

Online-Workshop: “Marginal Seas -
Past and Future” 16-17 Dec 2020

 Helmholtz-Zentrum
Geesthacht
Zentrum für Material- und Küstenforschung



Ocean Sediment Data, Integrated, Local to Global, for Modelling the Marginal Seas (dbSEABED Project)

Chris Jenkins, INSTAAR, CU Boulder
& Partners

<http://tinyurl.com/dbseabed/>



BIN: q1297_y0933

Lat | Lon: 3.35 | -50.03 deg

Water depths: 35 (38..32) m

Samples: 2

Methods: (Unspec.)

Data Source Links: am9:2;

Parameter Counts: gvl 2P|snd 2P|mud 2P|grz 2P|srt 2P|flk 2P

DominantBottomType: MUD

FolkCodes: M

Rock | Gravel|Sand|Mud: 0 | 0|0|100 (- | -|-) %

Carbt|OrgCarbn: -|- (-|-) %

Colours: -

Compts/Featrs:

[Explanations](#)



Introduction

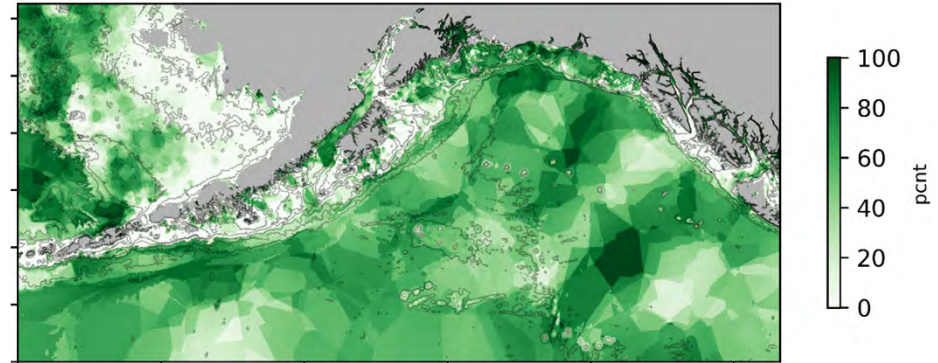
Data Browser
http://tinyurl.com/dbseabed/kml/dbS_global.kml
 Download then open with Google Earth, zoom, click cells:

Image Landsat / Copernicus
 Image IBCAO
 Data SIO, NOAA, U.S. Navy, NGA, GEBCO
 Image U.S. Geological Survey

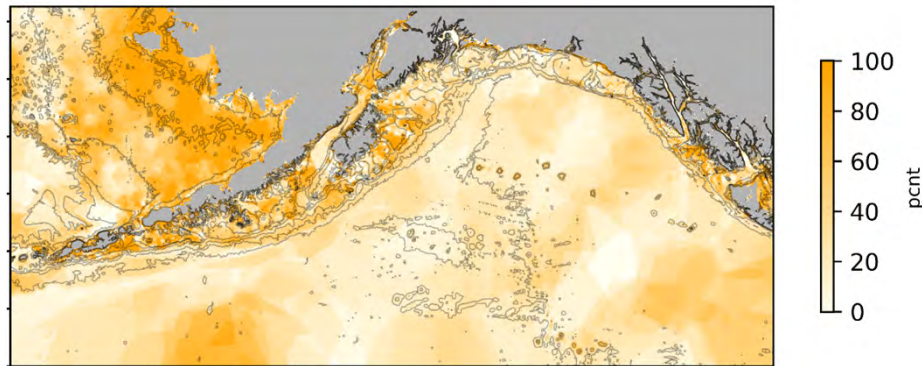
Google Earth

Regional mappings - textures

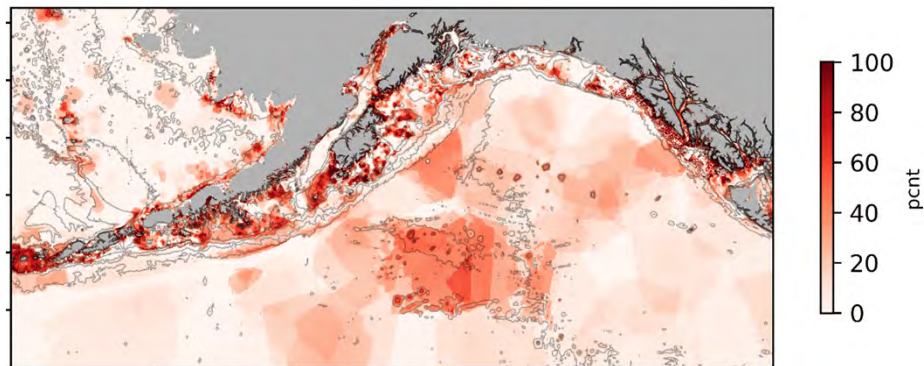
Inputs: EXT %mud, gvl:snd:mud, grainsize analyses
PRS descriptions eg "sandy mud", "bryozan-bearing shell_gravel"



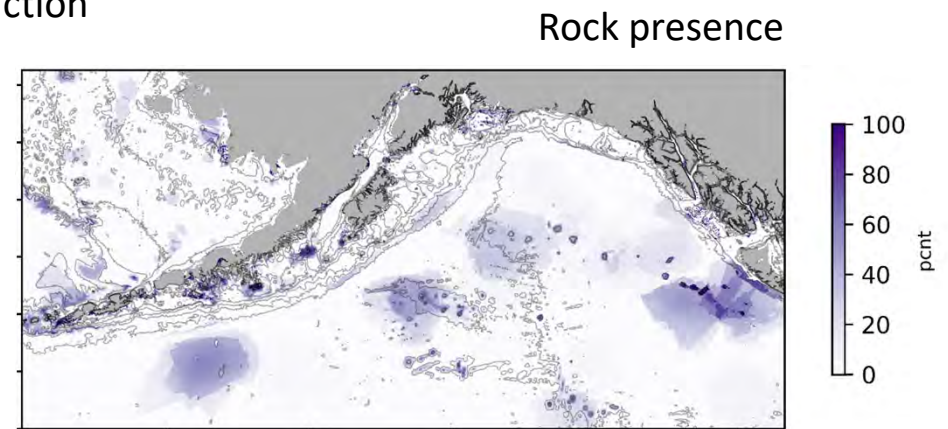
Mud fraction



Sand fraction



Gravel fraction

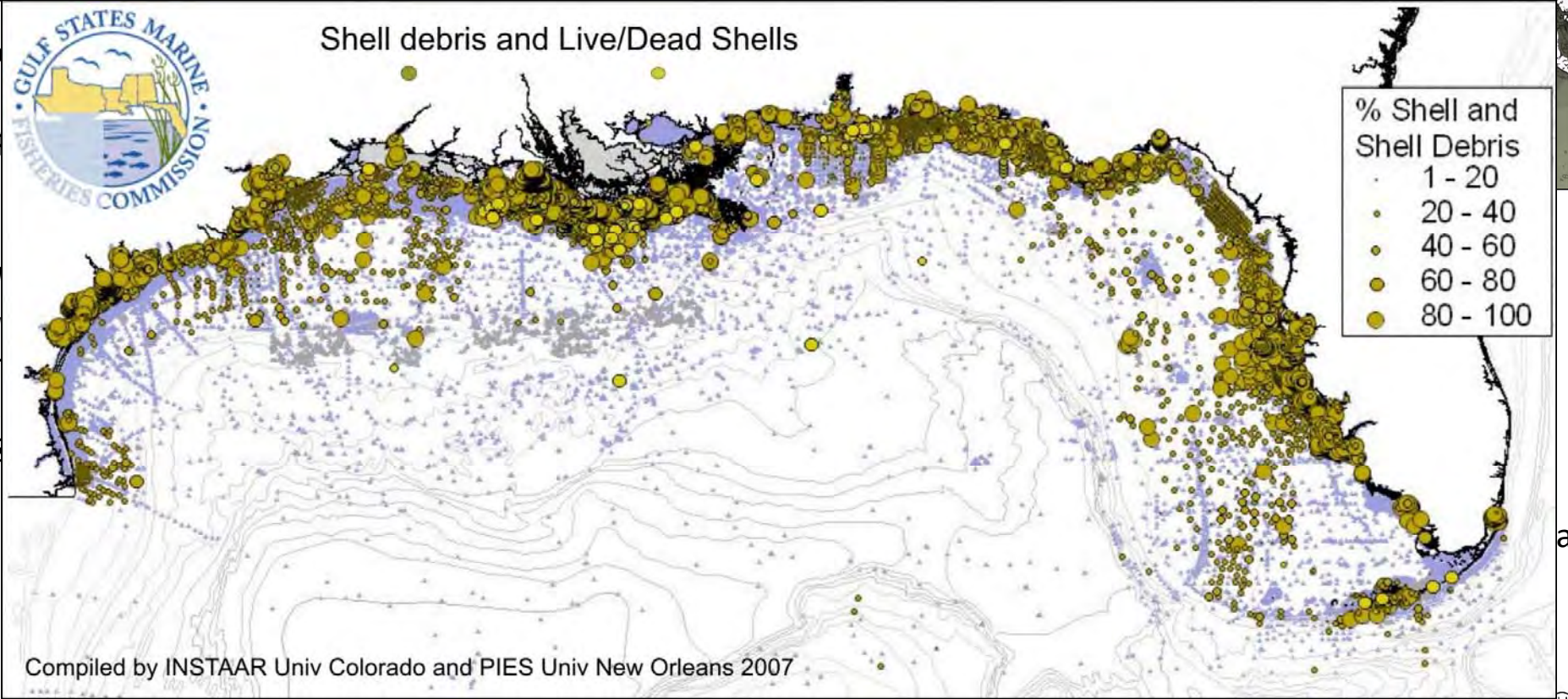


Rock presence

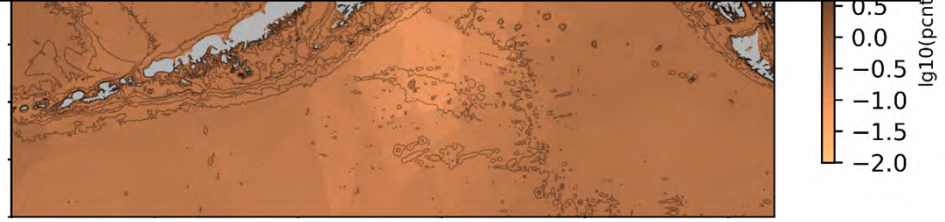
Regional mappings - compositions

Inputs: EX
petro
PRS descri
phos

Additional
fraction, g
'shell debr
volcanics),
grainsize &



action



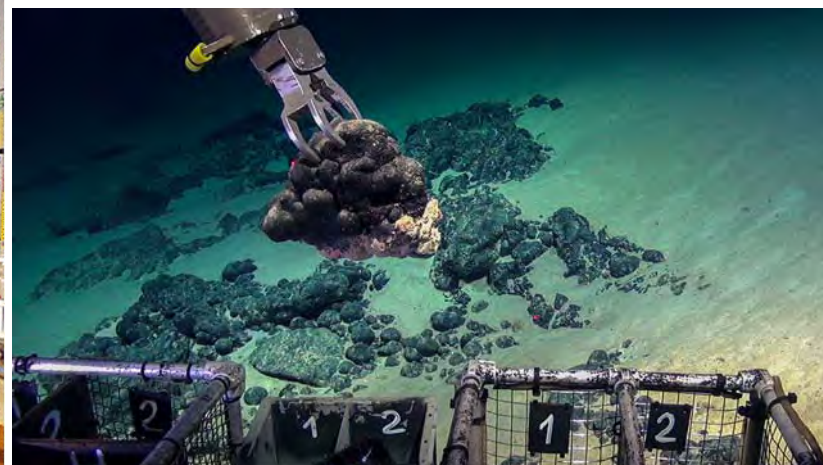
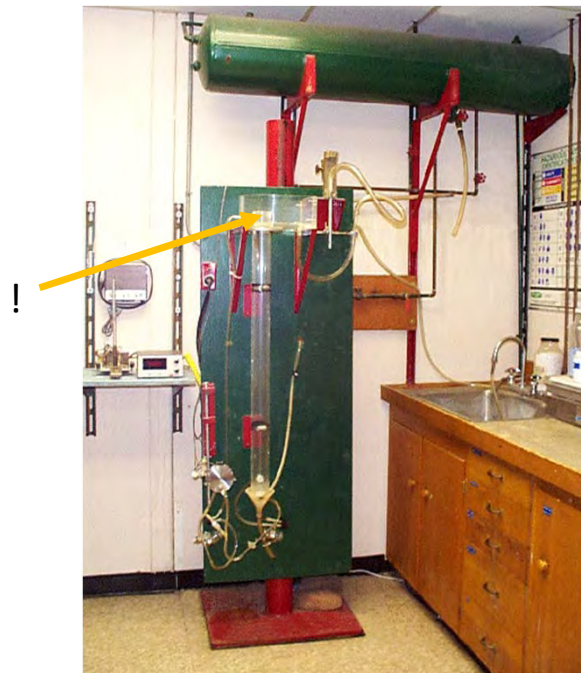
Design Principles:

- High efficiency for data entry = THE major hurdle for project success
 - Software-assisted for large datasets
- Numerical outputs, engineering physical and compositional parameters
- Extensible for parameters and themes – e.g. new parameters
- Improves constantly as more data is added (not a “one-off”)
- High usability for wide user-ship
 - Outputs: common GIS and CSV table formats
 - For local, regional, global scales
- Recognize and reduce collection biases ==> analyses & descriptions
- Strong quality tests / filters ; be prepared to decommission data/datasets

The collection-bias challenges of our science ...

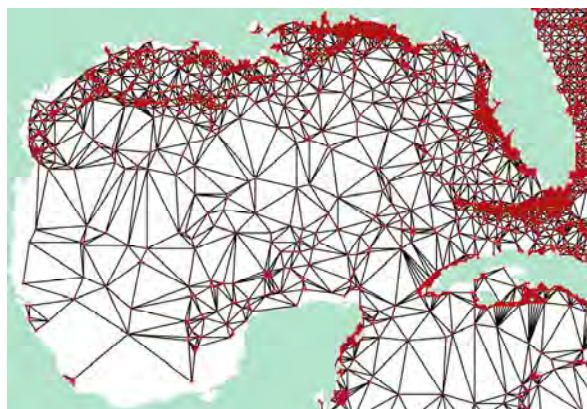
This system recognizes and works against these biases:

Biases against biological seafloors



**Collection & analysis
feature-size biases**

Spatial, geopolitical collections bias



The inaccessible nearshore



Word data

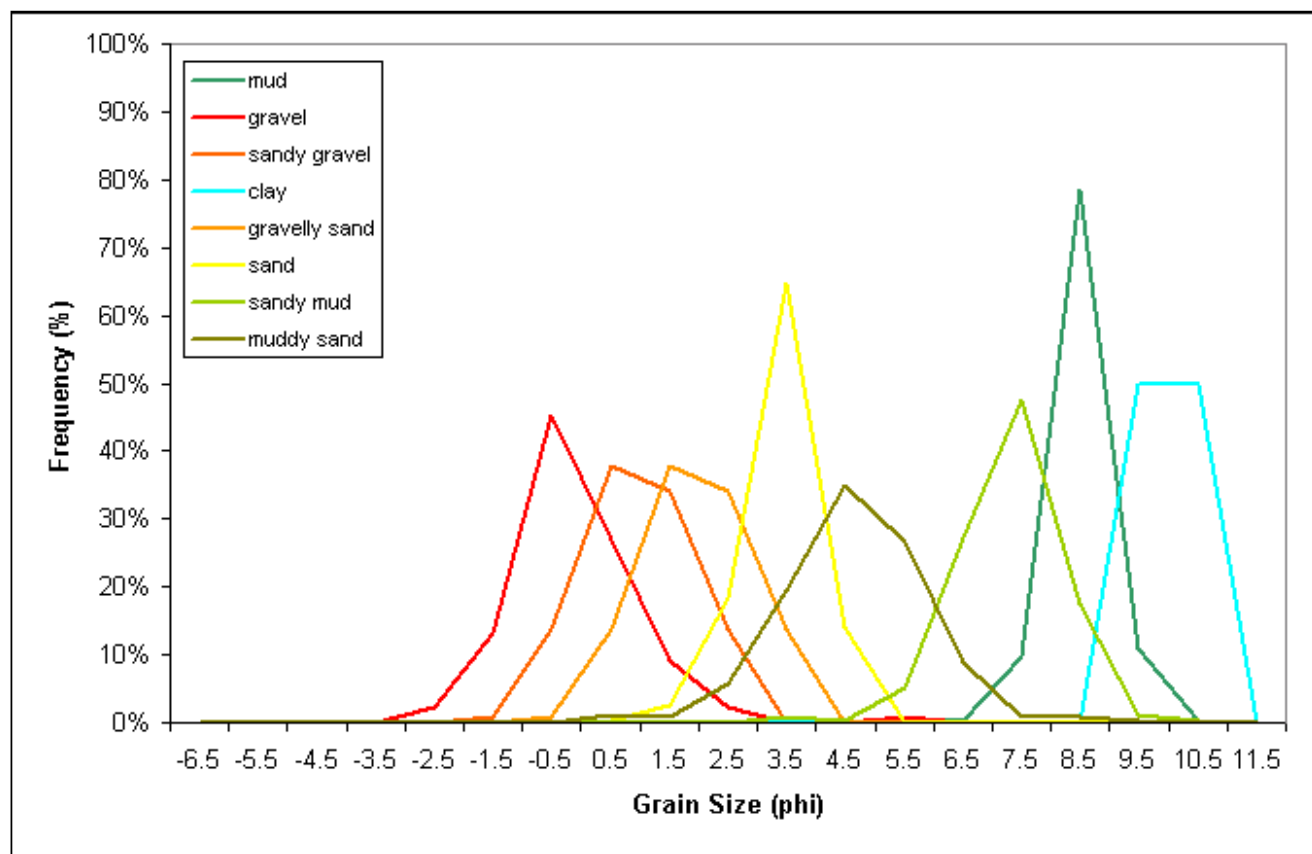
85% of seabed compositional & physical observations are descriptive



Must use word data in addition to analysis values ! How ??

Words to numerics: Membership function calibrations

- Encode descriptions to an 'arithmetic' form ('gry gvly snd – qtzse')
- They are noun phrases
- Objects, modifiers, quantifiers,
- Numerical values on terms →
- Bookkeeping summations of components, properties, etc.



Word Data (cont)

Worked example

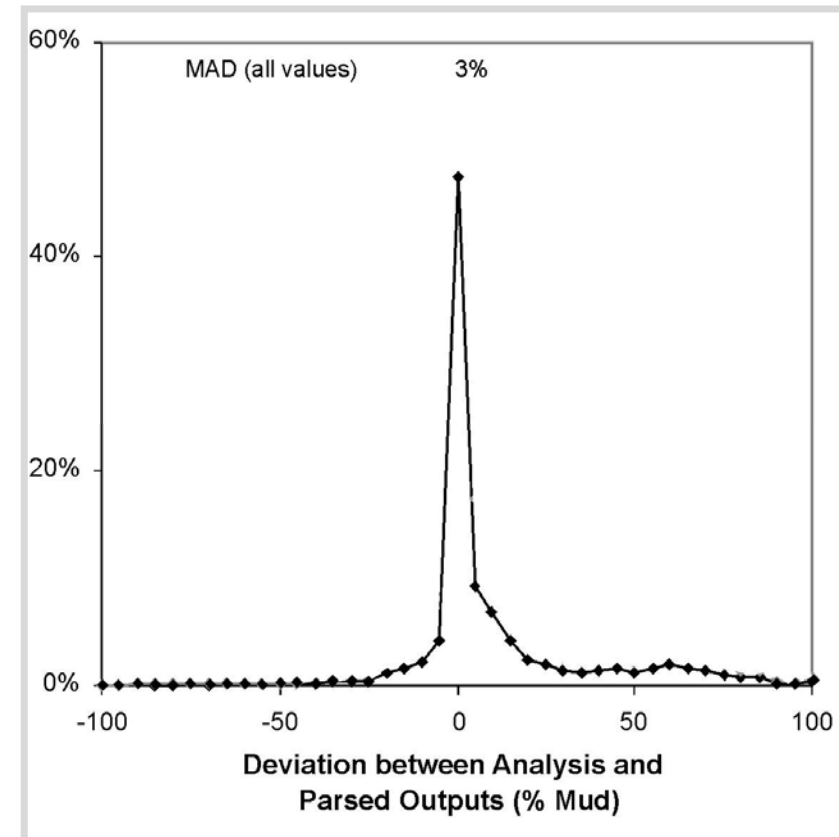
sl/ muddy rlct- bryzn_snd wi/ shls

TXR Objects:	-	1	-	2	-	3
TXR Object:	-	mud	-	snd	-	gvl
Inbuilt modifier:	-	-	-	cse-	-	fne-
Inbuilt quantity:	-	0.5	-	1	-	1
Attached quantity:	0.2	-	-	-	0.5	-
Dominance:	-	0.2	-	0.3	-	0.5

TXR Parsing: (0.2)(-)mud + (0.3)(cse-)snd + (0.5)(fne-)gvl

LTH Parsing: (0.2)(-)mud + (0.3)(rlct-)bryz + (0.5)(-)shl

Carb Parsing: (0.2) (unknown) + (0.3)carb + (0.5)carb



A next move for data ingestion ...

Process the **dive accounts of submersible pilots and onshore crews**, and populate database by location / substrate, etc.



https://oceanexplorer.noaa.gov/video_playlist/start/canyon.html#/?playlistId=0&videoid=9

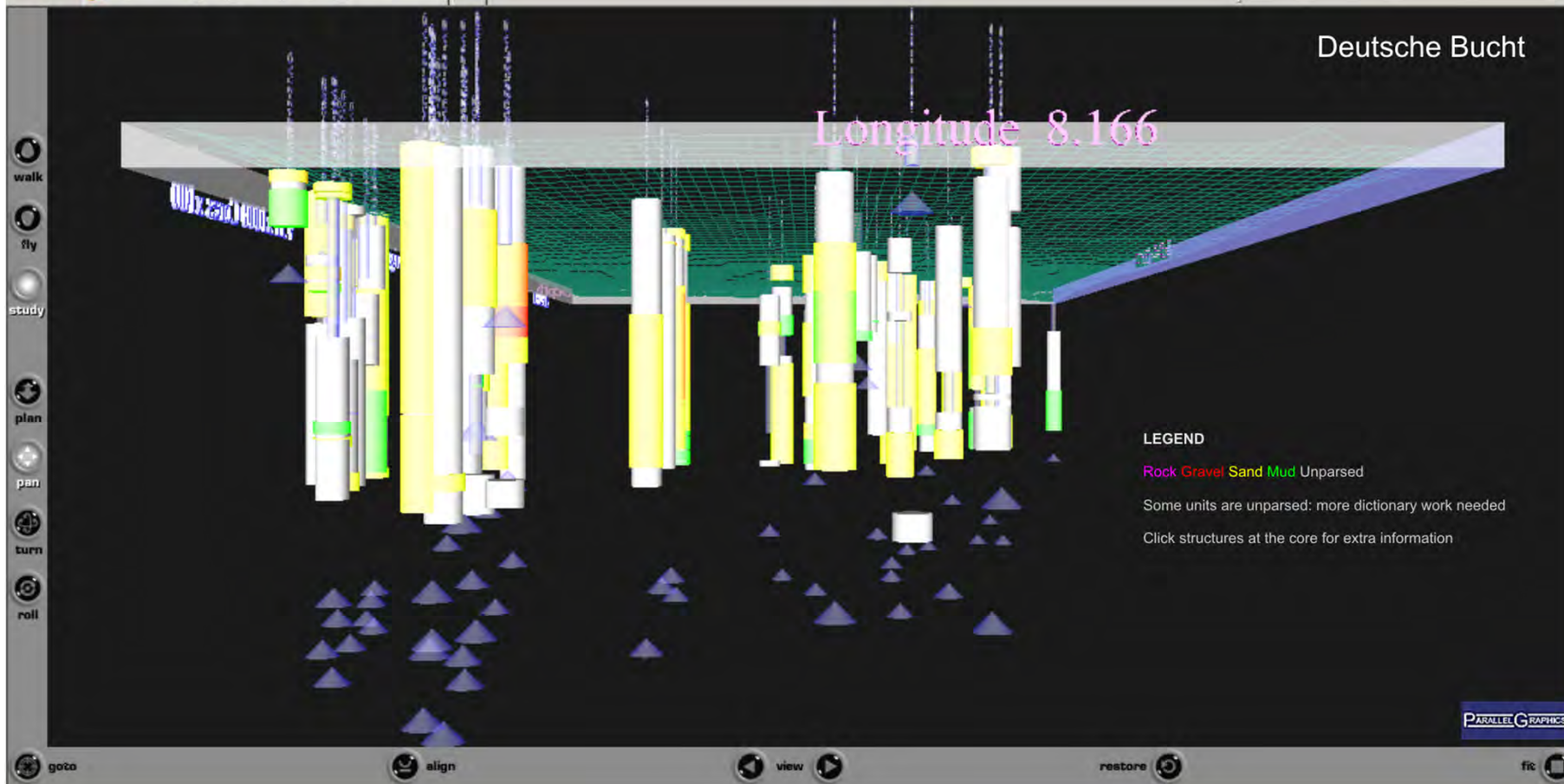


https://oceanexplorer.noaa.gov/video_playlist/start/canyon.html#/?playlistId=0&videoid=0

Sub-bottom Stratigraphy

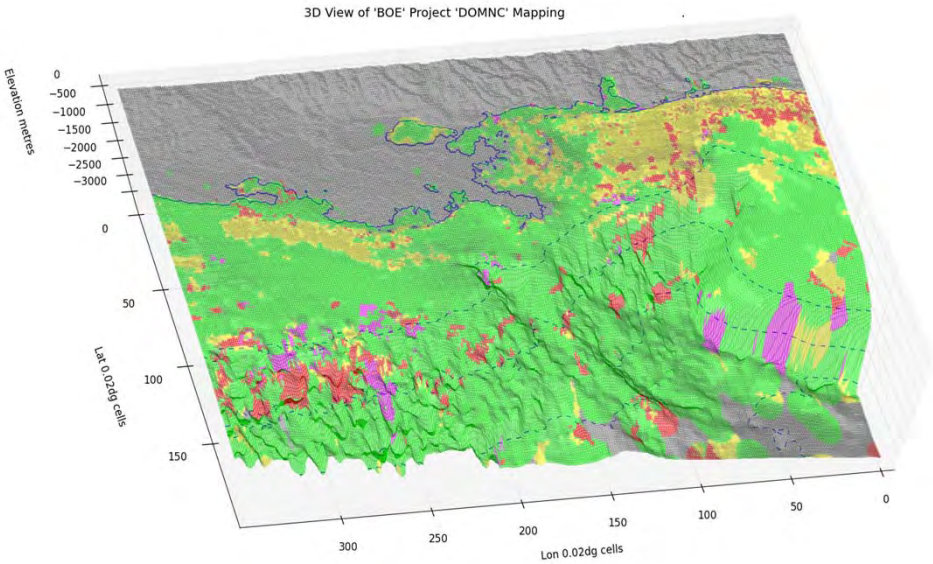
Erste Bildeindruecke: GENSCOL1 dataset: 07Nov2008 Chris Jenkins INSTAAR, Ivor Nissen, FWG

Mit Dank der BGR fuer die Datenkonvertierungsmoeglichkeit; Darstellung der Beschreibungssprache von dbSEABED CoreNavigator module



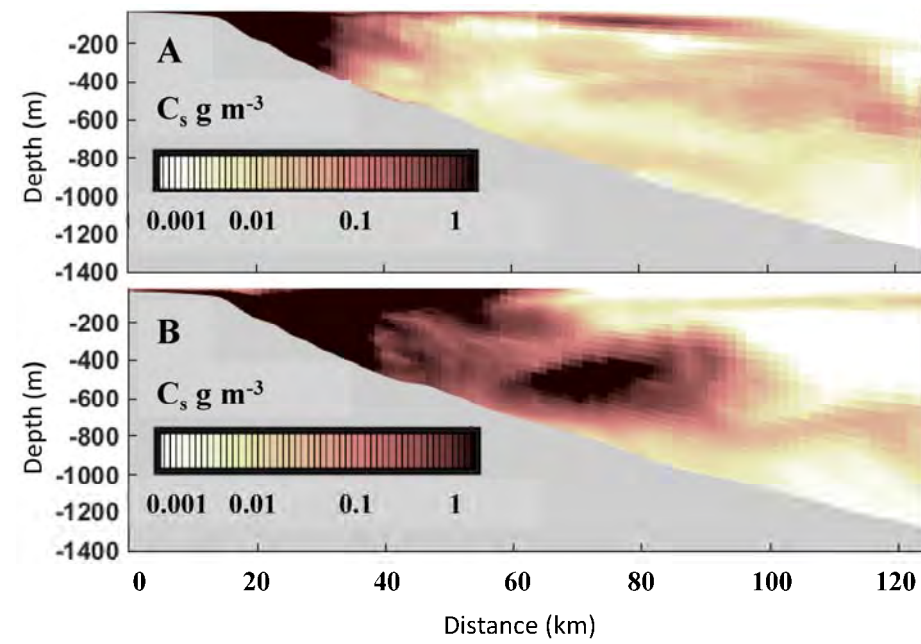
All the cores in an area can be browsed with fly-through VR click/inspect functionality (project: COREWALL) and then pass to commercial core-logging programs for core details.

Modelling example –Hurricane Sediment Transport with dbSEABED & ROMS

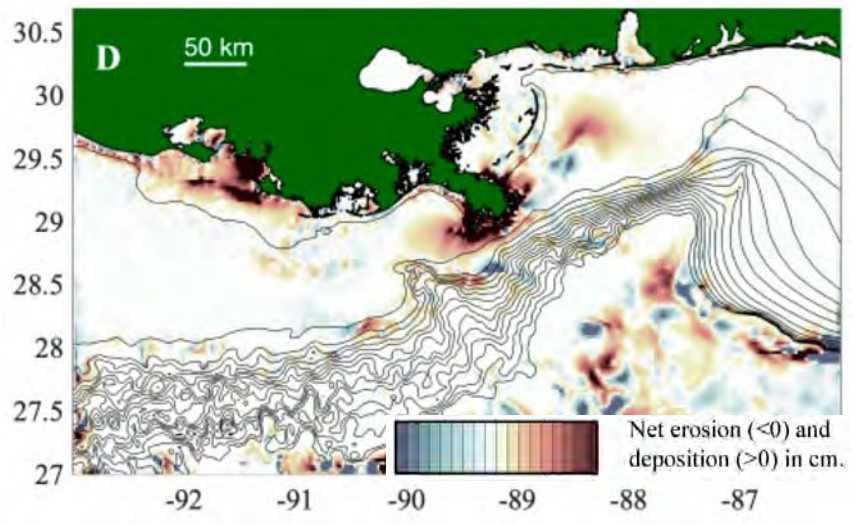


a. Seabed substrates (dbSBD)

Dominant (>66%)
 Rock Gravel Sand Mud
 Subdominant (>33%)
 Rock Gravel Sand Mud



c. Modelled suspended sediment plumes descending Mississippi Canyon after the hurricanes (ROMS)

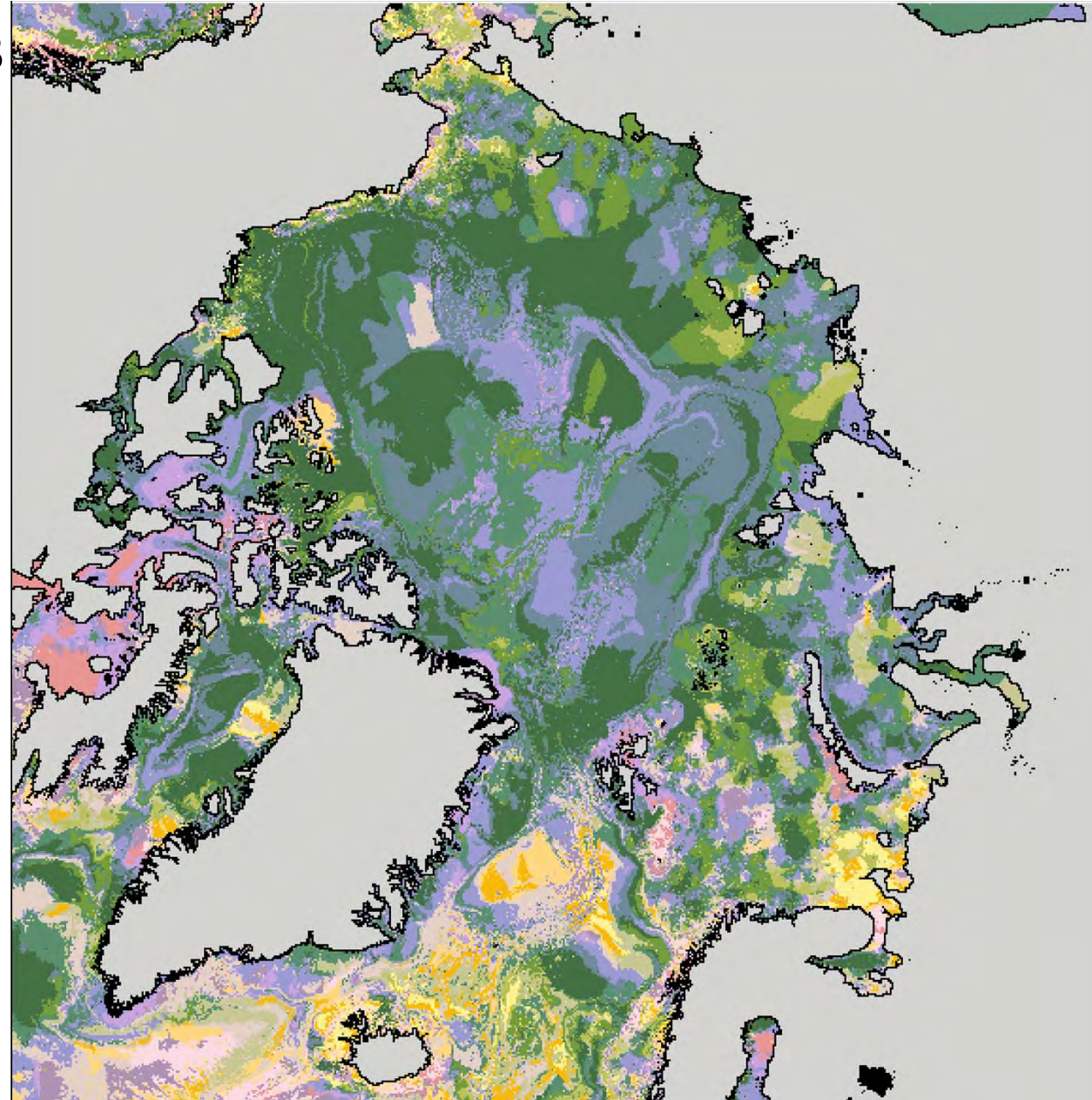
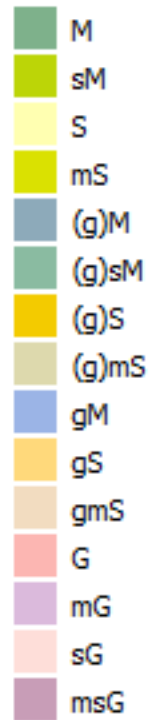


b. Erosion-deposition patterns, at a stage in hurricanes Gustav and Ike (ROMS)

Arctic Ocean sediment textures 2020

(IBCAO Projection)

Sediment FOLK codes:



How to access ?

- Research collaborations & funded projects
- Request supply of a customized product
 - Standard mappings, especially for bachelor, masters & doctoral thesis projects
 - Larger areas, different setup, more data entry
 - Development of extra capabilities
 - Full system acquisition
- Free public KML – summary data in 0.1dg resolution bins
<http://tinyurl.com/dbseabed/kml/>
- Outputs, projects and applications:
<http://instaar.colorado.edu/~jenkinsc/dbseabed/bibliography.htm>

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<http://tinyurl.com/dbseabed/>

- *Hurricane reference:*
*Harris, C.K., Syvitski, J., Arango, H.G., Meiburg, E. H., Cohen, S., Jenkins, C.J., Birchler, J.J., Hutton, E.W.H., Kniskern, T.A., Radhakrishnan, S. and Auad, G. 2020. **Data-driven, multi-model workflow suggests strong influence from hurricanes on the generation of turbidity currents in the Gulf of Mexico.** Journal of Marine Science and Engineering, <https://doi.org/10.3390/jmse8080586>*

Counts of the database content

Datasets	Data Sites	Cores	Observations	Parameter values	Parameter fields
'pjSourceCOUNT'	'pjLocationCOUNT'	'pjCoreCOUNT'	'pjObservationCOUNT'	'pjDatITEMcount'	'pjDatFIELDScount'
11,022	3,977,294	189,016	5,924,566	34,483,419	118,491,320
				Sparsity at this level=	71% vacant

As at: 29 Oct 2020