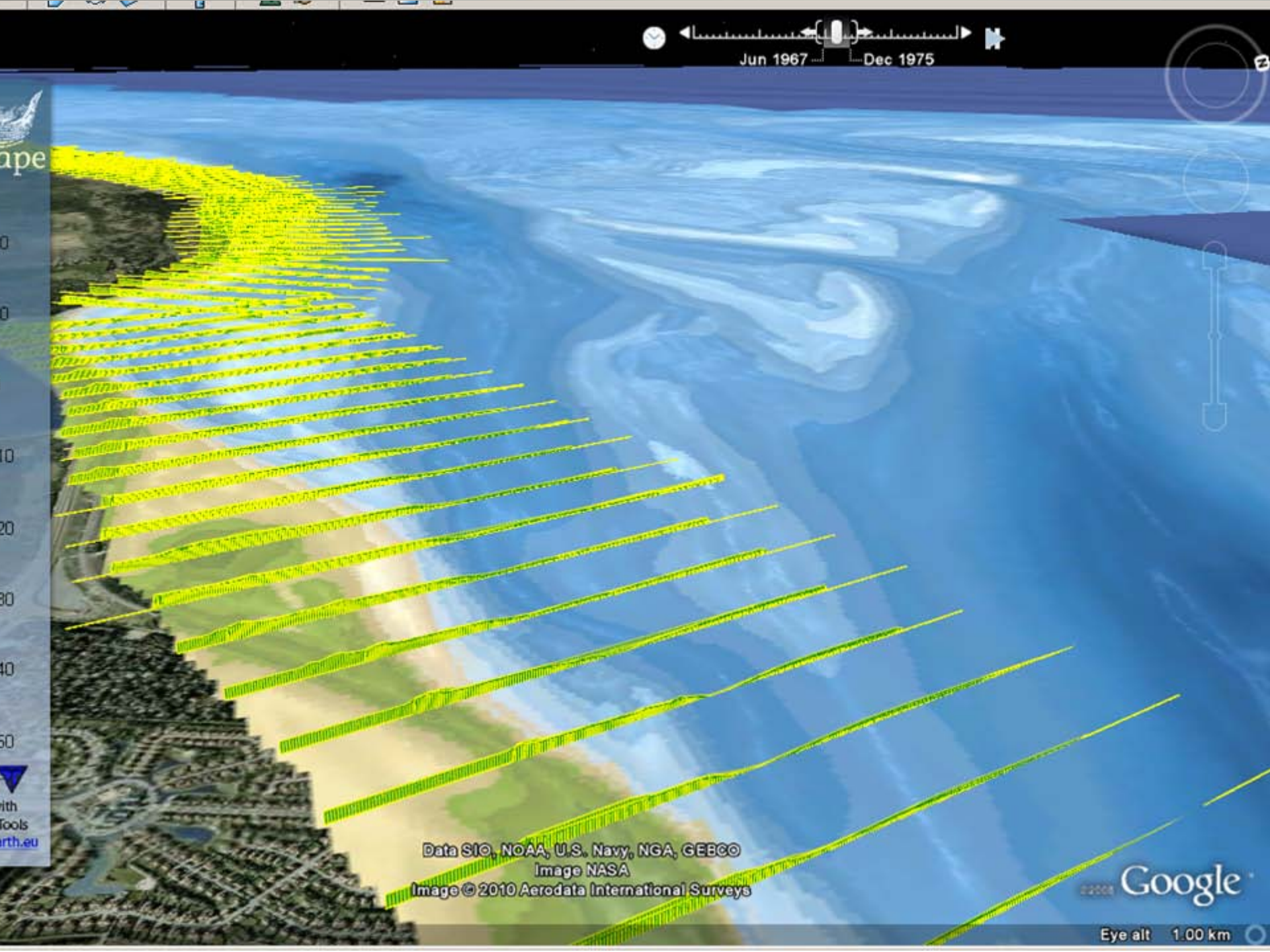
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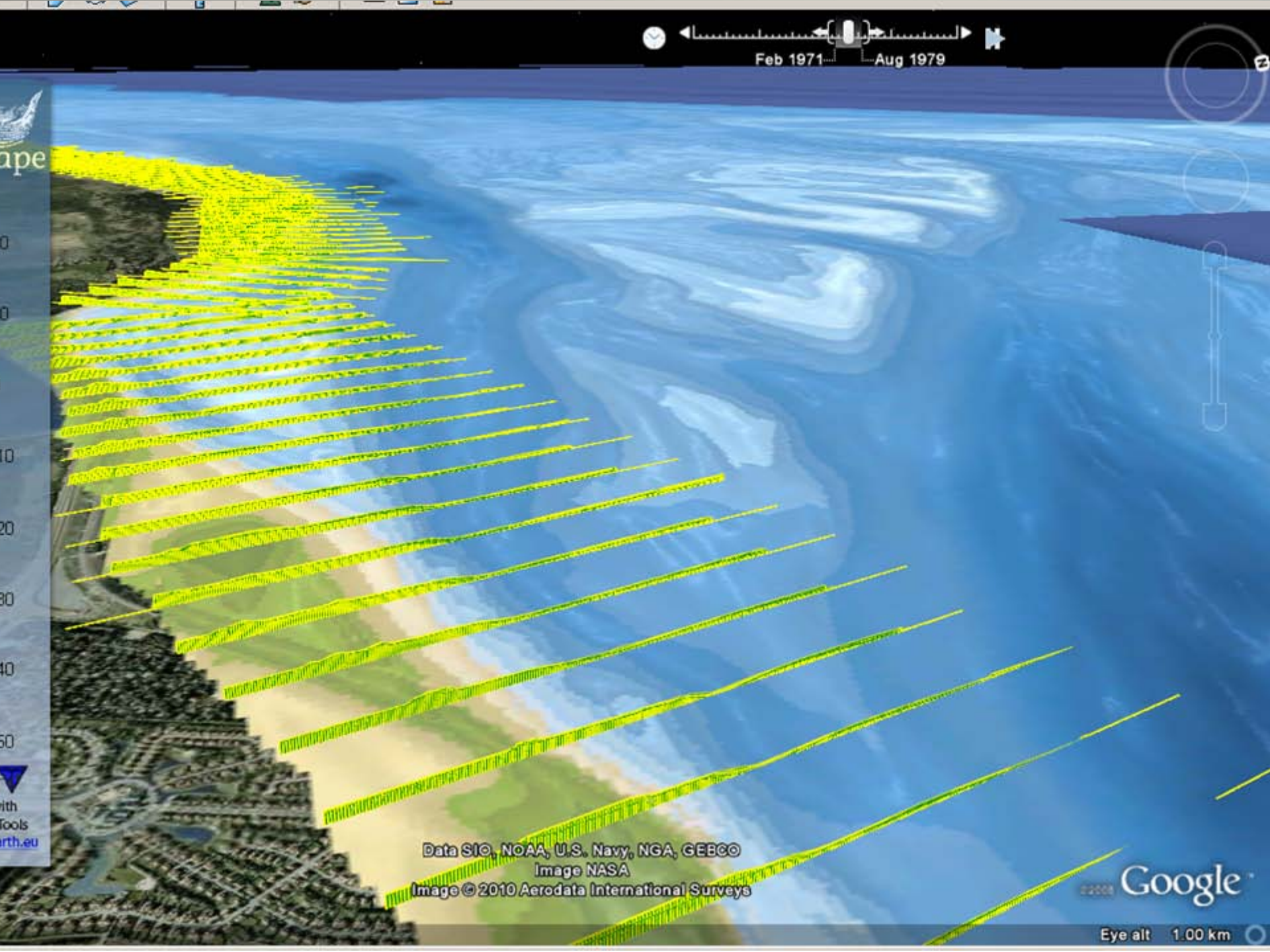
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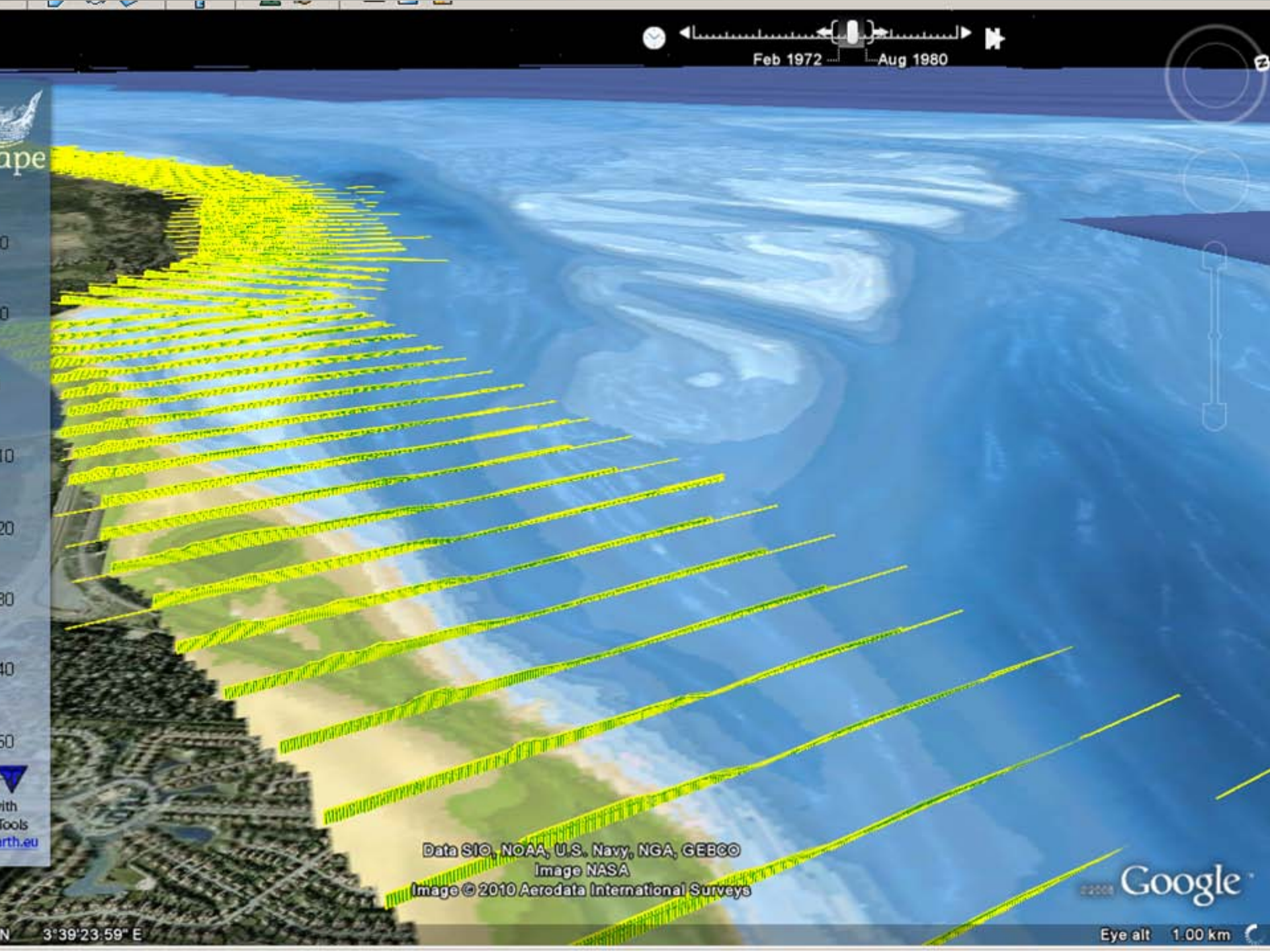
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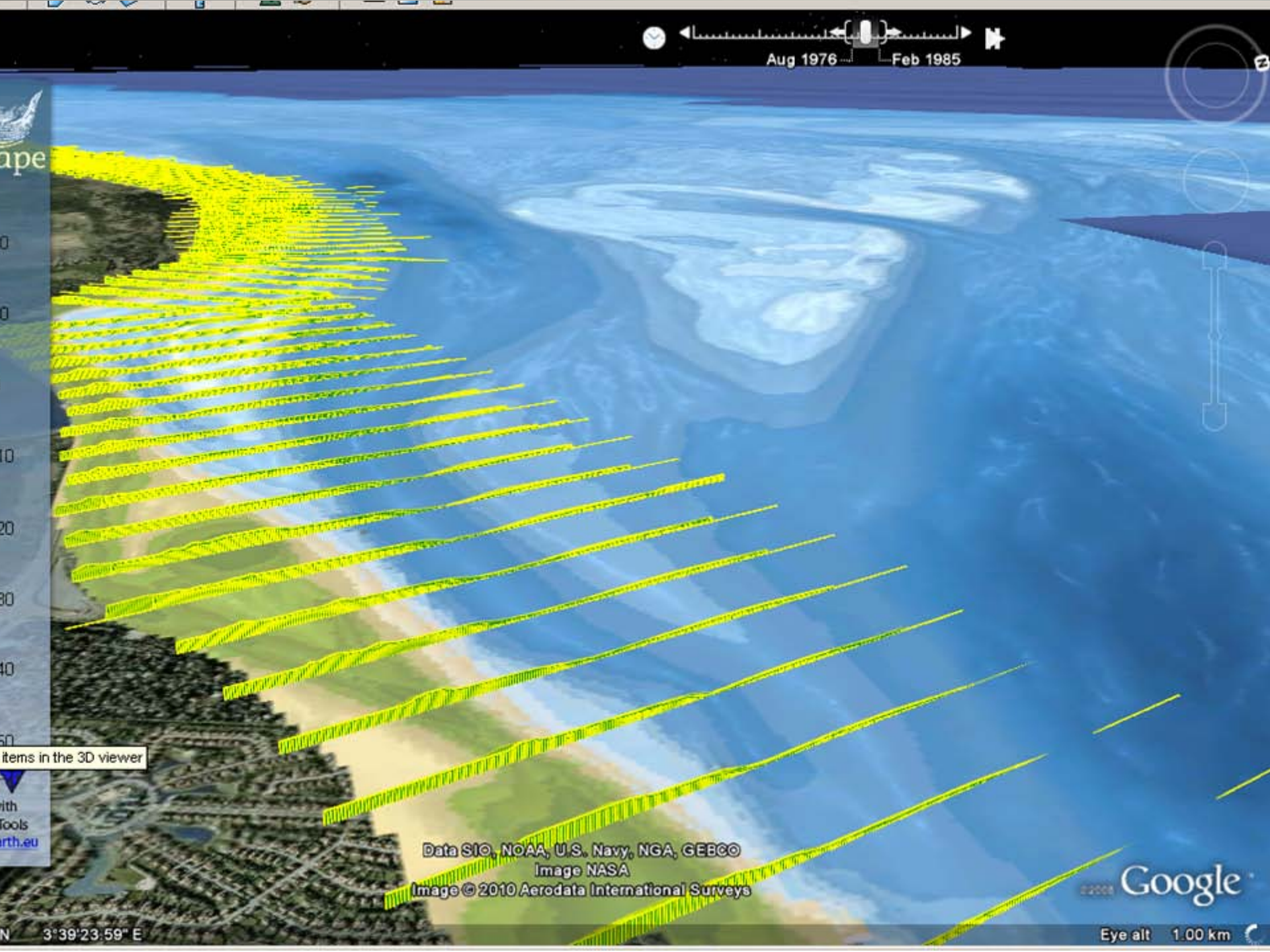
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Image © 2010 Aerodata International Surveys
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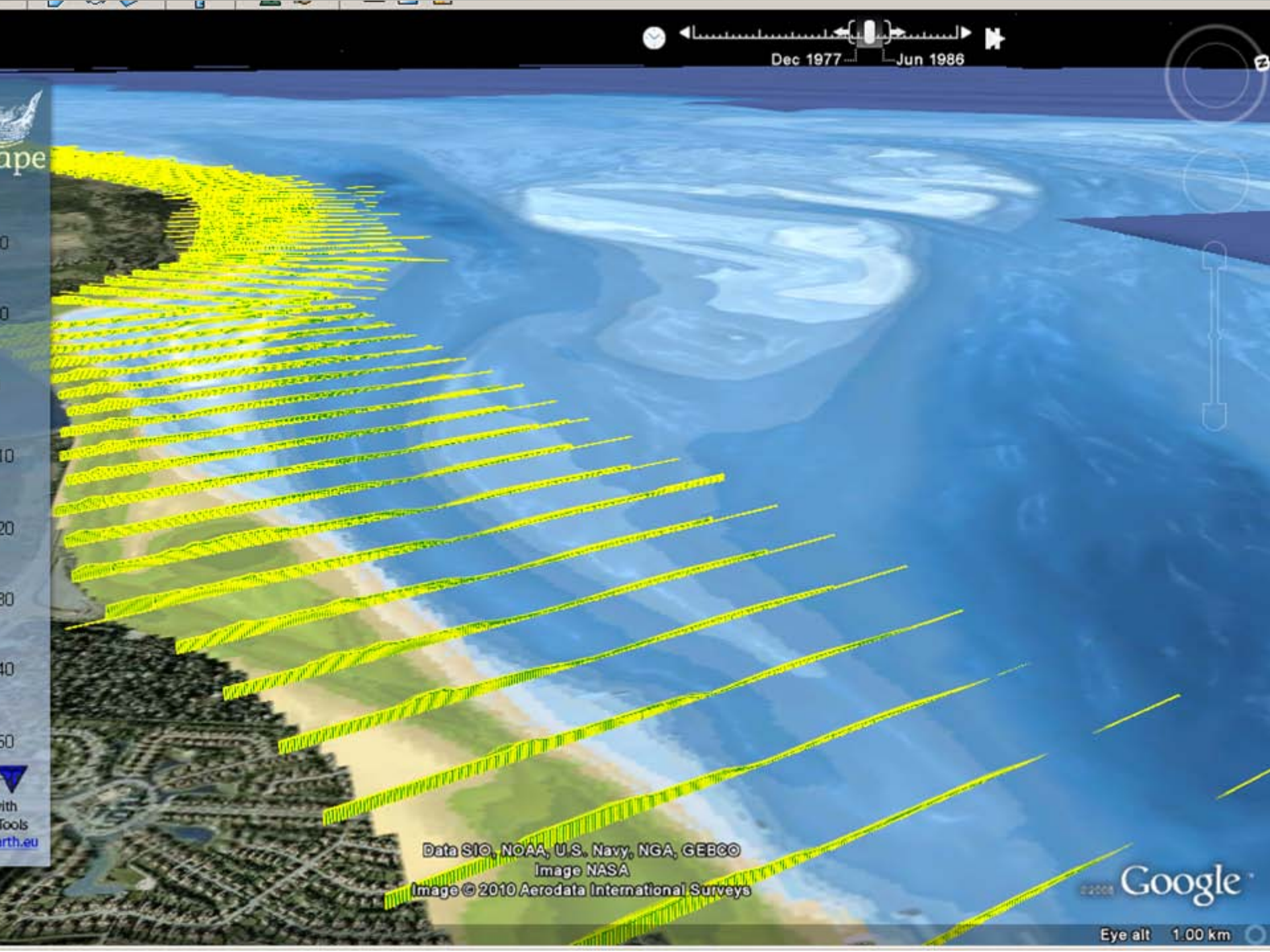
Eye alt 1.00 km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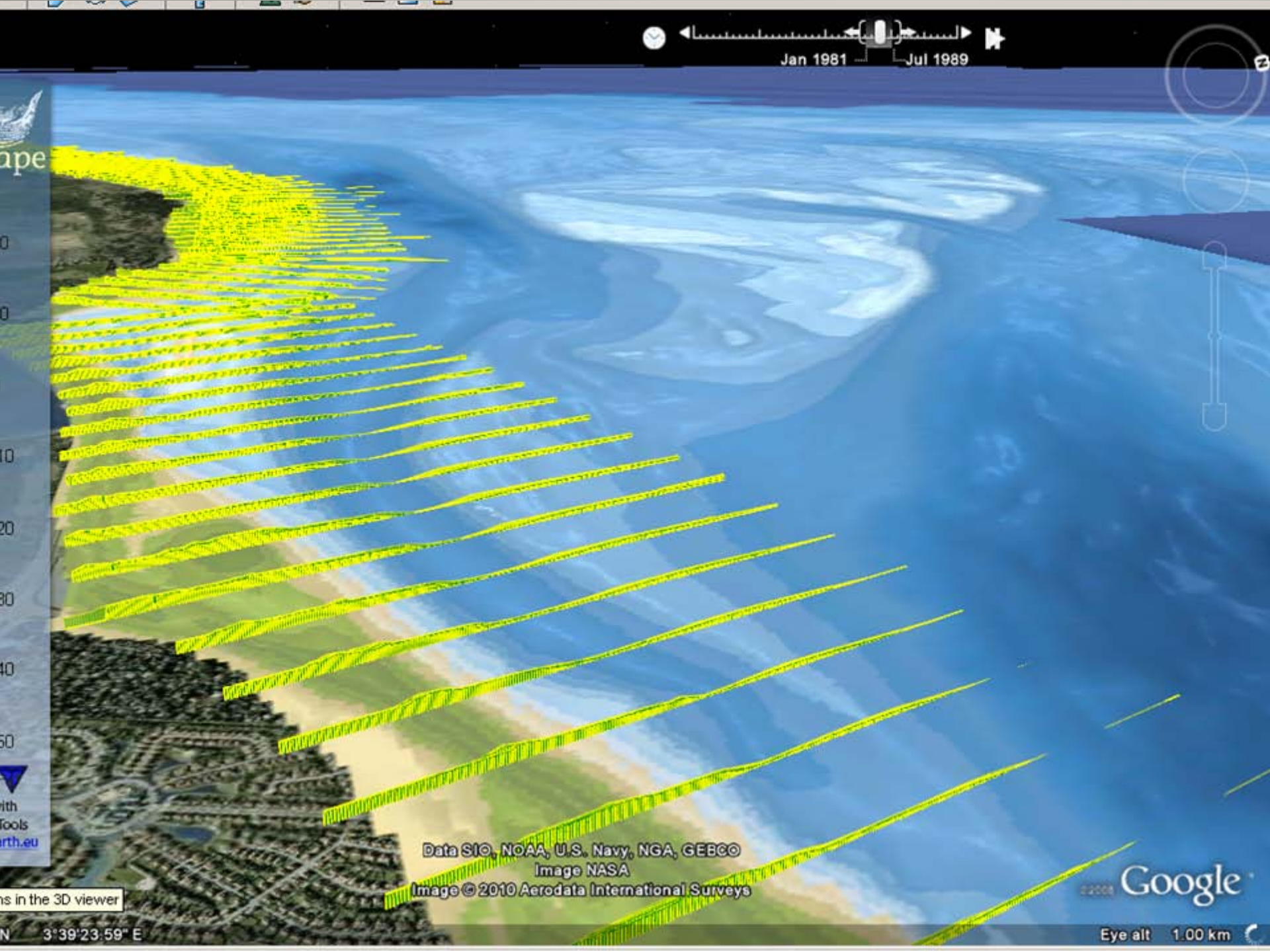
Google
Eye alt 1.00 km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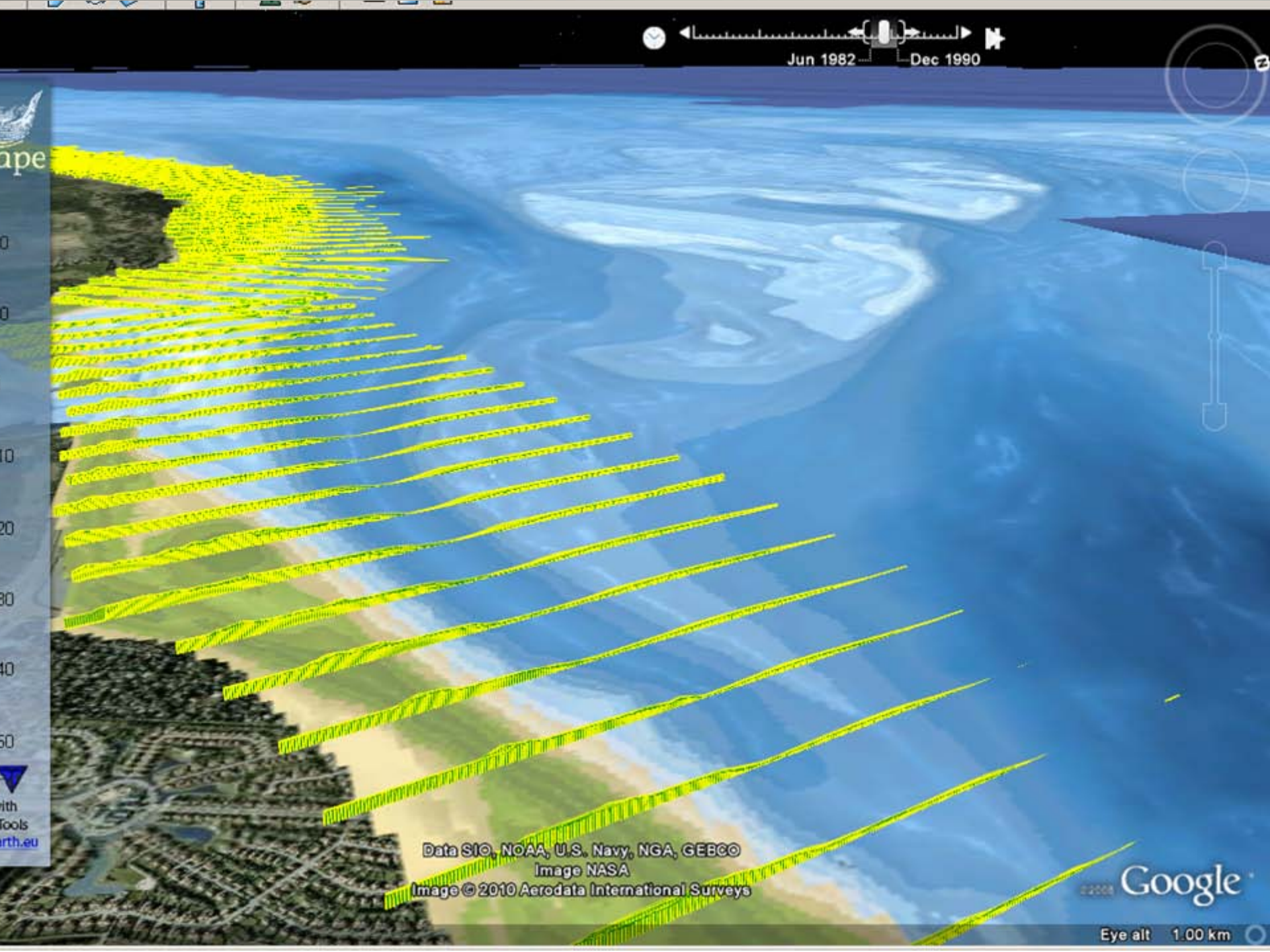
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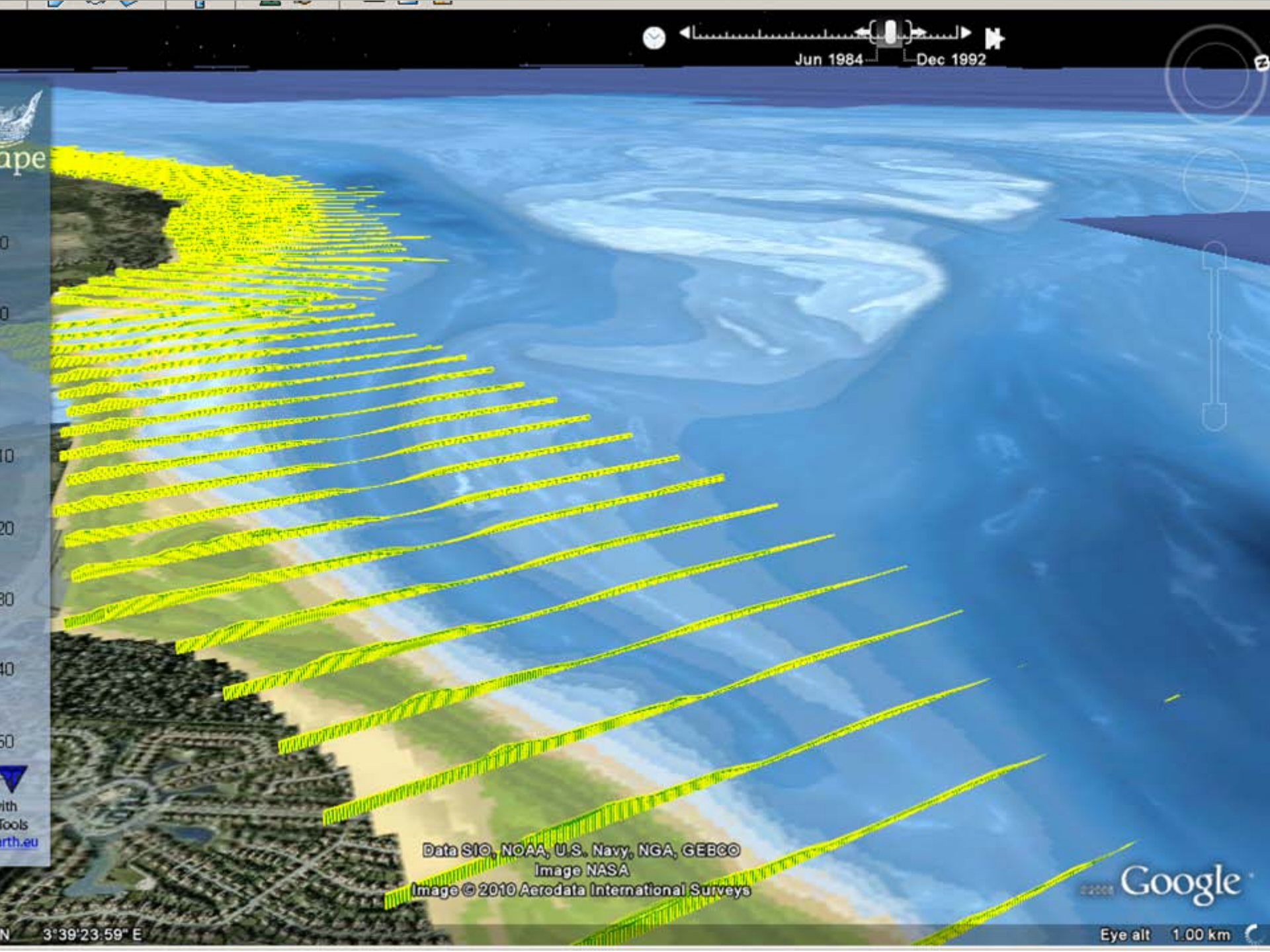
Image NASA
Image © 2010 Aerodata International Surveys
Google
Eye alt 1.00 km


Jun 1984
Dec 1992
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image NASA
Image © 2010 Aerodata International Surveys
Google
3°39'23.59" E
Eye alt 1.00 km

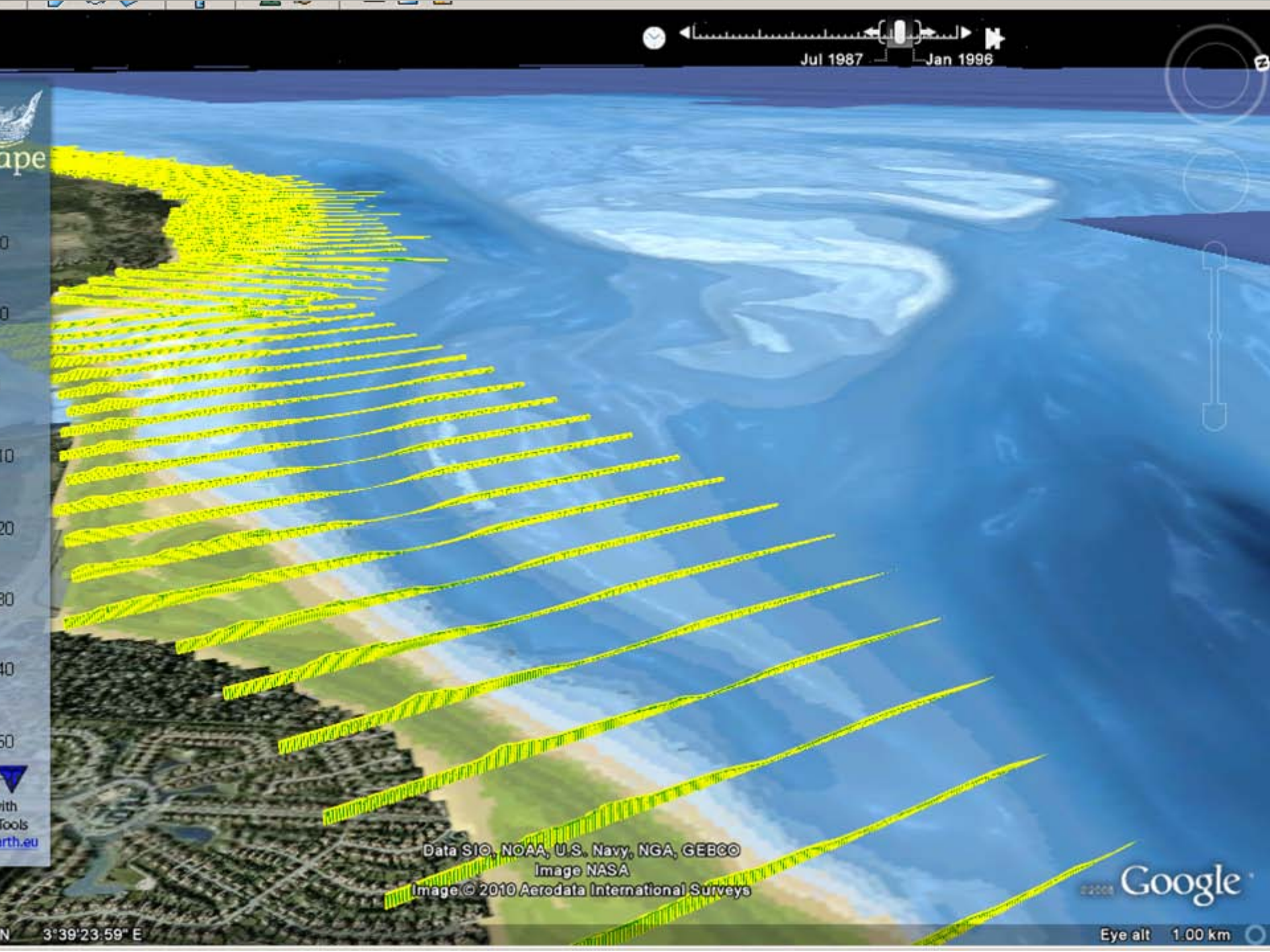

Jul 1987
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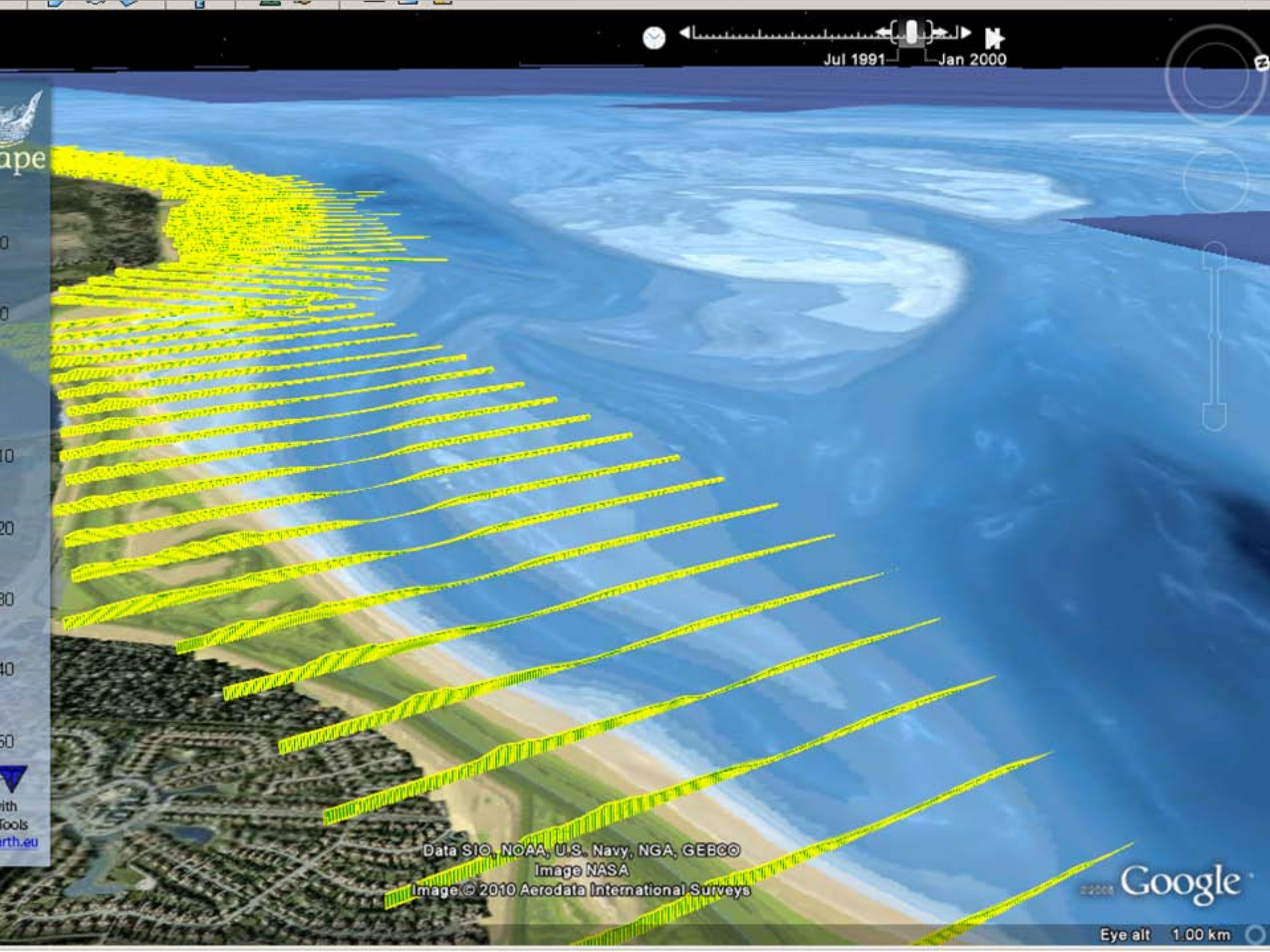
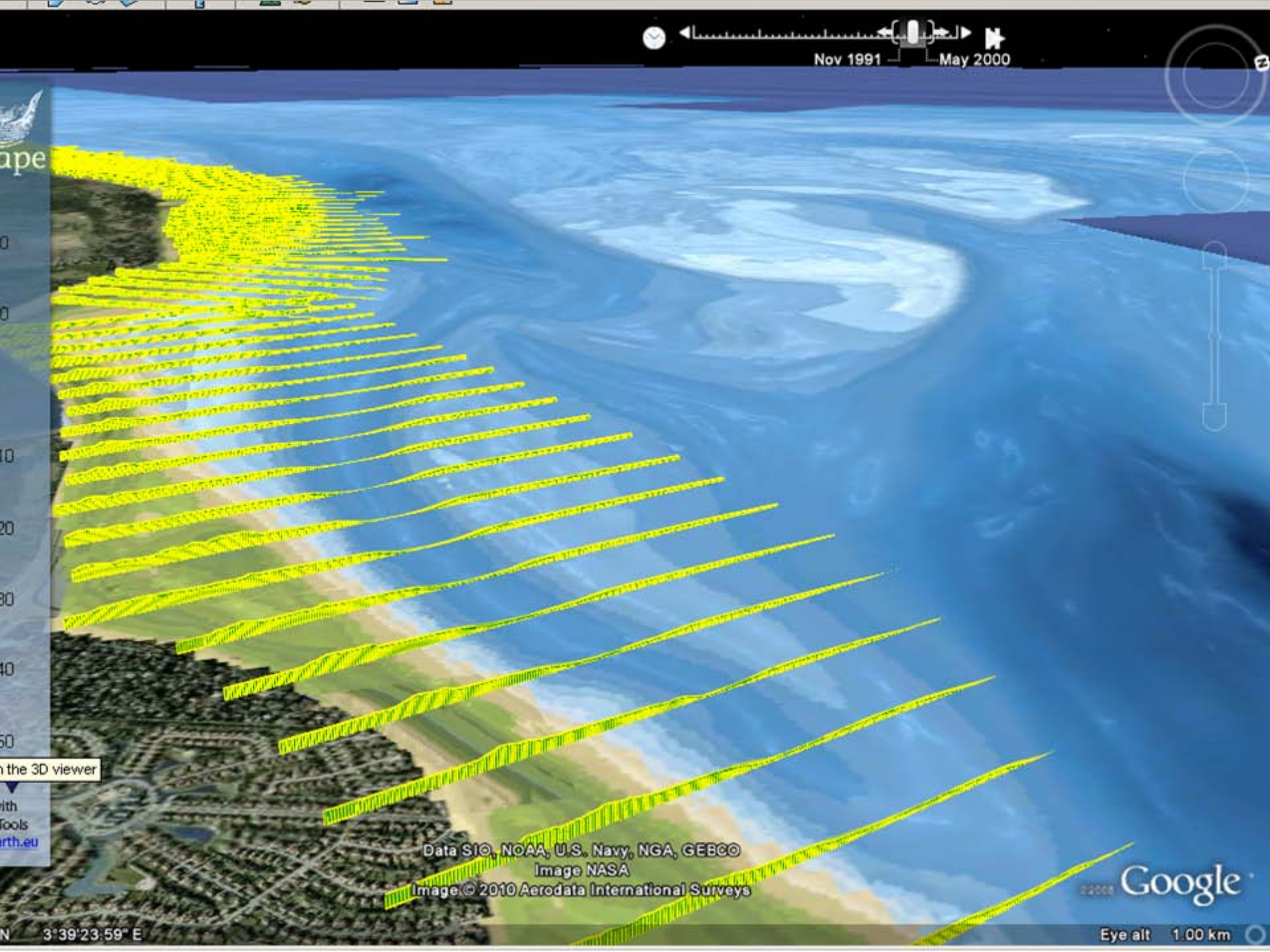
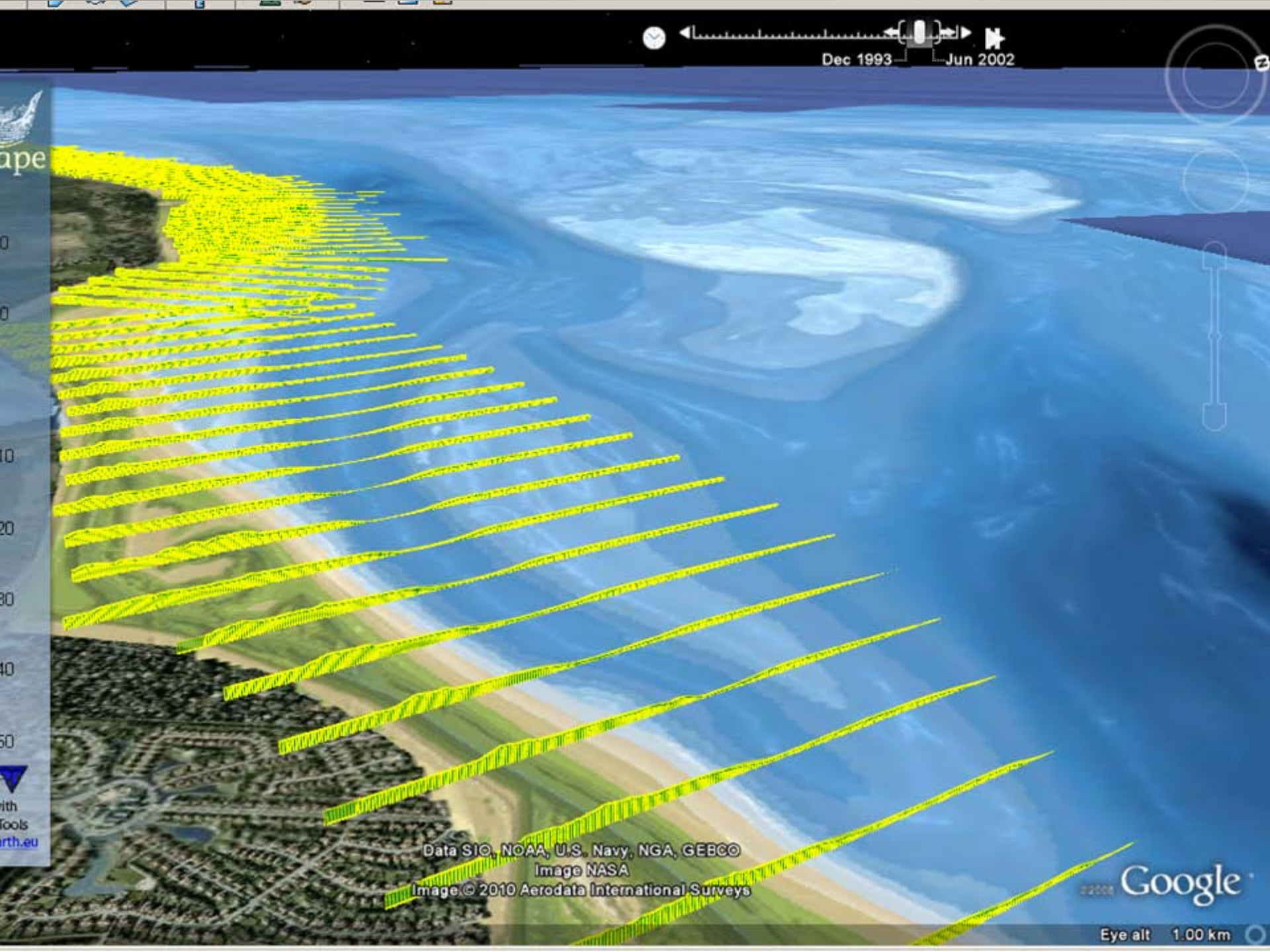
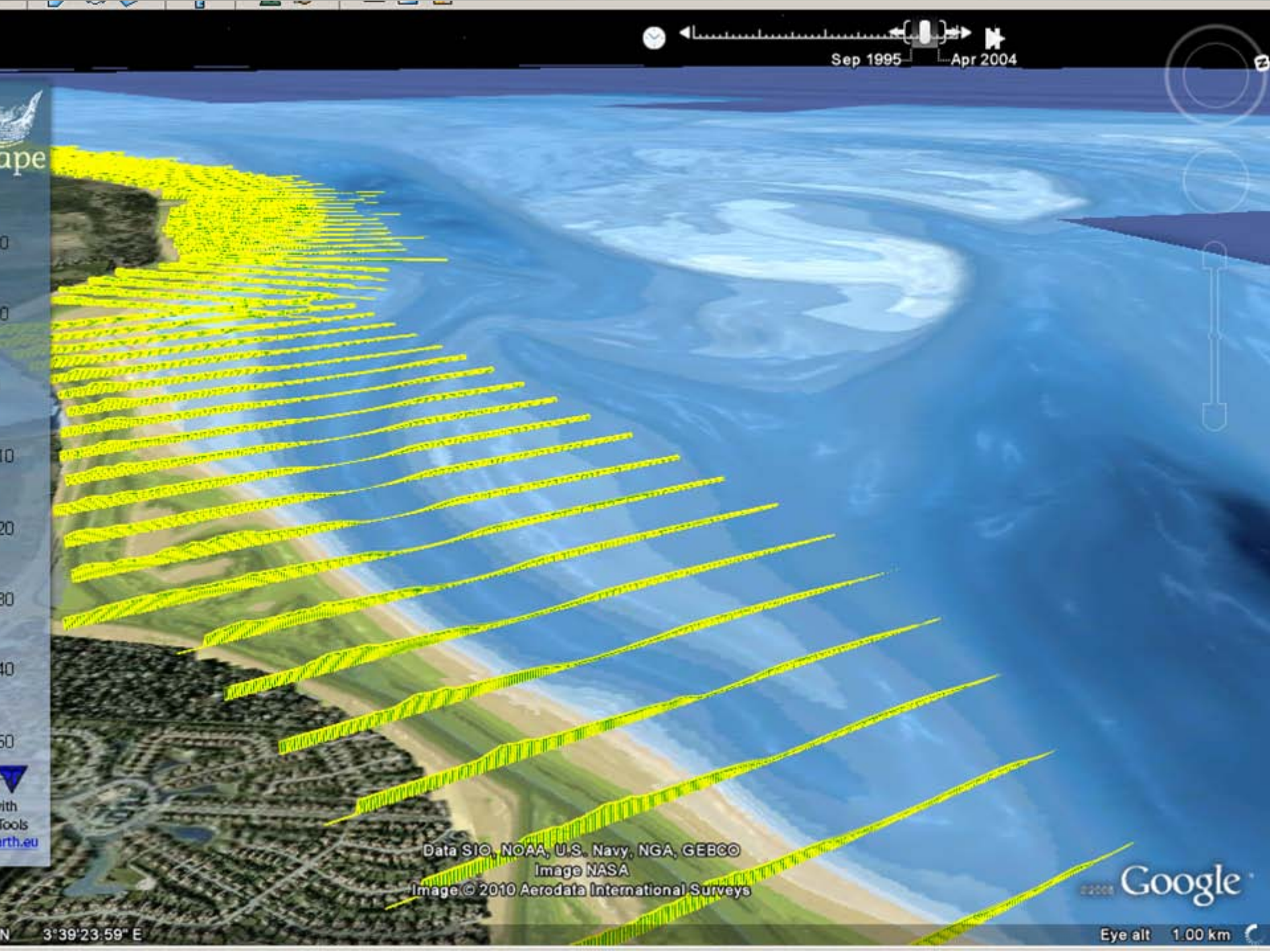
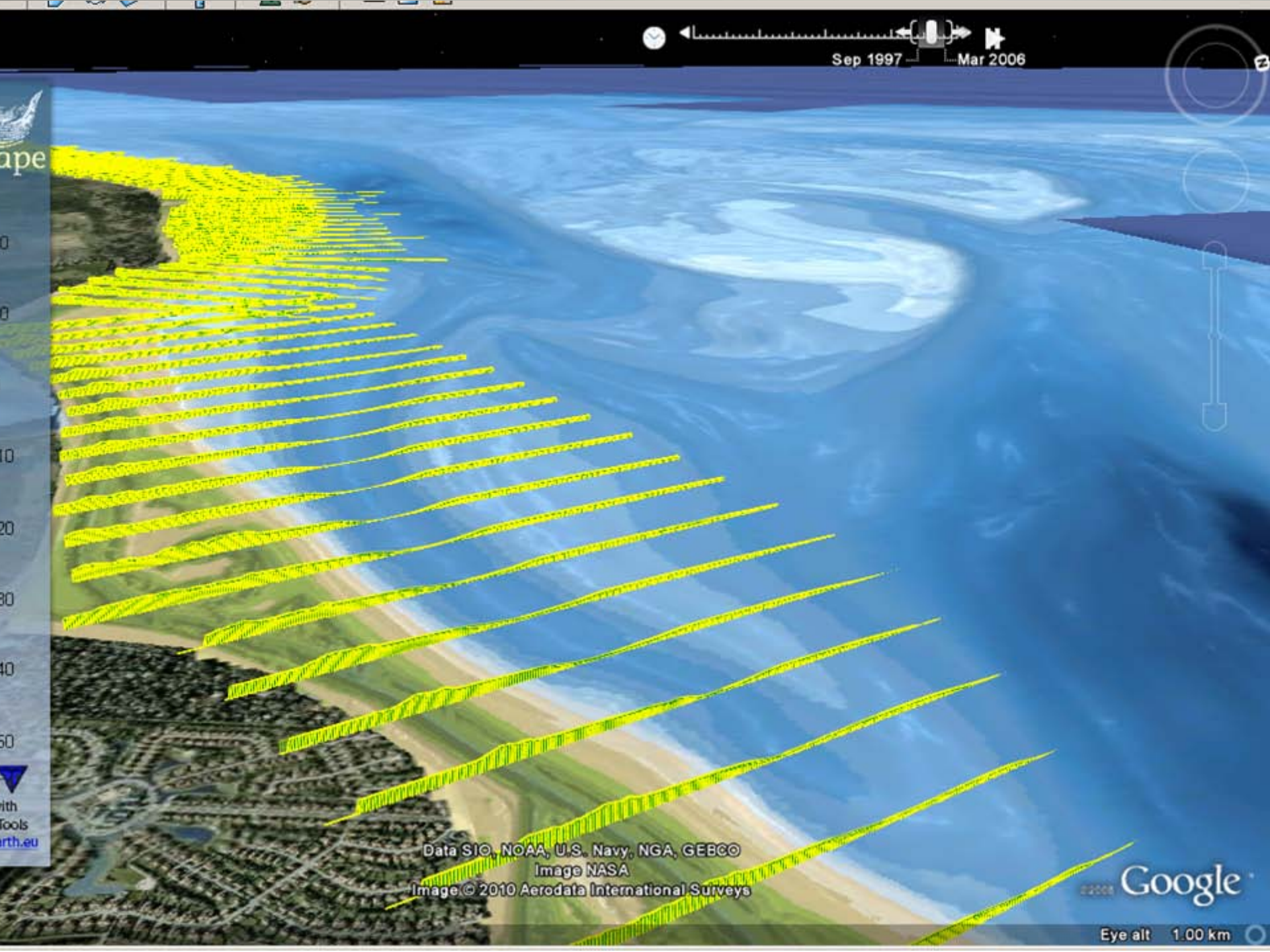
Image NASA
Image © 2010 Aerodata International Surveys
Google
3°39'23.59" E
Eye alt 1.00 km

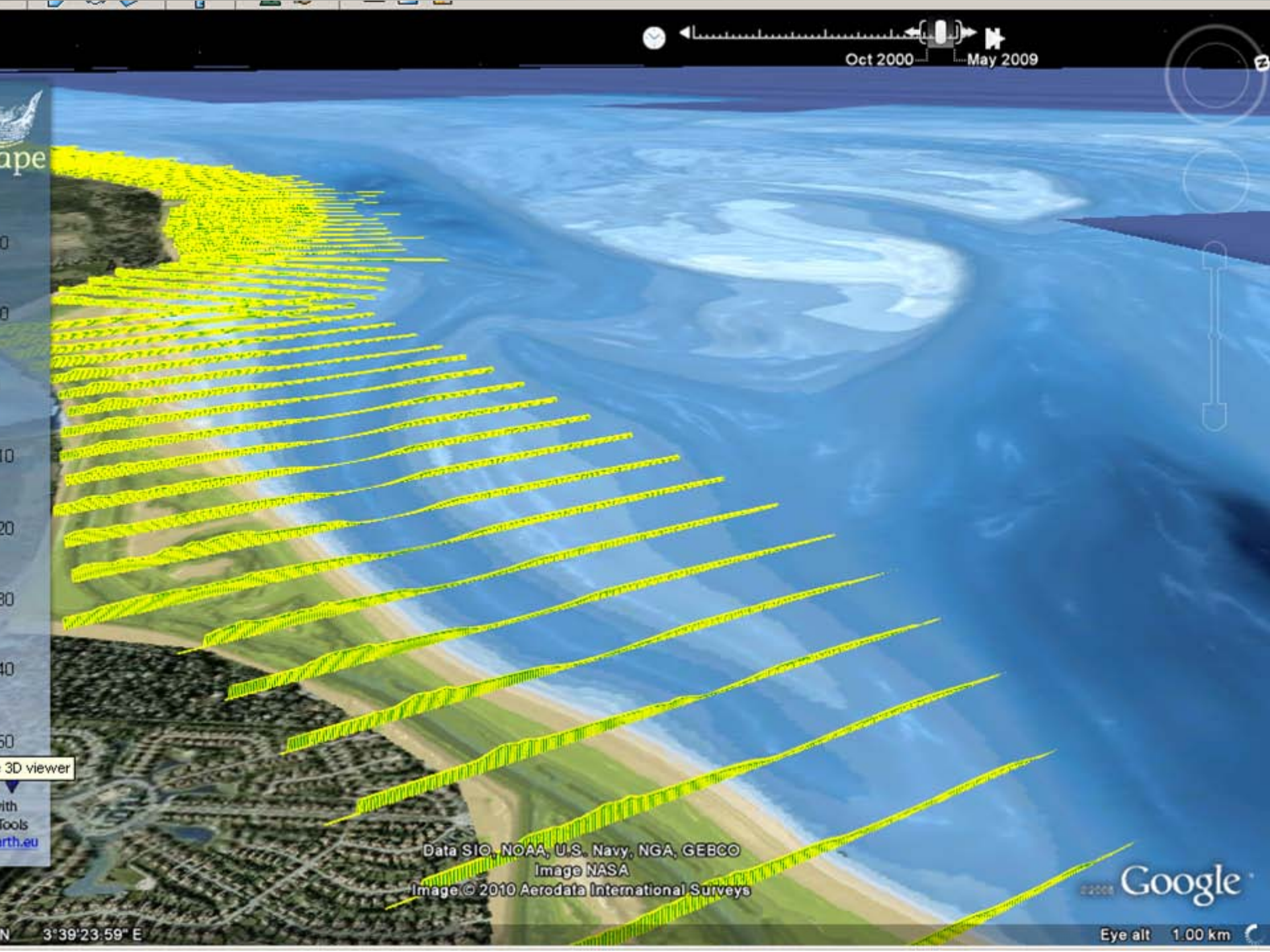

Jul 1991
Jan 2000
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image NASA
Image © 2010 Aerodata International Surveys
Google
Eye alt 1.00 km

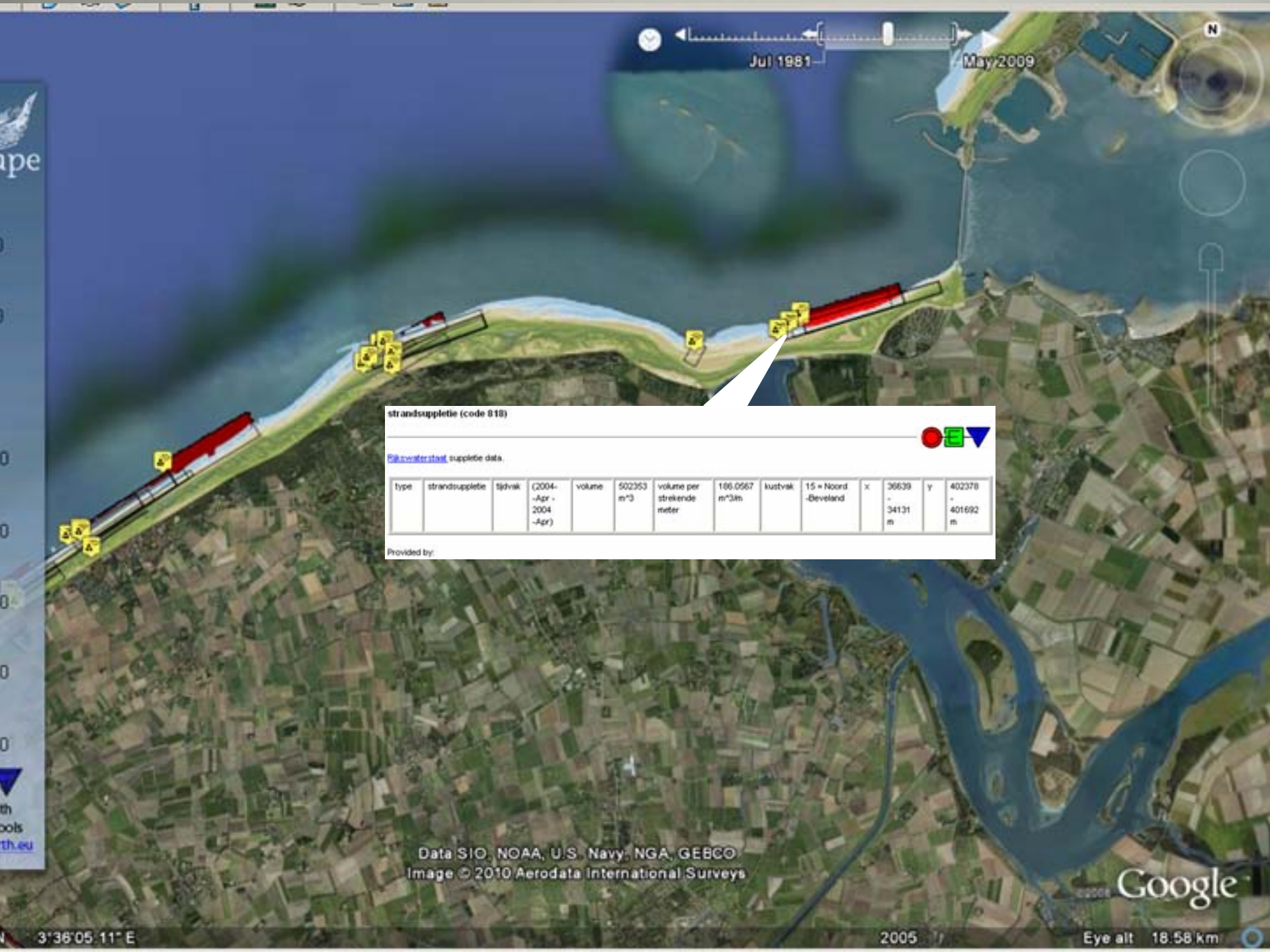

Nov 1991
May 2000
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image NASA
Image © 2010 Aerodata International Surveys
Google
Eye alt 1.00 km


Dec 1993
Jun 2002
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image NASA
Image © 2010 Aerodata International Surveys
Google
Eye alt 1.00 km


Sep 1995
Apr 2004
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image NASA
Image © 2010 Aerodata International Surveys
Google
3°39'23.59" E
Eye alt 1.00 km


Sep 1997
Mar 2006
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image NASA
Image © 2010 Aerodata International Surveys
Google
Eye alt 1.00 km


Oct 2000
May 2009
3D viewer
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image NASA
Image © 2010 Aerodata International Surveys
Google
3°39'23.59" E
Eye alt 1.00 km


Jul 1981
May 2009
N
strandsuppletie (code 818)
Rijkswaterstaat suppletie data.
type
strandsuppletie
tijdvak
(2004--Apr - 2004 -Apr)
volume
502353 m^3
volume per strekende meter
186.0567 m^3/m
kustvak
15 = Noord -Beveland
x
36639 - 34131 m
y
402378 - 401692 m
Provided by:
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2010 Aerodata International Surveys
Google
3°36'05.11" E
2005
Eye alt 18.58 km

Conclusions OpenEarth

- The poor quality and availability of data, models, tools and knowledge inhibits knowledge development and progress
- OpenEarth provides an open source project superseding approach for data and knowledge management
- The OpenEarth approach is used in a growing number of projects (a.o. Building with Nature)
- You can use it too!

www.openearth.nl or www.openearth.eu