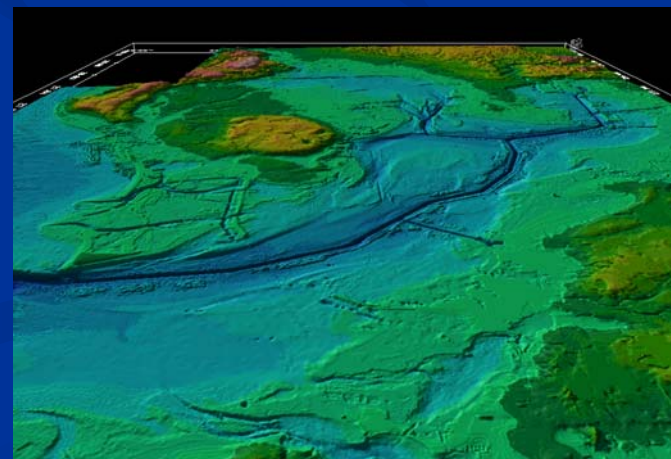
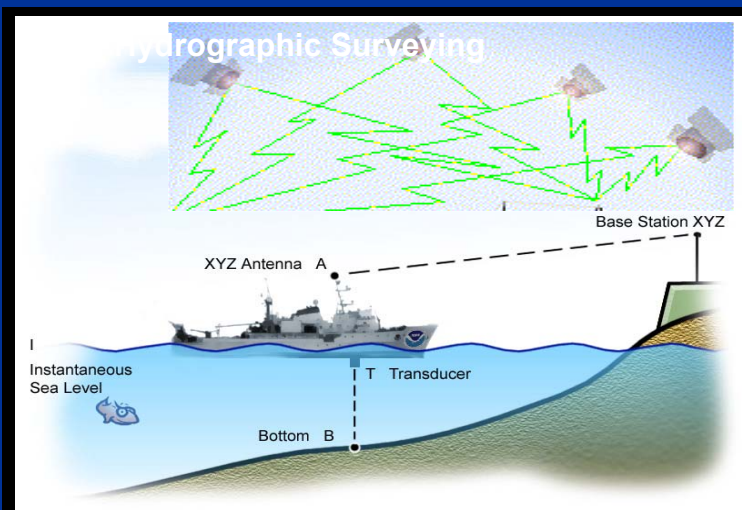




VIIIth IHO TC Meeting

Advances in Vertical Datum Transformation Tools and Use of Interpolation Tidal Models for Hydrographic Surveys at NOAA

Stephen Gill
NOAA, National Ocean Service
Center for Operational Oceanographic Products and Services





VIIIth IHO TC Meeting



Advances in Vertical Datum Transformation Tools and Use of Interpolation Tidal Models for Hydrographic Surveys at NOAA

- NOAA's Vertical Datum Transformation Tool - VDatum
- Tidal Constituent and Residual Interpolation Tool – TCARI
- Development of an web-based tidal prediction tool - eTides

All elevation data should be referenced to common vertical datums

BUT there are many different vertical datums in use around the nation

Relationship of vertical datums for Tampa Bay:

86.39 ft	<u>WGS 84 (G873)</u>	26.33 m
81.33 ft	<u>NAD 83</u>	24.79 m
0.792 ft	<u>MHHW</u>	0.241 m
0.409 ft	<u>MHW</u>	0.125 m
0.0 ft	<u>NAVD 88</u>	0.0 m
-0.535 ft	<u>LMSL</u>	-0.163 m
-0.850 ft	<u>NGVD 29</u>	-0.259 m
-1.495 ft	<u>MLW</u>	-0.456 m
-1.919 ft	<u>MLLW</u>	-0.585 m

Ellipsoid Datums



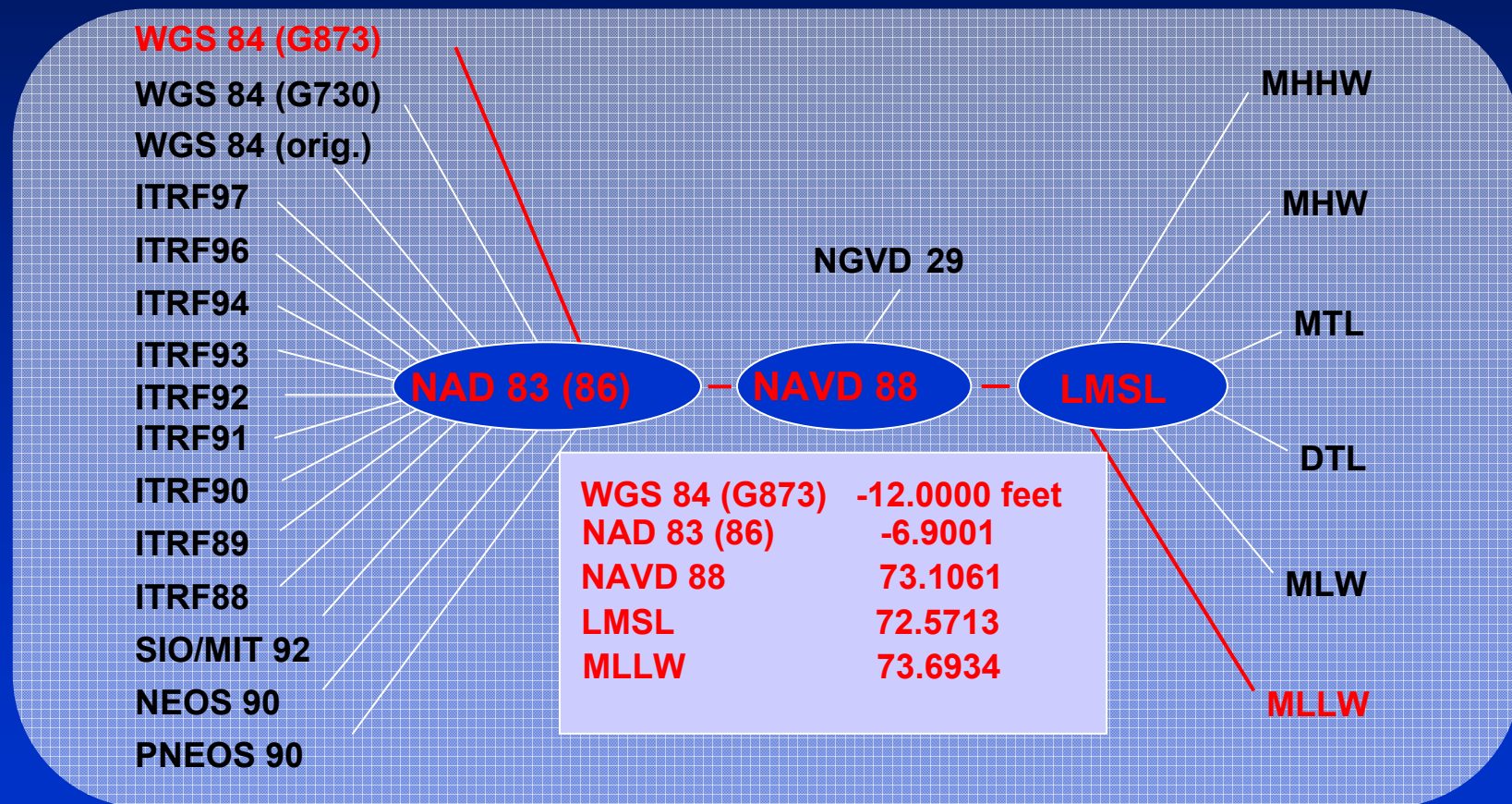
Orthometric Datums



Tidal Datums

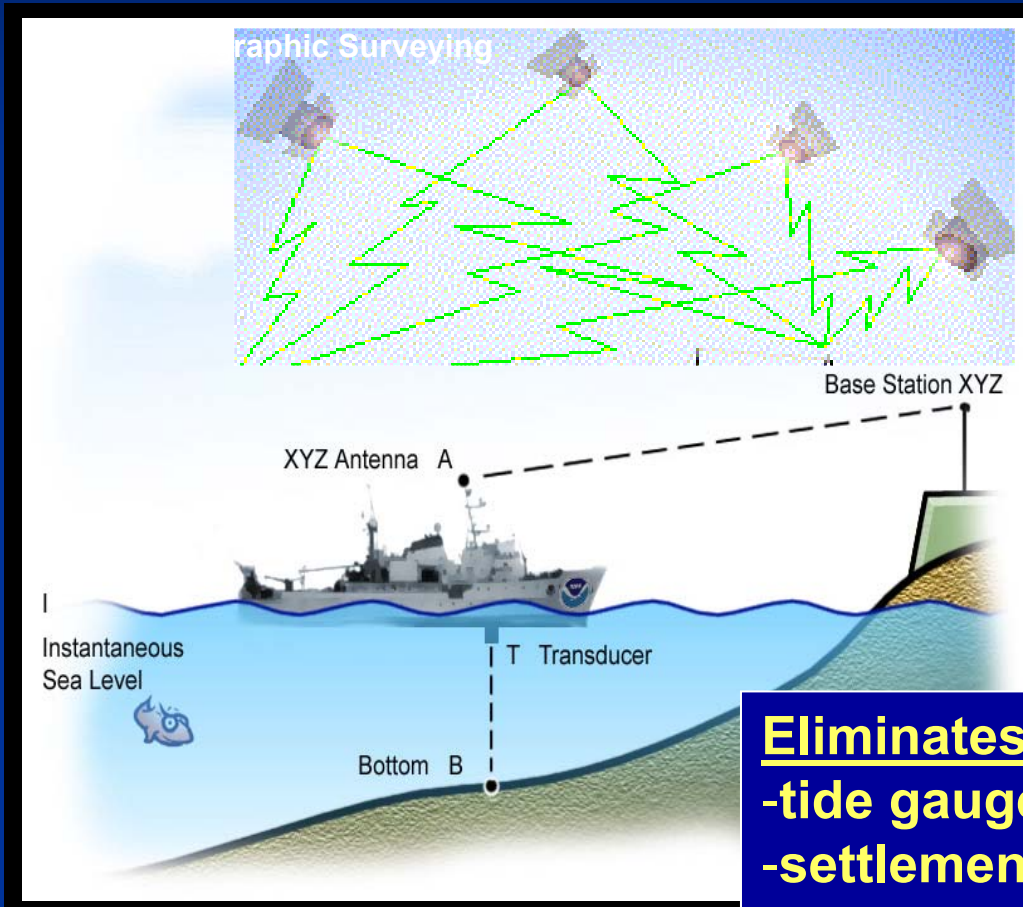


The Datum Transformation Roadmap



VDatum Complements Innovative Technologies

Depths are measured “on the fly” or near real time relative to chart datum (MLLW) using VDatum

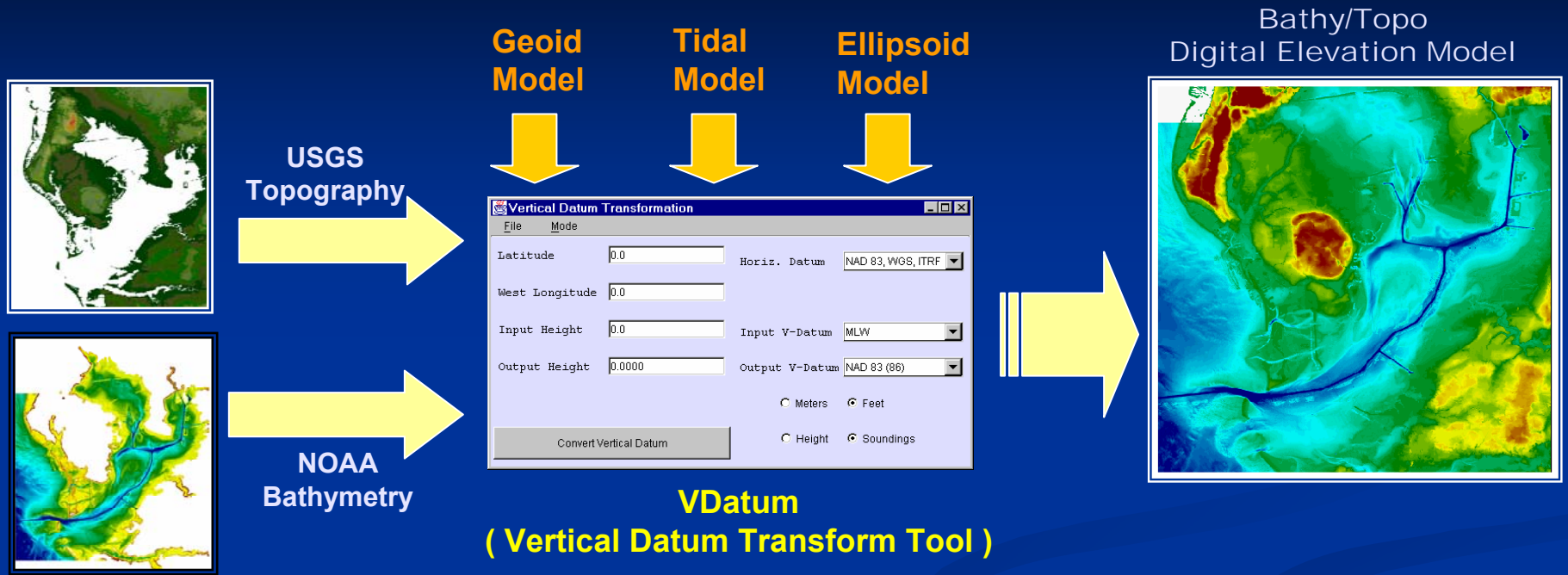


RTK-GPS Vertically-Referenced Hydrographic Surveys:
Hydrographic data is transformed from ellipsoid datum to MLLW datum

Eliminates need for:

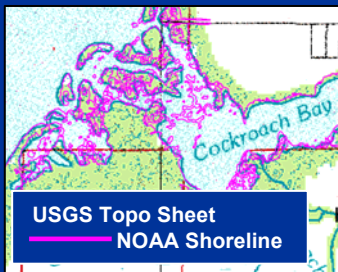
- tide gauges during survey
- settlement & squat
- corrections for survey vessel
- time-consuming post-survey processing

VDatum Supports Many Other Efforts

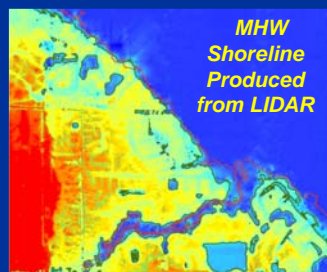


VDatum
(Vertical Datum Transform Tool)

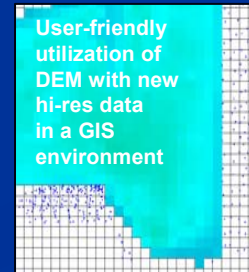
Resolve NOAA-USGS shoreline inconsistencies



Consistently defined Shoreline from LIDAR data



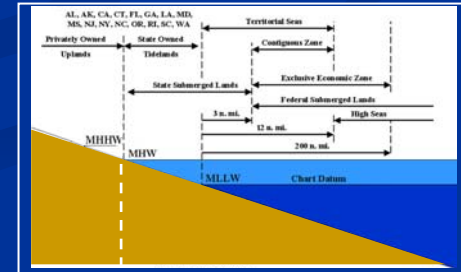
GIS users in the Coastal Community



Charting and Other Applications



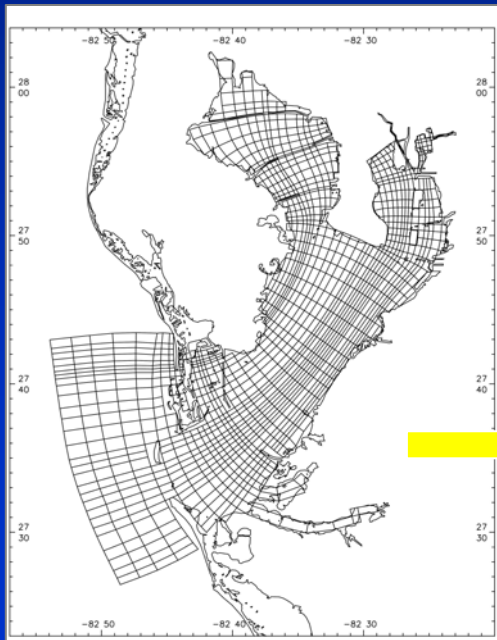
Marine Boundaries and Legal Issues



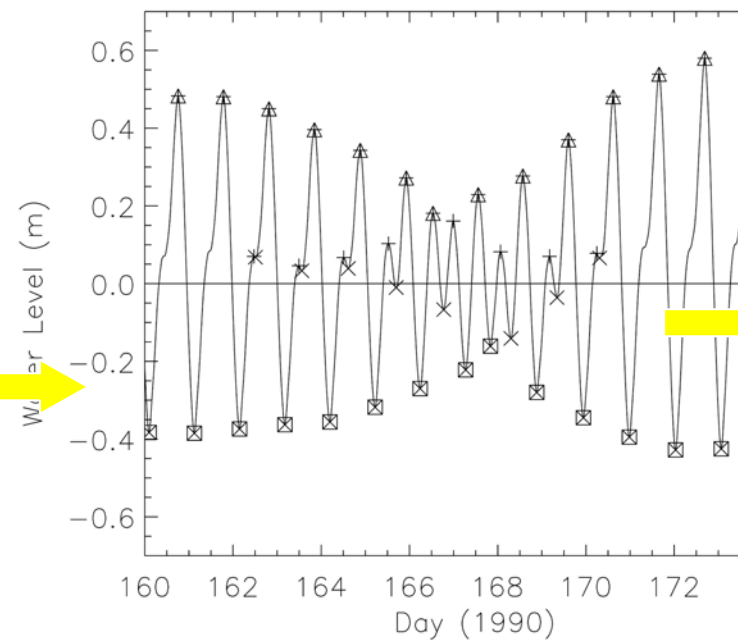
Tidal Datums from Hydrodynamic Models

- Drive model with astronomical tides
- Save water levels at each grid cell each 6 minutes (for 1 year)
- Analyze for higher high, high, low, and lower low waters
- Model's RMS error in water level is 4 cm

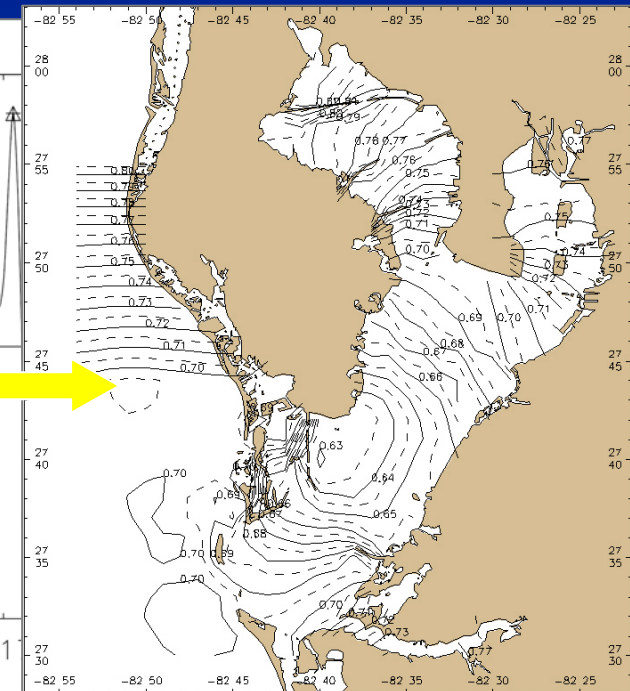
Model



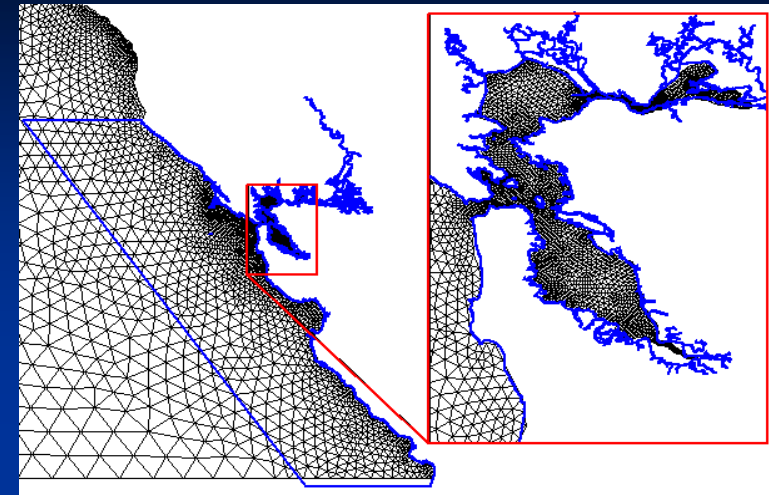
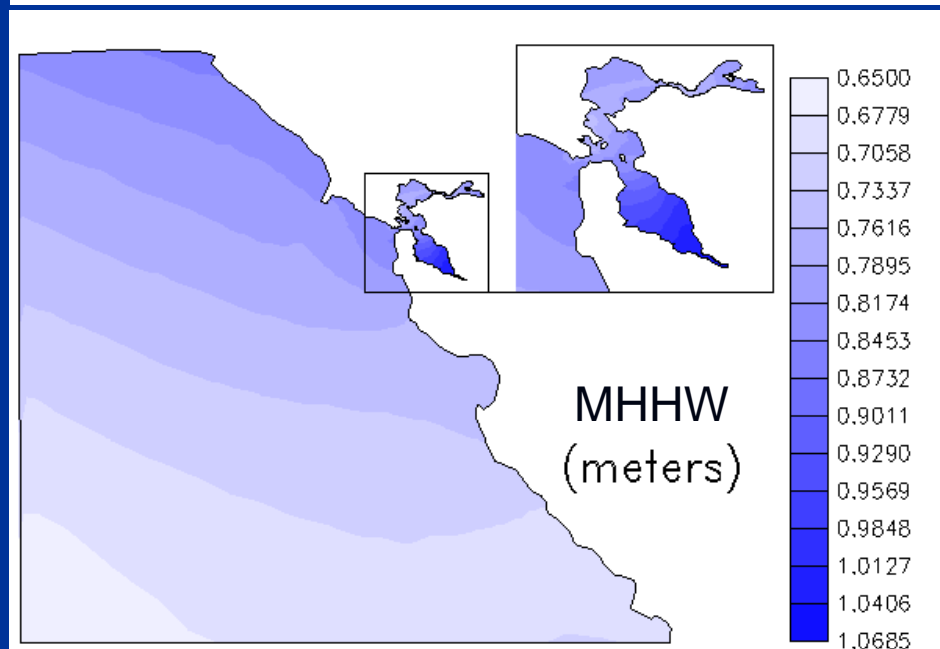
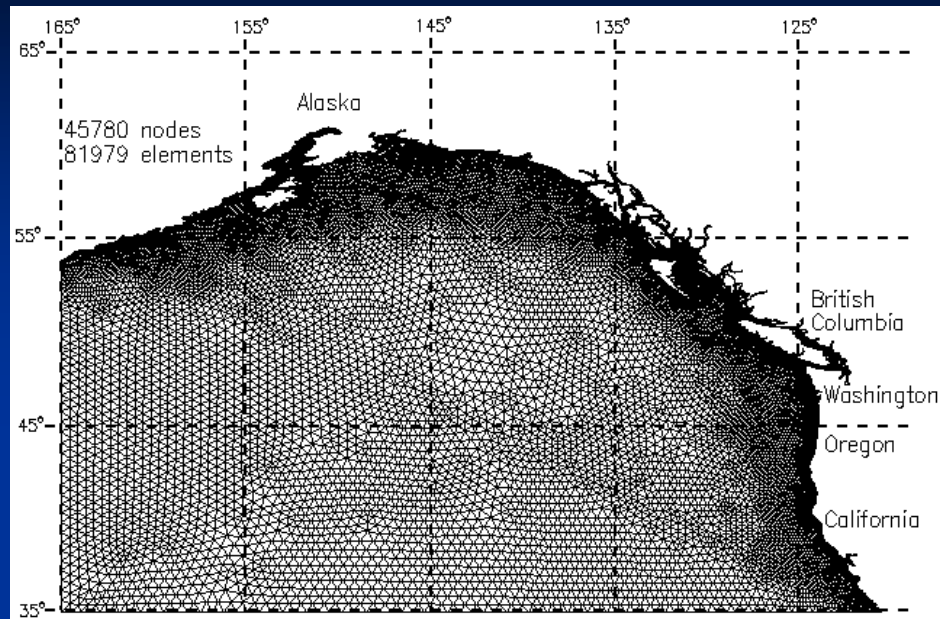
Saved Time Series



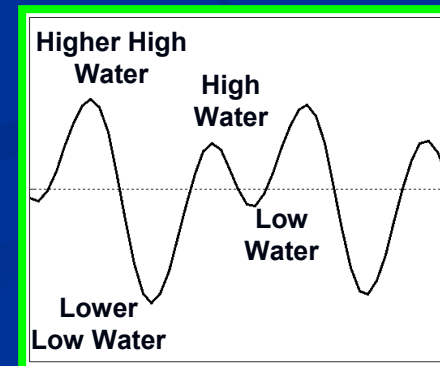
Tidal Datum Fields



Hydrodynamic Modeling of Tidal Datum Fields



- MHW tidal datum fields (as well as MHHW, MLW, MLLW, MSL, MTL, DTL) from calibrated hydrodynamic models
- Analysis of model-produced time series, then adjusted to provide a best fit to datums at NOS gauges.



Hydrodynamic Model Setup and Analysis

- Set-up

Forced with amp & phase for the $M_2, S_2, N_2, K_2, K_1, O_1,$ and Q_1 tidal constituents from the regional EC2001 tide model

37 day run

2 second time step (36 processors = 5 hours)

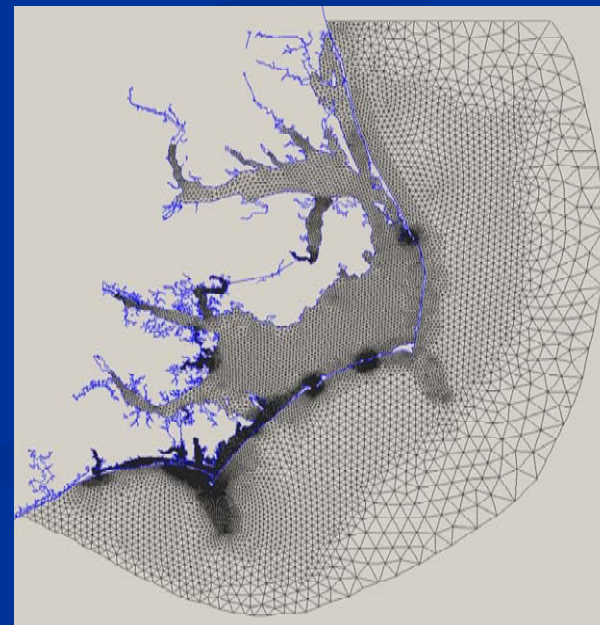
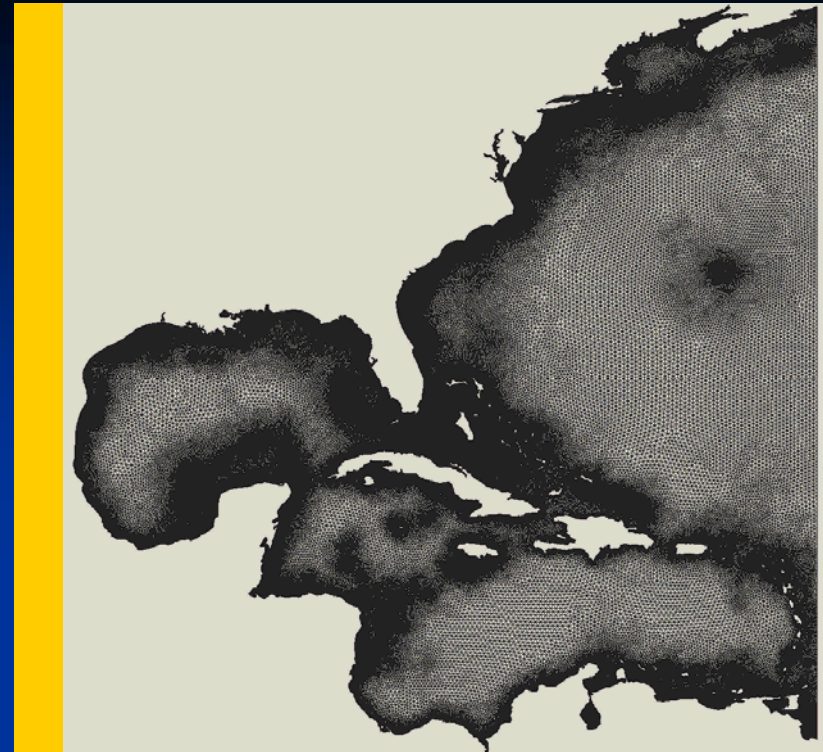
- Results

Record water surface elevation every 6 minutes for final 30 days

Analyze for tidal datums at every node in the mesh

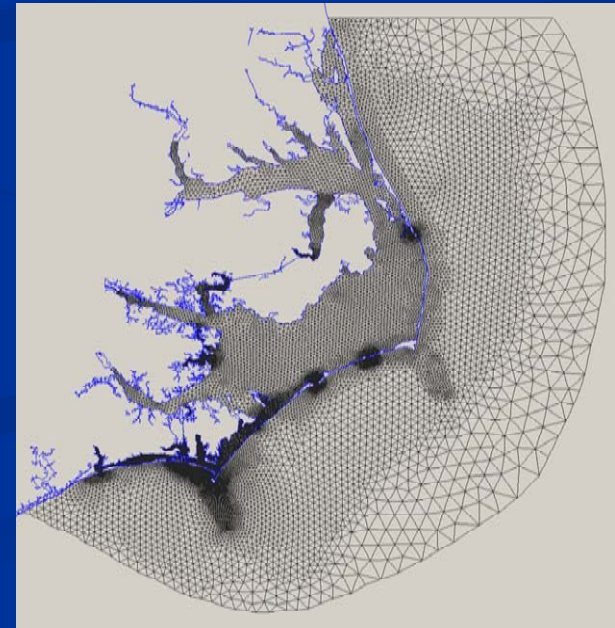
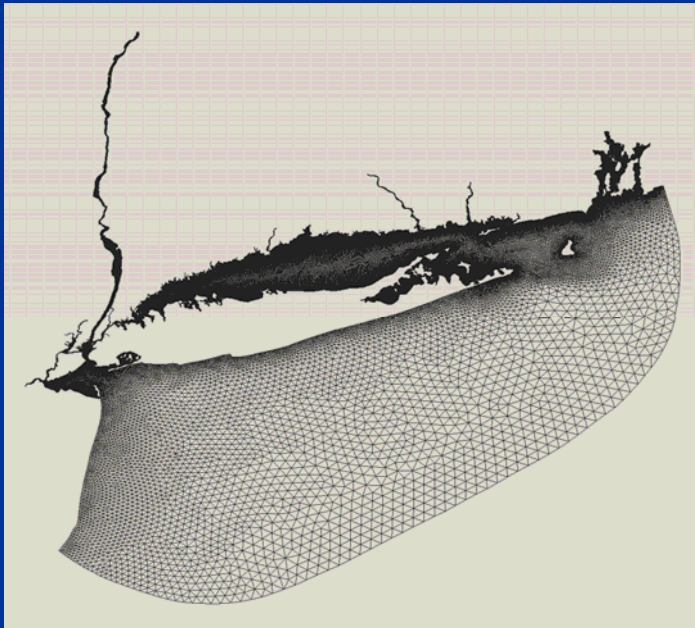
Correct results by spatially interpolating errors with TCARI

Results interpolated onto a regular VDatum marine grid



Hydrodynamic Modeling to Simulate the Tides

- NOAA/CSDL normally uses the ADCIRC (Advanced Circulation) Model
- *2-D depth-integrated shallow water equations*
- *Finite element solution on triangular grids*
- *Handles inundation*
- *Parallelized code (MPI), simulations are made on cluster computers.*




Nauticalcharts.noaa.gov

National VDatum Projects - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

Address http://www.nauticalcharts.noaa.gov/csd/vdatum_projects.htm



Index - Select One: ▾


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- What's New?
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- Critical Corrections
- Wrecks and Obstructions
- Navigation Services
- Hydrographic Surveys
- GIS Products & Services**
- Historic Maps and Charts
- Research and Development
- Sales Information

Office of Coast Survey and National Geodetic Survey

VDatum Transformation Tool

Version 1.06

[Overview](#) **[Projects](#)** [Documentation](#) [References](#)



VDatum transformation software is accessible by clicking on the geographic names on the image map of the continental U.S.

Projects

VDatum was initially developed for the [Tampa Bay](#) Demonstration Project, conducted by NOAA and the U.S. Geological Survey. For this pilot project, VDatum was applied to transform coastal elevations to a



Index - Select One:

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[Sales Information](#)

[Library](#)

[FAQs](#)

Office of Coast Survey and National Geodetic Survey VDatum Transformation Tool

Version 1.06

[Overview](#)

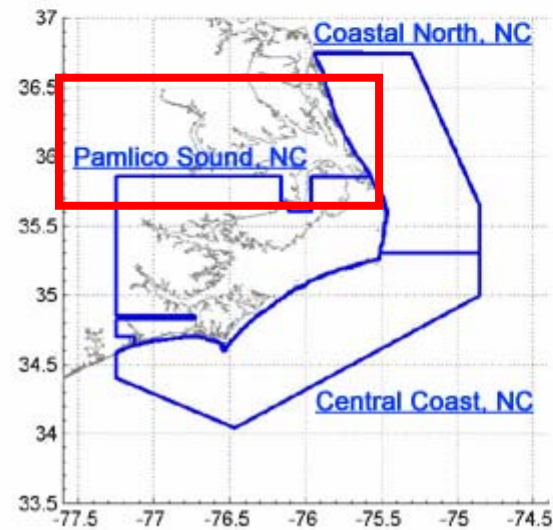
[Projects](#)

[Documentation](#)

[References](#)

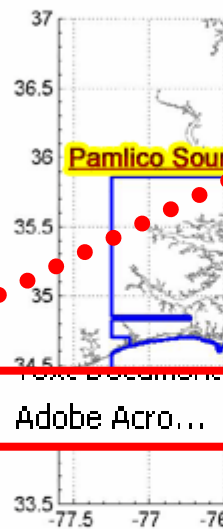
VDatum for North Carolina

VDatum transformation software and documentation are available for download by clicking on the project name on the image map.



VDatum for North Carolina

VDatum transformation software is available for download by image map.



References

Hess, K. W., Spargo, E., White, S. A., and Zervas, C., 2005: [VDatum for Coastal Navigation Grids, and Sea Surface Topography](#). National Oceanic and Atmospheric Administration, Silver Spring, Maryland, *NOAA Technical Memorandum NOS CS 5*, 25 p.

WinZip - VDatum06_NCpamlis01[1].zip

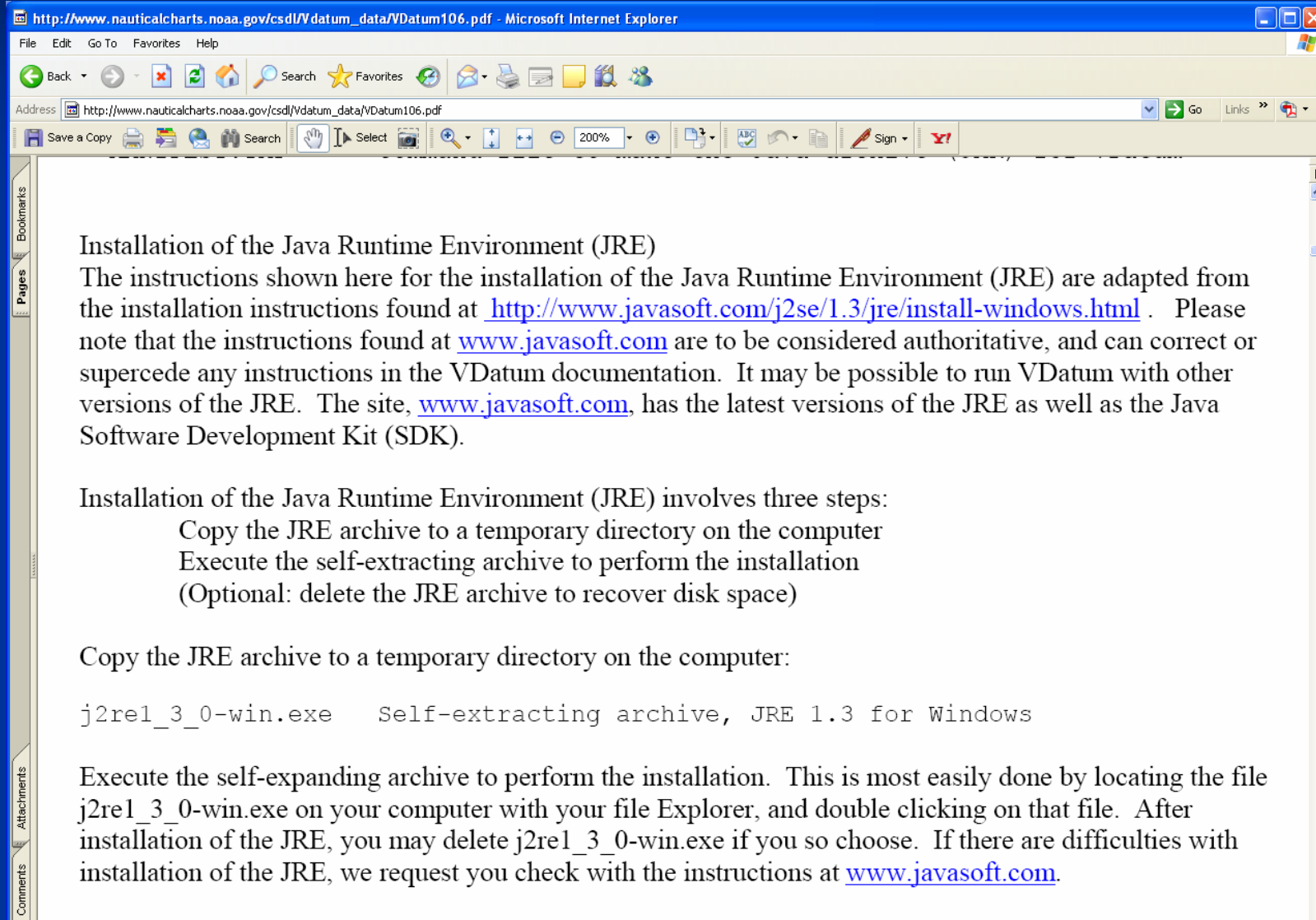
File Actions Options Help

New Open Favorites Add Extract Encrypt View CheckOut Wizard

Name	Type	Modified	Size	Ratio	Packed	Path
LLdd_NCpamlis01...	Text Document	10/15/2005 2:58 PM	6,050	73%	1,657	VDatum06_...
mapNCpamlis01...	JPEG Image	10/19/2005 1:38 PM	67,210	23%	51,548	VDatum06_...
notes_NCpamlis...	Text Document	10/23/2006 2:02 PM	3,361	54%	1,558	VDatum06_...
VDatum106.pdf	Adobe Acro...	10/15/2005 10:38 AM	132,591	30%	92,984	VDatum06_...
VDatumNTDE.txt	Text Document	7/23/2005 9:06 PM	506	41%	298	VDatum06_...
VDatumVersions...	Text Document	3/9/2005 2:15 PM	1,615	50%	803	VDatum06_...
dtl.gtx	GTX File	9/6/2005 6:01 PM	4,158,030	97%	124,759	VDatum06_...
g03.gtx	GTX File	9/6/2005 5:34 PM	393,222	69%	122,526	VDatum06_...
g99.gtx	GTX File	9/6/2005 5:34 PM	393,224	69%	122,787	VDatum06_...
mlw.gtx	GTX File	9/6/2005 6:01 PM	4,158,030	96%	183,578	VDatum06_...
mtl.gtx	GTX File	9/6/2005 6:01 PM	4,158,030	97%	111,240	VDatum06_...
Ncla.gtx	GTX File	10/27/2005 2:58 PM	2,746	75%	698	VDatum06_...
Nclo.gtx	GTX File	10/27/2005 2:59 PM	2,746	71%	789	VDatum06_...
Doit.bat	MS-DOS Bat...	12/18/1999 5:09 PM	33	21%	26	VDatum06_...
Makjar.bat	MS-DOS Bat...	7/23/2000 9:26 AM	41	0%	41	VDatum06_...
Manifest.tmp	TMP File	7/14/2000 5:46 PM	20	0%	20	VDatum06_...
NCpamlis01_dat...	Text Document	10/21/2005 6:26 PM	396	68%	128	VDatum06_...
VDatum.java	JAVA File	9/14/2002 10:03 AM	69,688	79%	14,533	VDatum06_...
sst.gtx	GTX File	3/21/2006 4:27 PM	4,158,032	97%	129,209	VDatum06_...
wcn.gtx	GTX File	10/27/2005 2:45 PM	59,386	61%	23,445	VDatum06_...
VDatum.bat	MS-DOS Bat...	8/31/2000 3:58 PM	23	0%	23	VDatum06_...
VDatum.jar	Executable J...	9/14/2002 10:05 AM	25,683	5%	24,337	VDatum06_...

Selected 0 files, 0 bytes Total 25 files, 29,556KB

Must have Java Runtime Environment



The screenshot shows a Microsoft Internet Explorer browser window with the address bar displaying http://www.nauticalcharts.noaa.gov/csdl/Vdatum_data/VDatum106.pdf. The browser interface includes a menu bar (File, Edit, Go To, Favorites, Help), a toolbar with navigation and utility icons, and a sidebar with 'Bookmarks', 'Pages', 'Attachments', and 'Comments' sections.

Installation of the Java Runtime Environment (JRE)

The instructions shown here for the installation of the Java Runtime Environment (JRE) are adapted from the installation instructions found at <http://www.javasoft.com/j2se/1.3/jre/install-windows.html>. Please note that the instructions found at www.javasoft.com are to be considered authoritative, and can correct or supersede any instructions in the VDatum documentation. It may be possible to run VDatum with other versions of the JRE. The site, www.javasoft.com, has the latest versions of the JRE as well as the Java Software Development Kit (SDK).

Installation of the Java Runtime Environment (JRE) involves three steps:

- Copy the JRE archive to a temporary directory on the computer
- Execute the self-extracting archive to perform the installation
- (Optional: delete the JRE archive to recover disk space)

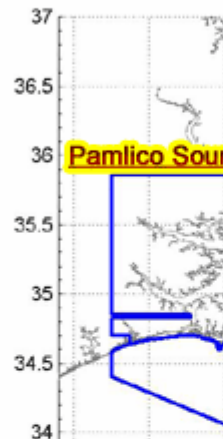
Copy the JRE archive to a temporary directory on the computer:

```
j2re1_3_0-win.exe    Self-extracting archive, JRE 1.3 for Windows
```

Execute the self-expanding archive to perform the installation. This is most easily done by locating the file `j2re1_3_0-win.exe` on your computer with your file Explorer, and double clicking on that file. After installation of the JRE, you may delete `j2re1_3_0-win.exe` if you so choose. If there are difficulties with installation of the JRE, we request you check with the instructions at www.javasoft.com.

VDatum for North Carolina

VDatum transformation software is available for download by image map.



WinZip - VDatum06_NCpamlis01[1].zip

File Actions Options Help

New Open Favorites Add Extract Encrypt View CheckOut Wizard

Name	Type	Modified	Size	Ratio	Packed	Path
LLdd_NCpamlis0...	Text Document	10/15/2005 2:58 PM	6,050	73%	1,657	VDatum06_...
mapNCpamlis01...	JPEG Image	10/19/2005 1:38 PM	67,210	23%	51,548	VDatum06_...
notes_NCpamlis...	Text Document	10/23/2006 2:02 PM	3,361	54%	1,558	VDatum06_...
VDatum106.pdf	Adobe Acro...	10/15/2005 10:38 AM	132,591	30%	92,984	VDatum06_...
VDatumNTDE.txt	Text Document	7/23/2005 9:06 PM	506	41%	298	VDatum06_...
VDatumVersions...	Text Document	3/9/2005 2:15 PM	1,615	50%	803	VDatum06_...
dtl.gtx	GTX File	9/6/2005 6:01 PM	4,158,030	97%	124,759	VDatum06_...
g03.gtx	GTX File	9/6/2005 5:34 PM	393,222	69%	122,526	VDatum06_...
g99.gtx	GTX File	9/6/2005 5:34 PM	393,224	69%	122,787	VDatum06_...
mhhw.gtx	GTX File	9/6/2005 6:01 PM	4,158,030	95%	192,971	VDatum06_...
mhw.gtx	GTX File	9/6/2005 6:01 PM	4,158,030	96%	186,365	VDatum06_...
mlw.gtx	GTX File	9/6/2005 6:01 PM	4,158,030	96%	184,383	VDatum06_...
VDatum.jar	Executable J...	9/14/2002 10:05 AM	25,683	5%	24,337	VDatum06_...
Nclo.gtx	GTX File	10/27/2005 2:59 PM	2,746	71%	789	VDatum06_...
Doit.bat	MS-DOS Bat...	12/18/1999 5:09 PM	33	21%	26	VDatum06_...
Makjar.bat	MS-DOS Bat...	7/23/2000 9:26 AM	41	0%	41	VDatum06_...
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NCpamlis01_dat...	Text Document	10/21/2005 6:26 PM	396	68%	128	VDatum06_...
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vcn.gtx	GTX File	10/27/2005 2:45 PM	59,386	61%	23,445	VDatum06_...
VDatum.bat	MS-DOS Bat...	8/31/2000 3:58 PM	23	0%	23	VDatum06_...
VDatum.jar	Executable J...	9/14/2002 10:05 AM	25,683	5%	24,337	VDatum06_...

Selected 0 files, 0 bytes Total 25 files, 29,556KB

References

Hess, K. W., Spargo, E., White, S. A., and Zervas, C., 2005: [VDatum for Coastal N... Grids, and Sea Surface Topo...](#) Commerce, National Oceanic and Atmospheric Administration, Silver Spring, Maryland, NOAA Technical Memorandum NOS CS 5, 25 p.

Running the Tool

Interactive Mode

Vertical Datum Transformation

File Mode

Latitude Horiz. Datum

West Longitude

Input Height Input V-Datum

Output Height Output V-Datum

Meters Height Soundings

Convert Vertical Datum

Vertical Datum Transformation

File Mode

◆ Interactive

Batch

Select horizontal datum

input topography is +

Select vertical datum

– input and output

input topography is –

input bathymetry is +

Batch Mode

Vertical Datum Transformation

File Mode

Input File Browse Horiz. Datum

Output File Browse

Input Filename Input V-Datum

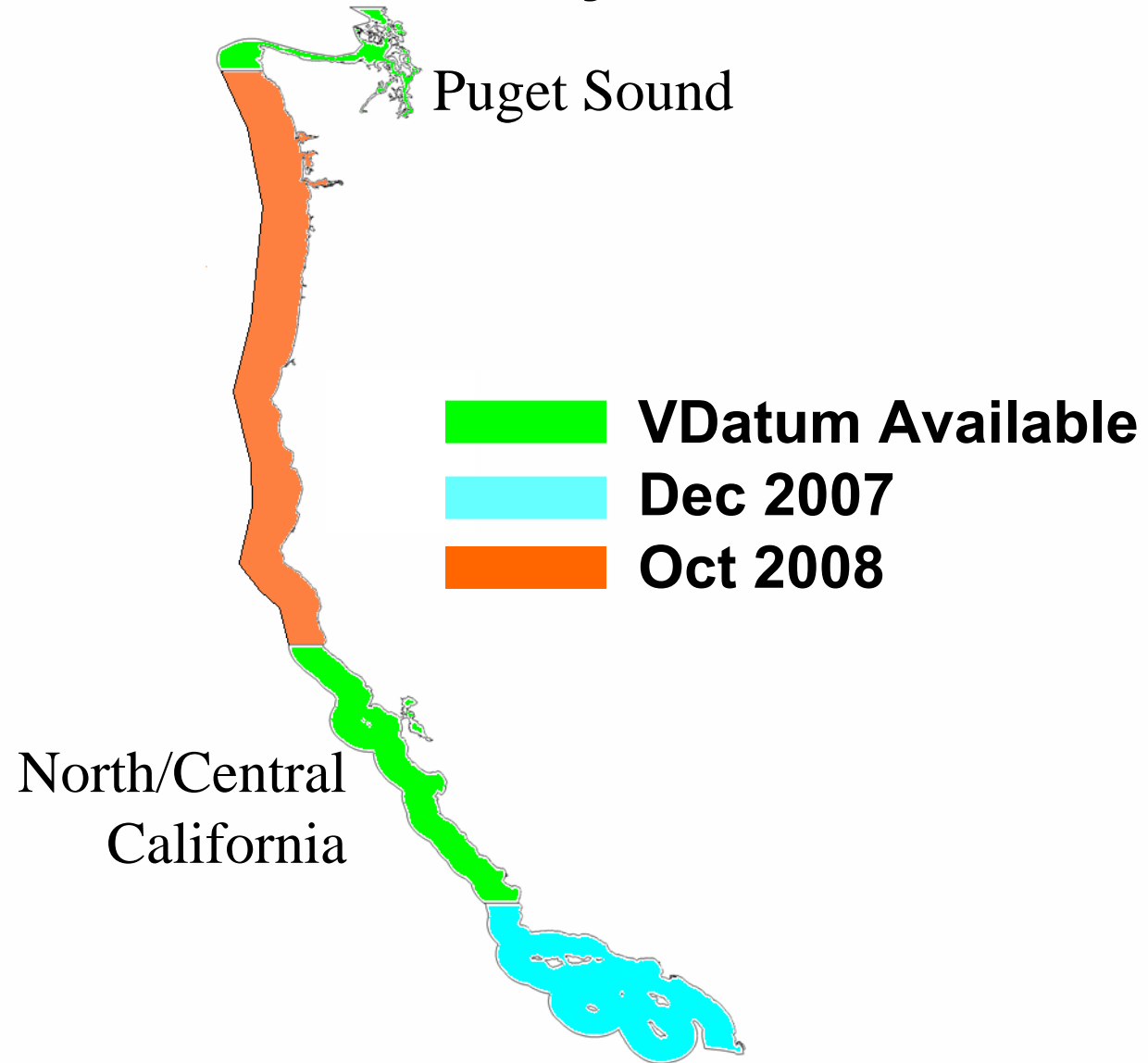
Output Filename Output V-Datum

Key, Lat, Lon, H Key, Lon, Lat, H Meters Feet

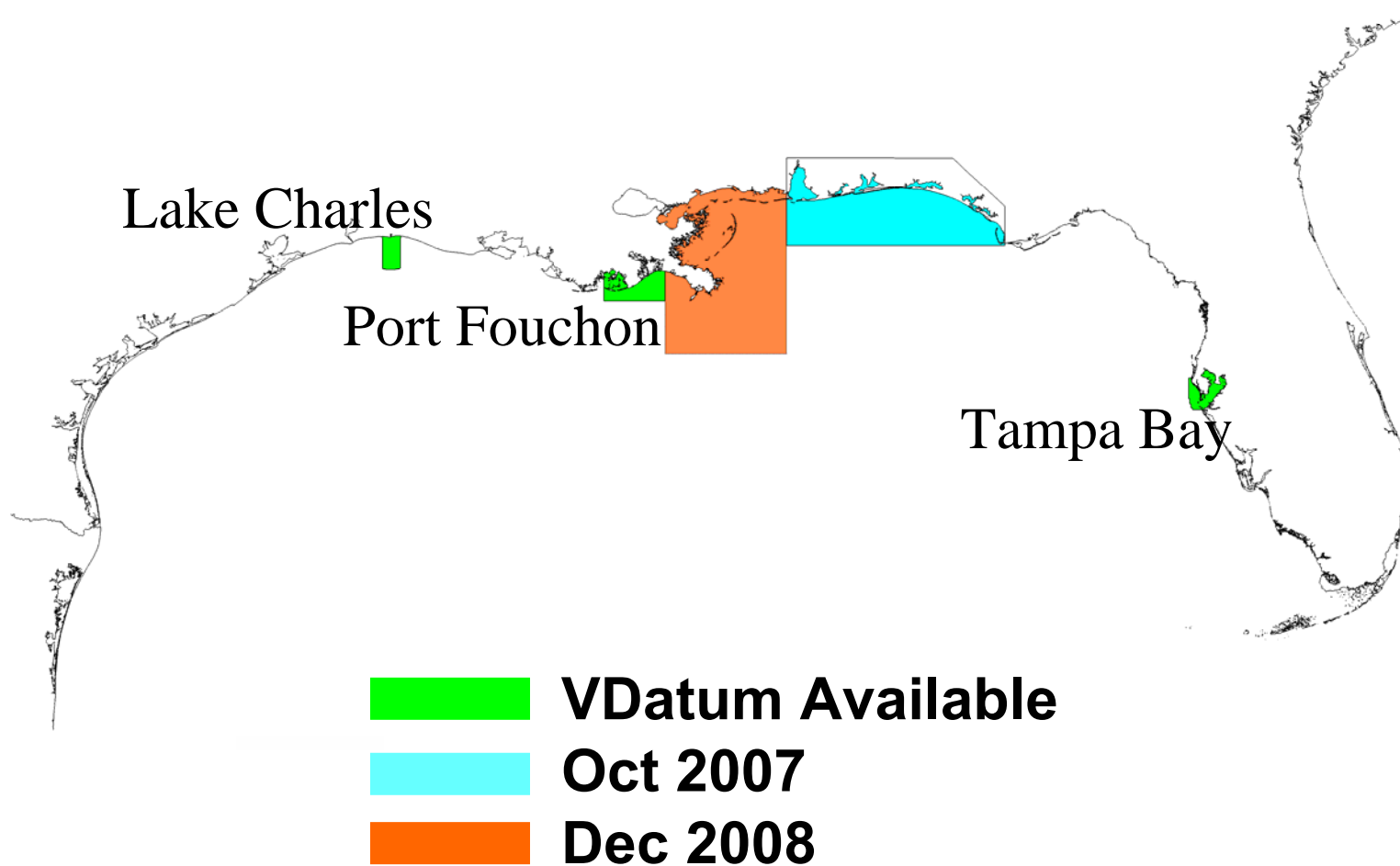
Height Soundings

Batch File Conversion

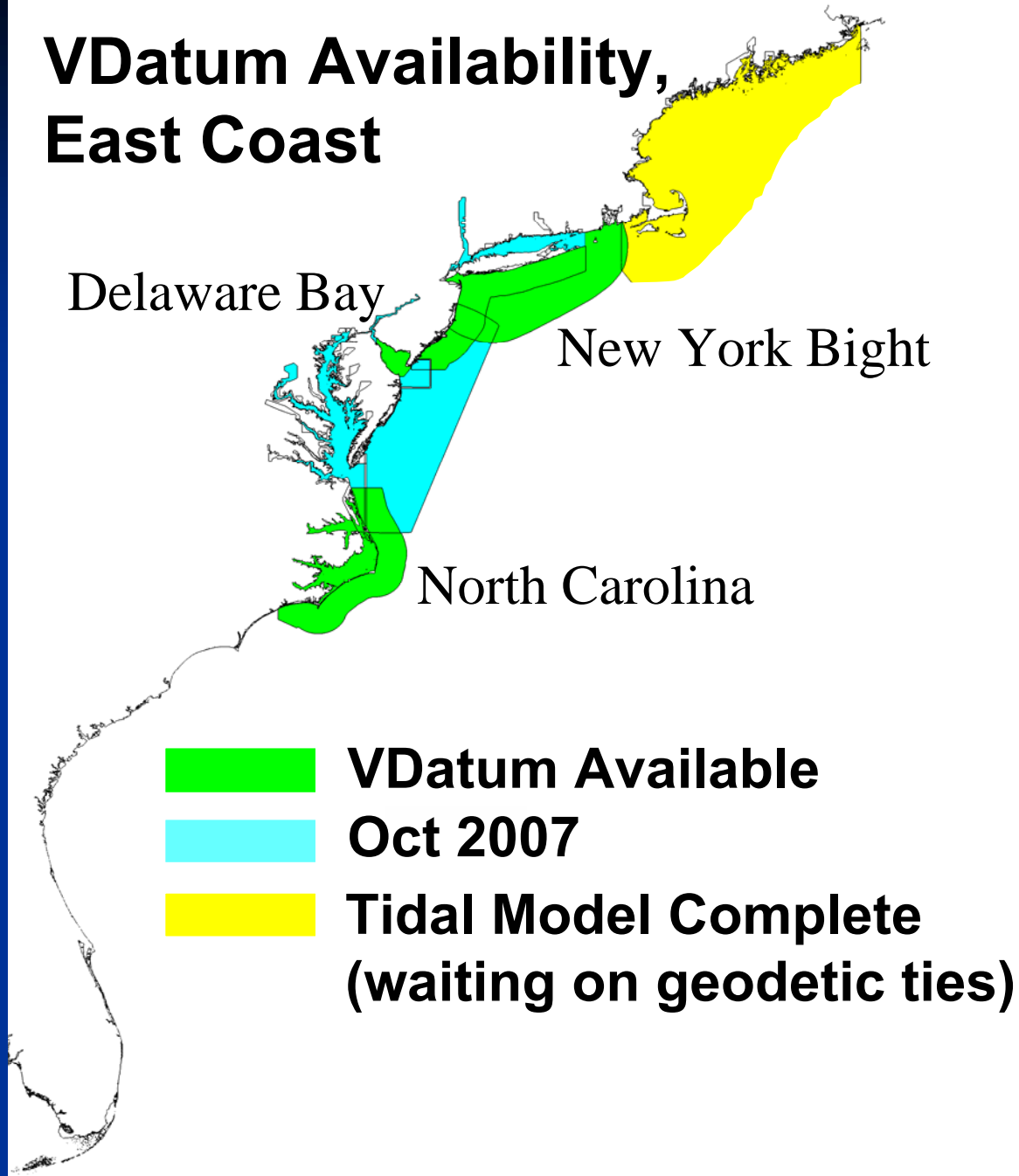
VDatum Availability, West Coast



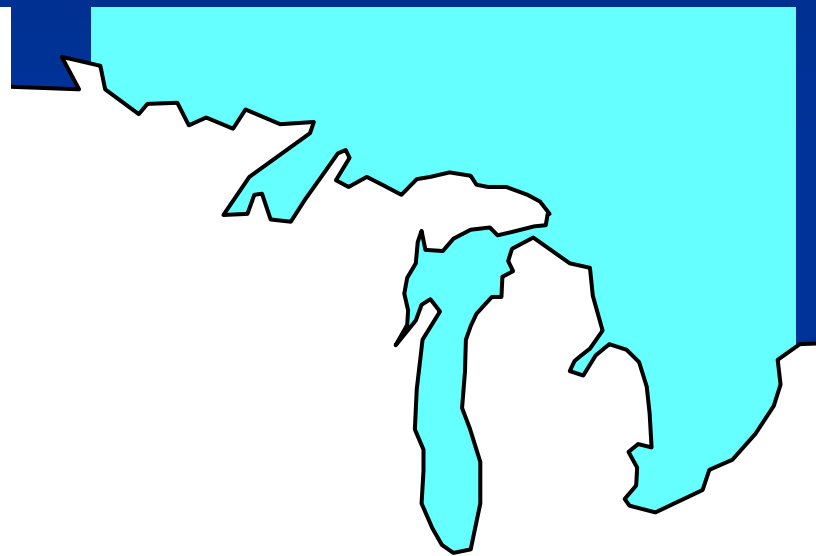
VDatum Availability, Gulf Coast



VDatum Availability, East Coast

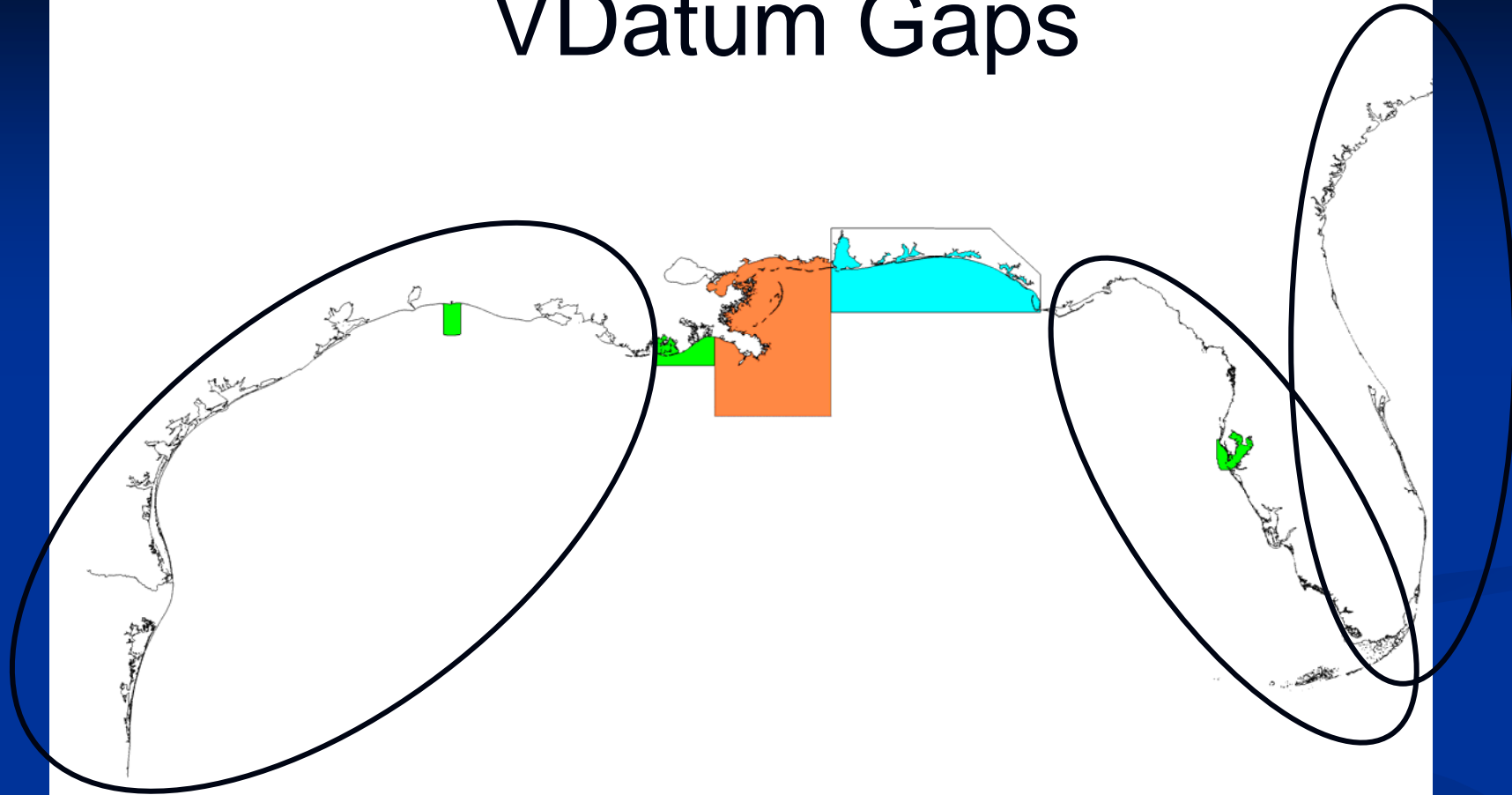


VDatum Availability, Great Lakes



 Dec 2007

VDatum Gaps



Improvements in Next Version

Choose region w/o rerunning executable

Key Field is optional

The screenshot shows the 'Vertical Datum Transformation Tool' window. The title bar reads 'Vertical Datum Transformation Tool'. The interface is divided into several sections:

- GTX Files Location:** A text box containing 'C:\Documents and Settings\Edward.Myers\My Documents\VDatum\NewSoftware'.
- Datum Information:**
 - Horizontal Datum: NAD 83, WGS, ITRF
 - Vertical Datum: NAVD 88
 - New Vertical Datum: NAVD 88
 - Vertical Datum Unit: Meter, Feet
 - Height/Sounding: Height, Sounding
 - Geoid: Geoid 2003
- Point mode:**

	Input Point:	Output Point:
Latitude:	0.000	0.000
Longitude:	0.000	0.000
Height:	0.000	0.000

Buttons: Reset, Convert
- File mode:**
 - Input File(s): [Empty text box]
 - Output File(s): [Empty text box]
 - Input File Format: (ASCII 3-column or 4-column)
 - (Key), Lat, Long, Height
 - (Key), Long, Lat, Height
 - Save output data as in geographic coordinate
 - Convert
- Coordinate Information:**
 - Geographic
 - UTM Zone: 1

2003 geoid model added

Lat, Long or UTM

Future VDatum Developments

- Incorporation of State Plane Coordinates
- Development of a National VDatum
- Evaluating extending VDatum inland
- Provide uncertainty estimates in metadata
- Improvements to downloadable software
- New web-based tools for interacting with VDatum results

A map of the United States with a color-coded area in the Pacific Northwest. The color scale ranges from dark blue (low values) to red (high values), with yellow and green in between. The high-value area is concentrated in the coastal waters of Washington and Oregon.

Implementation of TCARI for Hydrographic Surveying

Tidal Constituent and Residual Interpolation

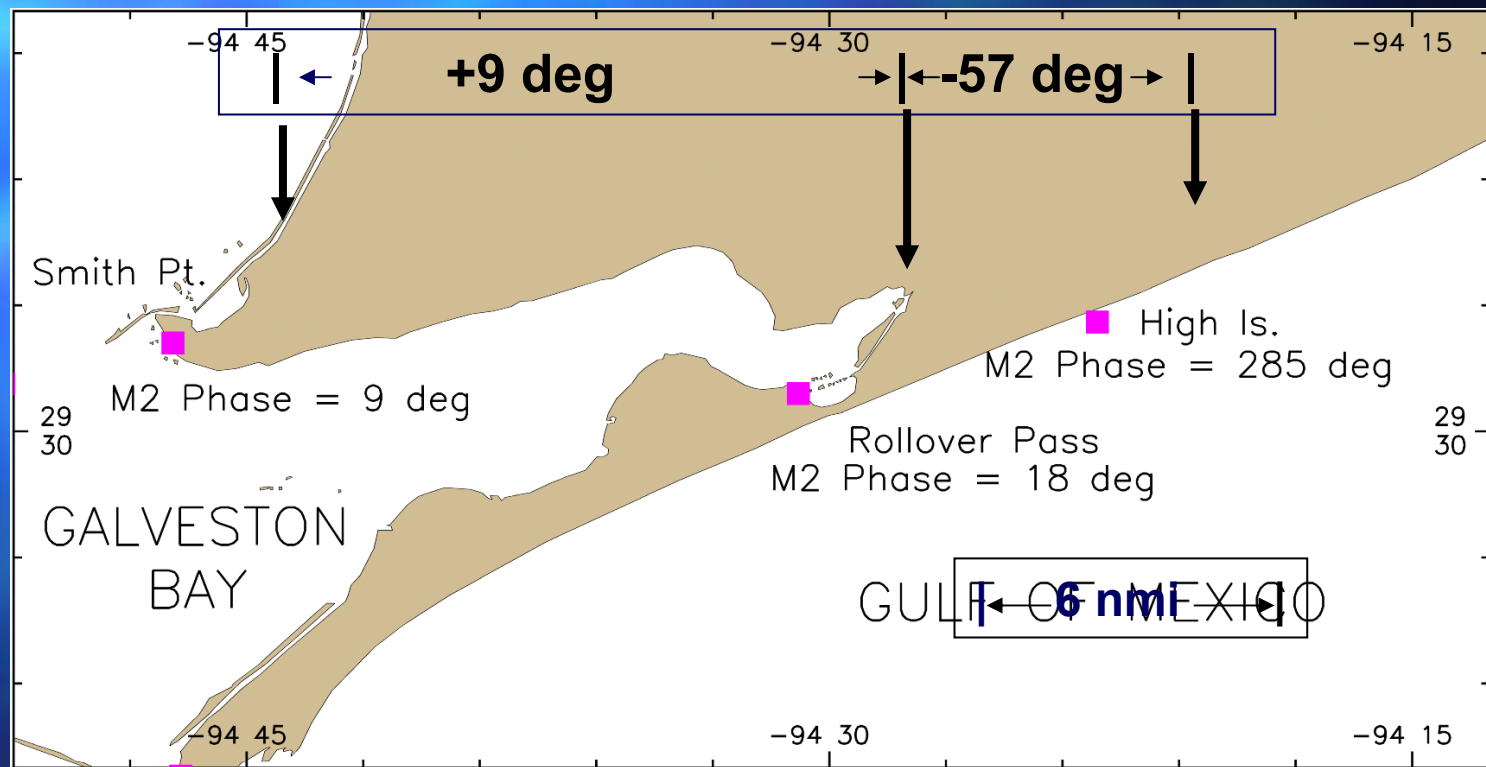
Tidal Constituent And Residual Interpolation (TCARI)

- Created in 1995 at Coast Survey Development Laboratory by Dr. Kurt Hess.
- Re-Coded in Python for PYDRO by Barry Gallagher (Hydrographic System and Technology Program).
- Uses formal mathematics to interpolate tidal constituents, residual water levels, and vertical datum across survey area.
- TCARI overcomes discrete zoning weaknesses.
- Also provides the means of modeling Chart Datum-Ellipsoid separation.



Spatial Interpolation: Why a New Method Instead of Linear?

-- Because of intervening land --



Overview of TCARI

Spatial interpolation (Laplace Equation)

- from tide station locations with known values of components
 - harmonic constituents, residuals, and datum offsets
- to anywhere else in local region at any time
- sum of weighted components



TCARI equations

Interpolation by Laplace's Equation: $\Delta^2 f = 0$

Subject to boundary conditions: $f(x_i, y_i) = f_i^{\text{obs}}$

$f = \text{datum, amp, cos(phase)}$ $\frac{\partial f}{\partial n} = \alpha \frac{\partial f}{\partial n}$



Overview of TCARI

TCARI Separately Interpolates:

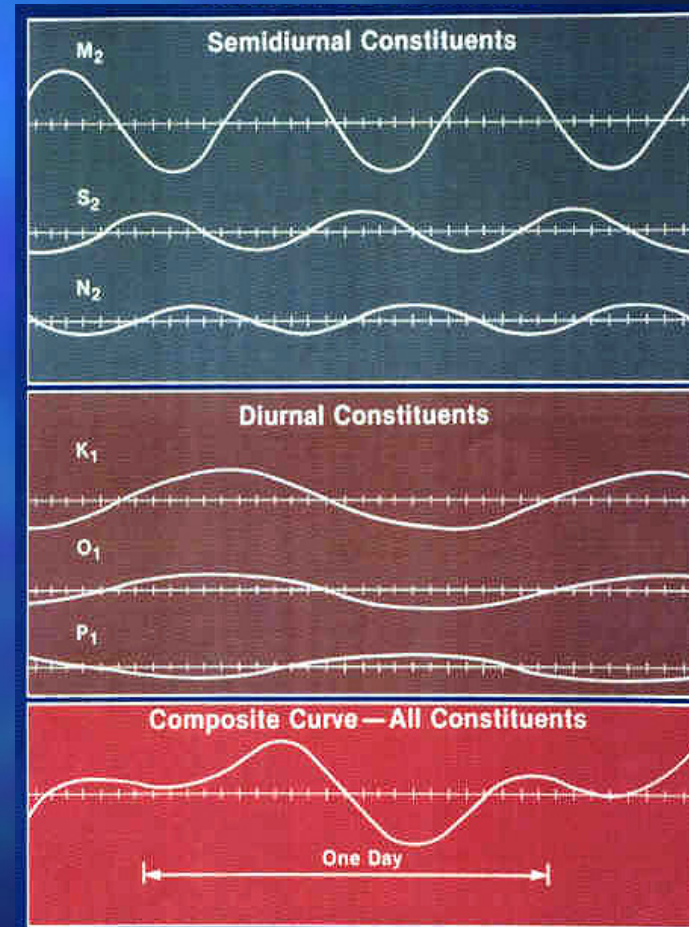
- astronomical tide = Sum of Harmonic Constituents
(i.e. predicted tides)
- residual water level = Observed – Predicted
- datum offset = MSL – MLLW
or MSL – ellipsoid,
etc.

tide correction = astronomical tide
+ residual
+ datum offset



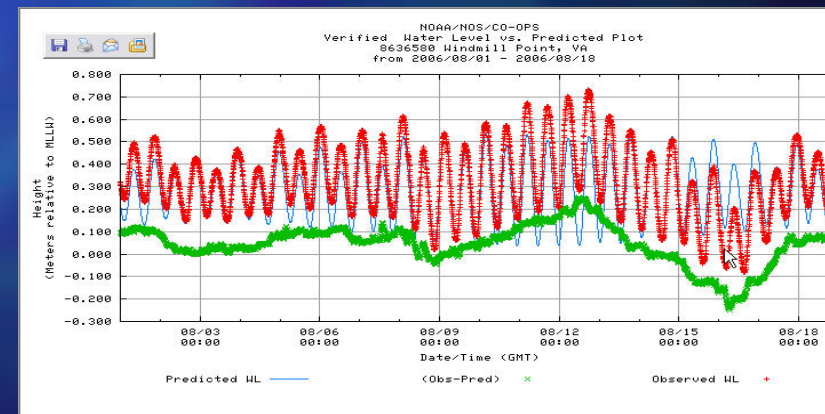
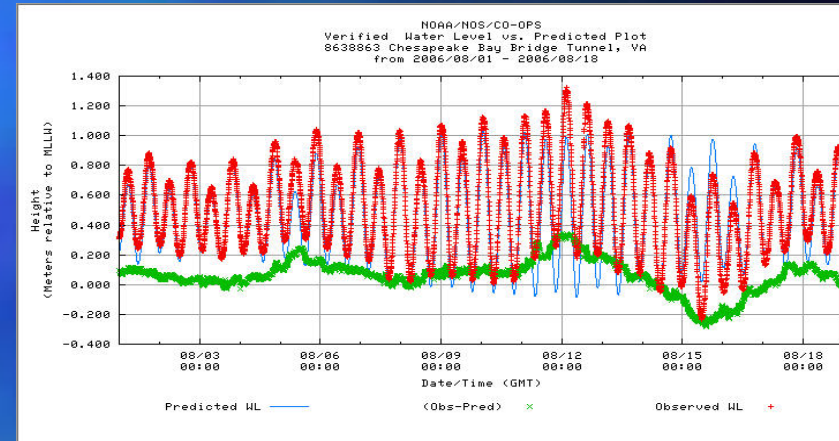
TCARI

- Tidal component may be broken down into its “harmonic constants”.
- 37 Used by NOAA.



TCARI

- Tidal portion induced by the interaction between the earth, sun, and moon.
- Non-tidal is induced by weather and riverine discharge.



Triangulated Mesh Creation

- Load Vector Shoreline – National Geophysical Data Center (NGDC) website
- Clean Shoreline
- Load Tide Stations
- Create Mesh Grid



Example of Running the TCARI Software: First extract a coastline

NOAA/NESDIS/NGDC/MGG-Coastline Extractor, Extracted Coastline Data - Microsoft Internet Explorer

File Edit View Favorites Tools Help

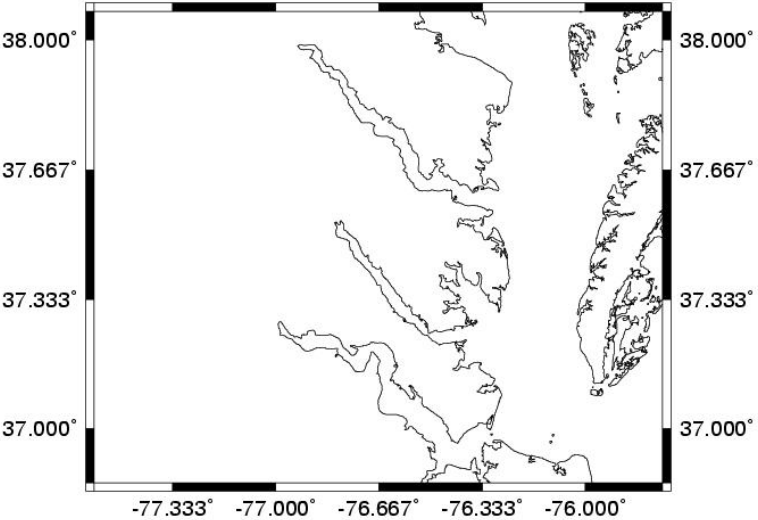
Address http://rimmer.ngdc.noaa.gov/cgi-bin/mgg/coast/get_coast.pl

NOAA > NESDIS > NGDC > MGG > bathymetry & relief > shorelines

Extracted Coastline Data

use your back button to return to the coastline extractor

-77.333° -77.000° -76.667° -76.333° -76.000°



38.000° 38.000°
37.667° 37.667°
37.333° 37.333°
37.000° 37.000°

-77.333° -77.000° -76.667° -76.333° -76.000°

Here is the coastline data you extracted: [19464.dat](#) (330093 bytes).

Note: If you don't want to list the file to your screen, you might want to select "load to local disk" (or the equivalent) before selecting. In Netscape, this is accomplished by holding down the shift key while you click.

[NOAA>NESDIS>NGDC>marine geology & geophysics](#) questions: peter.w.sloss@noaa.gov

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http://rimmer.ngdc.noaa.gov/cgi-bin/mgg/coast/get_coast.pl
maintained by: carla.j.moore@noaa.gov

Done Internet



Input Observed Datums into File

36.38.-77.-75.TCARI.txt - Notepad

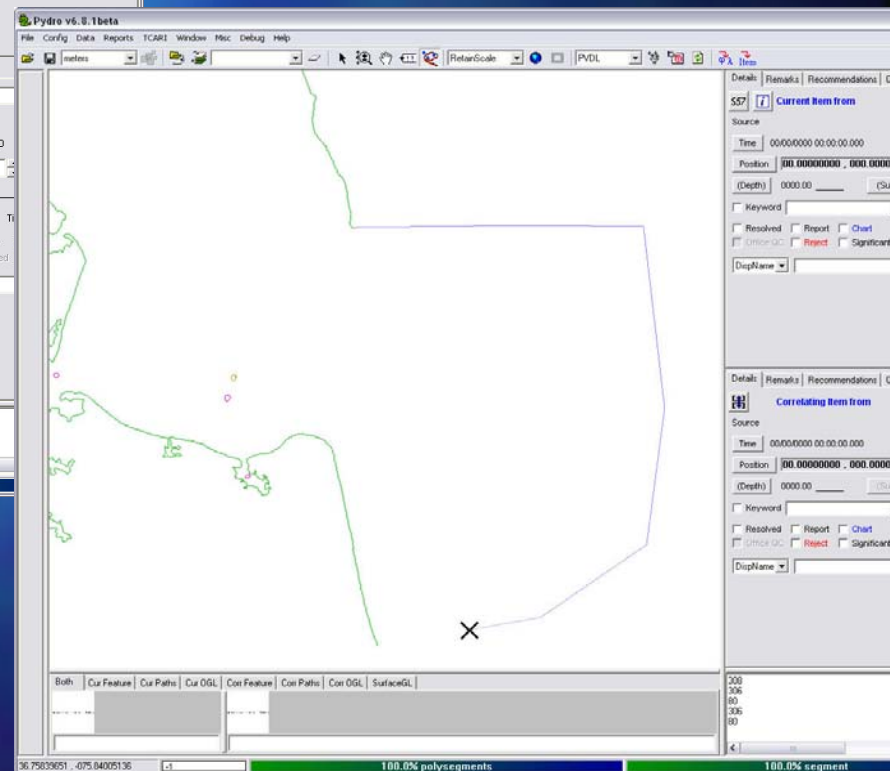
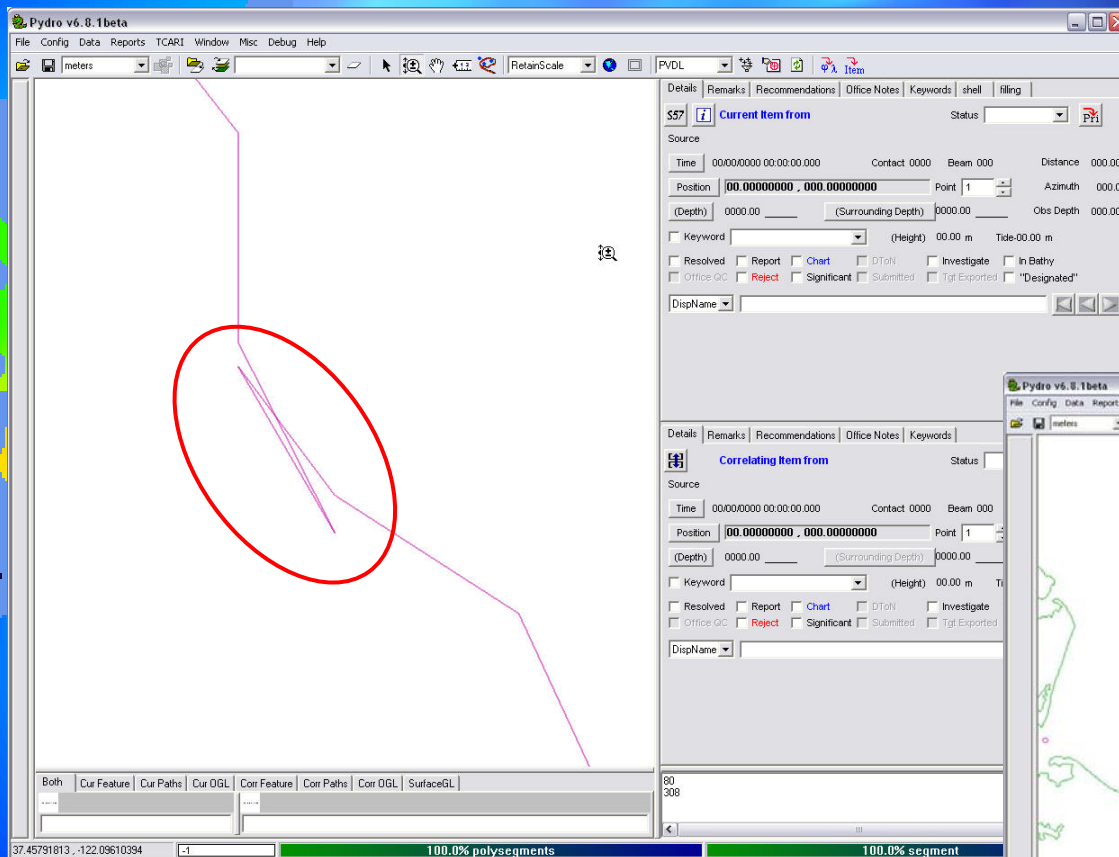
File Edit Format View Help

N	Station #	ST Name	Longitude	Latitude	Beg Mon	Beg Day	BegYear	End Mon	End Day	EndYear	Pub Mon
1	8632200	2 VA KIPTOPEKE, CHESAPEAKE BAY	-75.988333	37.166667	9.00	21.00	2005.00	-99.99	-99.99	-99.99	7.00
2	8633532	1 VA TANGIER ISLAND	-75.993333	37.828333	3.00	14.00	2005.00	-99.99	-99.99	-99.99	4.00
3	8635750	1 VA LEWISSETTA, POTOMAC RIVER	-76.465000	37.995000	7.00	20.00	1990.00	-99.99	-99.99	-99.99	4.00
4	8636580	1 VA WINDMILL POINT, RAPPAHANNOCK RIVER	-76.290000	37.615000	12.00	16.00	2004.00	-99.99	-99.99	-99.99	4.00
5	8637624	1 VA GLOUCESTER POINT, YORK RIVER	-76.500000	37.246667	4.00	29.00	1991.00	9.00	18.00	2003.00	4.00
6	8637689	2 VA YORKTOWN USCG TRAINING CENTER, YORK R.	-76.478333	37.226667	4.00	24.00	2004.00	-99.99	-99.99	-99.99	4.00
7	8638424	1 VA KINGSMILL, JAMES RIVER	-76.663333	37.220000	6.00	6.00	2003.00	9.00	18.00	2003.00	4.00
8	8638433	1 VA SCOTLAND, JAMES RIVER	-76.783333	37.185000	6.00	5.00	2003.00	9.00	18.00	2003.00	9.00
9	8638489	1 VA PUDDLEDock SAND & GRAVEL	-77.371667	37.266667	8.00	1.00	2003.00	9.00	15.00	2003.00	1.00
10	8638610	1 VA SEWELLS POINT, HAMPTON ROADS	-76.330000	36.946667	1.00	13.00	2006.00	-99.99	-99.99	-99.99	9.00
11	8638863	2 VA CHESAPEAKE BAY BRIDGE TUNNEL	-76.113333	36.966667	5.00	10.00	2005.00	-99.99	-99.99	-99.99	10.00



Clean up coastline file

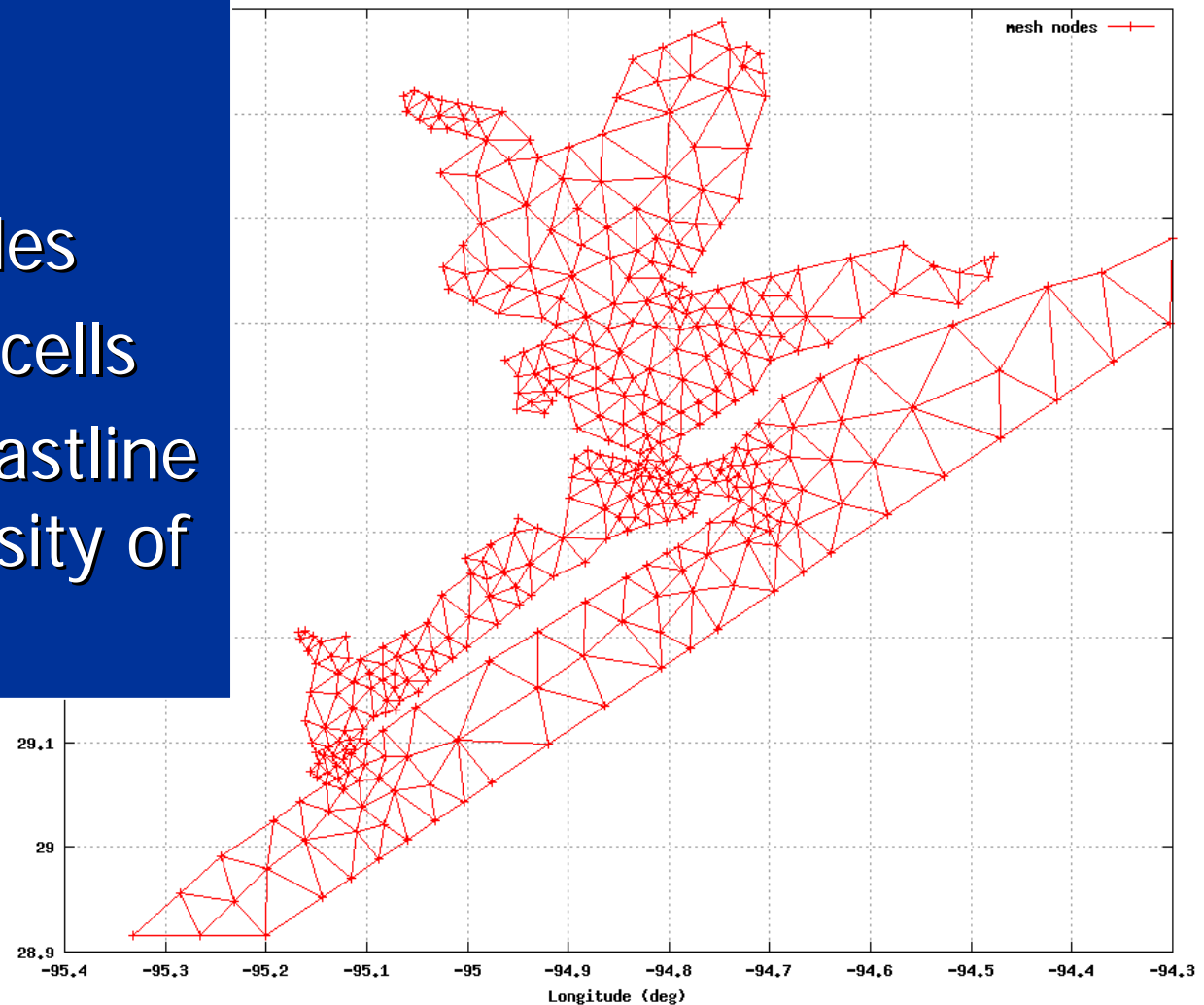
Create an open ocean boundary



TCARI: Mesh Generation

- Irregular mesh from Delauney triangulation.
- ~600 mesh nodes
- c.f. ~6000 grid cells
- resolution of coastline determines density of the grid

Irregular mesh of Galveston Bay, TX, generated by Delauney triangulation



Generate the triangular mesh

The screenshot displays the Pydro v6.8.1beta software interface. The main window shows a map of a coastline with a green triangular mesh overlaid on it. The mesh is composed of numerous small triangles, primarily concentrated along the shoreline and in the adjacent water area. The software's menu bar includes File, Config, Data, Reports, TCARI, Window, Misc, Debug, and Help. The toolbar contains various icons for file operations, navigation, and editing. The right-hand side of the interface features two panels for item details, each with tabs for Details, Remarks, Recommendations, Office Notes, and Keywords. The top panel is for item S57, labeled 'Current Item from', and the bottom panel is for a 'Correlating Item from'. Both panels show source information such as Time (00:00:0000), Contact (0000), and Position (00.00000000, 000.00000000). The bottom status bar shows coordinates (37.95482245, -075.70166389), a scale of 100.0% polysegments, and a zoom level of 100.0% segment. A circular logo for the National Oceanic and Atmospheric Administration (NOAA) is visible in the bottom-left corner.

Load data and run TCARI interpolation

The screenshot displays the Pydro v6.8.1beta software interface. The main window shows a map of a coastal area with a color-coded interpolation. The map is surrounded by a toolbar with various icons and a menu bar (File, Config, Data, Reports, TCARI, Window, Misc, Debug, Help). The status bar at the bottom indicates the current zoom level and segment completion: 37.98787068, -075.78029469, -1, 100.0% polysegments, and 100.0% segment.

The right-hand panel contains two sections for data entry, each with tabs for Details, Remarks, Recommendations, Office Notes, and Keywords.

Current Item from (Item ID: S57)

Source

Time: 00/00/0000 00:00:00.000 Contact: 0000 Bear

Position: 00.00000000, 000.00000000 Point: 1

(Depth): 0000.00 (Surrounding Depth): 0000.00

Keyword: (Height): 00.00 m

Resolved Report Chart DToN Investi

Office QC Reject Significant Submitted Tgt Ex

DispName:

Correlating Item from

Source

Time: 00/00/0000 00:00:00.000 Contact: 0000 Bear

Position: 00.00000000, 000.00000000 Point: 1

(Depth): 0000.00 (Surrounding Depth): 0000.00

Keyword: (Height): 00.00 m

Resolved Report Chart DToN Investi

Office QC Reject Significant Submitted Tgt Ex

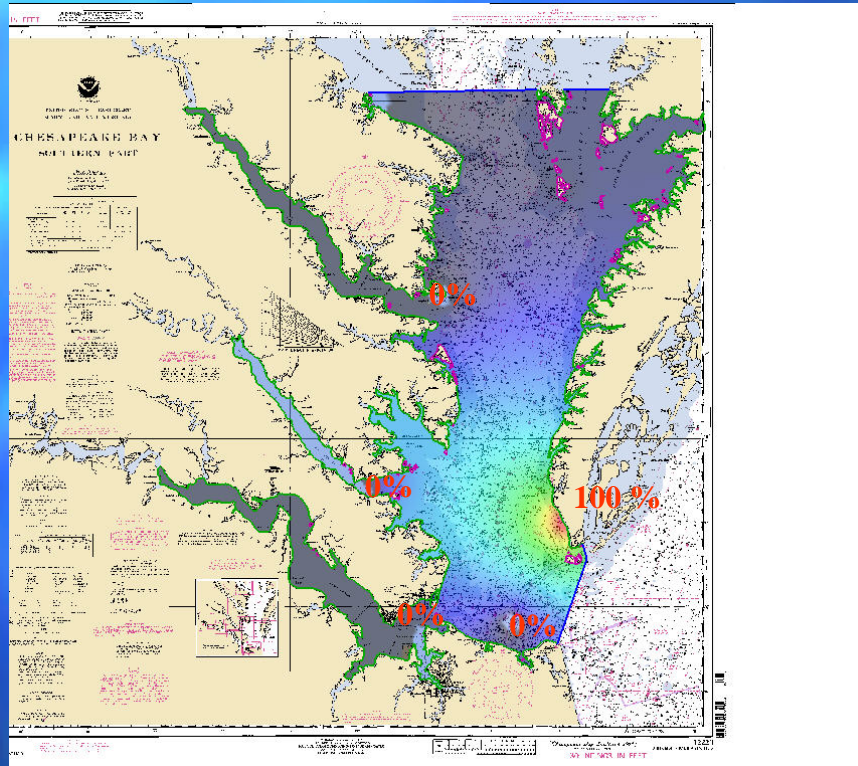
DispName:

306
308
80
306
308



How TCARI Interpolates

Spatial Interpolation Using Weighting Functions

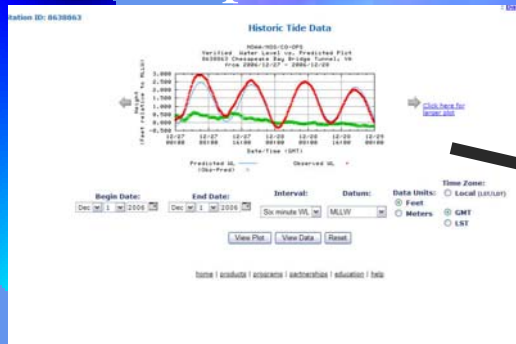


- Each grid point has a set of weighting values associated with it.
- Once these values are computed, they do not change, unless a new water level gauge is added, or if datums/HA are updated.
- The same grid can be used for multiple projects.

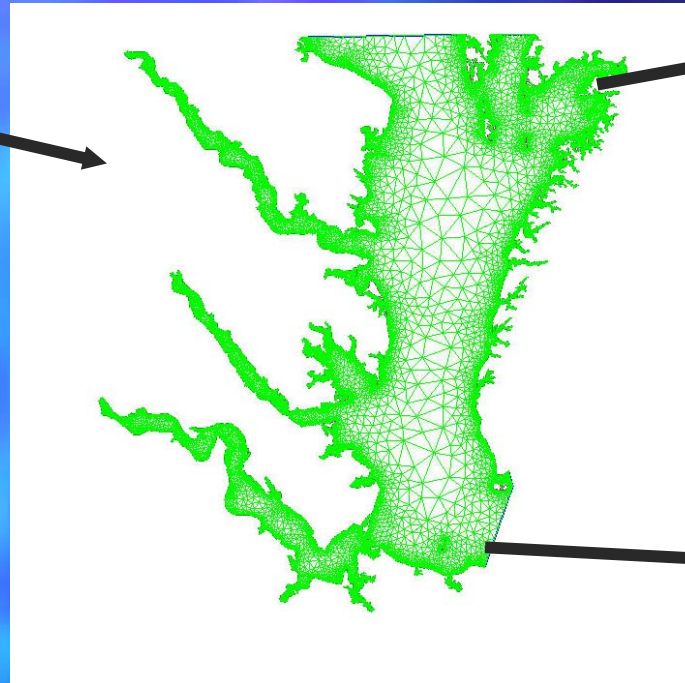
3 Sets of Weighting Values = 1) astronomical tide
Are Computed 2) residuals
(Since each piece is 3) datum offsets
interpolated separately)



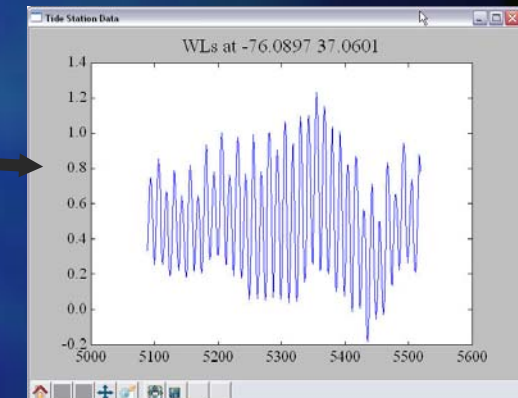
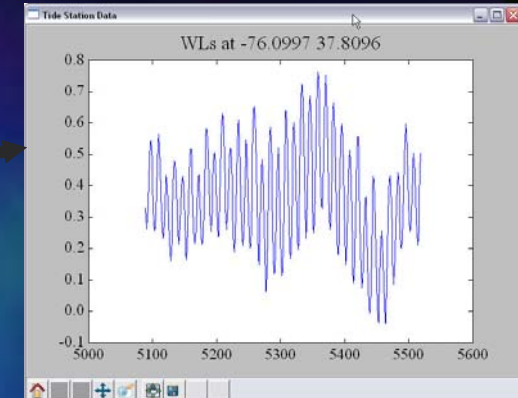
Input



6 – Minute Water Level Data from CO-OPS webpage



Output



TCARI spatially interpolates the tidal and non-tidal (residual) components of the water level signal, generating a tide corrector at a specific location.



Expected Benefits

- Increased water level correction resolution.
- This method produces more realistic water level uncertainties which, in most cases, will be less than present water level uncertainties... reducing Total Propagated Error (TPE) of survey depths.
- Quantitative, automated method to account for spatial variability of water level corrections in hydrography.
- Eliminates time spent hand drawing co-tidal lines and polygons in MapInfo.
- Useful for other applications such as Restoration Projects and Photogrammetry.



Constraints and Future Capabilities

Constraint

- TCARI requires tide gauge information. Older stations (before 1980's) are not readily available.

Future Capabilities

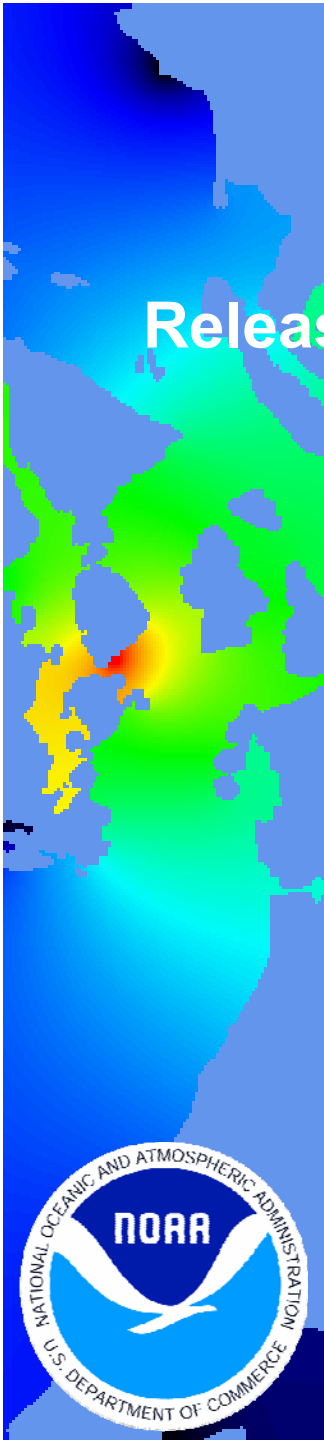
- Incorporate ADCERC offshore model





Release 1.0 of CO-OPS' electronic tide and tidal current prediction program called eTides

Expected release date in 2008





The main focus for this initial release is to develop a web-based application which will allow users, inside and outside of NOAA, to easily obtain accurate tide predictions in a form which is convenient for use.


- Map-based displays and text views for station selection
- “On-the-fly” predictions based on harmonic constituents where available
- Tabular and graphical displays of tide predictions for a user-specified time interval and datum
- Output options which will allow users to import the tide predictions into other tools
- Programmatic access to all predictions, constituents and updates via a web services portal



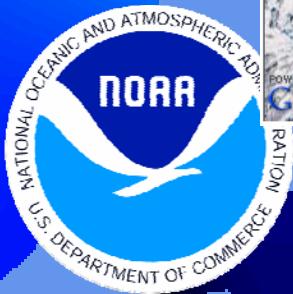


Station Selection Map Interface with Tiled Window

Map Satellite Hybrid

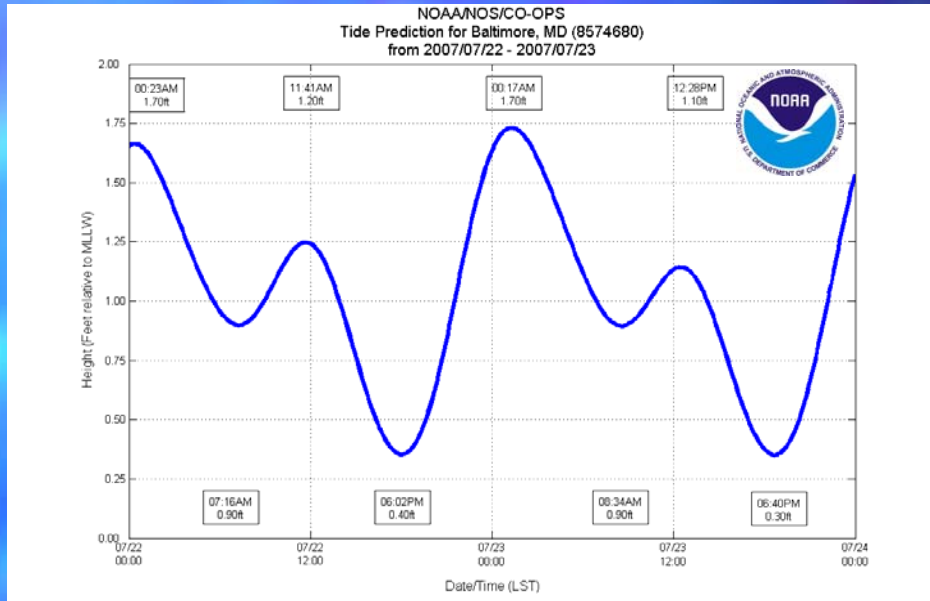
Station Information	Ancillary Information
Name: Cape Ninilchik, West of	ID: COI0511
Location: 60.02327°N, 152.12018°W	
 Get Prediction!	

Imagery ©2007 TerraMetrics, Map data ©2007 Tele Atlas - Terms of Use

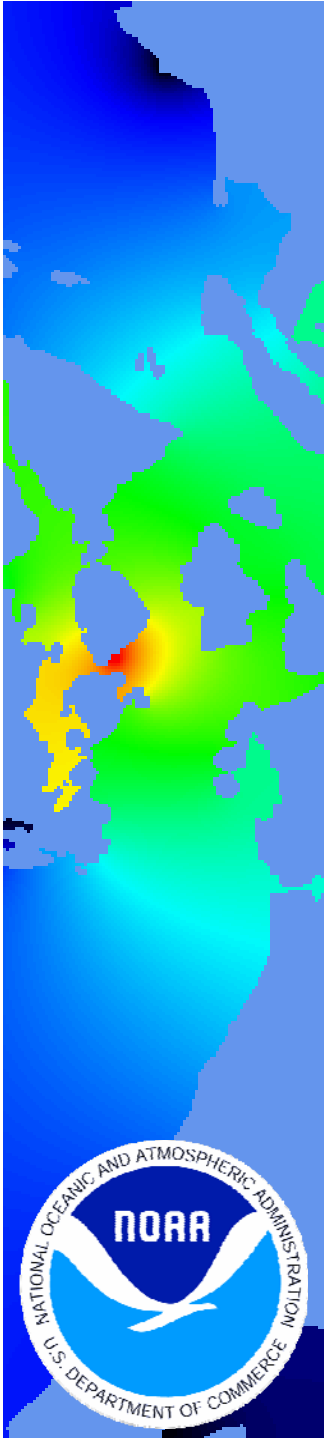
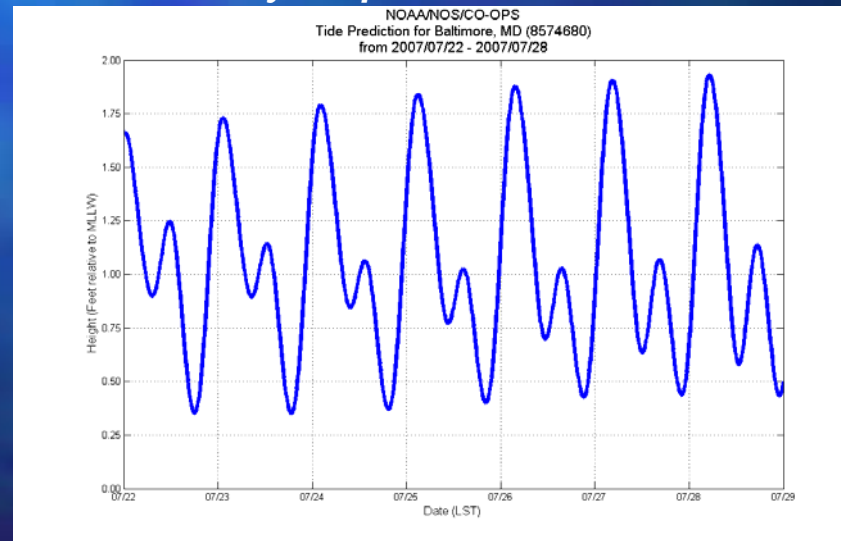




Daily Graphical Prediction



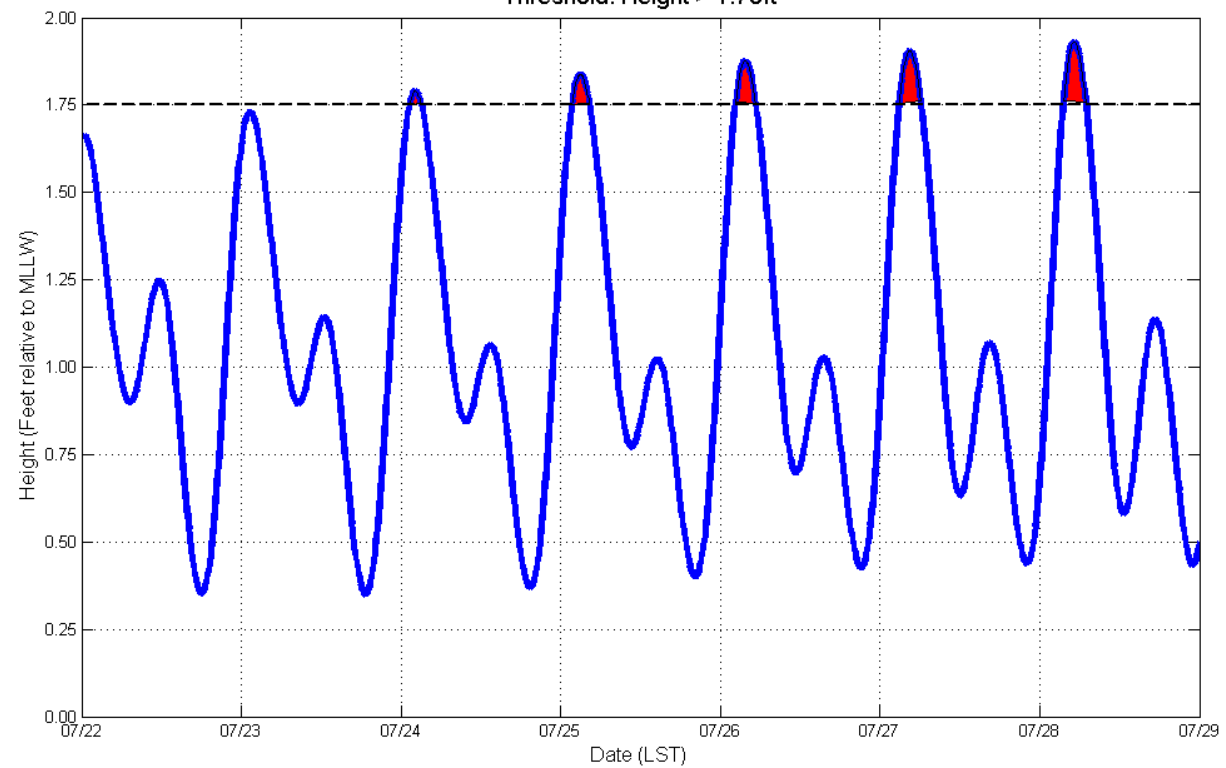
Weekly Graphical Prediction





Threshold Graphical Prediction

NOAA/NOS/CO-OPS
Tide Prediction for Baltimore, MD (8574680)
from 2007/07/22 - 2007/07/28
Threshold: Height > 1.75ft



Monthly Graphical Prediction



Tide Predictions for Baltimore, MD (8574680)

Time Zone: LDT Datum: MLLW

◀ JULY ▶

