

# Satellite Derived Bathymetry

High-resolution shallow water bathymetry

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# Motivation

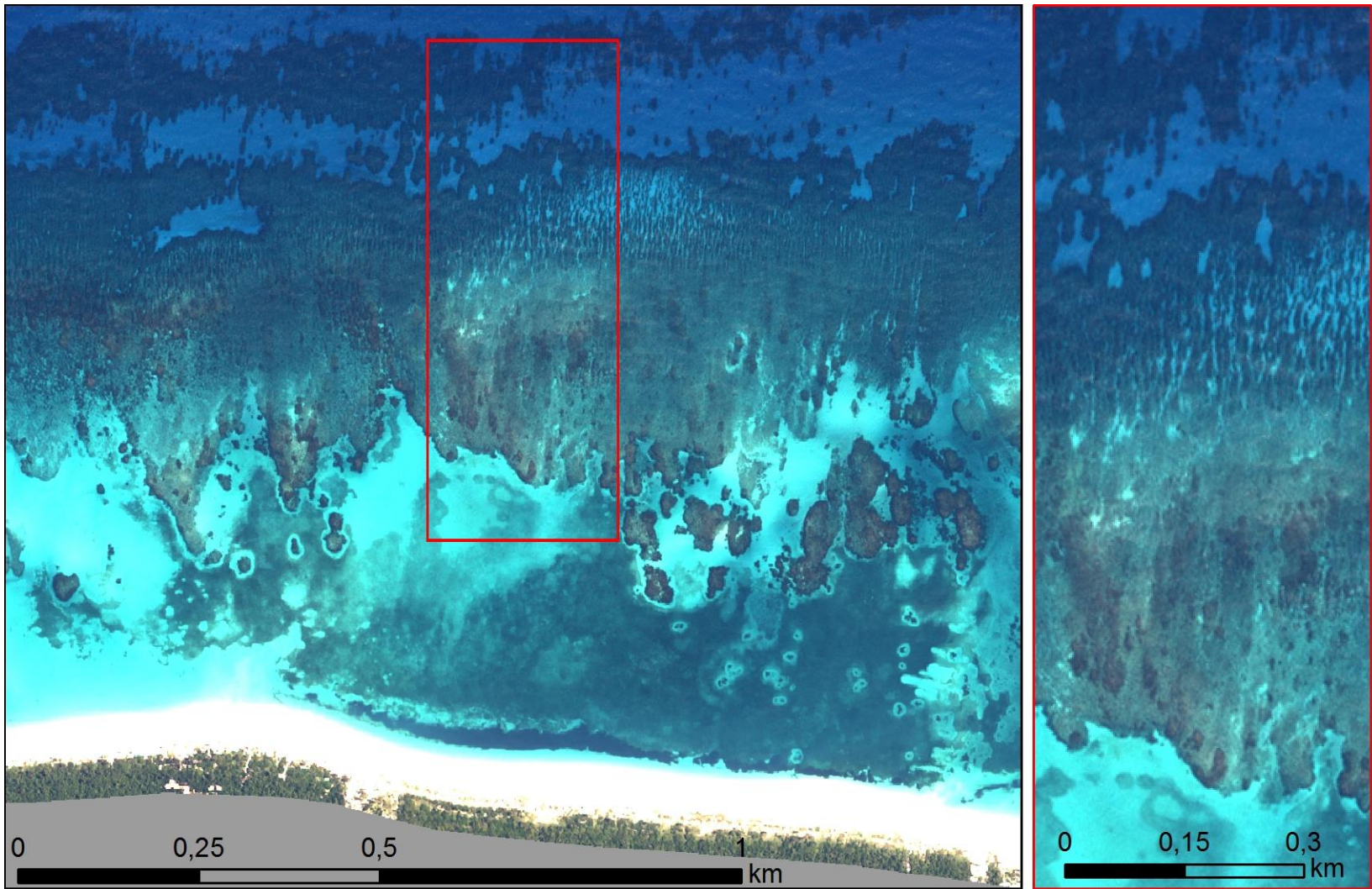
Data gaps?    Reconnaissance?    Change mapping?





# Raw satellite imagery

Radiance at sensor



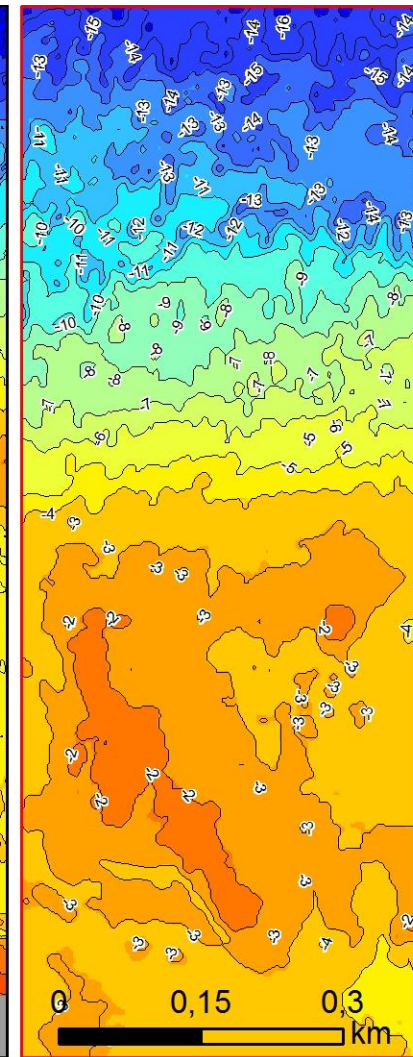
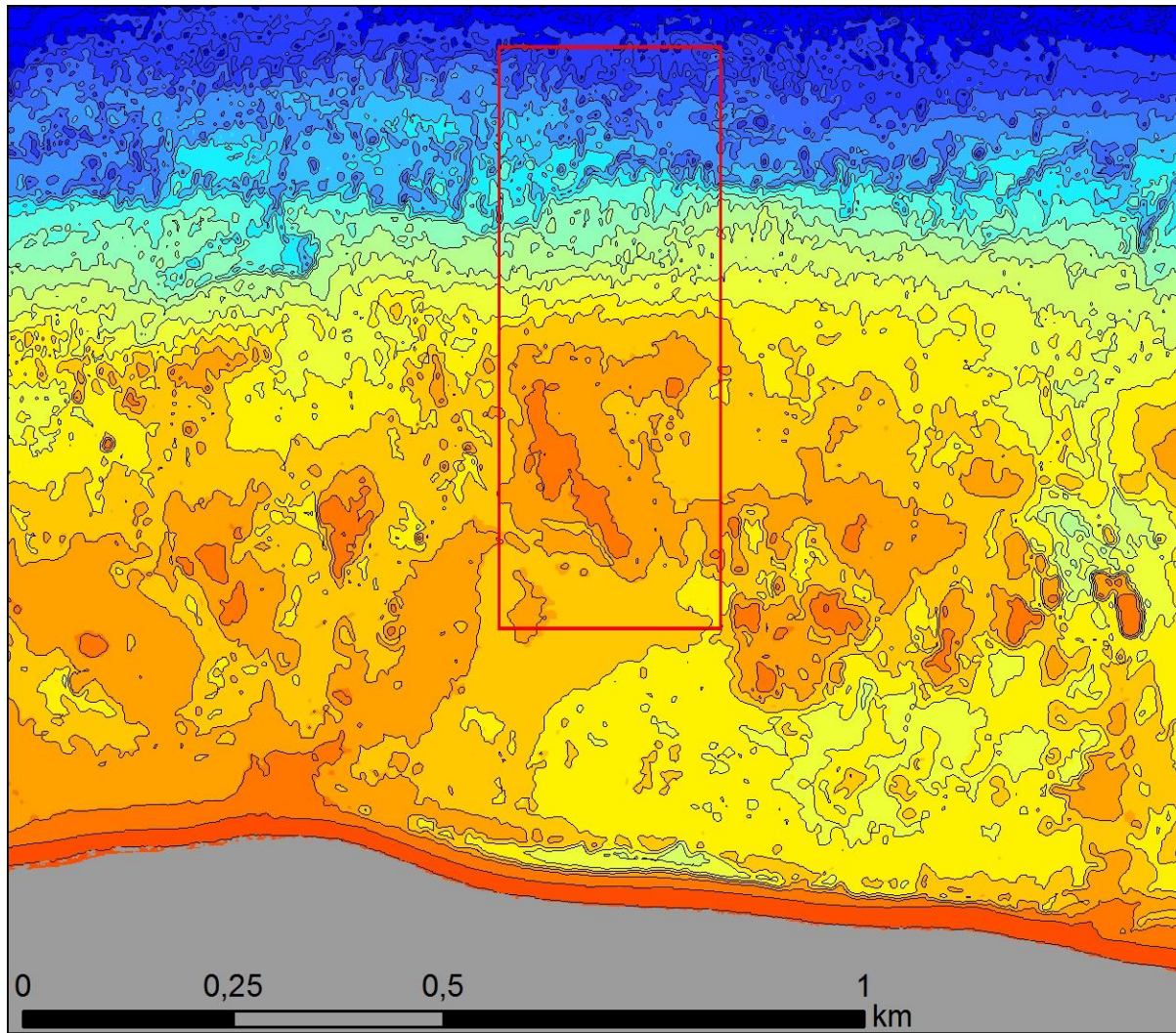
Mexico, Yucatan coastline, 2m resolution

EOMAP data processing, Digitalglobe Worldview-2 satellite

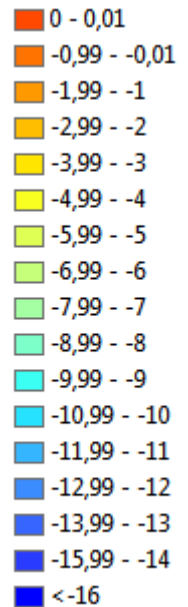


# Satellite Derived Bathymetry SDB, 2m resolution

Georeferenced and tidal correction applied



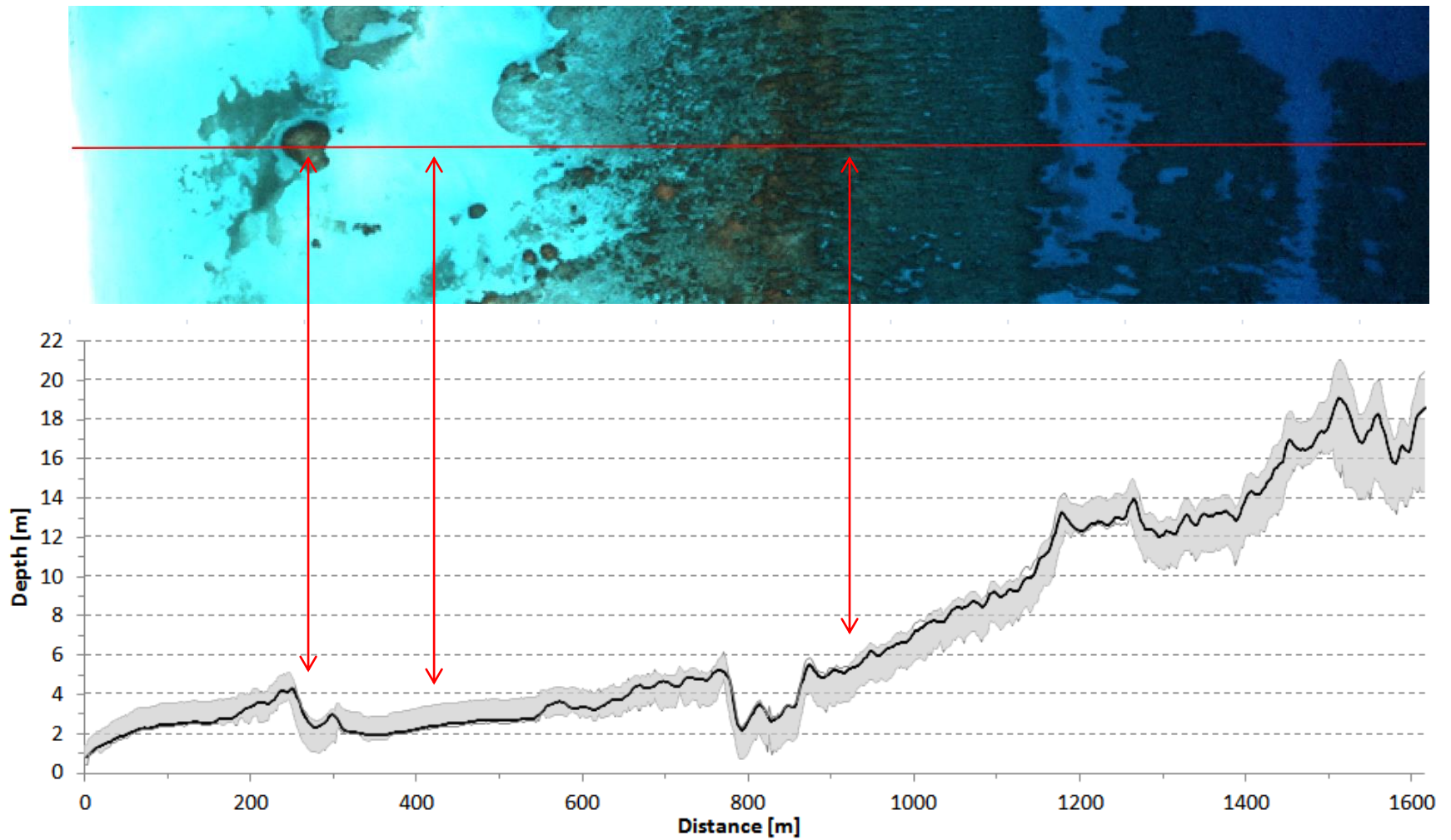
Bathymetry [m]



Mexico, Yucatan coastline, 2m resolution

EOMAP data processing, Digitalglobe Worldview-2 satellite

# Uncertainties: Plot 1





# Satellite „raw“ image using GoogleEarth



## Correction applied:

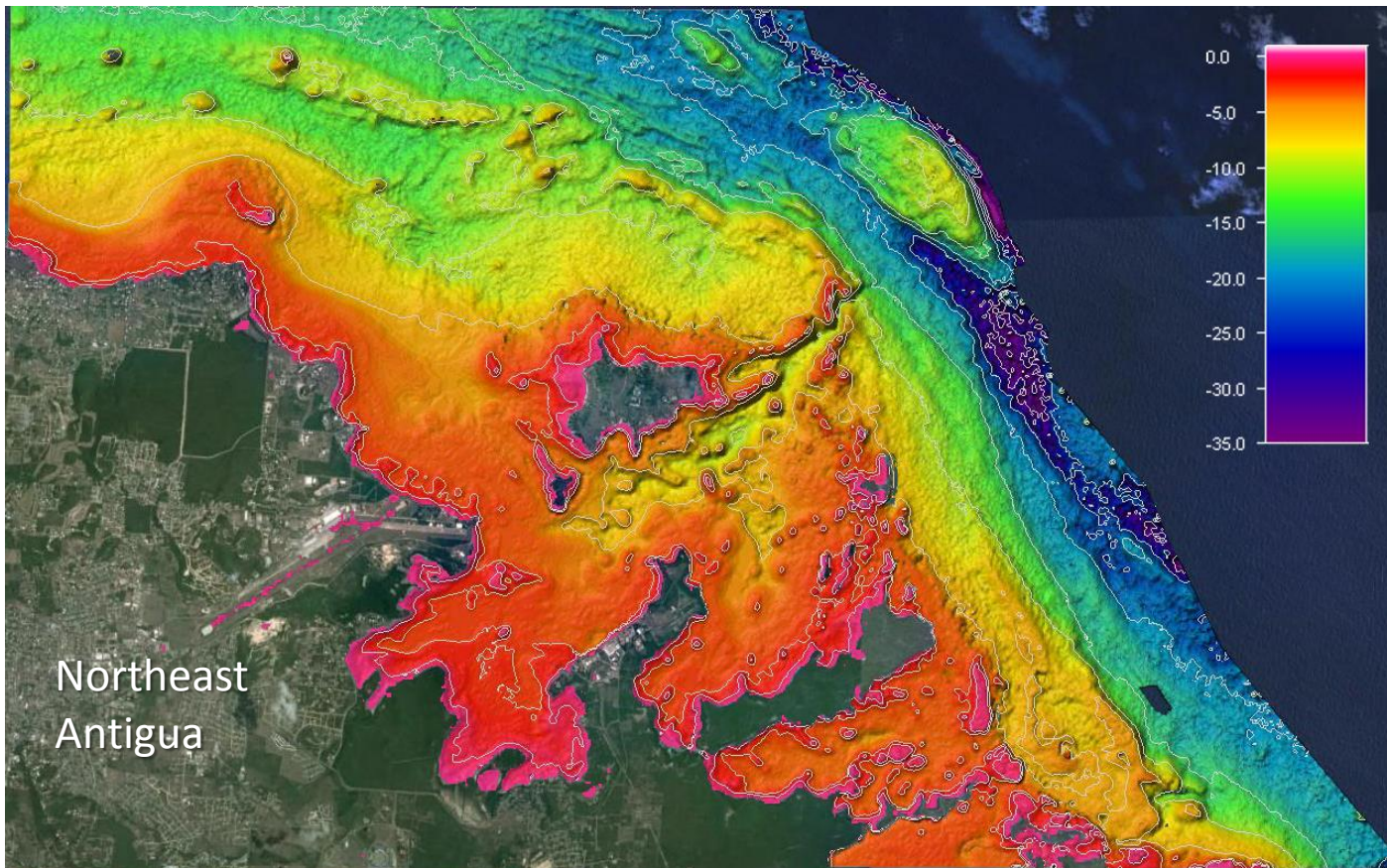
- ✘ Atmosphere and adjacency
- ✘ Water surface effects
- ✘ Water column



Provides general information, but typically not well suited for aquatic and benthic analysis

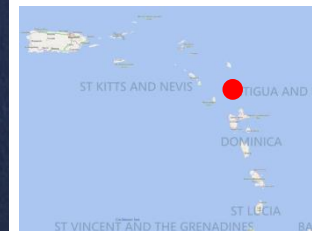
# Satellite Derived Bathymetry

for shallow waters up to the 35m contour



## Correction applied:

- ✓ Atmosphere and adjacency
- ✓ Water surface effects
- ✓ Water column



Sat. data used:  
Moderate res. (15m grid)

Provides bathymetric information in a dense grid. Data are mapped using EOMAP's physics based inversion algorithms, which has been applied in more than 40 areas worldwide.

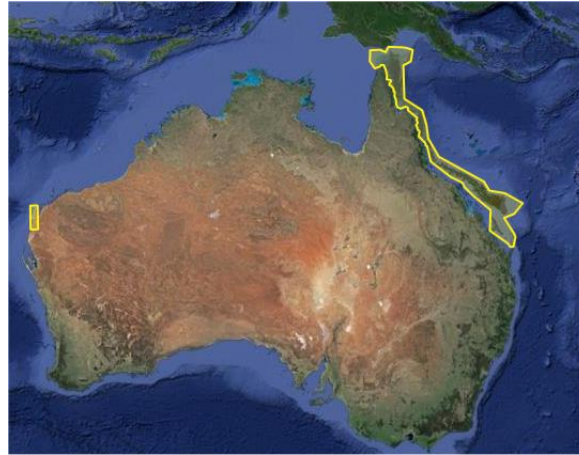
Antigua

EOMAP data processing, USGS Landsat-8 imagery





# Off-the-shelf BATHYMETRY



Off-the shelf catalogue

Resolutions: 30m, 5m, 2m

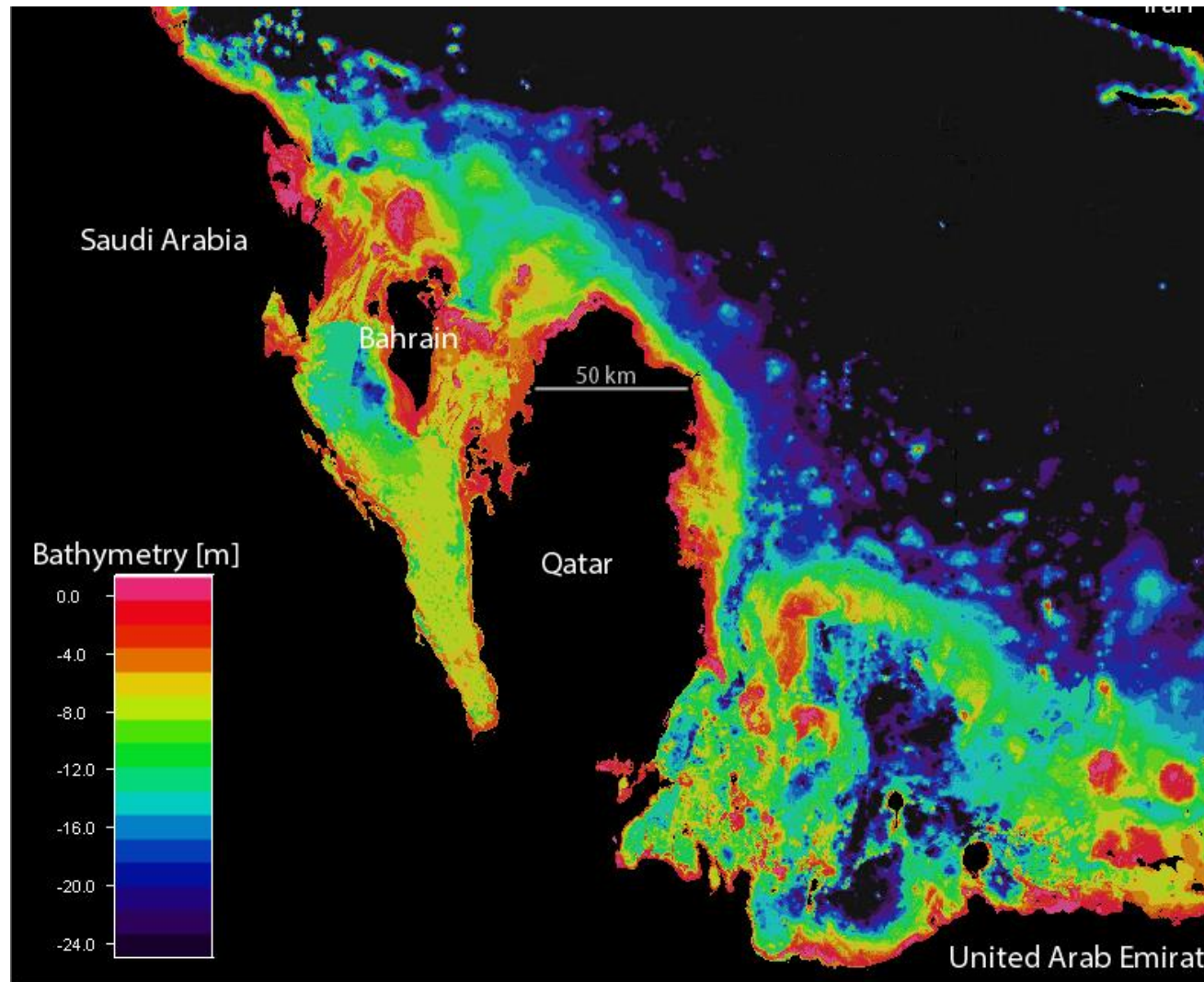
<http://www.eomap.com/off-the-shelf-data>





# SDB Basemaps in 15/30m resolution

Extended spatial coverage, available for many countries

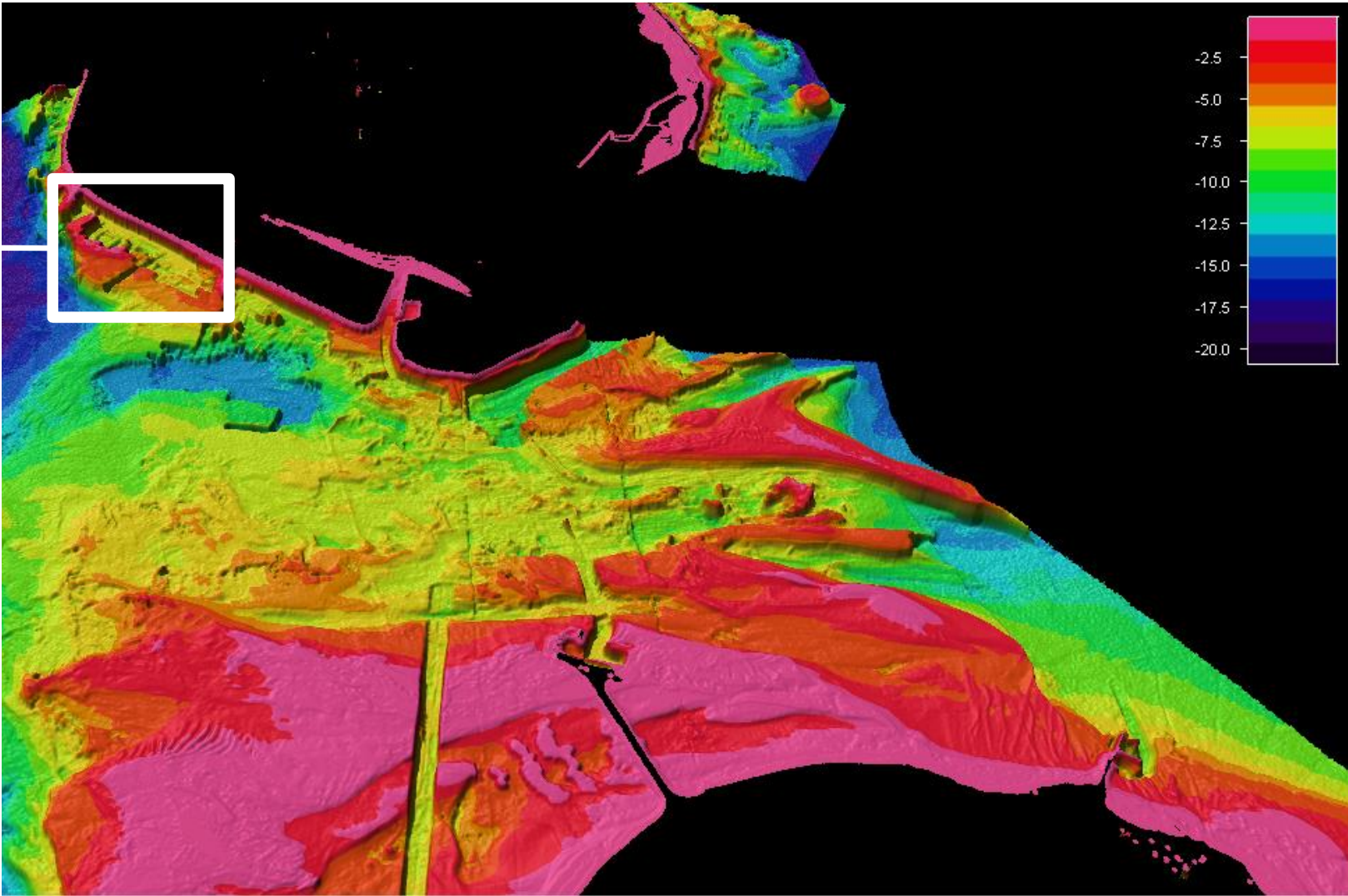


Next slide

# SDB 2m resolution

Sir Bani Yas Island, Abu Dhabi

Next slide



Contains copyrighted material of DigitalGlobe





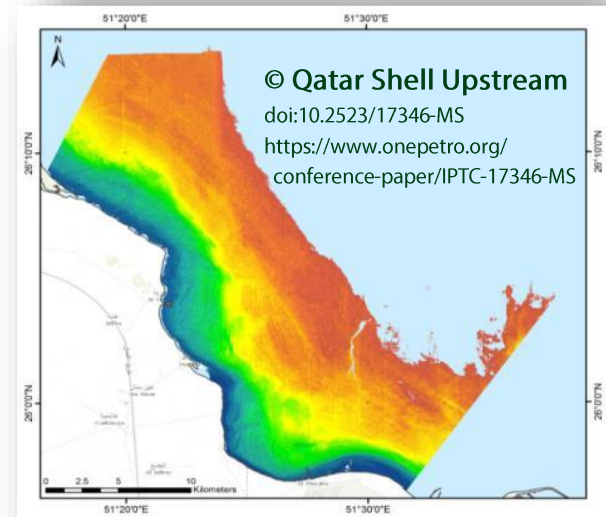
# Use case: Shell Qatar survey

Client	Shell Qatar
Location	North East Qatar
AOI size	740 sq km
Duration	2 weeks in 2011
Objective	Bathymetry and Seafloor habitat mapping for seismic survey



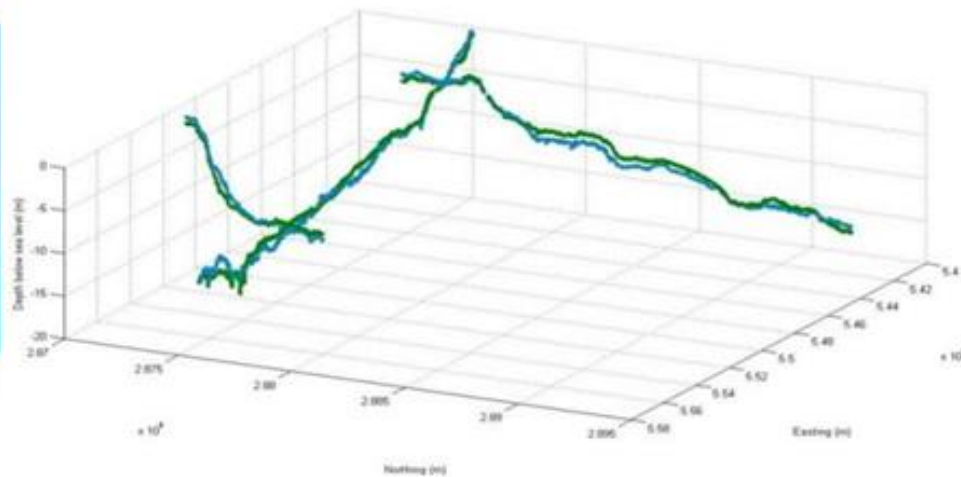
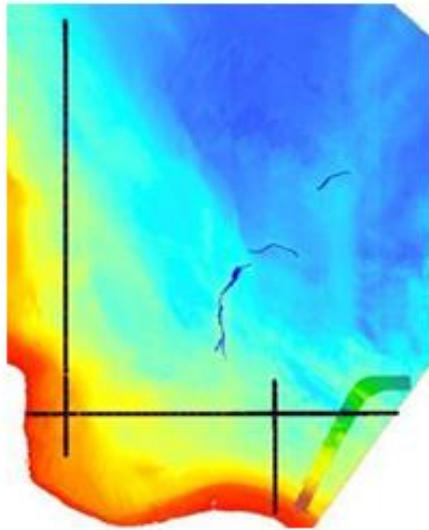
- *Significant cost savings > 1Mill \$*
- *HSSE risks mitigated*
- *Project schedule efficiently supported*
- *Key technology to aid the planning and preparation of seismic surveys.*

J. Siermann (SHELL) et al. 2014 published in:  
<https://www.onepetro.org/conference-paper/IPTC-17346-MS>



# Use case: Shell Qatar survey

## VERIFICATION - BATHYMETRY



Comparison for bathymetry from satellite (in blue) against LIDAR bathymetry (in green) along 3 calibration lines

Average absolute error: 60cm

Sounding vs. Satellite (meter)	
Mean Diff	0.25
Mean Abs Diff	0.60
RMSQE	0.73



# World's first bathymetry map

<b>Client</b>	None
<b>Location</b>	Great Barrier Reef, East Australia
<b>AOI size</b>	350,000 sq km
<b>Duration</b>	4 months in 2013
<b>Objective</b>	World's first bathymetry map in high resolution for the largest reef system on earth.



*“This information is regarded as essential for any government or company involved with managing the [Great Barrier] reef environment.”*

Professor Stuart Phinn, University of Queensland

*“Well done to the EOMAP team and you set a very high bench-mark for others to follow using these SBD [Satellite Derived Bathymetry] methods.”*

Dr Robin Beaman, School of Earth and Environmental Sciences, James Cook University



# Rush delivery of bathymetric data within 24 hours

**Client** Confidential

**Location** Red Sea

**AOI size** 170 sq km

**Project type** Commercial project

**Duration** less than 24 hours from first contact to delivery in 2014

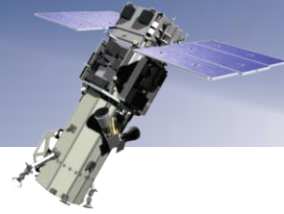
**Objective** Bathymetry mapping for unsurveyed areas





# Physics based SDB products

## Advantages



- ✓ Cost effective and rapid
- ✓ Multiple resolutions 0.5 – 30 m and base maps
- ✓ Independent technology, supporting uncertainty estimation
- ✓ Supporting various hydrographic and marine applications !
- ✓ Basemaps
- ✓ Reconnaissance
- ✓ Filling data gaps



# Thank you for your attention

Satellite based monitoring of aquatic systems  
Bathymetry, benthic habitat surveys and water quality monitoring

A new paradigm for fast changing environments.

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[www.eomap.com](http://www.eomap.com)

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