

**Esri Ocean GIS Forum 2013**

November 5 – 7, 2013 | Redlands, CA



# A Hero's Journey Across the Ocean

Dawn Wright, Ph.D., GISP

Esri Chief Scientist



Invasive species

Oil spills

Sea level rise

Tsunamis

Safety and security

Hurricanes

Ocean acidification

Loss of biodiversity

Habitat destruction

Harmful algal blooms

Overfishing

Piracy

Pollution

Sustainable fisheries management

Water quality

Agricultural runoff

Coastal development

Dead zones

So much unknown

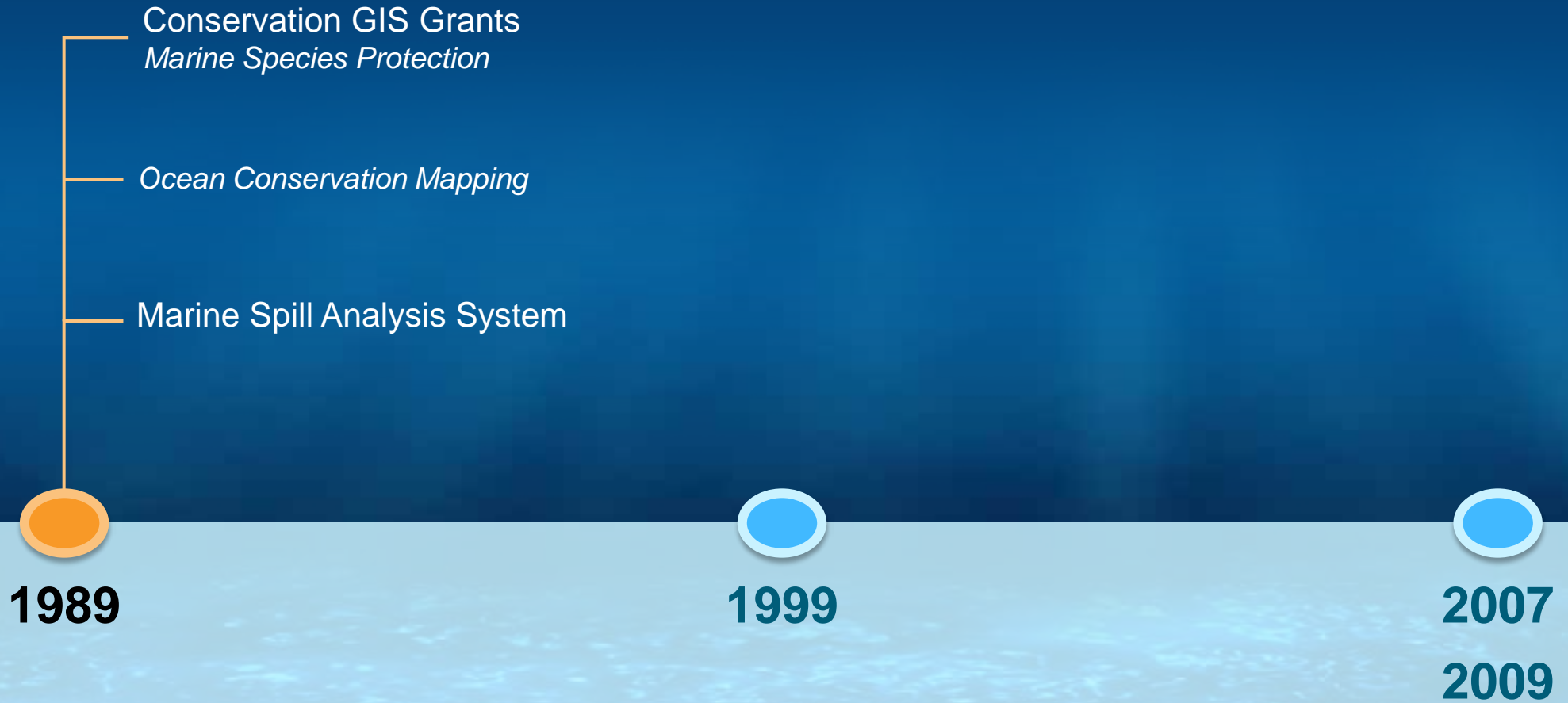
Coastal erosion

Coral bleaching

Polar ice melting

Conflicts in use of oceans

# Esri Ocean GIS History



# Esri Ocean GIS History



1999

Ocean science community

Digital Nautical Chart for NIMA

Navigation Ship's System for NIMA

Hydrographic Information System for Finland and Sweden

Dr. Sylvia Earle

Keynote Speaker at Esri UC

2007

2009

# Esri Ocean GIS History

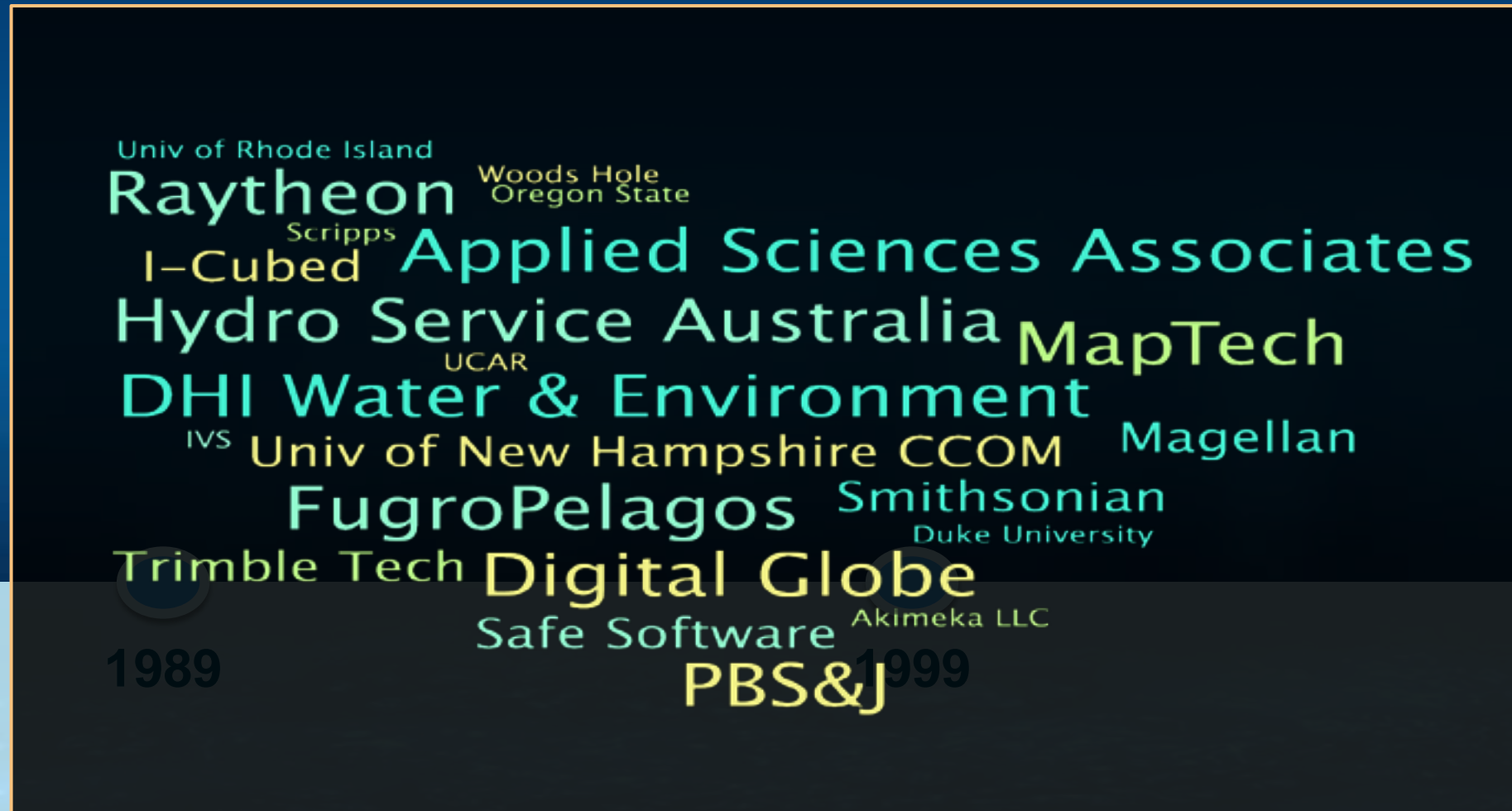
Hydrographic Solutions  
Production Nautical Mapping for NOAA  
Arc Marine Data Model  
*The Wave* newsletter  
netCDF  
Google Ocean (2009)

1989

1999

2007  
2009

# Esri Ocean GIS History



1989

1999

2007

2009

# Esri Ocean GIS Today



# Ocean GIS Initiative





# Ocean GIS Initiative

Chief Scientist

Project Managers

Software Engineers

Product Engineers

Account Managers

Industry Solutions Managers

Distributors

Federal Science Team

**YOU**

July 2013, *Second Edition*

# The Ocean GIS Initiative

Esri's Commitment to  
Understanding Our Oceans

[esriurl.com/oceanebook](http://esriurl.com/oceanebook)



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[esriurl.com/oceanebook](http://esriurl.com/oceanebook)

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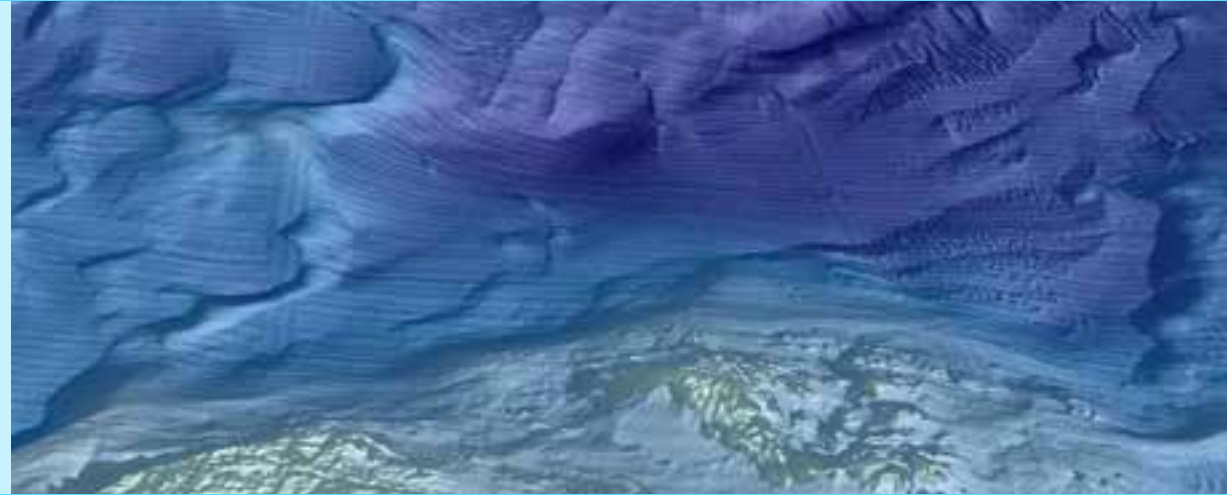
- 18 World Ocean Council
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- 21 Grow the Ocean Basemap
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- 23 Develop Vertical, Time-Dependent Data Transformations
- 23 Improve Support for Multidimensional Data and Analyses
- 24 Support Ocean Numerical Models

# Technical Teasers

**ArcGIS for Maritime: Bathymetry**  
Store, discover, model and manage  
bathymetric data.



**Additional Raster Formats Supported!**

à New GMT Grid to BAG Tool ß

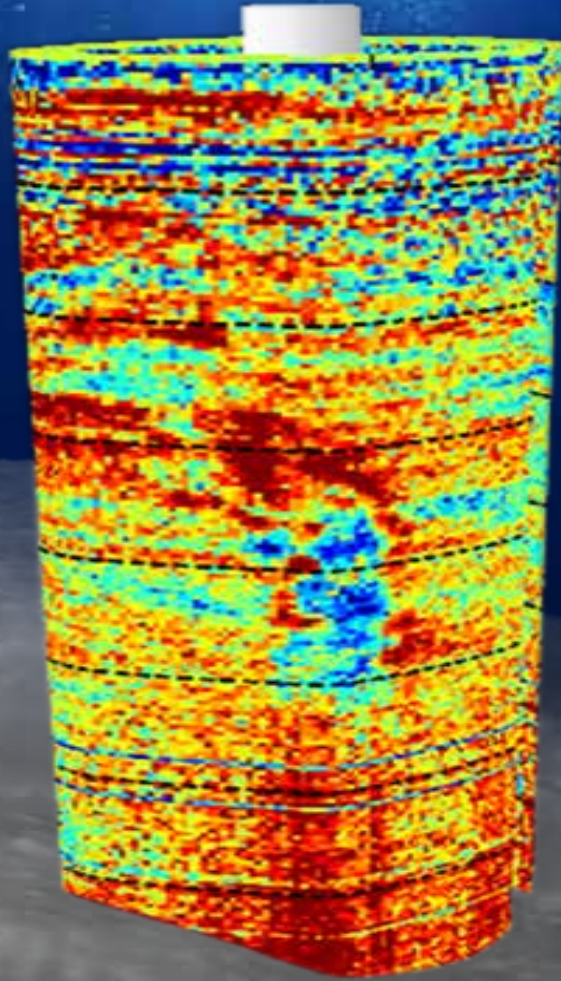
**[esriurl.com/maritime](https://esriurl.com/maritime) or [esriurl.com/ocnres](https://esriurl.com/ocnres)**

Mosaic to BAG

QPS Grid to BAG

Fledermaus v6 DTM to BAG

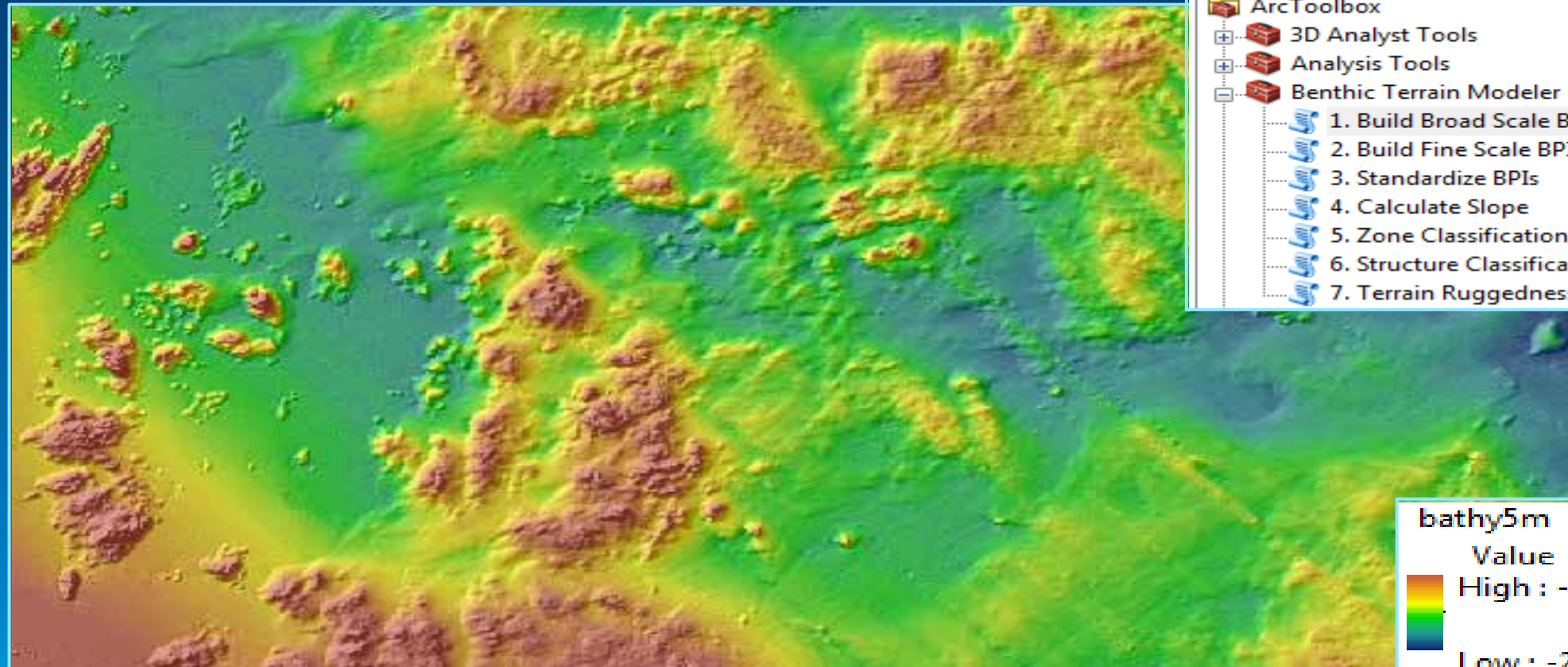
Support for **multiple dimensions** in WMS  
implementation of ArcGIS for Server...



Vector Field Renderer to display  
direction/magnitude symbols on the fly  
within a raster...

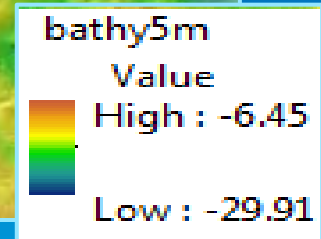
OpenDAP, netCDF, HDF, GRIB1,  
GRIB2...

# Benthic Terrain Modeler



ArcToolbox

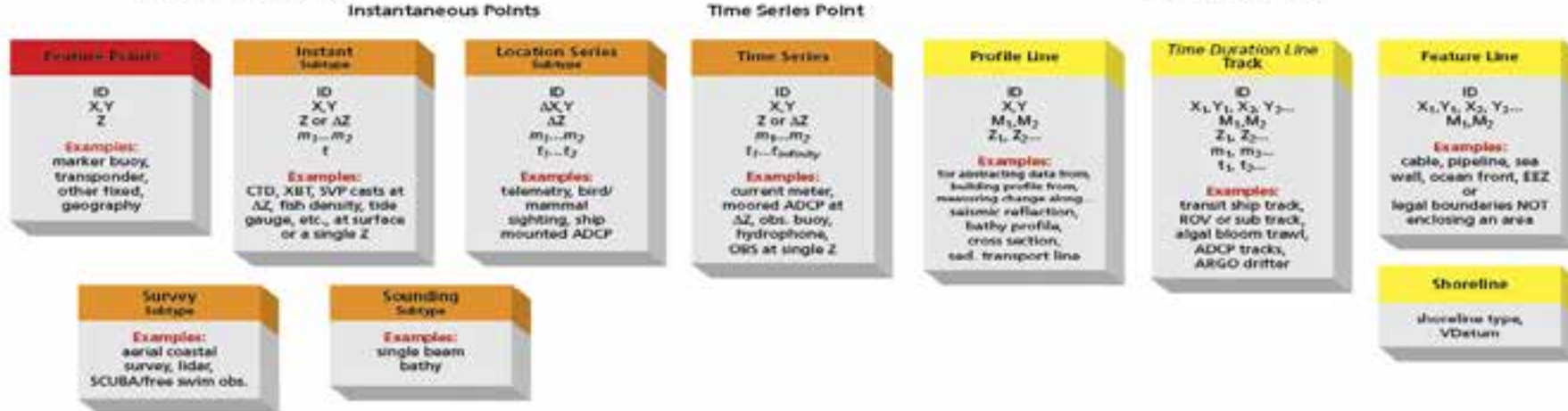
- ArcToolbox
  - 3D Analyst Tools
  - Analysis Tools
  - Benthic Terrain Modeler
    - 1. Build Broad Scale BPI
    - 2. Build Fine Scale BPI
    - 3. Standardize BPIs
    - 4. Calculate Slope
    - 5. Zone Classification Builder
    - 6. Structure Classification Builder
    - 7. Terrain Ruggedness (VRM)



# Arc Marine Data Model

## Common Marine Data Types

### Marine Points



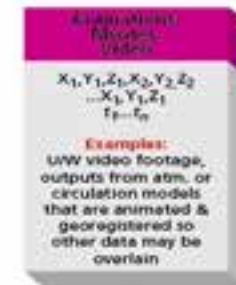
### Marine Areas



### Marine Rasters/Grids/Meshes



### Derived or Placeholder



### ACRONYMS—definitions

<p>ADCP—acoustic doppler current profiler</p> <p>ARGO—array for real time geostrophic oceanography</p> <p>BE—band interleaved by line (for satellite sensor images in grids)</p> <p>CTD—conductivity, temperature, depth</p> <p>EEZ—exclusive economic zone</p>	<p>GeoTIFF—georeferenced tagged image file format</p> <p>LiDAR—light detection and ranging</p> <p>MPA—marine protected area</p> <p>OBS—ocean bottom observator</p>	<p>ROV—remotely operated vehicle</p> <p>SCUBA—self contained underwater breathing apparatus</p> <p>SST—sea surface temperature</p> <p>SVF—speed velocity profile</p>	<p>TIN—triangulated irregular network</p> <p>U/VW—vector field (also often refers to "underway")</p> <p>VDatum—vertical datum</p> <p>XBT—extended bathythermograph</p>
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# Oceans

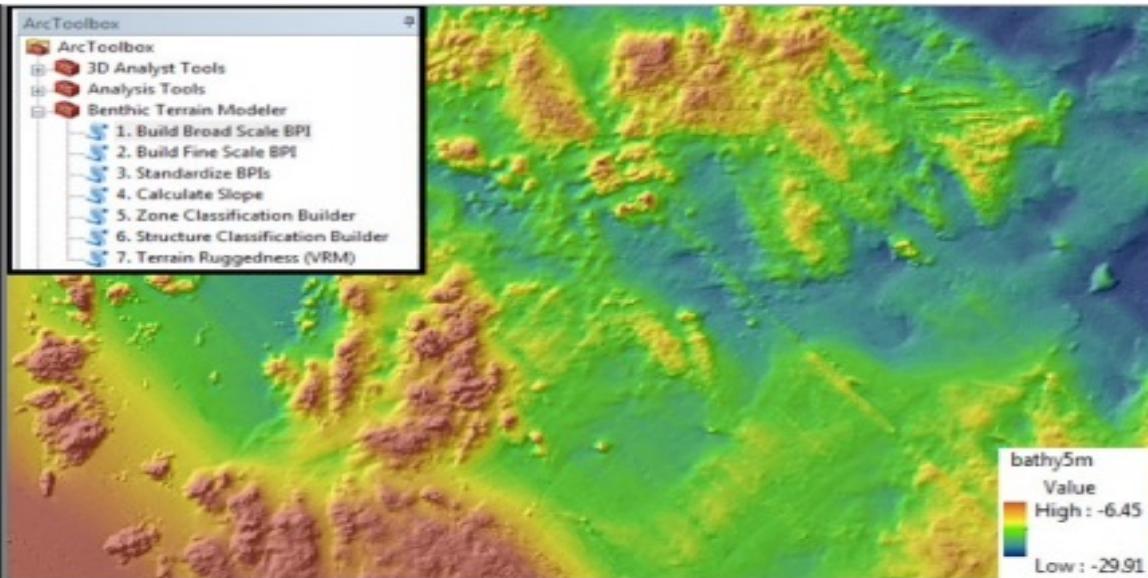
# esriurl.com/ocnres

Communities

*Esri is taking GIS to a new depth...*

## Benthic Terrain Modeler

The Benthic Terrain Modeler is a set of geoprocessing tools to analyze benthic terrain for the purposes of classifying surficial seafloor characteristics.

[Read more... ▶](#)

## Quick Links

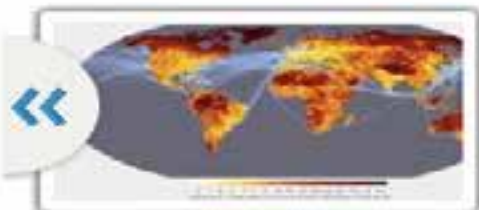
### I'm interested in...

- [Ocean Basemap](#)
- [Benthic Terrain Modeler](#)
- [ArcGIS for Maritime Bathymetry](#)
- [Ocean Use Planning and Coastal Protection](#)
- [Integrated Ocean Observing System \(IOOS\)](#)

### Featured Sites

- [Ecosystem-Based Management Tools Network](#)
- [Duke Marine Geospatial Ecology Tools \(MGET\)](#)
- [Davey Jones Locker](#)
- [Arc Marine Data Model](#)
- [International Coastal Atlas Network](#)
- [Global Ocean Scientific Data and Models \(DTU Space\)](#)
- [MyOcean Analysis & Forecasting](#)





A global map of Accessibility



Critical Habitat of Delta Smelt and Chinook Salmon



USA Critical Habitat American Crocodile



USA Critical Habitat Desert Tortoise



USA Critical Habitat Sockeye Salmon

## Recent Blog Posts

[More Blog posts ▶](#)

### [Esri and the Science Community](#) (07/06/2013)

Shawn Otto, CEO and cofounder of ScienceDebate.org recently pointed out: "We are poised over the next 40 years to create as much new knowledge as we have in the past 400 years. At the same time, our major unresolved policy ... [Continue reading](#) →

### [Invitation to participate in an Esri software Usability Study at the User Conference](#) (06/21/2013)

The Esri development team would like to invite you to participate in a moderated and recorded usability study of a new application for GIS professionals currently under development. Who we're looking for... Existing ArcGIS for Desktop users ArcGIS Online and App ... [Continue reading](#) →

### [How is GIS Meeting the Needs of Ocean \(and other\) Sciences? Plus, Minus, Interesting...](#) (05/29/2013)

Among the most important activities at the Esri Oceans Summit (November 7–8, 2012; see prior blog post 1 and prior prior blog post 2) were the breakout groups, where participants were called upon to identify major barriers to the use ... [Continue reading](#) →

### [Introducing the Multidimension Supplemental tools](#) (05/24/2013)

The Multidimension Supplemental toolbox Version 1.1 is a collection of nine tools that extend the functionality of the core tools of the Multidimension toolbox. These tools can be used as-is or you can modify them to handle specific use cases. The following ... [Continue reading](#) →



## Featured Videos

[More Videos ▶](#)

Esri Chief Scientist Dr. Dawn Wright introduces the Ocean GIS initiative. [⌵](#)



Dr. Sylvia Earle talks about the role of GIS in ocean conservation. [⌵](#)

## Spatial Sampling in the Ocean: A Modest Proposal

[esriurl.com/ocnres](http://esriurl.com/ocnres)

by Dawn Wright on May 7, 2013



At the Esri Oceans Summit there were several "hallway conversations" about a lack of spatial sampling tools in ArcGIS and how this had led people to use Hawth's Tools (now Geospatial Modelling Environment) and other approaches in order to perform ... [Continue reading](#) →

Posted in [Analysis & Geoprocessing](#), [Oceans & Maritime](#), [Spatial Statistics](#) | Tagged [Analysis & Geoprocessing](#), [ArcGIS 10](#), [ArcGIS Desktop](#), [marine science and conservation](#), [ocean](#), [Resource Centers](#), [sampling](#), [Spatial Analysis](#) | [Leave a comment](#)

## Stay Connected with the Oceans & Maritime Communities with an RSS Feed

by Dawn Wright on May 5, 2013

This Blog

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Subscribe to the RSS

Connect: RSS

As you know, Esri is seeking to serve user communities across many application domains by way of the ArcGIS Resource Center. The Oceans community therein is THE place to connect in order to keep up with the latest and greatest ... [Continue reading](#) →

Posted in [Oceans & Maritime](#) | Tagged [ArcGIS for Maritime: Bathymetry](#), [ArcGIS for Maritime: Charting](#), [marine science and conservation](#), [ocean](#), [Resource Centers](#), [user community](#) | [Leave a comment](#)

## Setting a New Course for the Arc Marine Data Model

by Dawn Wright on April 3, 2013



On April 2, 2013, an informal working group of twenty-five (including four Esri staffers) participated in a 1.5-hour webinar to discuss the development of a new, improved version of the Arc Marine Data Model (also known as the "Marine Data ... [Continue reading](#) →

Posted in [Analysis & Geoprocessing](#), [Hydro](#), [Oceans & Maritime](#) | Tagged [ArcGIS 10](#), [data](#), [Data Model](#), [marine science and conservation](#), [ocean](#), [open source](#) | [Leave a comment](#)

## New updates to the Ocean Basemap

by ArcGIS Content Team on March 29, 2013

2013's first update to the Ocean Basemap (Ocean\_Basemap) map service includes a few new areas of higher

Esri and the Science Community

The history and future of the ArcGIS SDKs for .NET

Community Maps Participants have improved our maps in Romania, Singapore, and North America

Leveraging NDVI to calculate other indices in Image Analysis window

ArcGIS 3.4 for Flex Released

### Tags

[.NET Announcement](#) [ArcGIS.com](#)  
[ArcGIS 10](#) [ArcGIS Content](#) [ArcGIS Data Reviewer](#)  
[ArcGIS Desktop](#) [ArcGIS Methods](#) [ArcGIS Mobile](#) [ArcGIS Online](#) [ArcGIS Server](#) [ArcMap](#) [bao-only](#) [Best Practices](#) [Business Analyst Desktop](#) [Business Analyst Online](#) [Cartographic Design](#) [Community Maps](#) [data](#) [demographic data](#) [Editing](#) [Esri Data Explorer](#) [Desktop](#) [Flex](#) [Geodatabase](#) [Geoprocessing](#) [GIS Imagery](#) [Java](#) [JavaScript](#) [map services](#) [mosaic dataset](#) [public safety](#) [Python](#) [Raster](#) [Rasters](#) [SDK](#) [sewer](#) [Silverlight](#) [stormwater](#) [Symbology](#) [Templates](#) [updates](#) [wastewater](#) [water](#)

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### Archives



## ArcGIS for Maritime

[esriurl.com/maritime](http://esriurl.com/maritime)

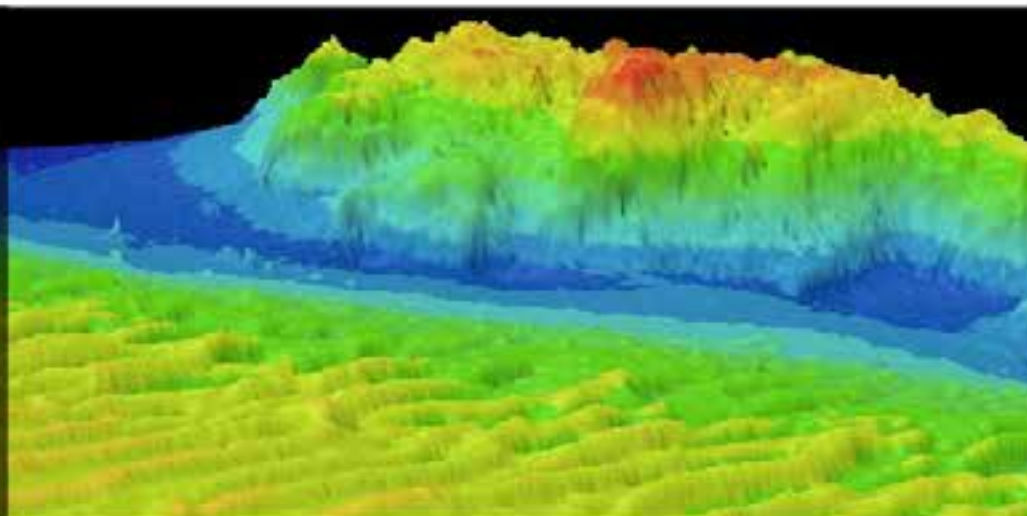
Communities

*Esri is taking GIS to a new depth....*

### QPS Bundles Esri Technology for Bathymetric, Charting, and Survey Solution

Esri and QPS Strengthen Partnership to Develop Ocean Science Tools

[Read more... >](#)



### Quick Links

#### I'm intested in...

- [What's new in ArcGIS for Maritime: Charting](#)
- [Viewing S-57 data](#)
- [Ocean Basemap](#)
- [ArcGIS for Maritime](#)
- [Ocean Use Planning and Coastal Protection](#)
- [Maritime Operations](#)

## Gallery

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Nautical Chart Finishing 10.1



Getting Started With NOAA S-58 Checks



Fix NAME and DSNM for ArcGIS for Maritime: Charting 10.1



Exploring Paper Chart Production in ArcGIS for Maritime: Charting 10.1



Exploring ENC Production in ArcGIS for Maritime: Charting 10.1

# Oceans

## GIS for Exploration, Ecosystems, Energy, and Climate Change

### Registration Open



The [Esri Ocean GIS Forum](#) is about you and the work you do for marine and coast environments. Meet ocean professionals who will share their experiences using GIS for ocean research, protection, and planning. Talk with GIS experts about how to put your project on the fast track to success.

### The Ocean GIS Initiative




This free e-book details Esri's Ocean GIS Initiative, including our commitment to and strategic plans for ocean science, resource management, and conservation.


[Read the e-book](#) (PDF)

### Twitter

#### Tweets

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 **Drew Stephens** @EsriOceans 7h  
REDLANDS: Noted oceanographer to give keynote address [ow.ly/qu6Te](#) #OceanGISForum

 **Drew Stephens** @EsriOceans 10h  
Keynote Dr. Gallo - Beyond Titanic: Exploration, Understanding, and Mgmt of Neptune's Realm [ow.ly/qtOXe](#)

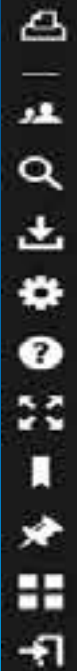
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# VIDEO Proceedings – [media.esri.com/seminars/oceans/](http://media.esri.com/seminars/oceans/)



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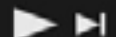
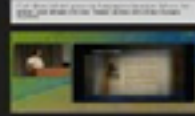
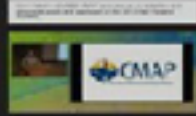
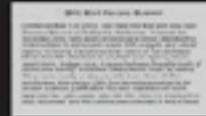
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## 2012 Esri Oceans Summit

On November 7-8, 2012, Esri held the first and only Esri Oceans Summit in Redlands, California. This was an invitation-only, high-level strategy workshop attended by intermediate to advanced ocean GIS analysts and developers, including many long-time users of Esri software. More than 50 attendees triumphed over agency travel restrictions, budget cuts, busy schedules, the aftermath of Hurricane Sandy, and other obstacles in order to attend. They came ready to discuss with more than 40 Esri employees the various GIS functional requirements for ocean science, justification for and validation of such approaches, use cases, and the like. Much of the Summit was recorded, and the videos are collected in this e-book.

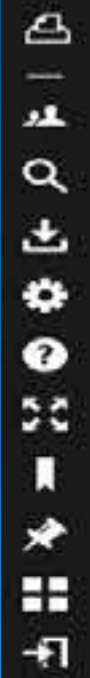
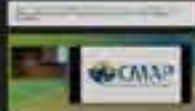
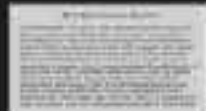


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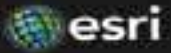


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Esri president Jack Dangermond and Esri's chief scientist Prof. Dawn Wright welcome attendees to the 2012 Esri Oceans Summit.

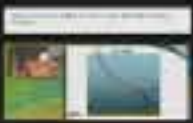
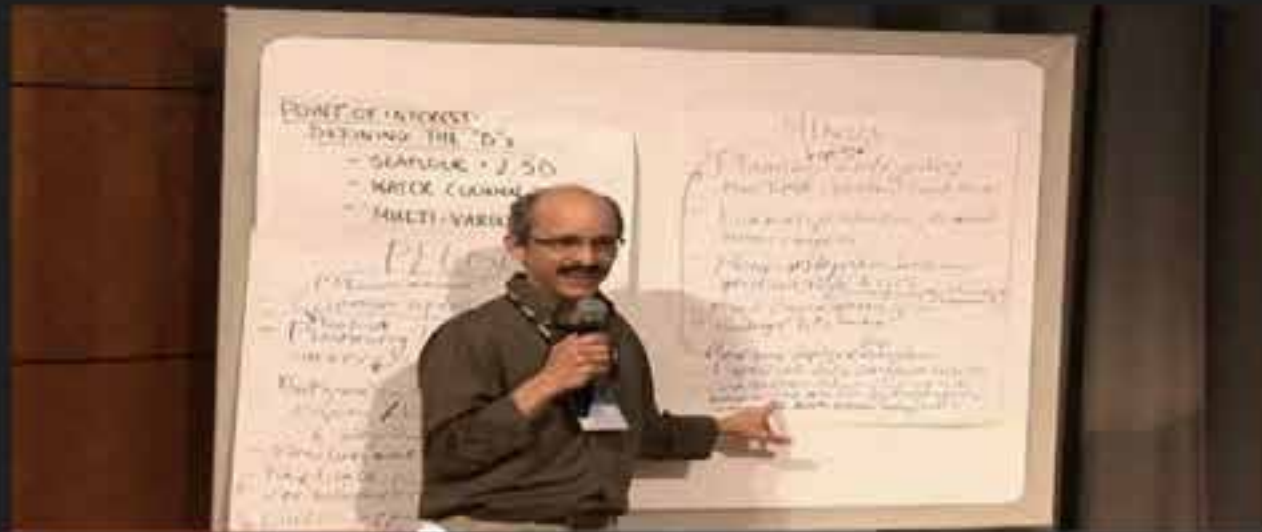


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Report on the Data Acquisition/Data Distribution breakout session at the 2012 Esri Oceans Summit.





# Contribute a Chapter to a New Esri Press Book, *Ocean Solutions, Earth Solutions*

Society needs solutions from policy makers that are underpinned by good, digestible science. Therefore, Esri Press invites you to submit your work to be considered for inclusion in a forthcoming book about use-inspired ocean science and realistic solutions for the oceans and thus the earth. This volume will be largely based on presentations at the **Esri Ocean GIS Forum**, and it will preserve good scholarship and encourage best practices. It will also serve the greater goal of reaching government decision makers, resource managers, and ocean/coastal GIS science researchers and practitioners. You may also submit geospatial data with your chapter, which will be assigned its own DOI, as well as Python scripts, geoprocessing workflows published as packages or services, static map packages, desktop extensions, mobile apps, and other supplementary material. Esri story maps are highly encouraged. All chapters will be peer reviewed.

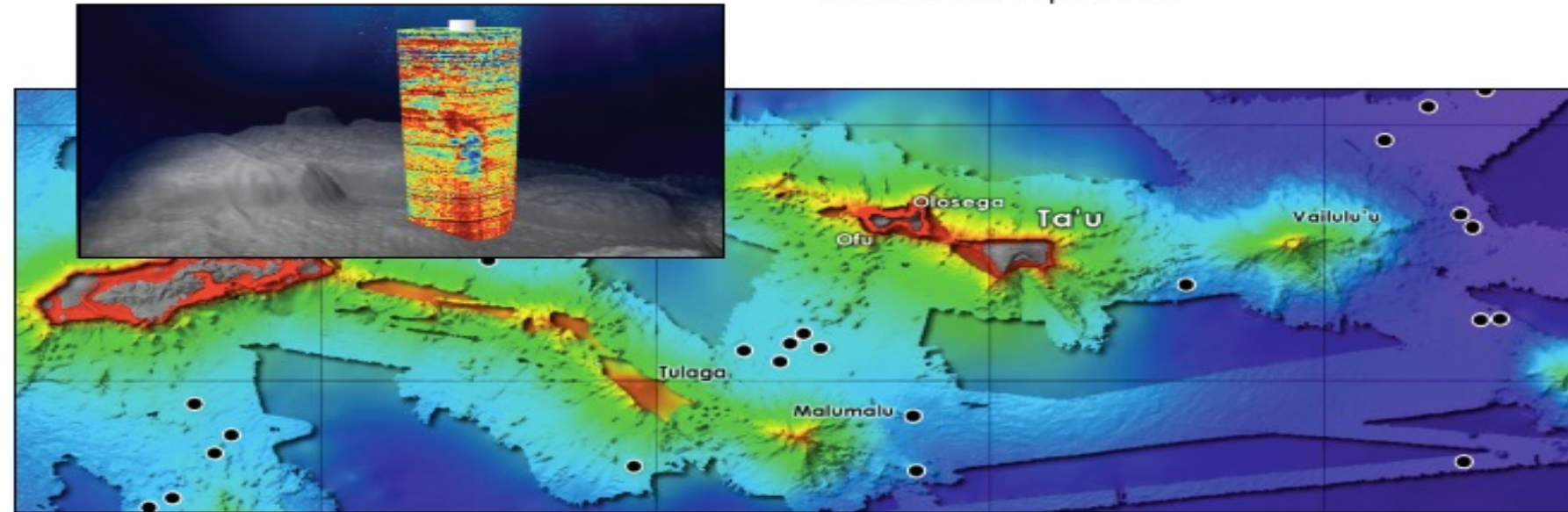
**The submission deadline is March 17, 2014.**

Submissions should be focused on topics, such as how to

- Effectively plan the exploration and discovery of the undiscovered parts of our planet.
- Better avoid ocean disasters and engineer rescues, thus ensuring ocean safety.
- Geodesign the ocean, including managing and mitigating conflict among multiple simultaneous uses of the ocean.
- Sustainably extract energy, food, and other services from the ocean.

We encourage submissions from the following ocean and coastal sectors:

- Research and exploration
- Ecosystems and environment
- Coastal protection and marine spatial planning
- Fisheries and aquaculture



Treasure Chest of Links on the Hero's Journey

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**[@EsriOceans](https://twitter.com/EsriOceans)**





Understanding our world.