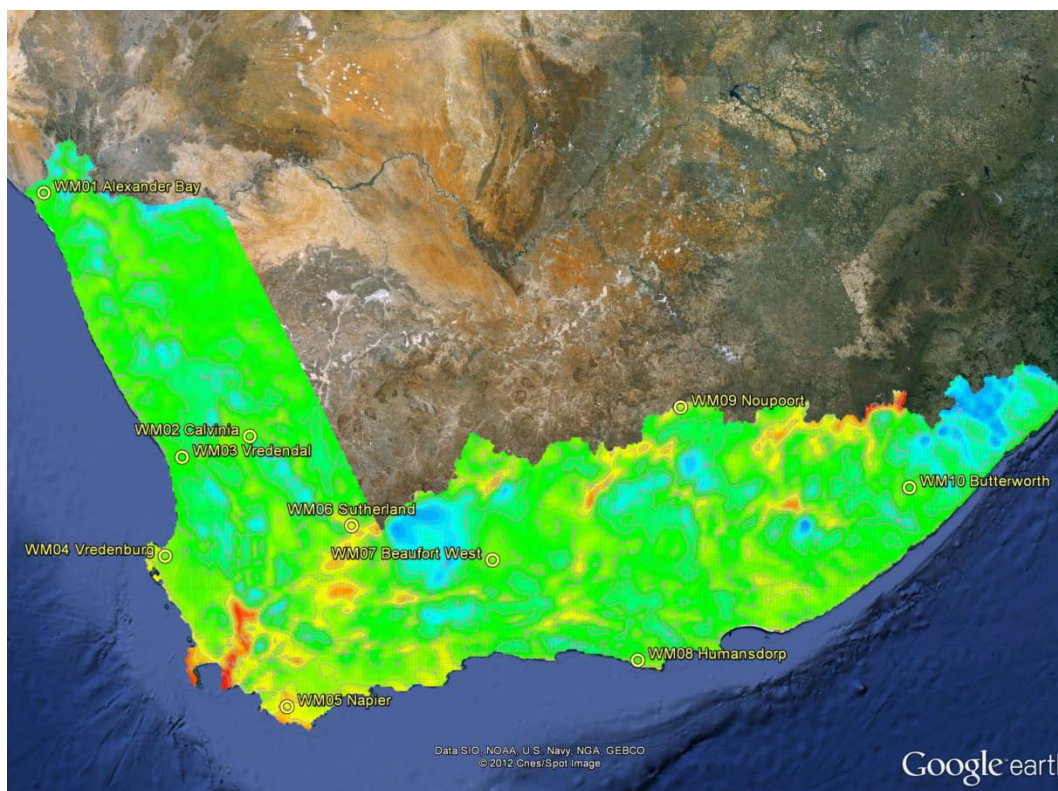


Application of Wind Atlas for South Africa

Niels G Mortensen and the WASA team



Outline

Application of Wind Atlas for South Africa

- How to use the Wind Atlas for South Africa?
 - WASA web sites, Tadpole, WASP data, guidelines
 - Wind farm case studies and examples
 - Resource mapping in sample areas
 - Phase II microscale modelling
- Q&A
- Questionnaire introduction and feedback (*Eugene, CSIR*)
- Take a look at the information available!

Software clinic

- Attendees are invited to use the “First Verified Numerical Wind Atlas for South Africa”

WASA project web sites

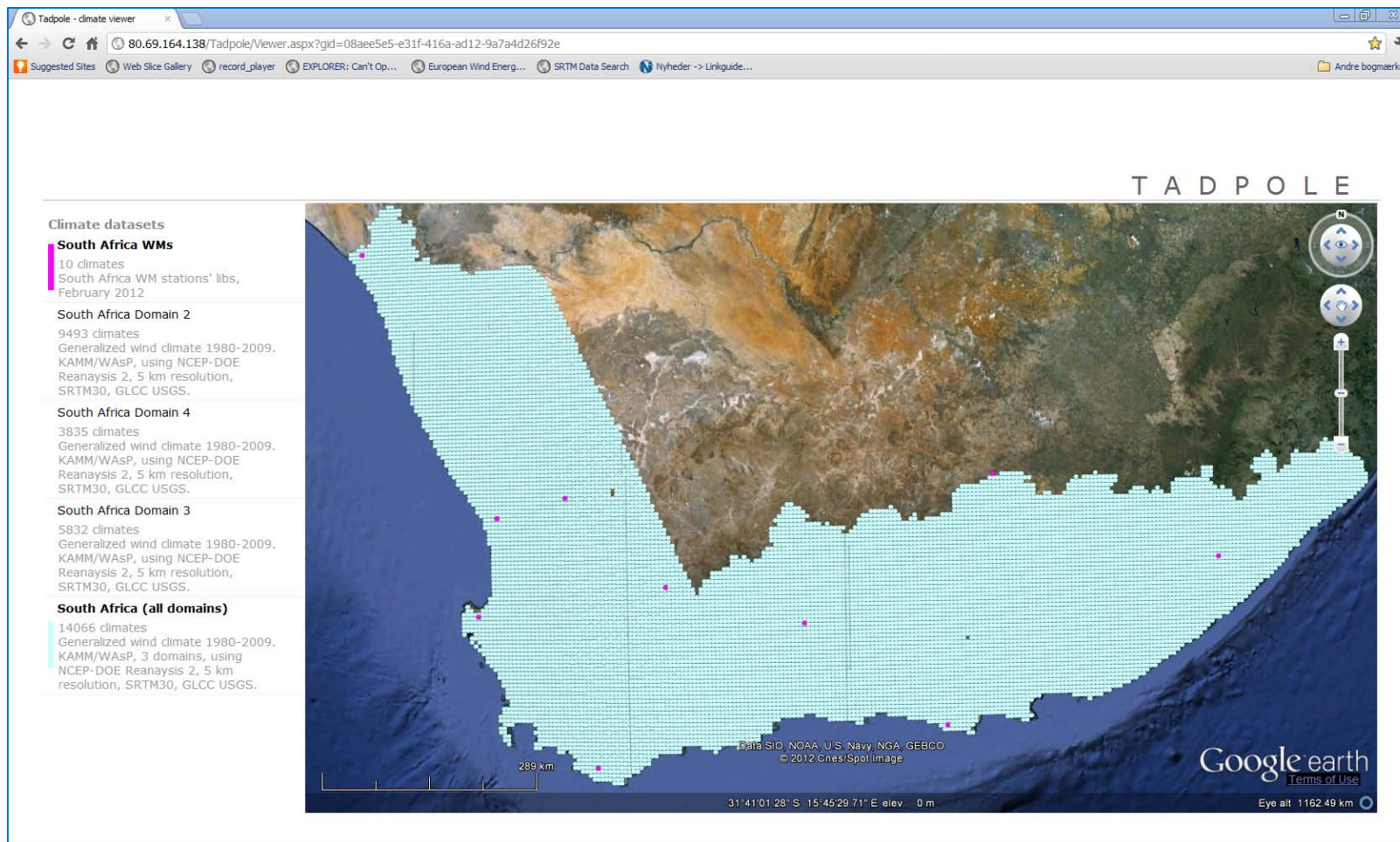
- General information about WASA project
 - www.wasaproject.info
 - www.saneri.org.za/wind_atlas.htm
- WRF wind forecasts are available on
 - veaonline.risoe.dk/wasa
- CSIR online – display of measured data
 - www.wasa.csir.co.za
- WASA met. data download site (monthly files)
 - wasadata.csir.co.za/wasa1/WASAData
- WASA wind atlas download site **NEW!**
 - wasadata.csir.co.za/wasa1/WASAData

WASA Wind Atlas download site

- First Numerical Wind Atlas – Tadpole
 - The Tadpole web interface uses the Google Earth plug-in
 - Google Chrome 1.0+, Internet Explorer 7+ (32-bit) and Firefox 2.0+
- Observational Wind Atlas
 - WASP data and workspaces
- Case studies
 - Wind farm and wind resource mapping examples
- Reports and guidelines
 - WASA reports and general WASP guidelines
- Map data and tools
 - SRTM 3 elevation data, SWBD water body data, Google Earth
- Software
 - Using WASP as a data viewer (reader) and for microscale modelling

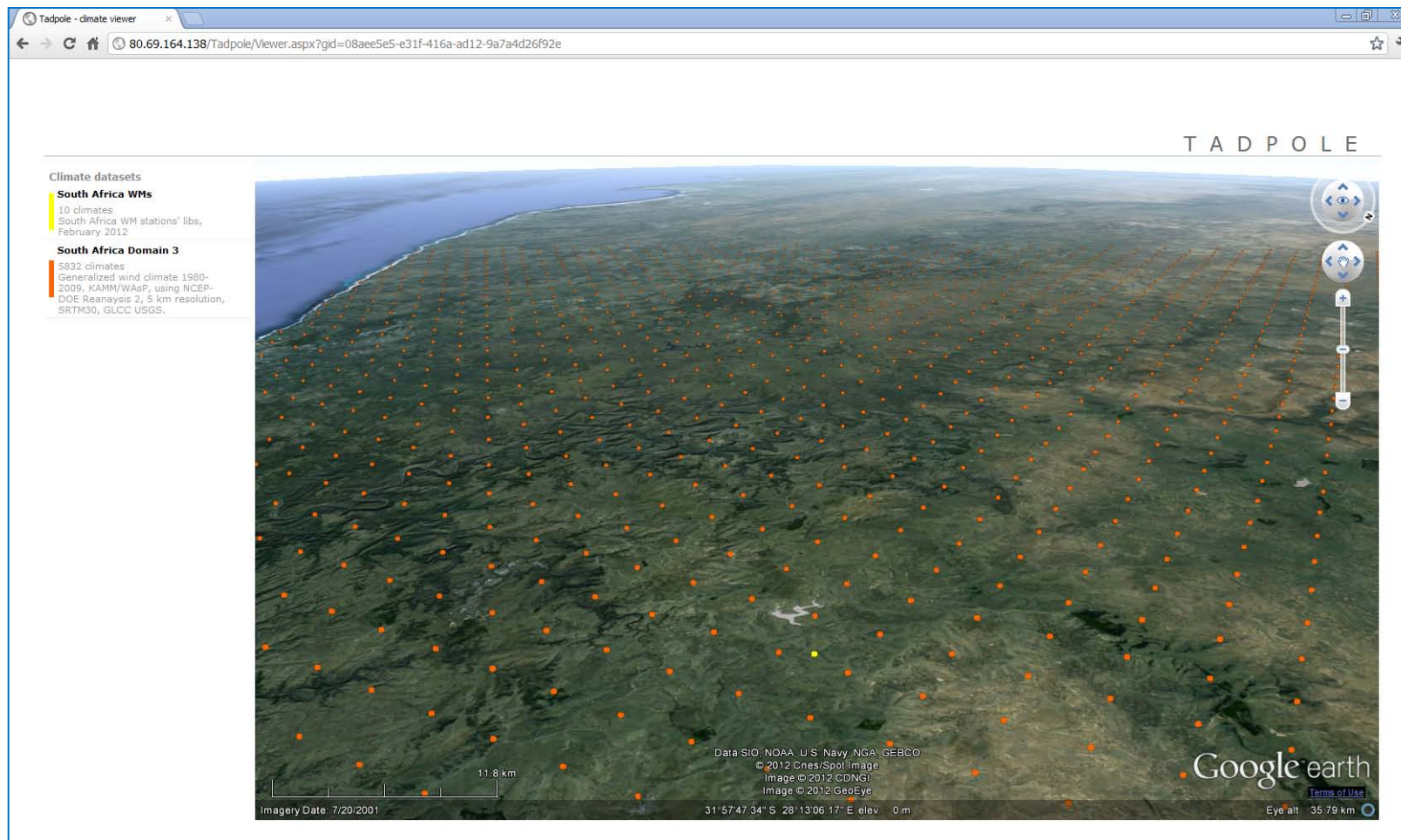
Numerical wind atlas

Tadpole: interface to wind atlas results



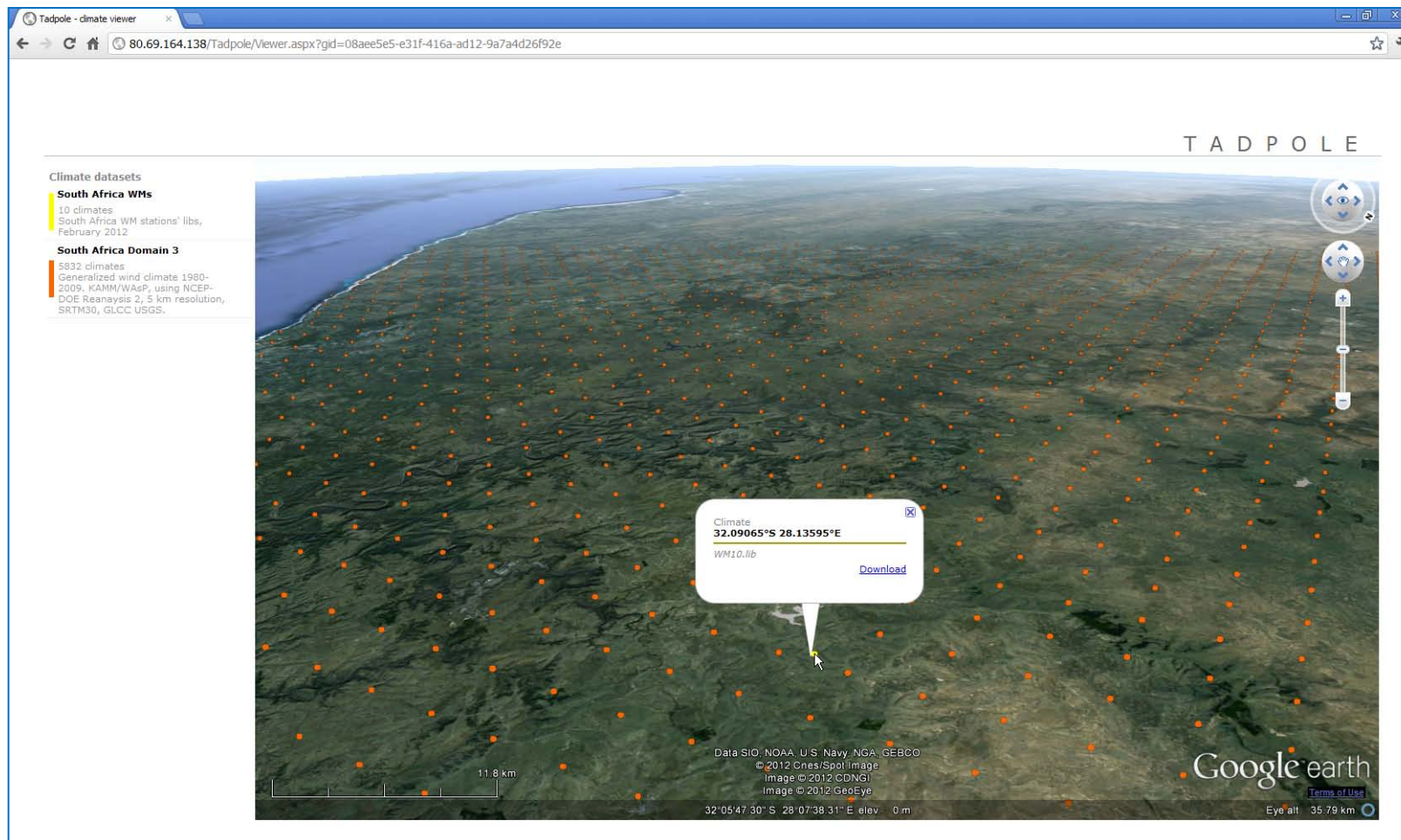
Numerical wind atlas

Tadpole: WM10 (●) and mesoscale grid points (●)



Numerical wind atlas

Tadpole: download of data from WM10 (just click!)



Climate datasets

- South Africa WMs**
 - 10 climates
 - South Africa WM stations' lbs, February 2012
- South Africa Domain 3**
 - 5832 climates
 - Generalized wind climate 1980-2009: KAMM/WASP, using NCEP-DOE Reanalysis 2, 5 km resolution, SRTM30, GLCC USGS.

Climate
32.09065°S 28.13595°E
WM10.lbs [Download](#)

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2012 Cnes/Spot Image
Image © 2012 CDNGI
Image © 2012 GeoEye

Google earth [Terms of Use](#)

Eye alt 35.79 km

Numerical wind atlas

Tadpole: download of data from NWA grid point

TADPOLE

Climate datasets

- South Africa WMs**
10 climates
South Africa WM stations' lib, February 2012
- South Africa Domain 3**
5832 climates
Generalized wind climate 1980-2009; KAMM/WASP, using NCEP-DOE Reanalysis 2; 5 km resolution, SRTM30, GLCC USGS.

Climate
32.076°S 27.933°E
SA3050_03_27.933E_32.076S_7.4_5.lib
[Download](#)

11.8 km

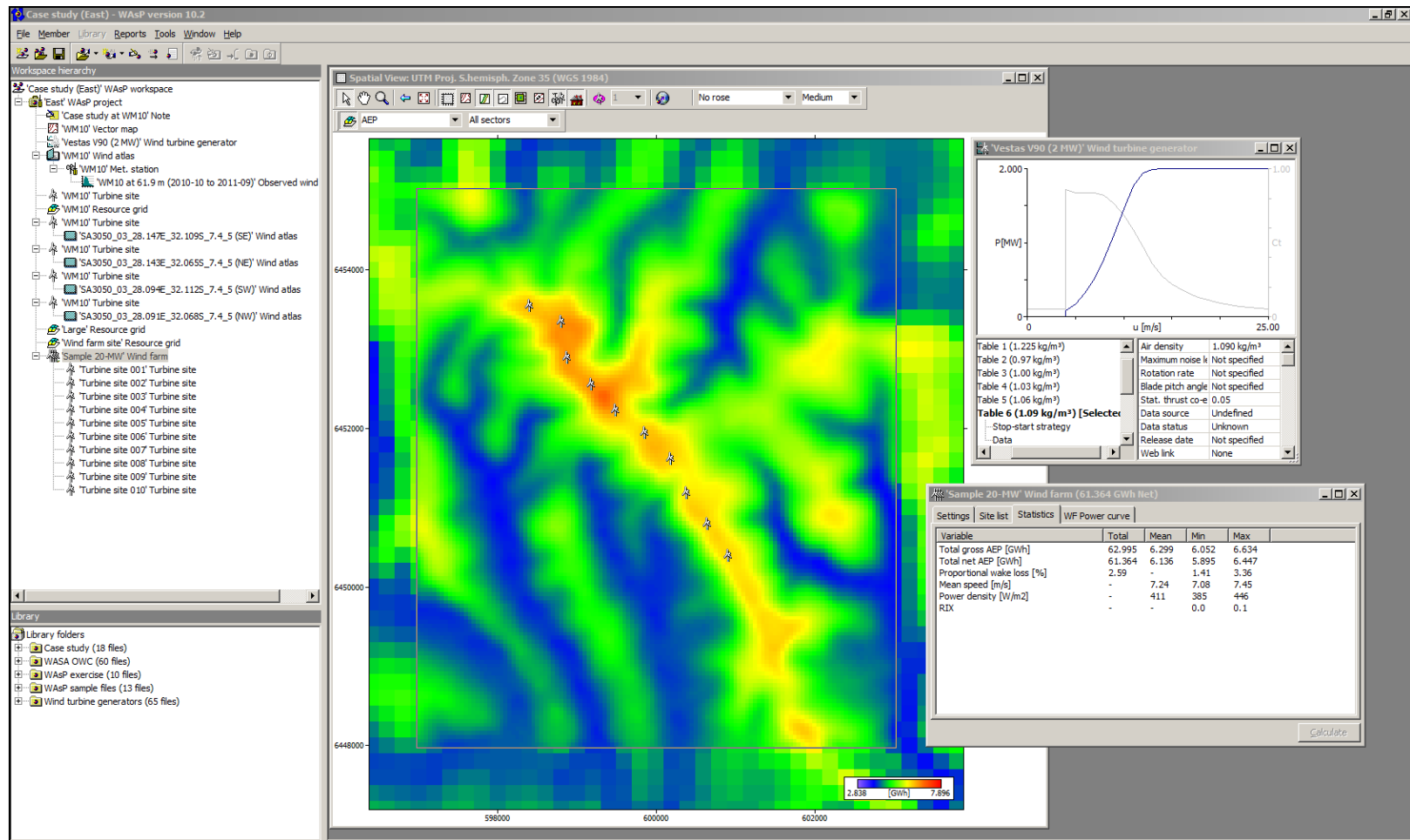
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2012 Cnes/Spot Image
Image © 2012 CDNGI
Image © 2012 GeoEye

Google Earth
[Terms of Use](#)

32° 04' 53.00" S 27° 55' 23.50" E elev 0 m Eye alt 35.79 km

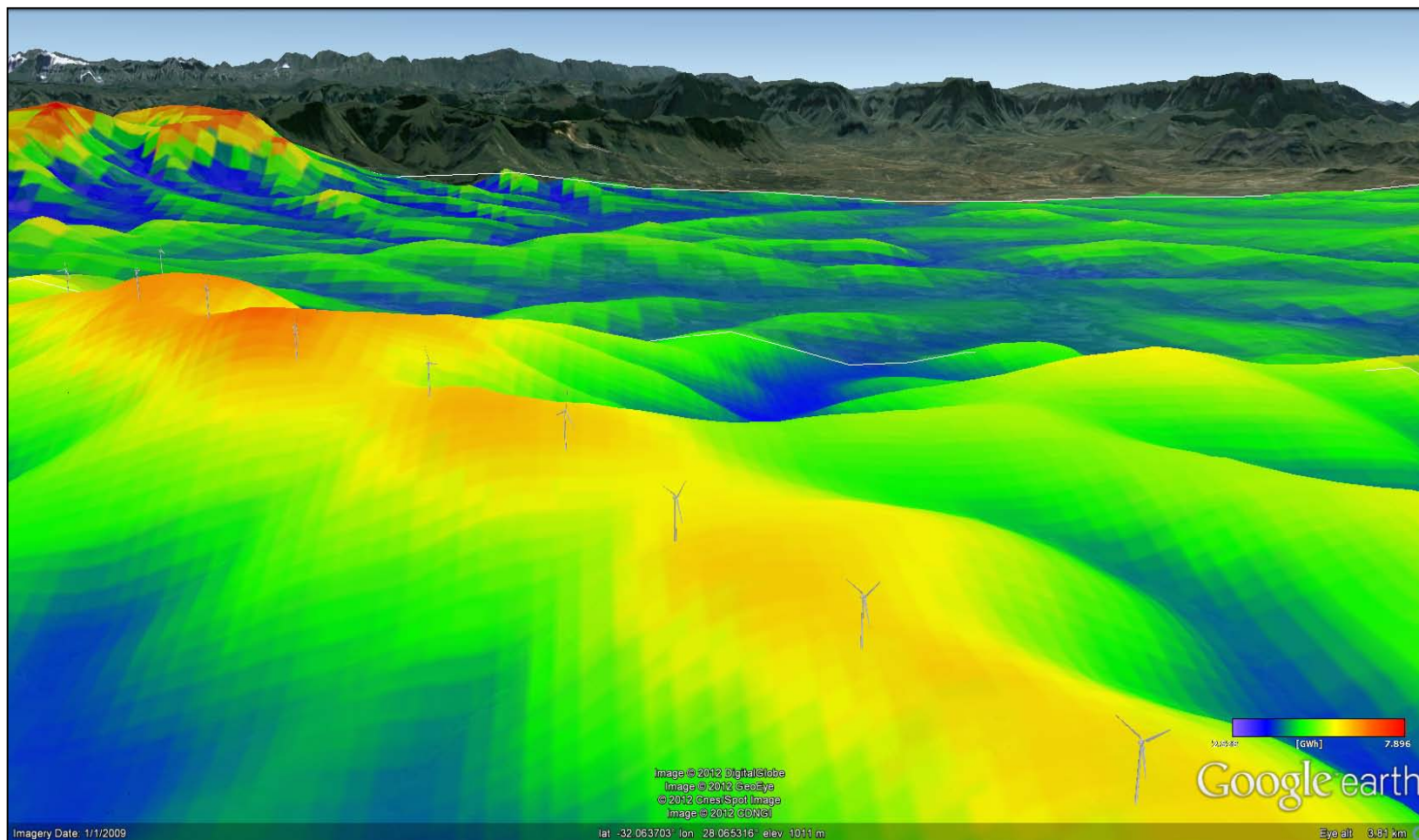
Case study 1

Sample wind farm project in WAsP



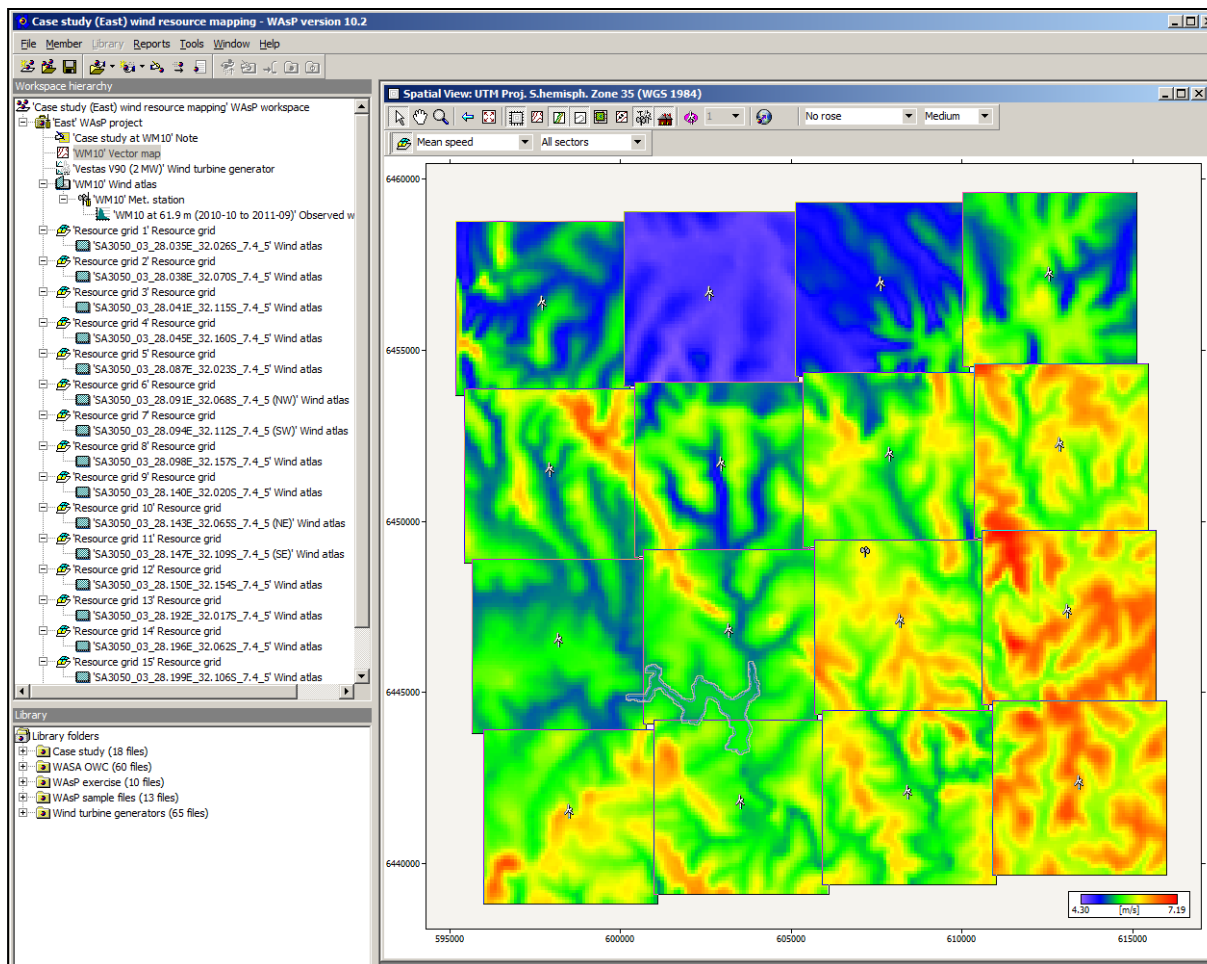
Case study 1

Sample wind farm project in Google Earth



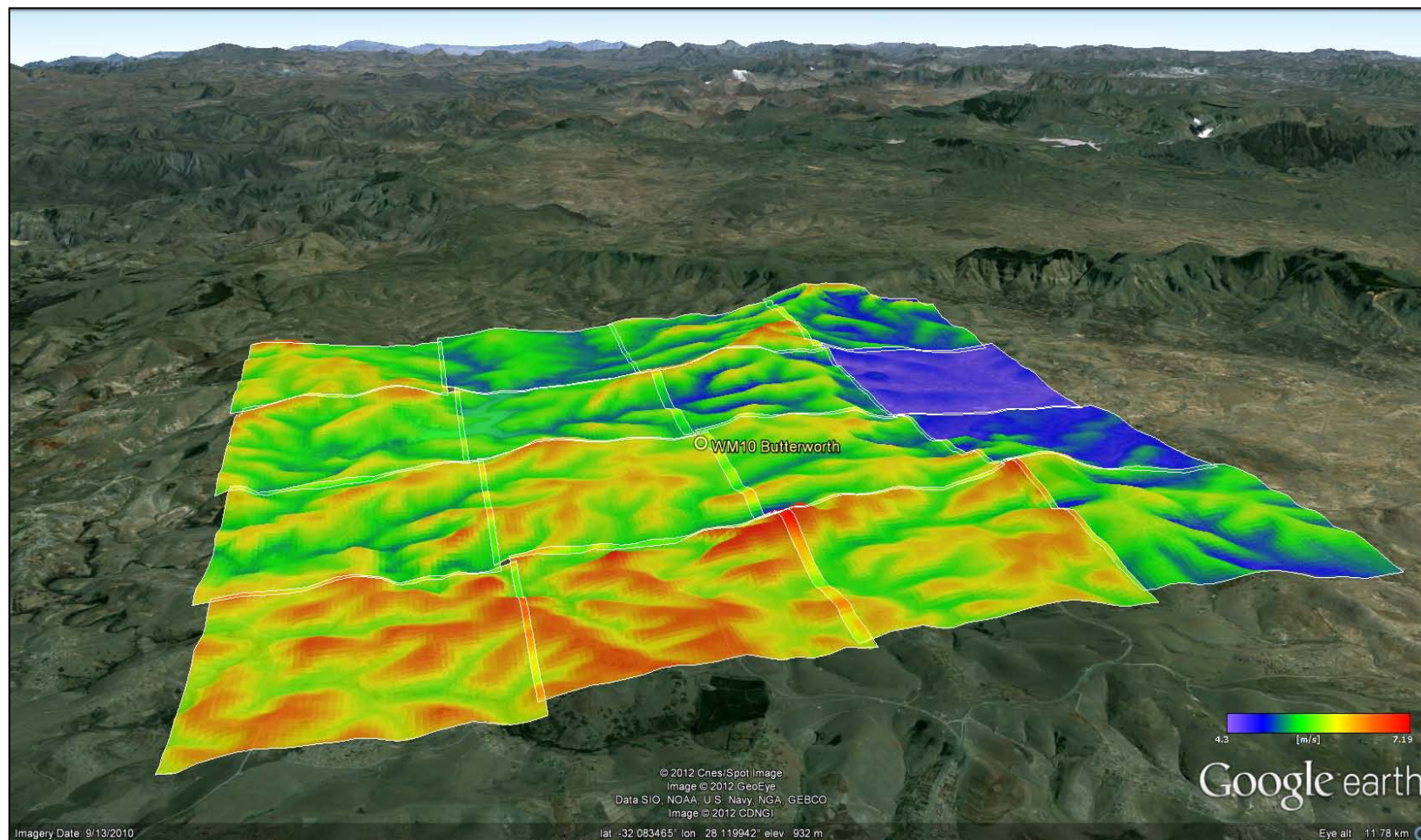
Case study 2

Resource mapping using the numerical wind atlas



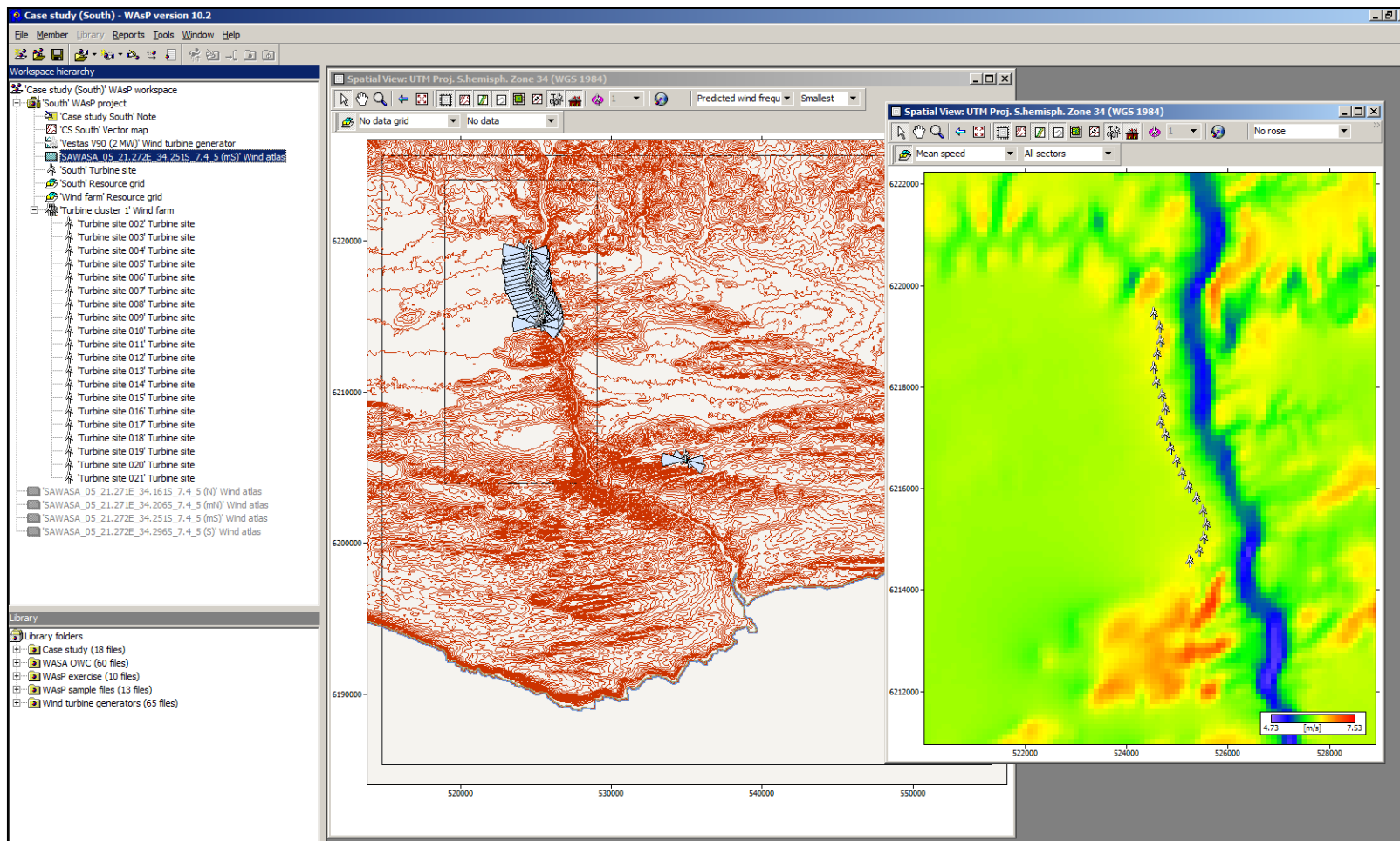
Case study 2

Resource mapping using the numerical wind atlas



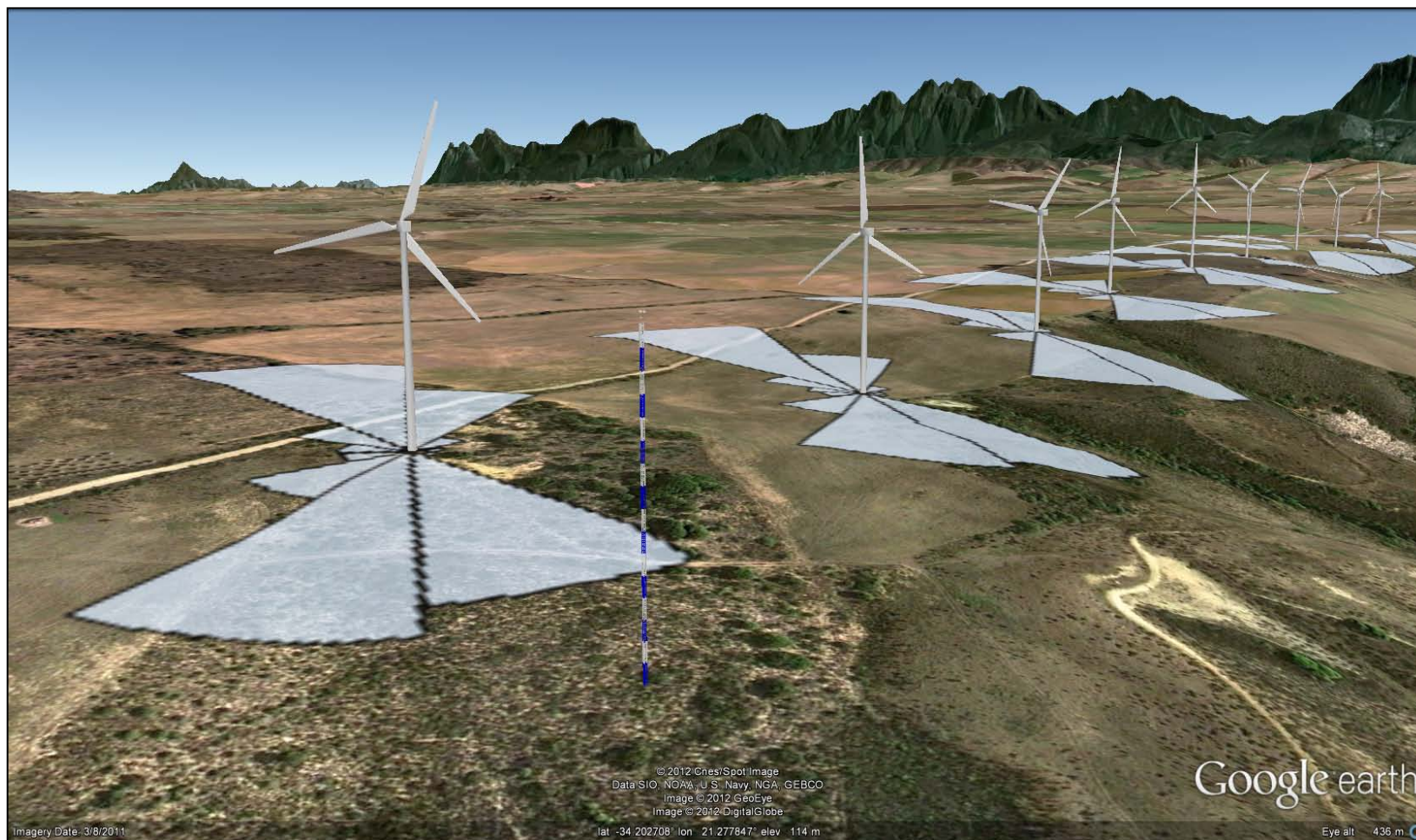
Case study 3

Designing a new project, including met. mast



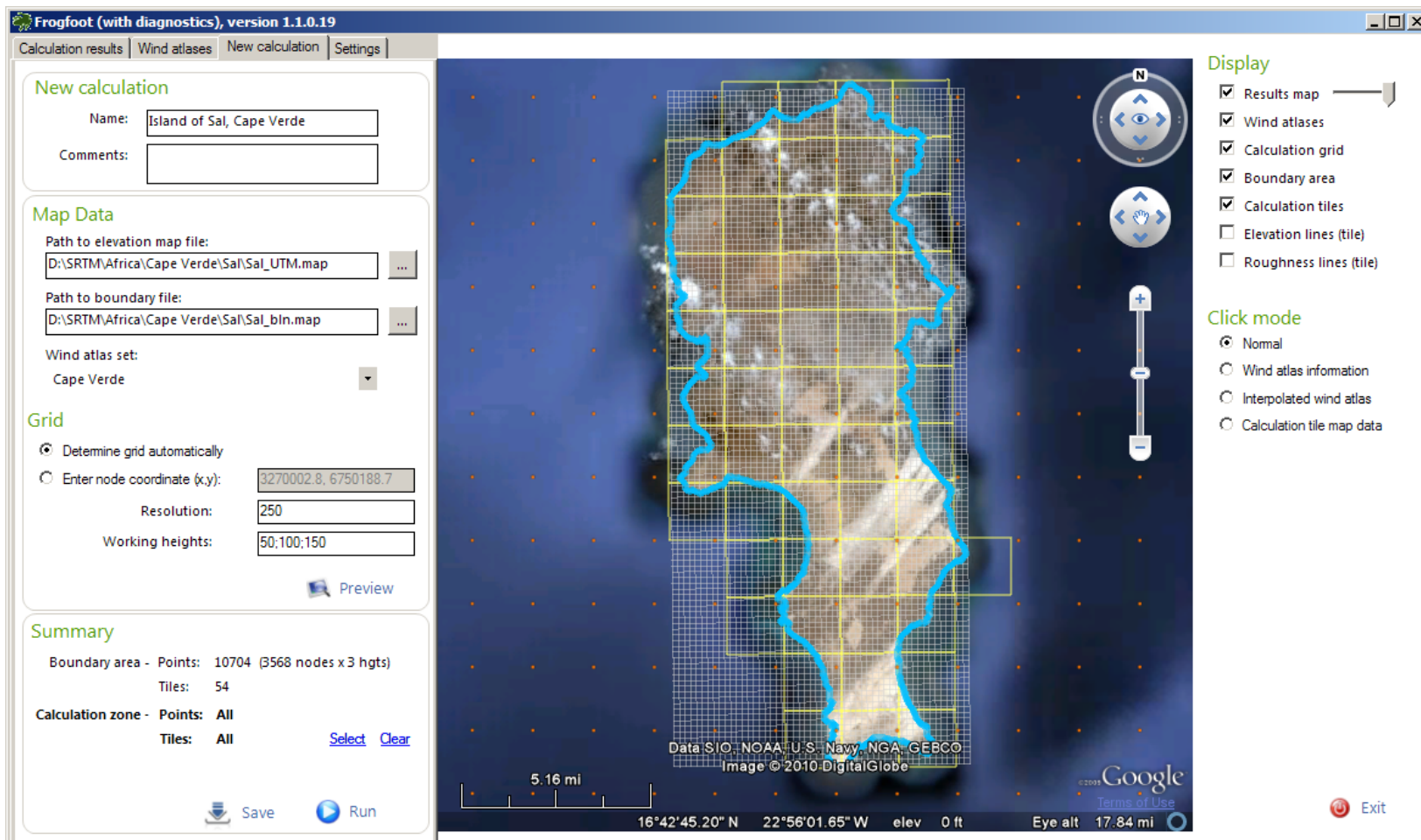
Case study 3

Designing a new project, including met. mast



Phase II

Microscale modelling over large areas



Frogfoot (with diagnostics), version 1.1.0.19

Calculation results | Wind atlases | New calculation | Settings

New calculation

Name:

Comments:

Map Data

Path to elevation map file: ...

Path to boundary file: ...

Wind atlas set:

Grid

Determine grid automatically

Enter node coordinate (x,y):

Resolution:

Working heights:

[Preview](#)

Summary

Boundary area - Points: 10704 (3568 nodes x 3 hghts)
 Tiles: 54

Calculation zone - Points: All
 Tiles: All [Select](#) [Clear](#)

[Save](#) [Run](#)

Display

- Results map
- Wind atlases
- Calculation grid
- Boundary area
- Calculation tiles
- Elevation lines (tile)
- Roughness lines (tile)

Click mode

- Nomal
- Wind atlas information
- Interpolated wind atlas
- Calculation tile map data

5.16 mi

16°42'45.20" N 22°56'01.65" W elev 0 ft Eye alt 17.84 mi

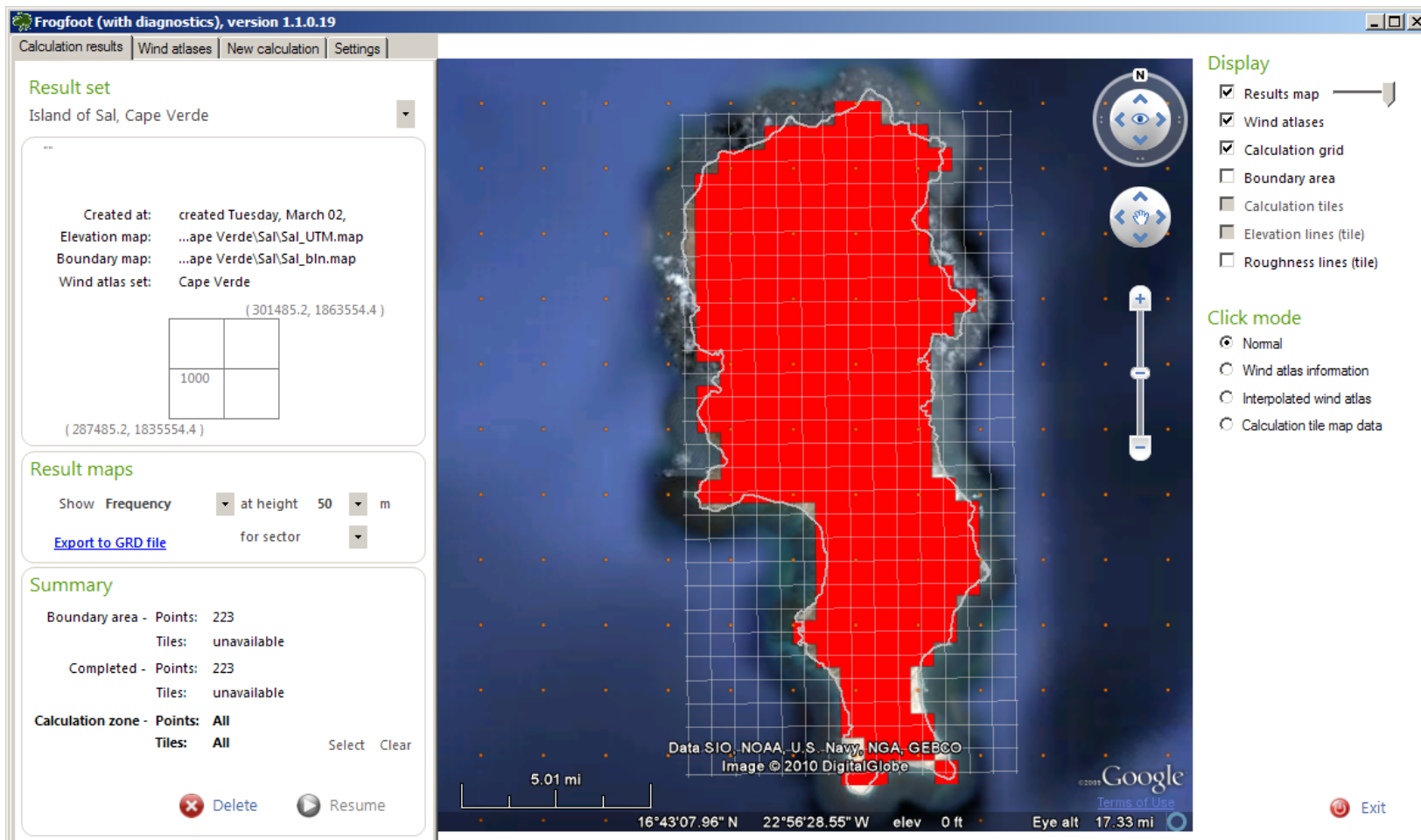
Data S/O: NOAA, U.S. Navy, NGA, GEBCO
 Image © 2010 DigitalGlobe

Google
 Terms of Use

[Exit](#)

Phase II

Automated setup and modelling (Frogfoot)



Frogfoot (with diagnostics), version 1.1.0.19

Calculation results | Wind atlases | New calculation | Settings

Result set
Island of Sal, Cape Verde

Created at: created Tuesday, March 02,
Elevation map: ...ape Verde\SaI\SaI_UTM.map
Boundary map: ...ape Verde\SaI\SaI_bln.map
Wind atlas set: Cape Verde

(301485.2, 1863554.4)
1000
(287485.2, 1835554.4)

Result maps
Show Frequency at height 50 m
Export to GRD file for sector

Summary
Boundary area - Points: 223
Tiles: unavailable
Completed - Points: 223
Tiles: unavailable
Calculation zone - Points: All
Tiles: All Select Clear

Delete Resume

Display
 Results map
 Wind atlases
 Calculation grid
 Boundary area
 Calculation tiles
 Elevation lines (tile)
 Roughness lines (tile)

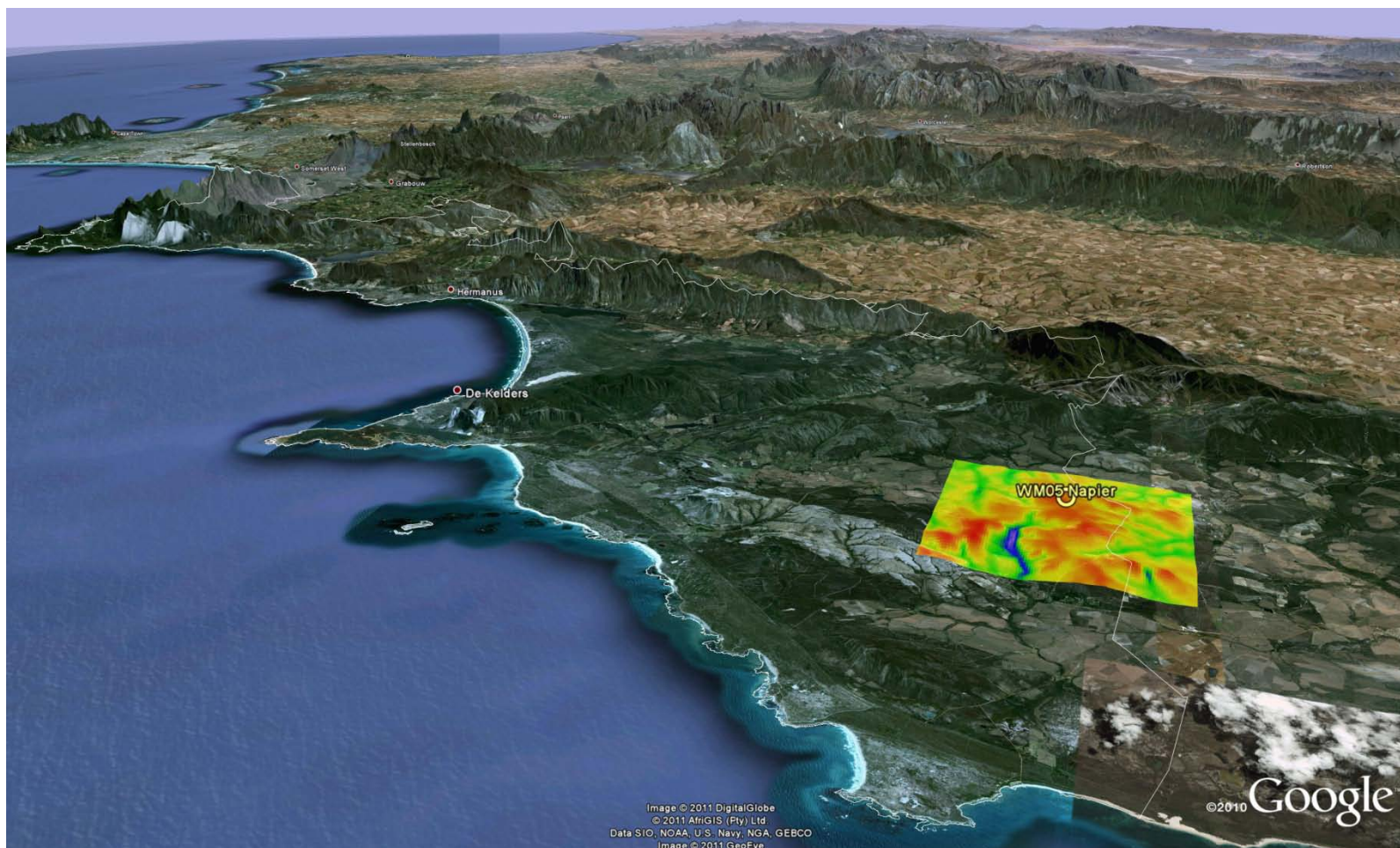
Click mode
 Normal
 Wind atlas information
 Interpolated wind atlas
 Calculation tile map data

5.01 mi
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2010 DigitalGlobe
Google
Eye alt 17.33 mi
Exit

16°43'07.96" N 22°56'28.55" W elev 0 ft

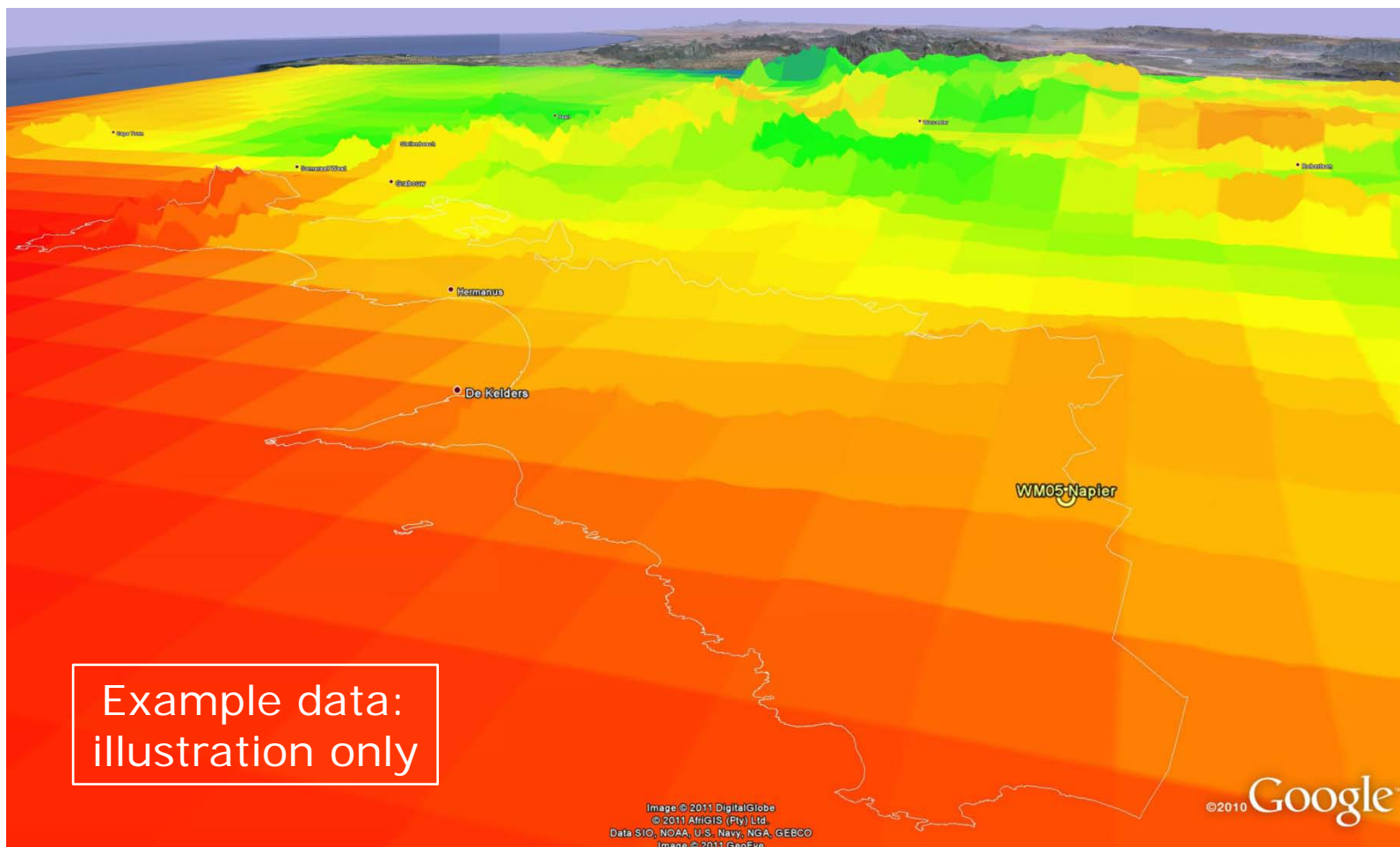
Overstrand example

Microscale modelling results @ WM05



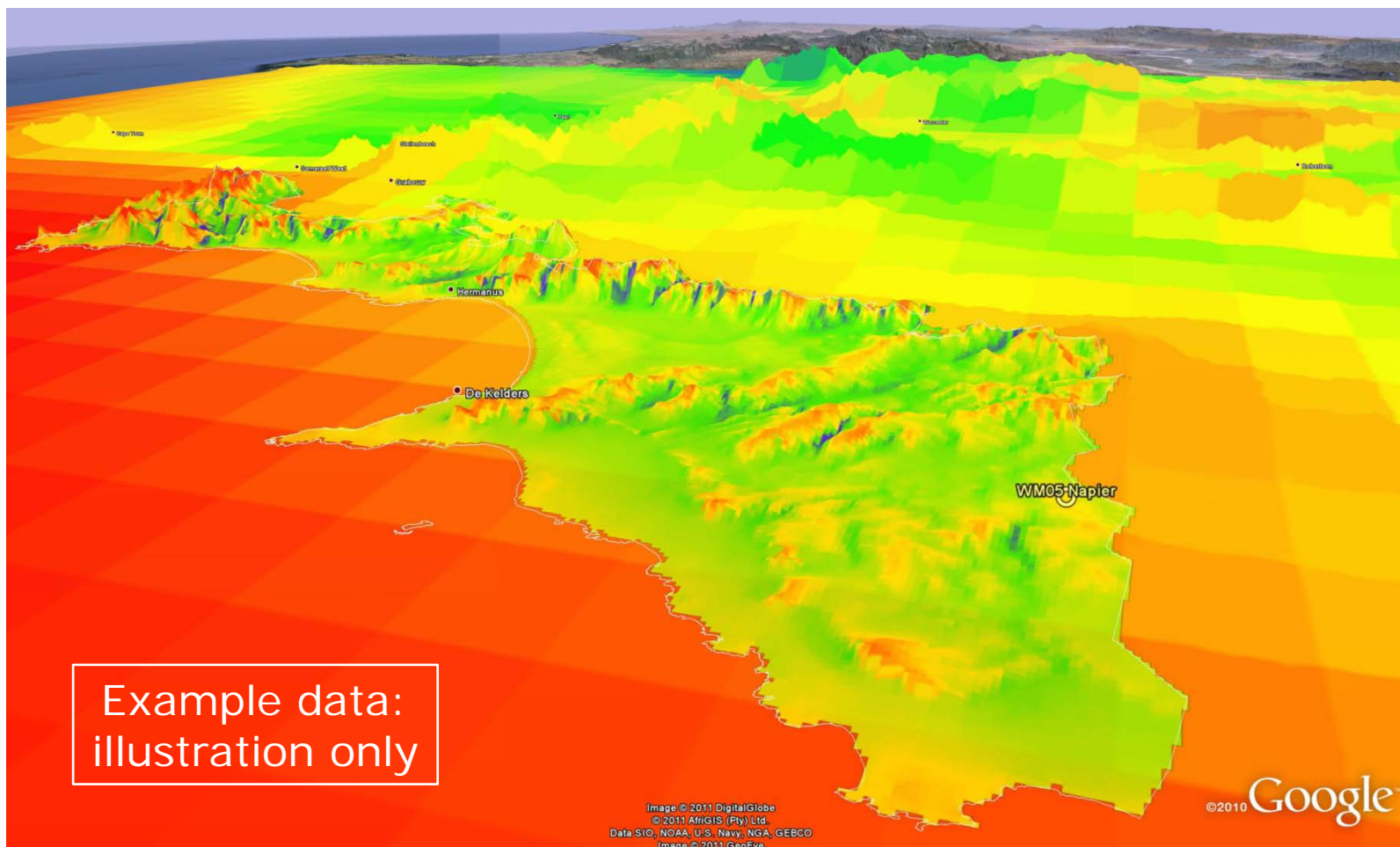
Overstrand example

Mesoscale modelling results in $5 \times 5 \text{ km}^2$ grid



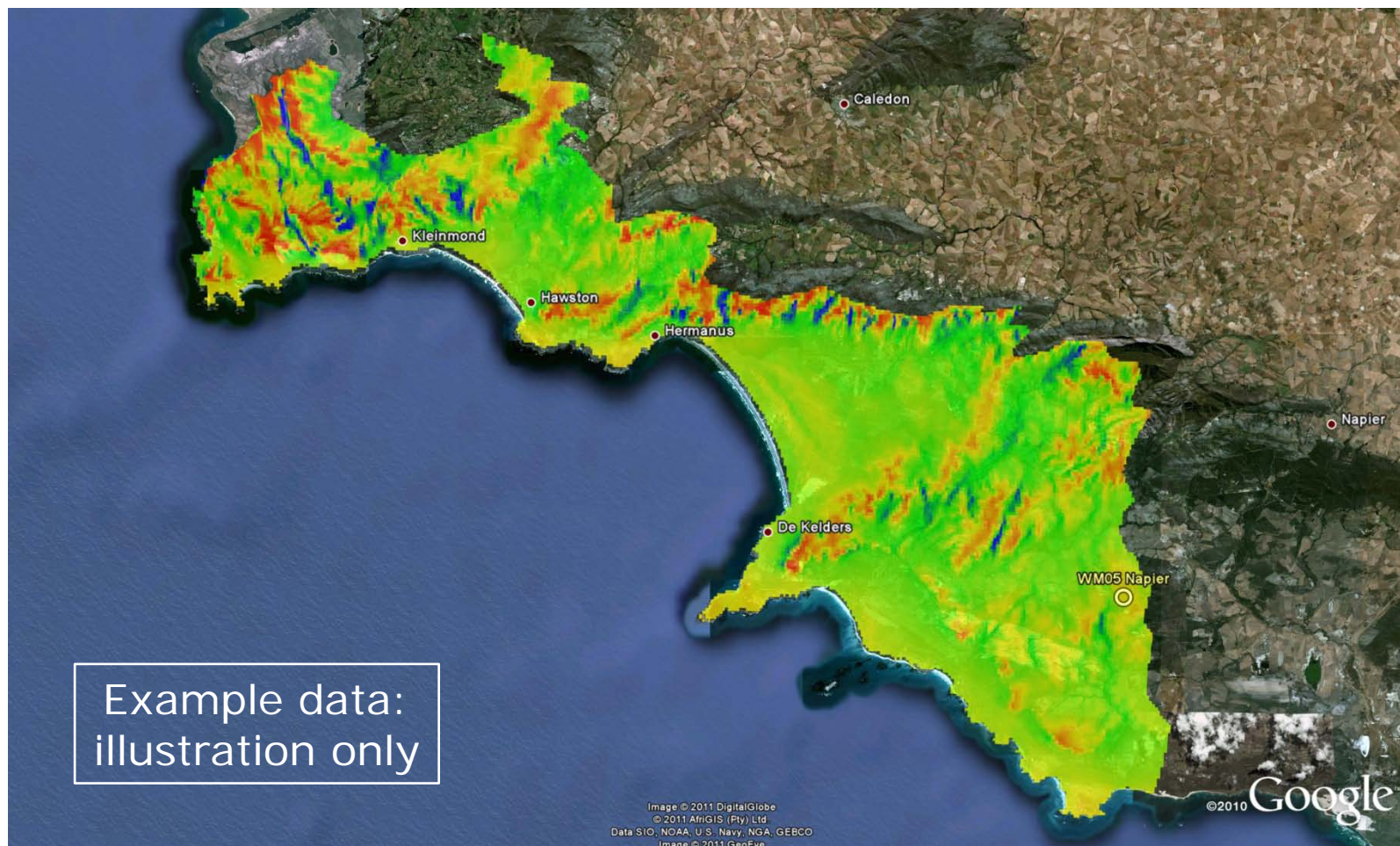
Overstrand example

Meso- and microscale results



Overstrand example

Wind resource mapping in Phase II



User feedback is important!

- All data, model results and descriptions are available in public domain!
- WASA numerical wind atlas can provide a first estimate of the wind resource anywhere in the WASA study area.
- If and when you apply the numerical wind atlas (or the mast data), we would like to learn about your experiences.
- One way of providing feed back is to fill out the WASA Questionnaire:
 - [Questionnaire](#)