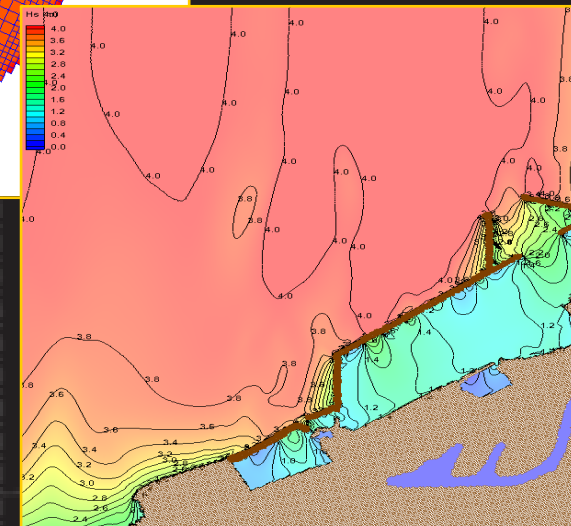
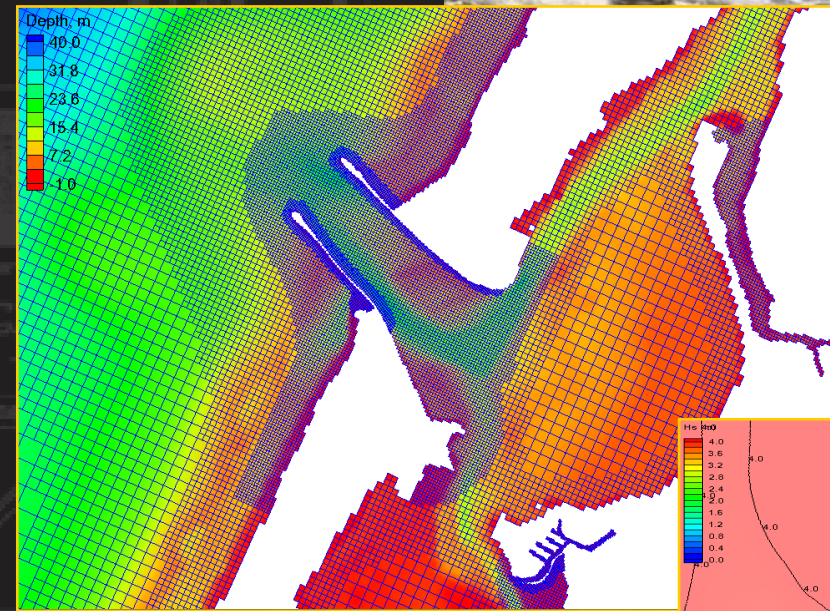


WORKING WITH BATHYMETRY

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Coastal & Hydraulics Laboratory
US Army Engineer Research and Development
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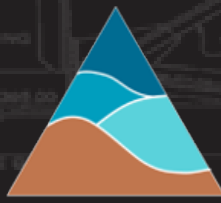
U.S. ARMY



US Army Corps
of Engineers®



ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER



CIRP



Working with Bathymetry topics

- Loading Surveys
- Horizontal Projection
- Vertical Datums
- Merging Datasets



Setting primary projection for the Project.

File Edit Display Feature Objects Window Help

Display Projection

Horizontal

No projection Units: Meters

Global projection Set Projection...

Projection name:
NAD 1983 StatePlane New Jersey FIPS 2900 (Meters)

WKT:
PROJCS["NAD_1983_StatePlane_New_Jersey_FIPS_2900",GEOGCS
["GCS_North_American_1983",DATUM
["D_North_American_1983",SPHEROID
["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT
["Degree",0.0174532925199433]],PROJECTION
["Transverse_Mercator"],PARAMETER

Vertical

Datum: Local Units: Meters

Help... OK Cancel

(?, ?)



Name	Date
Merged	9/7
0.75m_Contour.xyz	4/7
3364_0409_ft_MLW.xyz	4/7
Channel_Survey_NJ-DEP_0609_ft_MLW.xyz	4/7
Coastal_Relief_Model_II_m_msl.pts	4/7
Field_Team_Measurements_0809_m_NAV...	4/7
LIDAR_ft_NAVD.xyz	4/7

Choose the correct individual projection for each survey dataset. Make sure you get the right Units.

Projection - Project\Scatter Data\0.75m_Contour

Horizontal

No projection Units:

Global projection

Projection name:
NAD 1983 StatePlane New Jersey FIPS 2900 (Meters)

WKT:
PROJCS["NAD_1983_StatePlane_New_Jersey_FIPS_2900",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER

Vertical

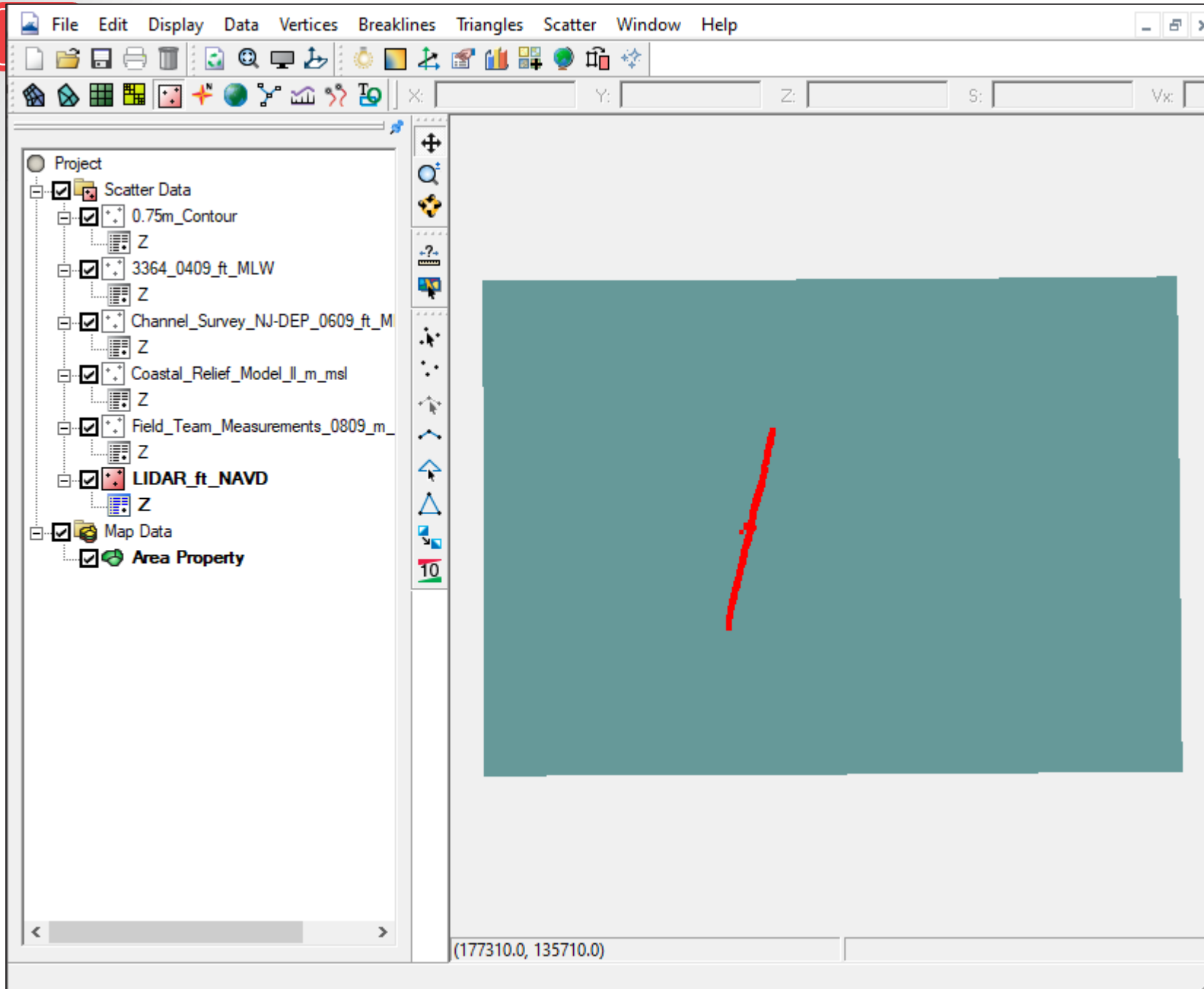
Datum: Units:

Filename	Horizontal Projection information
Channel_Survey_NJ- DEP_0609_ft_MLW.xyz	State Plane, New Jersey, U.S. Feet, NAD83
Coastal_Relief_Model_II_m_msl	Geographic (Lat/Long), Arc Degrees, NAD83
3364_0409_ft_MLW.xyz	State Plane, New Jersey, U.S. Feet, NAD83
LIDAR_ft_NAVD	State Plane, New Jersey, U.S. Feet, NAD83
Field_Team_Measurements_0809_m_NAVD.xyz	State Plane, New Jersey, Meters, NAD83
0.75m_Contour	State Plane, New Jersey, Meters, NAD83

Creating vector datasets...



The screenshot shows a GIS software window with a menu bar (File, Edit, Display, Data, Vertices, Breaklines, Triangles, Scatter, Window, Help) and a toolbar. On the left, a project tree lists several layers: Scatter Data (0.75m_Contour, 3364_0409_ft_MLW, Channel_Survey_NJ-), Coastal_Relief_Mo, Map Data, and Area Property. An Info dialog box is open in the center, displaying an information icon and the text: "112662 duplicate data points were found in the file and were removed." with an OK button. The status bar at the bottom left shows "(?, ?)" and the text "Creating vector datasets..." is visible at the very bottom of the page.



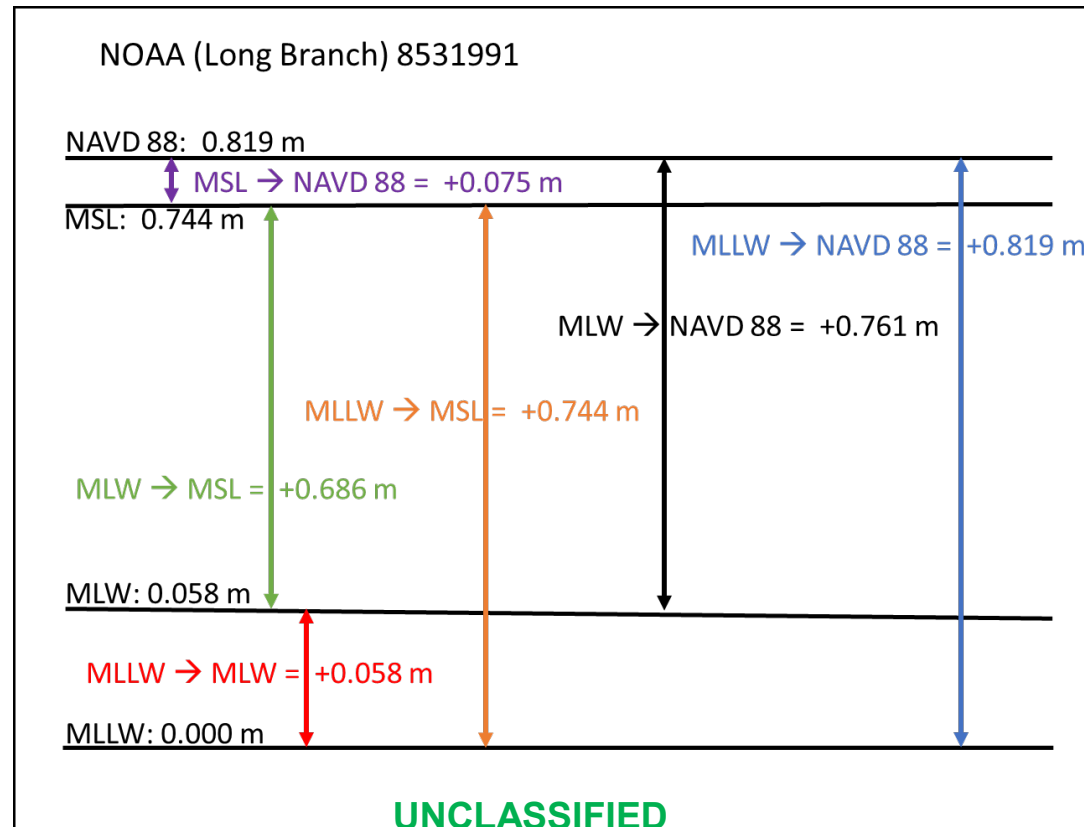
This has modified the Horizontal Projection of the selected files.

Next the datums must be modified so there is a common datum of the final scatter set.

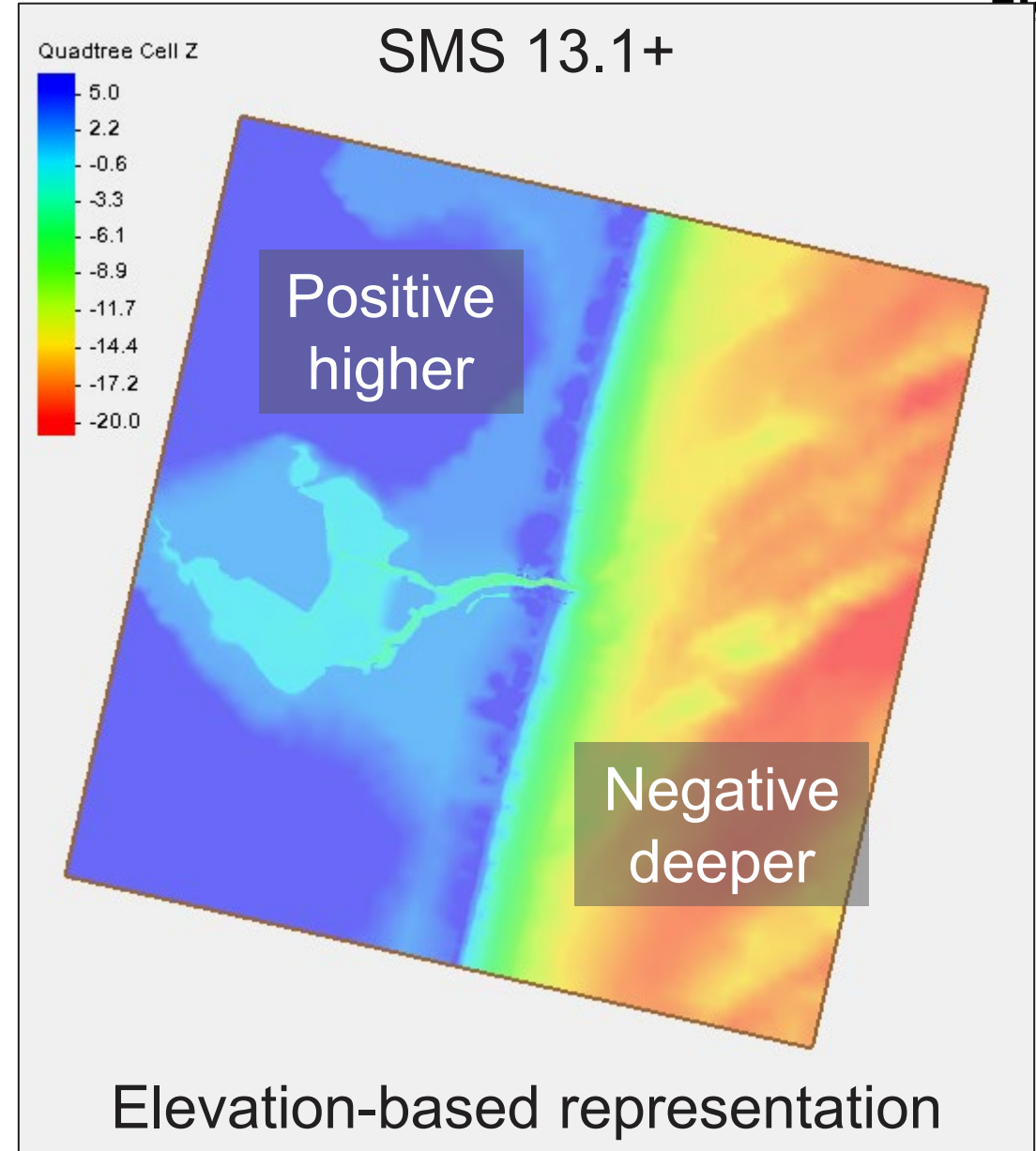
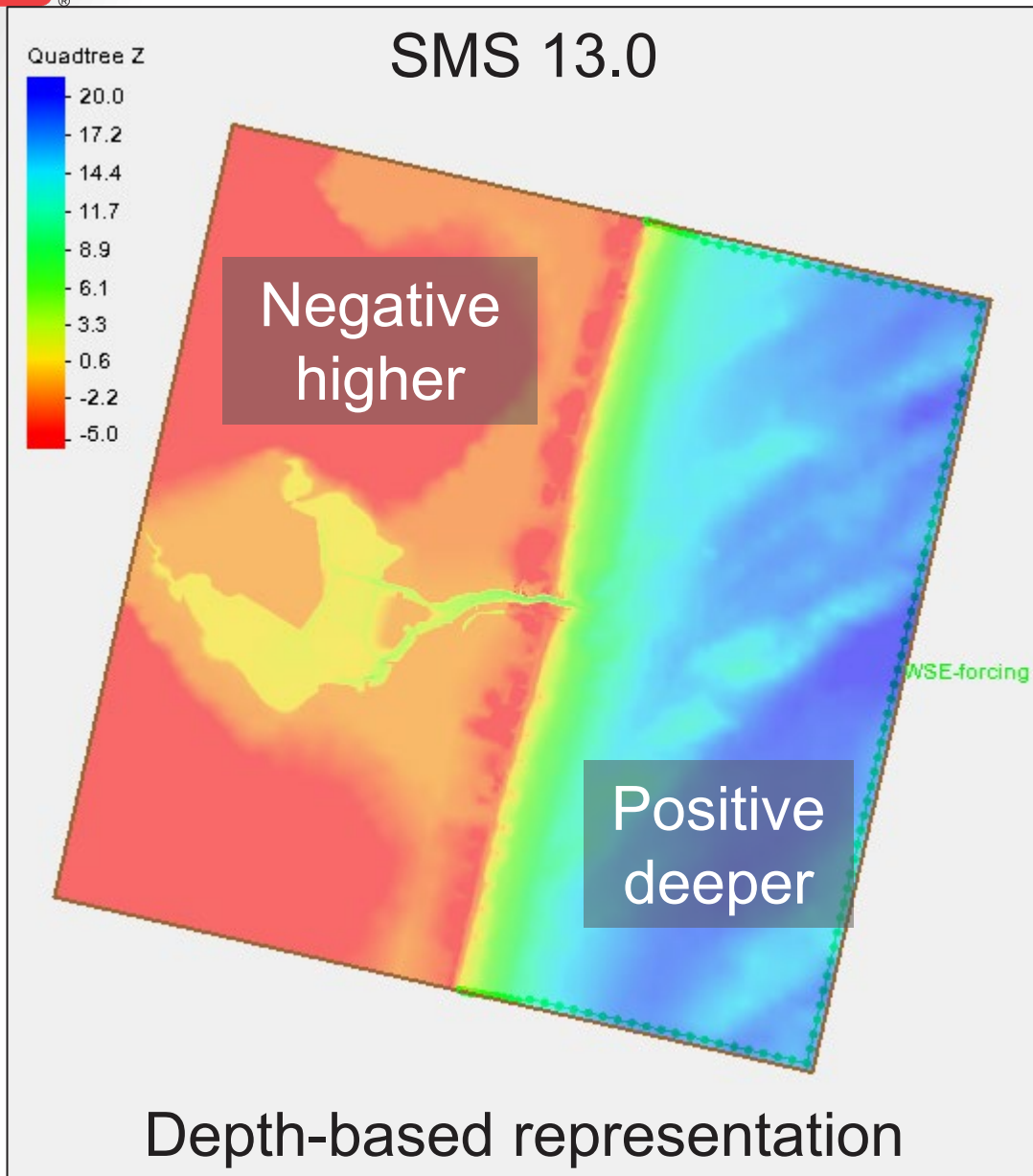
This process is done through the Data Calculator.



Dataset	Horizontal Projection	Horizontal Units	Vertical Datum	Vertical Units	Convert to MSL (ft)	Convert to MSL (m)
0.75m_Contour.xyz	SP NJ	m	MSL	m	0	0
3364_0409_ft_MLW.xyz	SP NJ	ft	MLW	ft	2.25	0.686
Channel_Survey_NJ-DEP_0609_ft_MLW.xyz	SP NJ	ft	MLW	ft	2.25	0.686
Coastal_Relief_Model_II_m_msl.pts	Lat Long	degrees	MSL	m	0	0
Field_Team_Measurements_0809_m_NAVD.xyz	SP NJ	m	NAVD88	m	-0.246	-0.075
LIDAR_ft_NAVD.xyz	SP NJ	ft	NAVD88	ft	-0.246	-0.075



SMS changes from 13.0 to 13.1 and after





Because all these survey files are already Positive UP, no change to the sign is needed

0.75m_Contour.xyz

No change needed

3364_0409_ft_MLW.xyz

Convert feet to meters, MLW to MSL

Channel_Survey_NJ-DEP_0609_ft_MLW.xyz

Convert feet to meters, MLW to MSL

Coastal_Relief_Model_II_m_msl.pts

No change needed

Field_Team_Measurements_0809_m_NAVD.xyz

Convert NAVD 88 to MSL

LIDAR_ft_NAVD.xyz

Convert feet to meters, NAVD to MSL

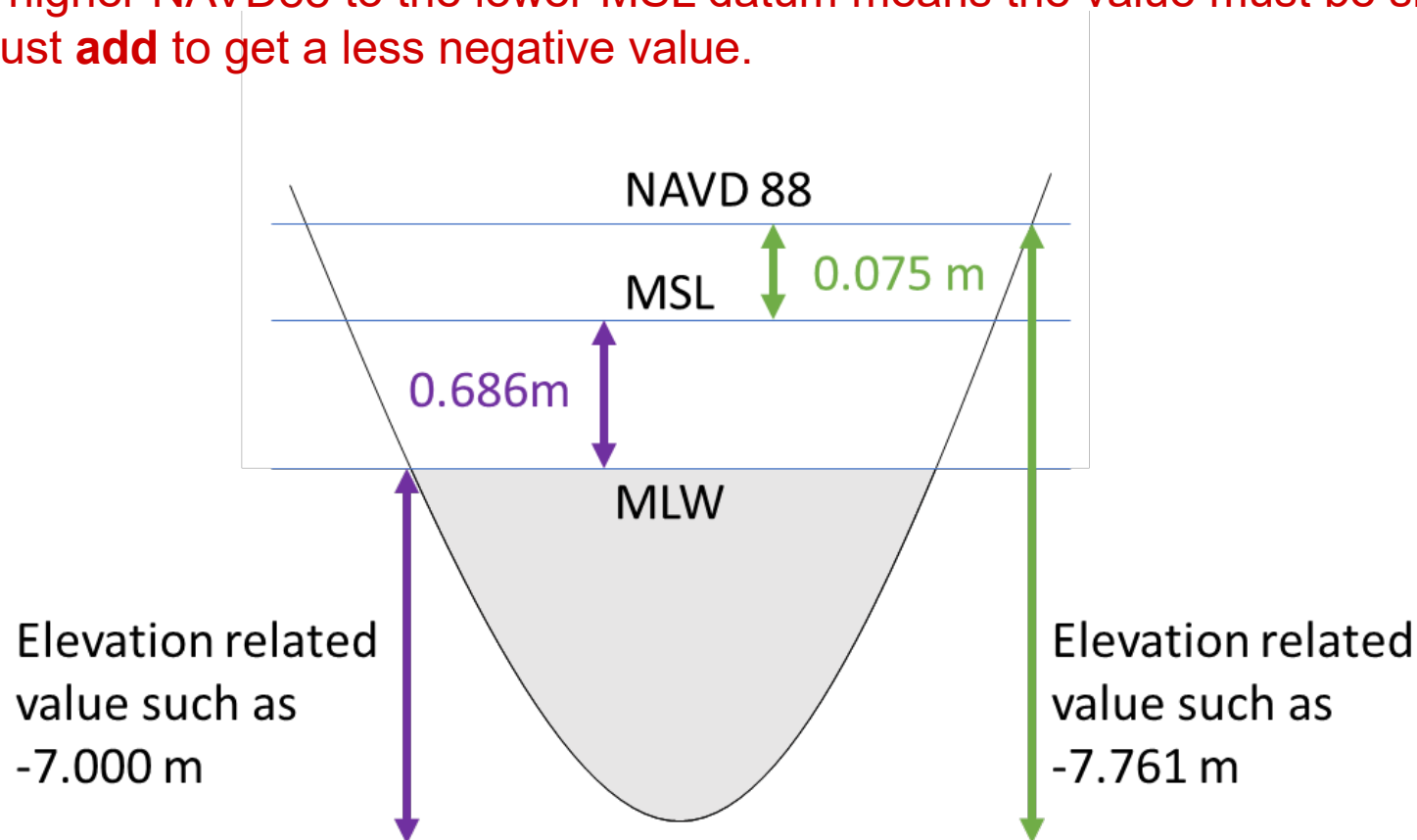
Dataset	Horizontal Projection	Horizontal Units	Vertical Datum	Vertical Units	Convert to MSL (ft)	Convert to MSL (m)
0.75m_Contour.xyz	SP NJ	m	MSL	m		
3364_0409_ft_MLW.xyz	SP NJ	ft	MLW	ft	2.25	0.686
Channel_Survey_NJ-DEP_0609_ft_MLW.xyz	SP NJ	ft	MLW	ft	2.25	0.686
Coastal_Relief_Model_II_m_msl.pts	Lat Long	degrees	MSL	m		
Field_Team_Measurements_0809_m_NAVD.xyz	SP NJ	m	NAVD88	m	-0.246	-0.075
LIDAR_ft_NAVD.xyz	SP NJ	ft	NAVD88	ft	-0.246	-0.075



It can be confusing to determine whether to add or subtract the datum from the original values. The diagram below should help.



- Moving from the lower MLW to the higher MSL datum means the value must be deeper (more negative in this case). Working with elevations means we must **subtract** to get a more negative value.
- Moving from the higher NAVD88 to the lower MSL datum means the value must be shallower (less negative). We must **add** to get a less negative value.



- MLW to MSL = value – correction = $-7.000 - 0.686 = -7.686$ m
- NAVD88 to MSL = value + correction = $-7.761 + 0.075 = -7.686$ m



UNCLASSIFIED Example Datum conversion



Dataset Toolbox

Tools

- Math
 - Compare datasets
 - Data Calculator**
 - Angle convention
- Spatial
 - Smooth datasets
 - Geometry
 - Grid Spacing
- Temporal
 - Sample time steps
 - Merge datasets
- Conversion
 - Scalar to Vector
- Coastal
 - Wave Length and Celerity
 - Gravity Waves
 - Quadratic Friction
 - Mannings N
 - Chezy Friction
 - Directional Roughness
 - Canopy Coefficient
 - Primitive Weighting
- Modification
 - Map activity
 - Filter

Data Calculator

Data Sets

- Channel_Survey_NJ-DEP_0609_ft_MLW
 - d1. Z**
 - d2. x location
 - d3. y location

Time Steps

1. 0:00:00:00

Use all time steps

Calculator

(d1 * 0.3048) - 0.686

Output dataset name: MSL, m

Compute

Done

Help...

Update Available Tools

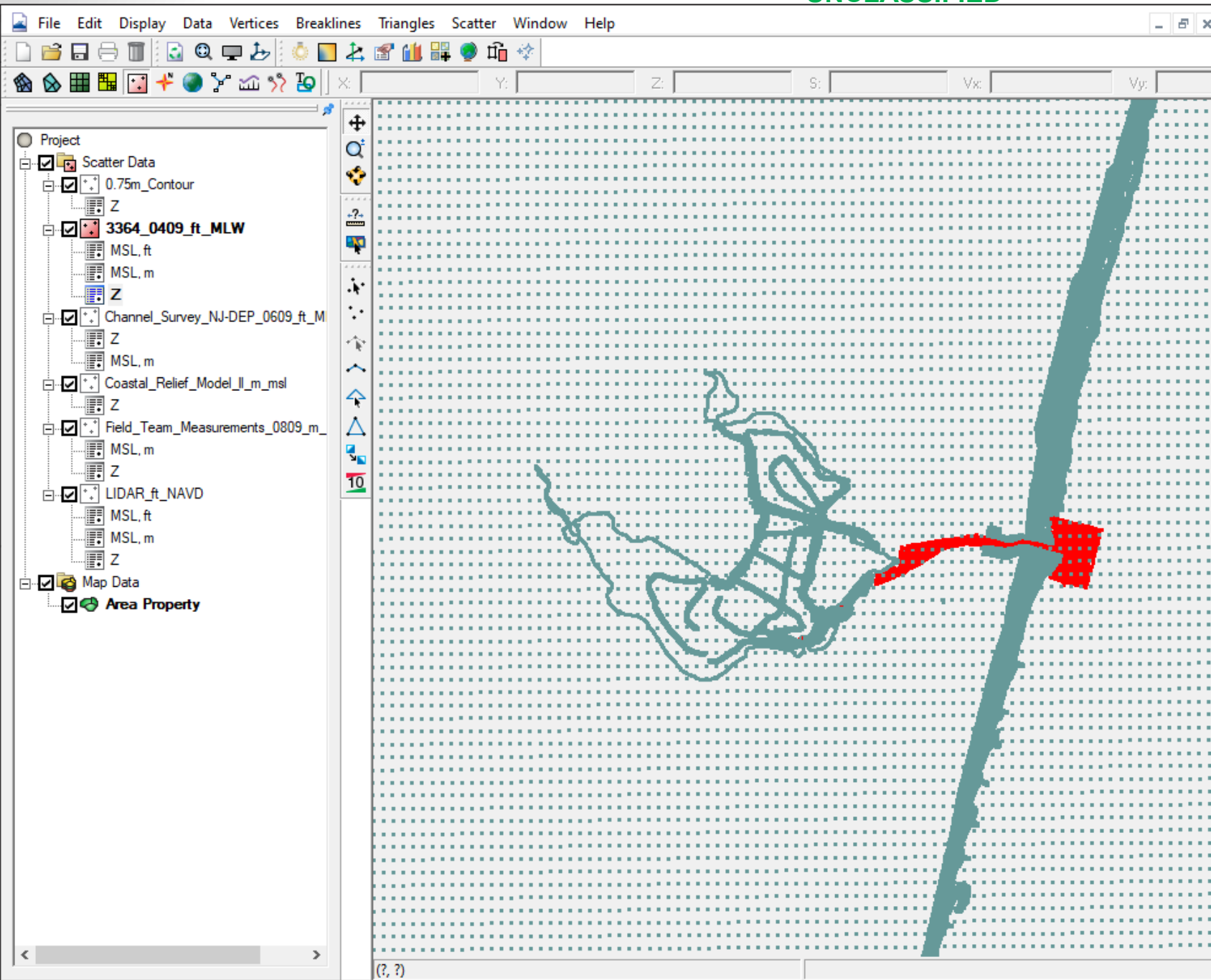
Channel Survey must have the following changes:

- 1) Convert feet to meters (multiply by 0.3048)
- 2) Add (or subtract) datum conversion (ex. from MLW to MSL, - 0.686)

They can be combined in one step or separated into separate steps.

I recommend separate steps until you are comfortable with this.

The combined (one-step) conversion is shown to the left.



Remember to save
project frequently.

There is no UNDO
in SMS

Merge all but Coastal Relief datasets together



Scatter Options...

- Merge Sets
- Assign Point Name
- Interpolate to Mesh

Merge Report

Input	vertices
Channel_Survey_NJ-DEP_0609_ft_MLW	2006
Field_Team_Measurements_0809_m_NAVD	176695
LIDAR_ft_NAVD	977751
0.75m_Contour	732
3364_0409_ft_MLW	5729
Output	
Merged surveys	1162877

Deleted Points
36 points deleted due to duplicate point tolerance.

Options Used
Input scattersets/functions
Channel_Survey_NJ-DEP_0609_ft_MLW/m MSL
Field_Team_Measurements_0809_m_NAVD/m MSL
LIDAR_ft_NAVD/m MSL
0.75m_Contour/POINT_Z
3364_0409_ft_MLW/m MSL

Merging all points
Duplicate point tolerance: 0.1

Help

Merge Scatter Sets

Select scatter sets to merge

Priority	Scatterset	Merge	Dataset
1	LIDAR_ft_NAVD	<input checked="" type="checkbox"/>	m MSL
2	Field_Team_Measurements...	<input checked="" type="checkbox"/>	m MSL
3	Coastal_Relief_Model_II_m_...	<input type="checkbox"/>	m MSL
4	Channel_Survey_NJ-DEP_0...	<input checked="" type="checkbox"/>	m MSL
5	3364_0409_ft_MLW	<input checked="" type="checkbox"/>	m MSL
6	0.75m_Contour	<input checked="" type="checkbox"/>	m MSL

Merged scatter set options

Name: Merged surveys

Delete original scatter sets

Overlapping region options

Merge all scatter points

Delete lower priority scatter points

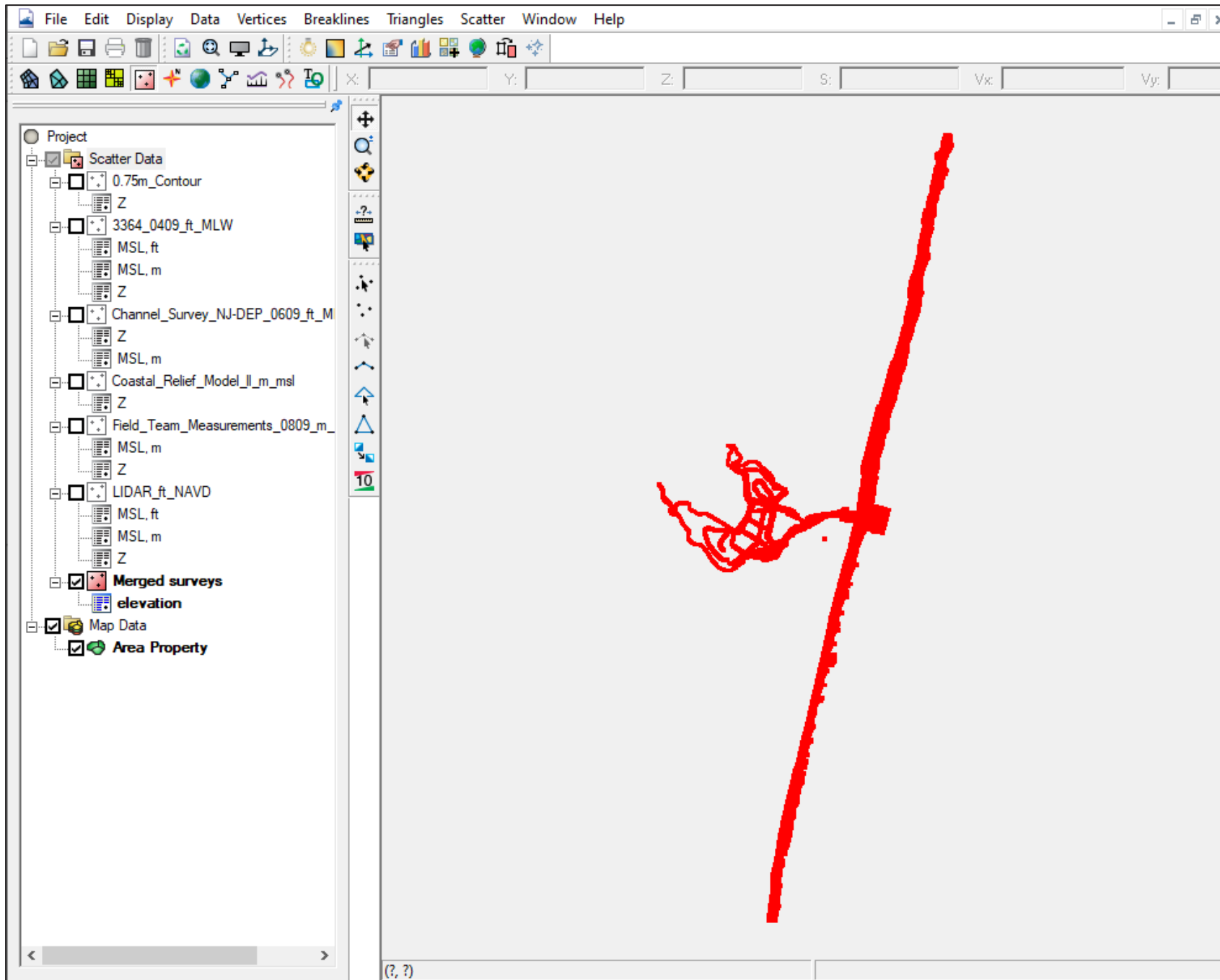
Maintain triangulation

Help... OK Cancel

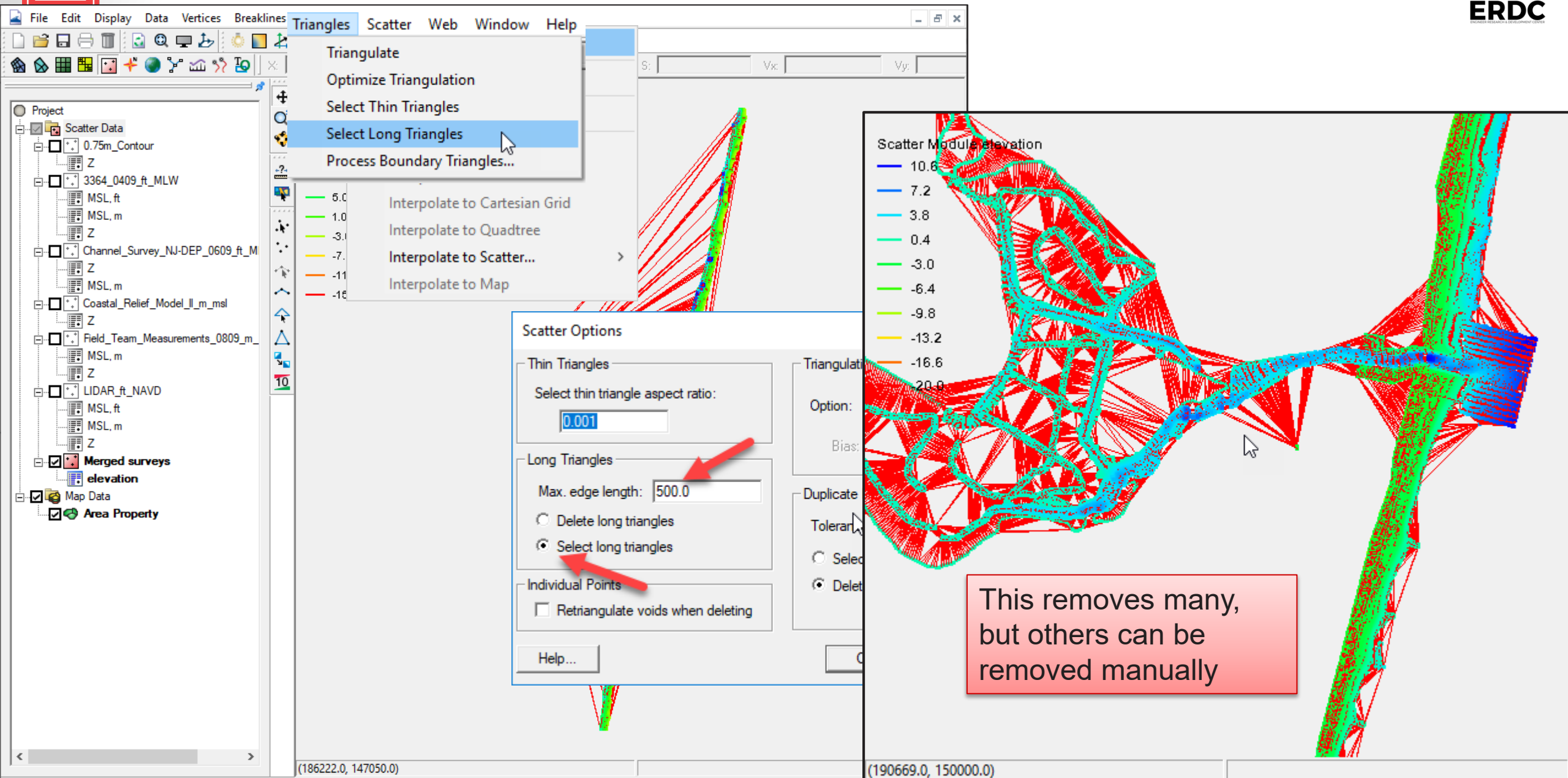
Scatter Data

- Channel_Survey_NJ-DEP_0609_ft_MLW
 - POINT_Z
 - m MLW
 - m MSL
- Coastal_Relief_Model_II_m_msl
 - POINT_Z
 - m MSL
- Field_Team_Measurements_0809_m_NAVD
 - POINT_Z
 - m MSL
 - points)
- Coastal_Relief_Model_II_m_msl
 - m MSL
 - points)
- Channel_Survey_NJ-DEP_0609_ft_M
 - m MLW
 - m MSL
 - points)
- 3364_0409_ft_MLW
 - m MLW
 - m MSL
 - points)
- 0.75m_Contour
 - Z
 - m MSL
- Merged surveys**
 - m MSL
- Map Data
- Area Property

Merge two or more scatter sets.

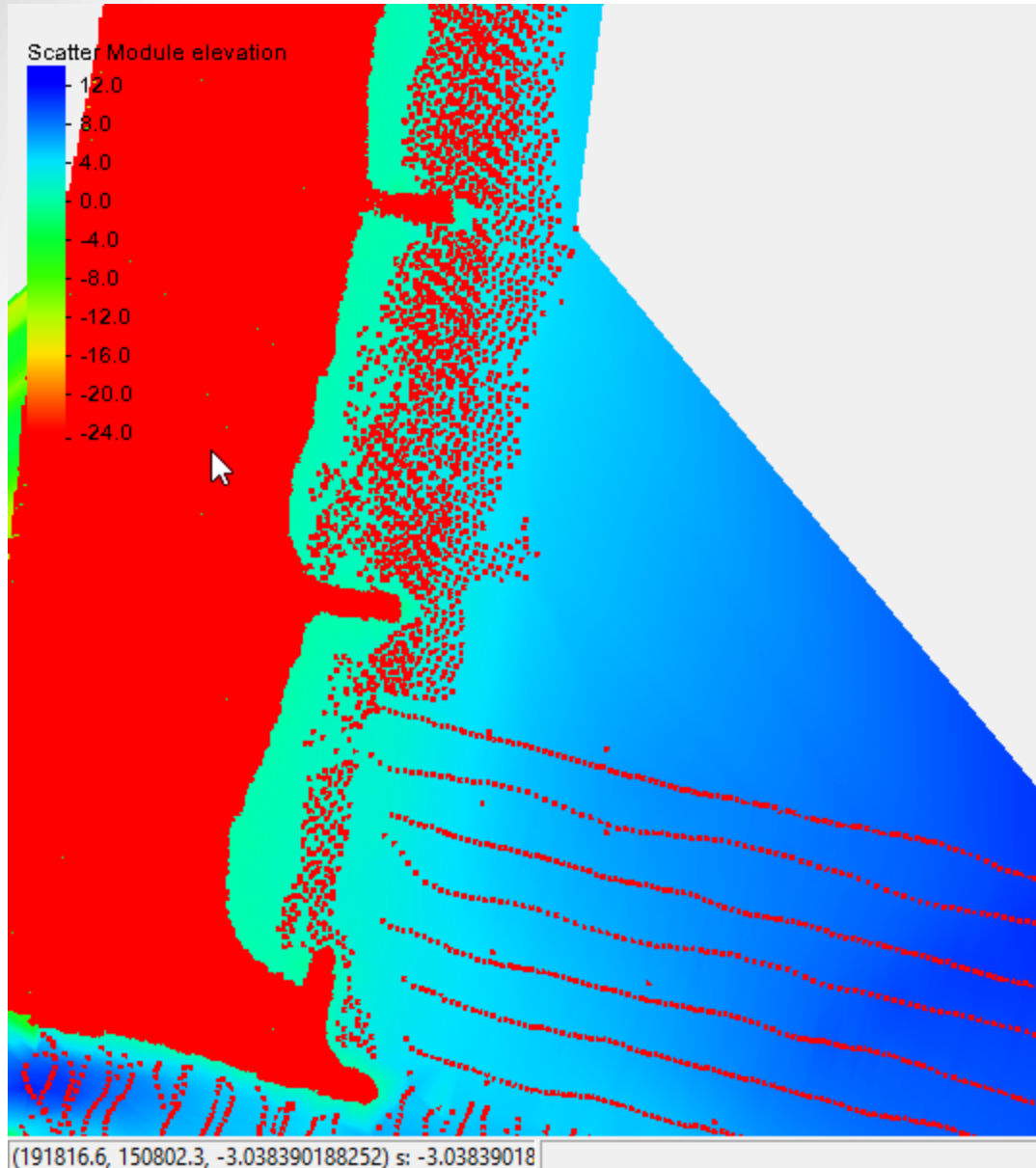


Remove triangulated elements where no points exist



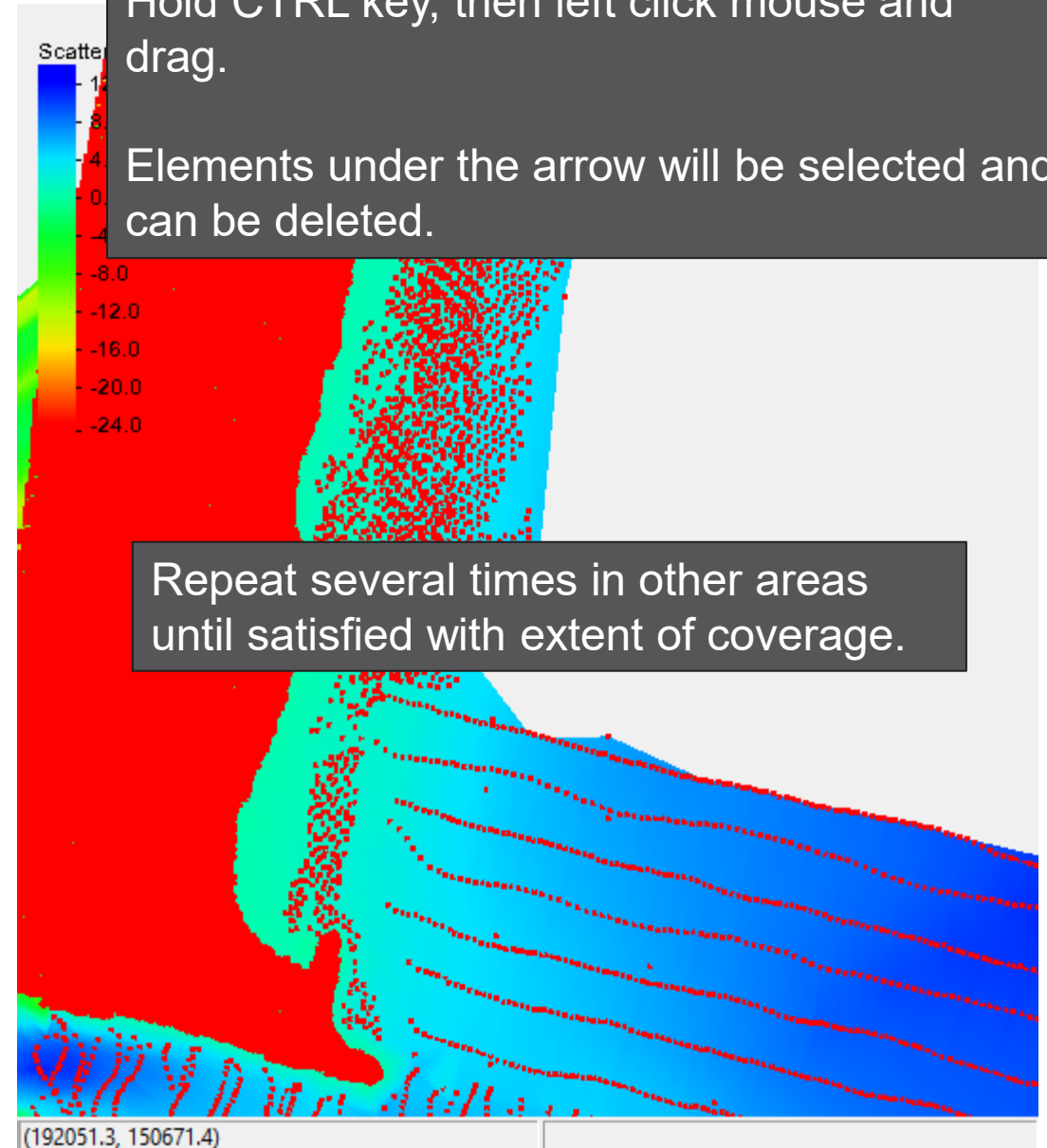
The screenshot displays a software interface for handling triangulated data. On the left, a project tree lists various data sources including 'Scatter Data', '0.75m_Contour', '3364_0409_ft_MLW', 'Channel_Survey_NJ-DEP_0609_ft_M', 'Coastal_Relief_Model_II_m_msl', 'Field_Team_Measurements_0809_m', 'LIDAR_ft_NAVD', and 'Merged surveys elevation'. The main window shows a triangulation of a scatter plot with a color-coded elevation scale ranging from 10.6 (blue) to -20.0 (red). The 'Triangles' menu is open, highlighting 'Select Long Triangles'. The 'Scatter Options' dialog is also open, showing 'Max. edge length' set to 500.0 and 'Select long triangles' selected. A red box contains the text: 'This removes many, but others can be removed manually'.

Manually remove elements before next merge of datasets



Hold CTRL key, then left click mouse and drag.

Elements under the arrow will be selected and can be deleted.

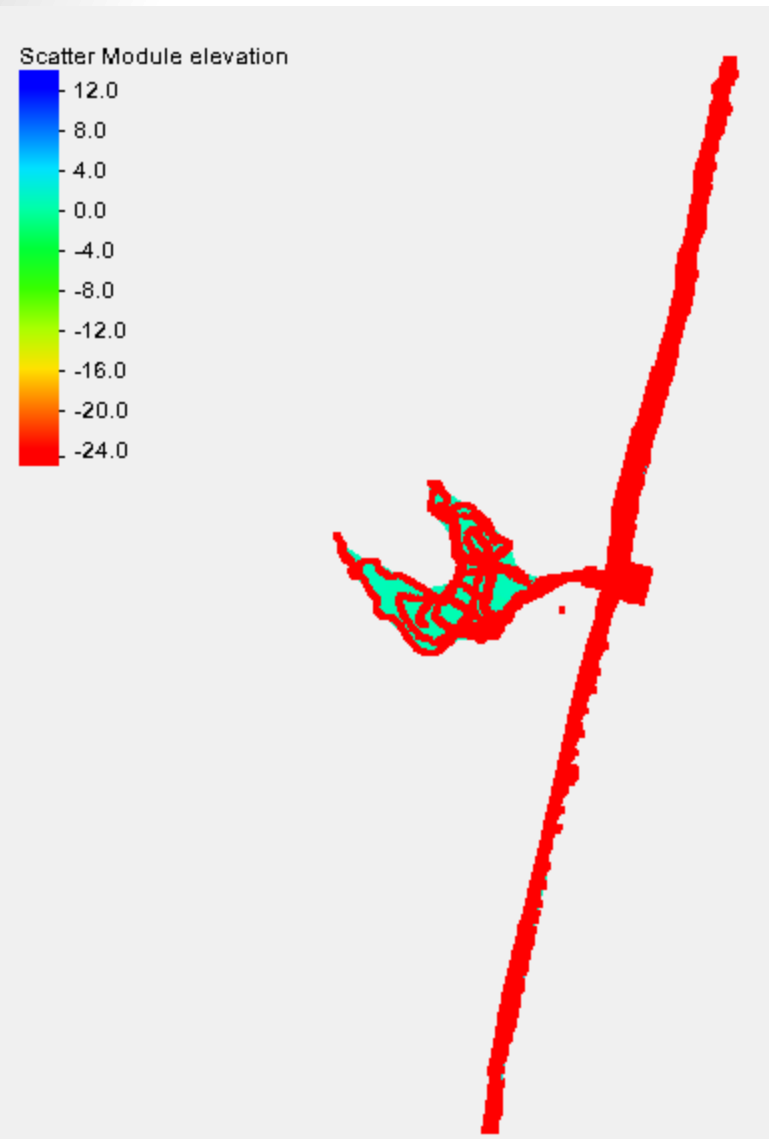


Repeat several times in other areas until satisfied with extent of coverage.



Merge this dataset with Coastal Relief dataset – WITH Priority to this one

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Merge Scatter Sets

Select scatter sets to merge

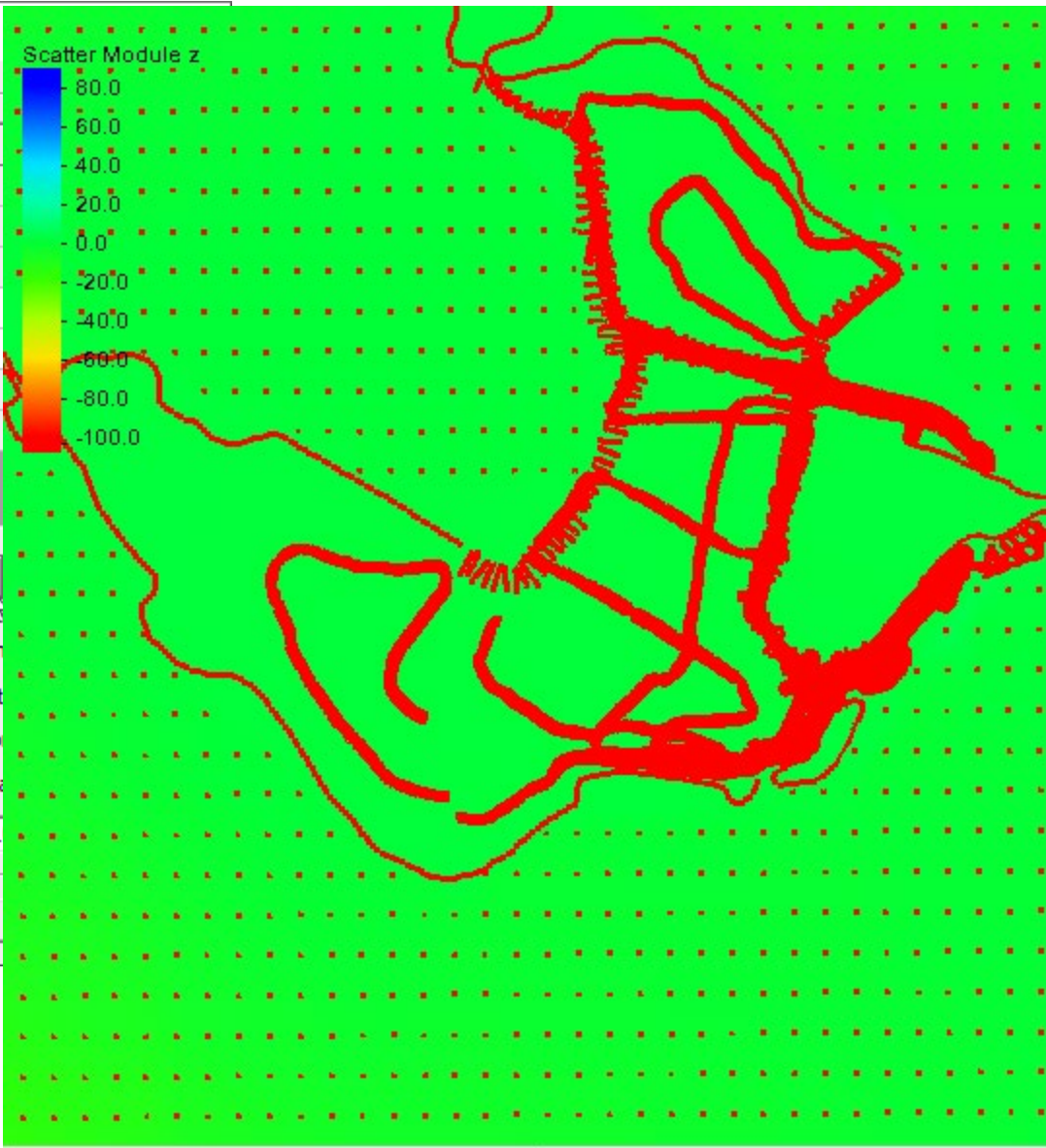
Priority	Scatter set	Merge	Dataset
1	0.75m_Contour	<input type="checkbox"/>	Z
2	3364_0409_ft_MLW	<input type="checkbox"/>	MSL, ft
3	Channel_Survey_NJ-DEP_0...	<input type="checkbox"/>	Z
4	Merged surveys	<input checked="" type="checkbox"/>	elevation
5	Coastal_Relief_Model_II_m_...	<input checked="" type="checkbox"/>	Z
6	Field_Team_Measurements...	<input type="checkbox"/>	MSL, m
7	LIDAR_ft_NAVD	<input type="checkbox"/>	MSL, ft

Select All Deselect All Move up

Merged scatter set options
Name:
 Delete original scatter sets

Overlapping regions
 Merge all scatter sets
 Delete lower priority
 Maintain triangulation
Tolerance:

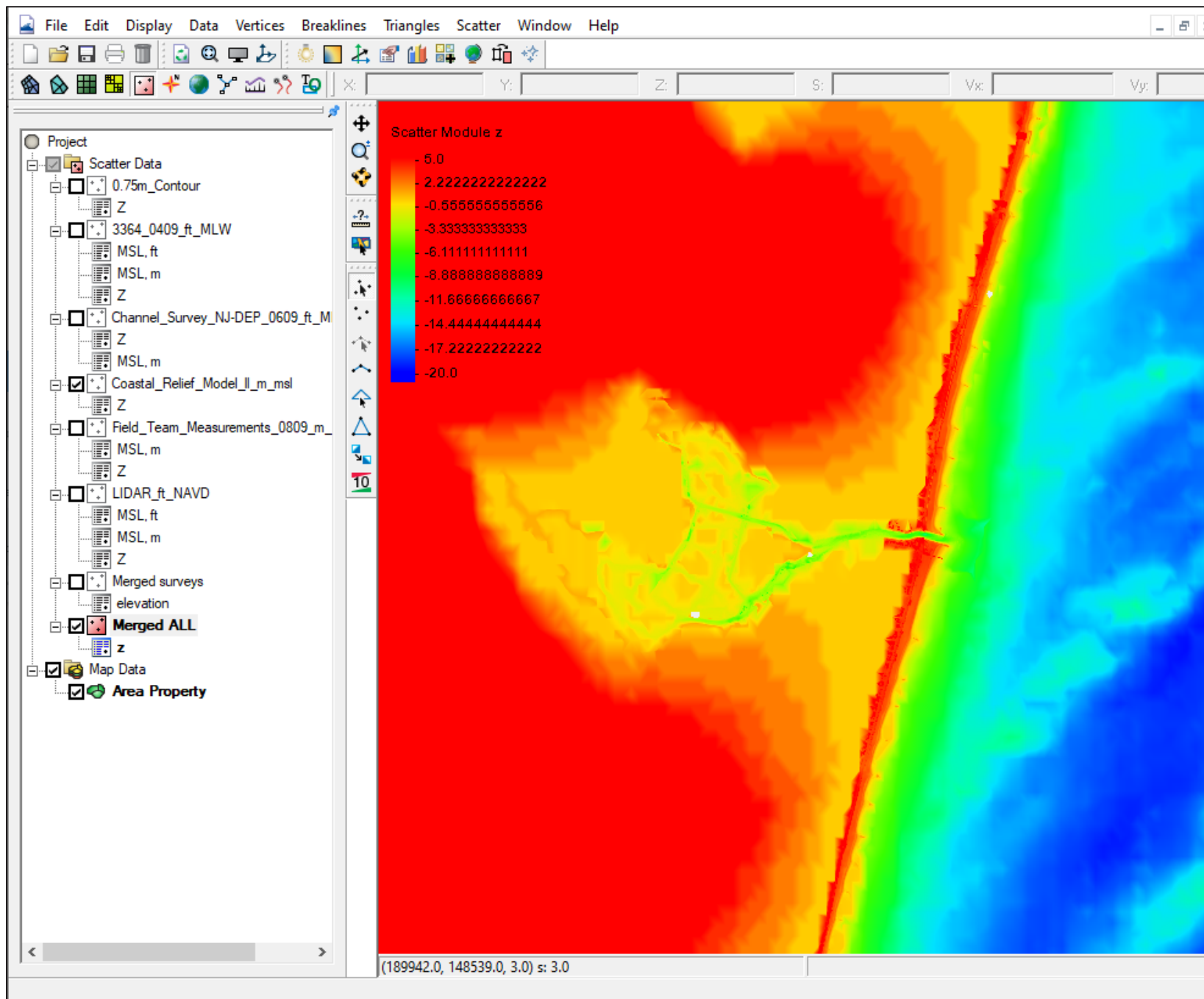
Help... OK



(187958.0, 147817.0)

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(189221.0, 149997.0, 0.4154303061864) s: 0.415430306



QUESTIONS?

CMS Team

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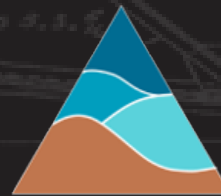
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