Leveraging Coastal Data: The Development of a Coastal MultiFrequency Geospatial Data Catalog

Christopher MacDougall, Senior GIS Specialist, Compass Tucker Mahoney, Coastal Program Specialist, FEMA Rafael Canizares, Senior Coastal Engineer, FEMA





Coastal MultiFrequency Data – Why, Where, How?



- Benefits of having multi-frequency flood elevation data
- FEMA is driving the development of this data in many areas, including for coastal hazards
- TMAC recommendation: structure-specific flood frequency determinations
- Multi-frequency data are in some cases already available



Coastal MultiFrequency Data – Vision



- Important first step: document which exact multi-frequency data is available from modern, detailed coastal studies.
- Coastal studies may:
 - Employ different methodologies or limiting assumptions
 - Be in different stages of production
 - Be implemented over large geographical areas
- Provide a forward-thinking vision for a coastal data catalog and enable that catalog spatially to best serve the needs of FEMA's coastal program.
- Document data characteristics to better understand data limitations, and to identify where additional multi-frequency data can be created by expanding other products.



Coastal MultiFrequency Data – Purpose



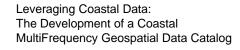
- This Catalog provides a tool that can benefit FEMA and external stakeholders by providing a point-and-click interface that could be used for a variety of applications.
- If multi-frequency data are created, a mapping tool like this one could potentially allow users to identify a structure and obtain a sense of not just the 1-percent-annual-chance flood event, but a spectrum of return periods.
- This multi-frequency data may be used to drive actions to reduce the risk of loss of property and life, and to support communities as they address risks stemming from current and future coastal flood hazards.



Project Team



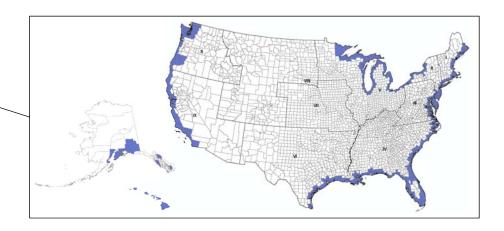
FEMA	Tucker Mahoney	Coastal Program Specialist			
FEIVIA	Rafael Canizares	Senior Coastal Engineer			
	Michael DelCharco	Project Manager			
Compass	Brian Caufield	Senior Coastal Engineer			
Compass	Elena Drei-Horgan	Senior Coastal Engineer			
	Chris MacDougall	Senior GIS Specialist			
	Jeff Gangai	Senior Coastal Engineer			
STARRII	Gib Jones	Senior Water Resources Engineer			
	Fred Knight	Coastal Resource Team Lead			





Coastal MultiFrequency Data – Stats

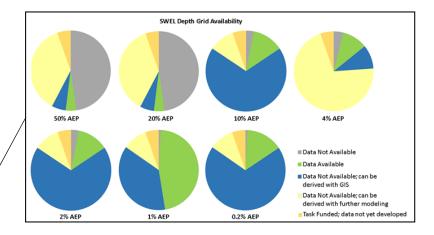
8 Coastal FEMA Regions 364 Coastal Counties



Search 1995. Dis Section (May 2014) Data Concess that Found 1, Stocky Concess (1995) 1, 1 - Section (May 2014) Data Concess that Found 1, Stocky Concess (1995) 1, 1 - Section (May 2014) 1, 1 - Section

65 data columns

23,000 data points, plus various metrics & summaries





Coastal MultiFrequency Data – Spatial Implementation

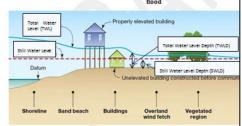


03 Estimating Coastal Total Water Levels for Flood Fre

Typically, FEMA studies for the Gulf Coast and Atlantic Ocean include only de calculations for the 1% AEP flood and sometimes the 0.2 % AEP flood. The result by the wave effects, are referred to as the total water elevation (TWEL). To devid datasets, there is a need to estimate the TWEL for other AEPs where the SWEL wave effects. The following is a proof of concept, proposing a method to approximate than the 1% AEP flood using only data typically available for recent coast math GIS functions.

The concept is based on the knowledge that the difference between the SWE I am related to 1) the water depth and 2) the wave energy and height reduction (or in the interaction of the waves with the land cover. We are proposing that the ra elevation depth [TWELD) divided by the still water level depth [SWELD) is similar at illustrates the data being used for this analysis. Using raster files of the 195TWELD ratio can be calculated by taking 195TWELD raster and dividing it by the 195SWELD math functions of ARCGIS. The SWELD depth rasters for other AEPs can then resulting 195 ratio raster to reate a TWELD raster for the other AEPs. Once the TV estimated, the TWEL rasters can be calculated by adding the TWELD rasters to a D data. Using raster math is not only relatively fast, but provides TWEL and TWELD where rasters of the SWEL or SWELD are available. This process is being called

Figure 3-1: Illustration of the data being used to calculate TWELs for AEPs other



This concept was tested using WHAFIS runs and hand calculations on an actual most types of land cover in the WHAFIS model. A WHAFIS run was made using the flood. Two additional WHAFIS runs were then executed where the SWEL was declower water levels and increased by 4 ft, to test higher water levels. The analysis reasonable range of SWEL values where the concept might break down. A sprea the WHAFIS input and output data to calculate the 1% ratio (1%TWEL)1%SWEL) ratio was then multiplied by the plus 4 SWELD and minus 4 SWELD for all points for all points for both transacts. The depths were then converted to TWELS

Coastal Multifrequency Spa

Table: L Cst Data Info

This table is a lookup table that contains Multifrequency Coastudy information and supplemental attributes that correspon creation procedures outlined in the report, "ereports." This tat each study recorded in the Multifrequency Coastal Data C. S_Cst_Cat_Ar features through either a FIPS code or CID. records in this table for each area represented in S. Cst. Cat_A

The L_Cst_Data_Info table contains the following elements:

Field Name	Required if Applicable	Description
CST_DAT_ID	R	Primary key for table lookup. Ass
FIPS	R	Federal Information Processing St 5-digit FIPS code. It is created by with the County FIPS code.
CID	R	Community Identification Number. number assigned by FEMA.
CASE_NO	A	FEMA Case Number. The alphanumeric identifier for a proje An example of a FEMA case nur 10-03-0002S. Hyphens are to be
STUDY_BY	R	Data producer. PTS, Agency, or the coastal modeling, analysis, and for this field are listed in the D_Ent
STUDY_CAT	R	Project type. This describes the which the coastal data was Modernization; Risk MAP). Accordisted in the D_Study_Cat table.
STUDY_NM	А	Study name. This describes the documented in the MIP. The structure with a MIP Case Number.
TECH_APPR	R	Technical approach. Indicate performing coastal hazard analy: field are listed in the D_Tech_App
MULTIFR_SRC	R	Multifrequency data source. If modeling methodology applied to derive 1% Annual Exceedance Pr multifrequency data may be extra values for this field are listed in the
OFFSHR_MDL	R	Offshore model This is the FEMA-approved model that was analysis. Acceptable values fo D_OffShr_Mdl table.
NEARSHR_MDL	R	Nearshore model. This is the FEMA-approved model that was analysis. Acceptable values fo D_NearShr_Mdl table.

Coastal Multifrequency Spatial Data Catalog

Page 8

Coastal Multifrequency Spatial Data Catalog

1. Overview

The Coastal Multi-Frequency Spatial Data Catalog contains several types of information pertinent to recent coastal storm surge studies. This data is classified on a countywide basis within the Web App. The Spatial Data Catalog includes each coastal county in the United States, including islands and territories. The Web App allows users to zoom to bookmarks (per FEMA Region), view the map legend, to turn on and off available layers, change the Base Map (imagery, grayscale, etc.), view the multifrequency catalog (attribute table), and print a quick-reference map. In addition to displaying the data sources and type, the Web App can be utilized for the spatial visualization of the available datasets and to overlay the Spatial Data Catalog with related outside data sources. The print map function can be utilized for the quick creation of outreach materials.



Figure 1. Overview of Coastal Multi-Frequency Spatial Data Catalog "Web App"

2. Data Access

The Coastal Multifrequency Spatial Data Catalog is presented through a Web App hosted on the FEMA. GeoPlatform. The Web App is based on a feature service and map service accessible through FEMA's ArcGIS Online account, which is enabled for either internal FEMA use or public access. Access can be adjusted on an as-needed basis. The Web App is located at the following address:

http://fema.maps.arcgis.com/apps/webappviewer/index.html?id=a4a2b2f8144d4ed2955ec8f55 54429dc

The Web App is compatible with standard web browsers (i.e., Internet Explorer, Firefox, Chrome) as well as most mobile devices and tablets.

Coastal Multifrequency Spatial Data Catalog

Database Dictionary

Page 2

Web Application User Guide





Coastal MultiFrequency Data – Attribute Compilation



domain, text 6	25 2 text 3 open, text 25 op	en, text 2 open.	text 32 open, text 3	pen, tast 6	200 Open, fewt 200	ia. Cortuin, best ia	on and the	ur.	COTAGO, SENT ZE	21 Steman, host 2)	11.00	man, test 23	demain, text 27		25 doctors, brist 25	43 doctors, seed 42	orsen, test 3	ferner, test 1		somers, sext 10	donain, text III	filemain, text	3 7 Stemato, feet 3 Steel
Easel (n/w) (17007)	ors state on	/ei coun	TY (n/s)	(n/a)	Study Name (i.e West Florida)	Technical Approach	Multifreque	mry Data Source	Offshore Model Used	Nearshore Model u	and We	ever Serbup Model Userif	Ware Funup Wodel)	() Uhand	Dune Erosion Model Used	Wase Overlopping Model Used	Inches and Mark Propagation Model Used	Tsunami Elevation in Flood	Mags (Y/N)	Contractor Leading Technical	Stell Contractor Leading Technical Study	RokMap Shuff	Surgestat if Su Model that
Valid Values I Chumer II II IV VV	rical) (test)	(text)	., 1000	(numerical)	(test) I	Evert-Based Response-Based Other	JPM-OS Hyde Event-Based Tidal Profile Total Water I Other N/A	tro/Wave Model d Hydro/Wave Model s Level (TWL) Hindusd	ADCIRC+SWAN ADCIRC+STWAYE ADCIRC ADCIRC+WISWAYE ADCIRC+WISWAYE EDCIRC+SPMI Self3d	ADCRE-SWAN ADCRE-STWAYE ADCRE ADCRE ADCRE WAYTRAN DelPGd	AD AZ SPI AC TAJ	DORCHSWAN DORCHSTWAVE MUCEM 25 W HORE	ACIS CSHORE CSHORE/SPM CSHORE/SPM/TAW DIM/TAW	Comment.	S40 SF CSHORE MUNIP ANGRA (KOMARI)/KRIEBEL DEAL MODILE S40 SF/NOBLE	Atlantic Guidelines Paolic Guidelines including Cox-Machemeth 3 Other N: N/A	OHAPIS PM/CBM UNUP Z.0 CES BILIN PMAVE	v N	ween (1) rel	RAMMP BukerAECOM STARR USACE STARR2 COMPASS	RANNAP BANKALCOM STAME UNACE STAME COMPASS	RiskMap MapMod Other N/A	V applied to develop Value (Value) Value (Va
VO VVIII IX X X XATINA, only AND AND ONLY MOTOR							JPM-05 + H1		WARAZI WAWENG HACE MAGE ANALYSIS MALENIA METHODS USED TOPA	MAKEZS OWN/SIG USACE GAGG ANALYSS MALTIPLE MITHODO Other W/A	SUSED CSP STO	M OCKDON ULTIFIC BETHODS USE WITANISTOCKDON HORIZINA	DMATAWISHM DMATAWISH MEDIOD MATHER METHODS FUNDED 2 ANCHORD SHAWCEM SH	0 2.0/VERTICAL CRE/JAM WACES	Other		ODAY			CTP OTHER N/A	CTP Other N/A		
12 domain, text 12	sz domain, text 12	12	main, text 32	- 1	orban, text 32	33 Stormers, telet 32	1	Dirtham, heat 32	E) districts, healt \$2	III domen.	Seed 32	S) (Somethia, Ne	FL/A	ati plantain, best 40		io Compress seed 40	MI. Johnson, book All	et Comirs, te	ct.80		All James, Nel All		domen, text 40
SIN Annual Evec Prob	20% Annual Ever, Prot	250	S Annual Esec, Prob		WIS_SOPET_ARCH This Annual Exec. Prob	Stiffwater Elevation B 4% Annual Exec. Prote	Arthodology - m	WEL_DECT_ARCH say or may not include wave setup % Armoul Exec. Prob	1% Arresal Exec. Prop	(WE) ES	noul Exec, Proto	(SWG_65P)	of Exec. Proto	30% Armusi Exec.		SOS Annual Exec. Prob	2% Arrual Exer. Profit	20% Annua	Carr but	S1	SWS, APCT AVAIL 4% Annual East, Prob	Stillweb	er Develon (Data Ave
(10-year water level) 0 - No Data	20% Annual Ever, Prot (10-year water level) 0 - No Data 1 - JMM	0	S Annual Even, Proti Lyear water level) No Data	b	UN Armuel (sec. Proti 10-year mater (evel) - No Deta - JPM	6% Annual Exec. Prob [25-year water level) 0 - No Data 1 - JPM	0	30-year water level)	1% Arresult Ever, Prob (100-year mater level) 0 - No Data 1 - JPM	0 - No Da 1 - JPM	er winter Sevel)	0.1% Annu (1000-year 0 - No Data 1 - JPM	water level).	0-No Data 1 - Data Present	-0	90% Annual Esec, Prob (10-year water level) 0 - No Data 1 - Data Present	20% Annual Exer, Prote (10-year water level) 0 - No Data 1 - Data Present	0 - No Data 1 - Data Pro	ater (evel)		GN Annual East, Prob (2h-year water layel) (0 - No Data 1 - Data Present		2% Annual Esec. Prot (30-year water level) 0 - No Data 1 - Data Present
2 - JPM-05 3 - JPM-05/EST 4 - EST 5 - TIDE GARSE EVA 6 - MCOVET CARLD 7 - Parametric Analysis on Sim TWI, 8 - GEV Pol EV in Diff. 9 - GEV Pol EV in Diff.	2 - JPM-OS 3 - JPM-OS/EST 4 - EST 3 - TIDE GAGE EVA 6 - MONTE CARLO 7 - Parametric Analysis 8 - GEV Dist Fit on ETS	2 - 3 - 4 - 5 - 6 - 6 - 7 - 100ms	JPM-OS JPM-OS/EST EST TIDE GAGE EVA MONTE CARLD	2 3 4 3- 6- o Sirm TWH, 7 ons 8 and Events 9	- JPM-OS - JPM-OS/EST - EST - TIDE GASE EVA - MONTE CARLO - Parametric Analysis on Sins TWI.	2 - JPM-OS 3 - JPM-OS/EST 4 - EST 5 - TIDE GAGE EVA 6 - MONTE CARLO	2 3 4 5 6 1 on Sim TWL 7 torms 8 sixual (vents 3	- JPM-OS - JPM-OS/EST - EST - TORI GAGE EVA - MONTE CARLO - Recement Analysis on Sim TVIL - GEV Diet Fit on ET Stones - GEV Diet Fit on ET Stones	2 - JPM-OS 3 - JPM-OS/EST 4 - EST 5 - TIDE GAGE EVA 6 - MONTE CARLO	2 - JPM-C 3 - JPM-C 4 - EST 3 - TIDE E 6 - MONI 00 Sim TWL 7 - Parami 9999 B - GEV 5	OS OS/EST SAGE EVA TE CARLD Nettre Analysis or Det Fit on ET Stor Fit of 530 Heaturie	2 - JPM-06 3 - JPM-05, 4 - EST 3 - TIDE GA 8 - MONTE o Sim TML 7 - Paramer ms 8 - GEV Der	(EST GE EVA CARLO tre: Analysis on Sim TV I Fit on ET Storms of 150 Historical Event	2 - No Data; High L 3 - No Data; Medic 4 - No Data; Low Li 3 - Funded; Not Ye	OE to create - (new modeling) a m LOE to create - (partial anal) of to create - (GIS)	2 - No Data; Negle LOE to cestre - (new modeling) 3 - No Data; Nethirum LOE or cestre - (pertial analysis 5 - No Data; Lev LOE to reside - (OSI) 3 - Funded; Yest 'Perwisiped	2 - No Data; High LOE to create - (new	modeling) 2 - No Data ertial analysis) 5 - No Data 4 - No Data	High LOE's Medium L	orsete i (neu modeling) Et sorsete (pertial analysis) orsete ((SrS) swioped	2 - No Data; High LOE to create - (new r	ertial analysis)	2 - No Date; High LOE
						D- Data Yest Available								3 - Date Not Awails 4 - Date Not Awails 5 - Funded, Not Ye	bie; High LDE to create bie; Medium LDE to create bie; Line LDE to create 10c; Line LDE to create 1 Convetoped	Third Not Available Third Available Third Available Third Available Third Available, single LOS to create Third Not Available, shedown LOS to create Third Not Available, Low LOS to create	D - Data Not Available 1 - Data Available 2 - Data Not Available; High LDE to cre 3 - Data Not Available; Magnitud to the 4 - Data Not Available; Loo Dit to cre 5 - Funded; Not the Developed	crearie 3 - Data No de 4 - Data No	elable t Anallable; t Anallable;	segh LOE to create Medium LOE to create Line LOE to create selloses	Cota fest Averlable Data Averlable Data Not Averlable; Data Not Averlable; High LDE to stre. Outs Not Averlable; Income LDE to stre. Data Not Averlable; Date LDE to stre. Turnded: Not Yet Developed	create .	E - Dote Post Available 1 - Data Available 2 - Data Not Available 3 - Data Not Available 4 - Data Not Available 5 - Funded: Not Yet D
O_SWEL_METH														D_DATA_AVAR		D_DATA_AVAIL							
accompany, test 45	-	uin, hist All			60 domain, fact 60 feet, spirit, assault	-	emain, toxt 40		D7 Homato, task D7	in territoria	doman, ter	et 40		o omen, test 40 or over avail		AG plantam, bald AG map tart ayeas	et donar, test 40	LT Romans	teet 17	GE SECTION SECTION	Ten, test 40	80 domain, tex	I AG
Stillwater Deveton Plus Wave	e Effects (Data and Met	hodology) Notwel (see: Prof	ă)		IN Annual East, Prob	74	PN Annual Exec.	22		SN Annual East, Prob	4N Annual I	Stillwater Elevation	Depth Grid Data Avail	shile 'S Annual Exec. Prob		15 Annual Page Proh	6.2% Annual Eyes, Prob			50% Annual Exec. Prob 50%	Canada and Sala	20% Annual	
US-year value fevel) 0 - No Cets 1 - Cets Present 2 - No Cets, High LOE to create - (new 3 - No Cets, Medium LOE to create - (GIS) 4 - No Cets, Lov LOE to create - (GIS) 7 - Funded, Not Yet Ceveloped	0 - 5 1 - 5 a modeling) 2 - 5 (partial analysis) 3 - 5 4 - 5	year teater level) to Data tata Present to Data; High LOE	to create - (new mode (OE to create - (partial to create - (GIII)	elong) analysis)	(100-year water level) 6 - No Duta 1 - Duta Present 2 - No Duta; High LDE to create - () 8 - No Duta; Hedium LDE to create 6 - No Duta; Low LDE to create 6 - No Duta; Low LDE to create 1 - Funded: Not Yeb Developed	0 1 Prew modeling) 3 re-(partial analysis) 3 Ort) 4	No Data Data Present No Data; High L No Data; Mediu	LOE to create - (new modelling) uni LOE to create - (partial analysis DE to create - (GEL)	Submitted to FEMA Contractor Server CTP Server Unknown I	r - No Data; High LOE to I - No Data; Medium G	0 - No Data 1 - Data Pre to CN 2 - No Data 06 1 3 - No Data 0 CN 4 - No Data	cient High LOE to create (in Medium LOE to create (io Low LOE to create (io	ew modeling) 2 - (partial analysis) 3	SO-year water level) No Data - Data Present - No Data; High LOE to - No Data; Medium LO - No Data; Low LOE to - Funded; Not Yet De - Funded; Not Yet De	coneste - (new modelling) of to create - (partial analysis) create - ((011) influent	(100-year water level) 0 - No Cata 1 - Data Present 2 - No Data; singh LOS to create - (new modeling) 3 - No Data; Medium LOS to create - (partial analy 4 - No Data; LOW LOS to create - (GRI) 3 - Tundest Not the Developed	UND -year water level) 0 - No Cuts 1 - Duts Present 2 - No Cuts, High LOIt to create - (ne 4 - No Cuts, Low-LOIt to create - (ne 4 - No Cuts, Low-LOIt to create - (no 5 - Funded, Not Not Developed	Contract a modeling) CTP Serv (partial analysis) Unknow	nd to FEMA or Server er	(13) year eveter level) (13) 0 - tou Data (1) 1 - Data Present (1) 2 - Noi Data; otigh LOE to or (2) 3 - Noi Data; otigh LOE to or (2)	-year water level) No Duta Data Present No Duta, high LOS to create - [new mode No Duta, Medium LOS to create - [partial No Duta, LOS LO create - [DIS]	0 - No Data 1 - Data Pres lin, 2 - No Data; an 3 - No Data; 4 - No Data;	ner level) uent High LOE to create - In
								7							over the second								
0 - Data Nutr Aupliable 2 - Data Annifolds 3 - Data Annifolds: High LOE for the Core Nutr Annifolds: Helicon LOE 6 4 - Data Nutr Annifolds: Low LOE to one 3 - Fundant, Nutr Yet Developed	reale 2-5 to create 3-5 sate 4-5	lata Nict Available	r, riigh LOE to create r. Medium LOE to creat r. Low LOE to create		6 - Data Not Assilable 1 - Data Assilable 2 - Data Not Assilable; regh LOI: to 3 - Data Not Assilable; Lovs LOI: to 4 - Data Not Assilable; Lovs LOI: to 5 - Fundert, Not Yet Developed	to create 2 DE to create 3 o create 4	Data Not Availa	able; High LOE to create able; Medium LOE to create able; Low LOE to create		- Data Not Assistile; I - Data Not Assistile;	1 - Data Aug Hig 3 - Data Not Me 7 - Plyta Not Lov Sta Not		create 3 Etocovalin 3 create 4	- Data foot Available - Data Available - Data foot Available; - Data foot Available; - Data foot Available; - Funded, foot Yet De	Medium LOE to create Low LOE to create	D- Data Net Available 1. Cata Available 2. Cata Net Available: High LOT to create 2. Cata Net Available: Wellium LOT to create 4. Data Net Available: Live LOT to create 4. Data Net Available: Live LOT to create 3. Funded). Met Net Developed	D - Deta Not Association 1 - Data Association 2 - Outs Not Association; High LDK to o 3 - Data Not Association; High LDK to o 4 - Data Not Association; Switzum LDK 5 - Fundand, Not Yet Developed	to create		3 - Data Available 3 - 1 2 - Data Not Available; Hig 2 - 1 3 - Data Not Available; Me 3 - 1	Data Nor Available Data Normatic Data Rest Available; High LOS to create Data Nos Available; Madium LOS to create Data Nos Available; Los LOS to create Funded; Nos Yet Developed	W. S. Data Not	Available; Nigh LOC to Available; Medium LO Available; Line LOE to

Leveraging Coastal Data: The Development of a Coastal MultiFrequency Geospatial Data Catalog





Coastal MultiFrequency Data – Tabular Catalog



STCOFIPS
STATE
COUNTY
Study Name (i.e West Florida)
Technical Approach
Multifrequency Data Source
Offshore Model Used
Nearshore Model Used
Wave Setup Model Used
Wave Runup Model(s) Used
Dune Erosion Model Used
Wave Overtopping Model Used
Overland Wave Propagation Model Used
Tsunami Elevation in Flood Maps (Y/N)
Contractor Leading Technical Study
RiskMap Study
SurgeStat Model applied to develop surfaces
If SurgeStat Applied, Static Uncertainty Term Value (m)
If SurgeStat Applied, Proportional Uncertainty Term Value
Other ways Uncertainty Included and Value
Water Level Surface Data Format

Stillwater Methodology -	50% Annual Exec. Prob		
may or may not include wave setup	(2-year water level)		
	20% Annual Exec. Prob		
Stillwater Elevation	(5-year water level)		
Data Available	10% Annual Exec. Prob		
	(10-year water level)		
Stillwater Elevation Plus Wave Effects	4% Annual Exec. Prob		
Data Available	(25-year water level)		
	2% Annual Exec. Prob		
Stillwater Elevation Depth Grid	(50-year water level)		
Data Available	1% Annual Exec. Prob		
	(100-year water level)		
Stillwater Elevation Plus Wave Effects Depth and	0.2% Annual Exec. Prob		
Velocity Grid Data Available	(500-year water level)		
velocity Grid Data Available	Data Location		

	Stillwater Elevation Methodology
0	No Data
1	JPM
2	JPM-OS
3	JPM-OS/EST
4	EST
5	Tide Gage EVA
6	Monte Carlo
7	Parametric Analysis on Sim TWL
8	JPM-OS/EV Fit on ET Storms
9	GPD Fit of 150 Historical Events
10	Multiple
	Data Availability
0	Data Not Available
1	Data Available
2	No Data; Derive with GIS
3	No Data; Develop with Further Modeling
4	Funded; Data Not Yet Developed

Stilly	water Elev	ation Meth	odology (may or ma	y not inclu	de wave se	tup)		Stillv	vater Eleva	tion Data	may or ma	y not inclu	de wave s	etup)			Stillw	ater Eleva	tion Plus V	Vave Effec	ts (Data an	d Methodo	ology)	
50% Annual Exec. Prob (2- year water level)	20% Annual Exec. Prob (5- year water level)	10% Annual Exec. Prob (10-year water level)	4% Annual Exec. Prob (25- year water level)	2% Annual Exec. Prob (50- year water level)	1% Annual Exec. Prob (100- year water level)	0.2% Annual Exec. Prob (500- year water level)	0.1% Annual Exec. Prob (500- year water level)	50% Annual Exec. Prob (2- year water level)	20% Annual Exec. Prob (5- year water level)	10% Annual Exec. Prob (10-year water level)	4% Annual Exec. Prob (25- year water level)	2% Annual Exec. Prob (50- year water level)	1% Annual Exec. Prob (100- year water level)	0.2% Annual Exec. Prob (500- year water level)	0.1% Annual Exec. Prob (500- year water level)	Data Location	50% Annual Exec. Prob (2- year water level)	20% Annual Exec. Prob (5- year water level)	10% Annual Exec. Prob (10-year water level)	4% Annual Exec. Prob (25- year water level)	2% Annual Exec. Prob (50- year water level)	1% Annual Exec. Prob (100- year water level)	0.2% Annual Exec. Prob (500- year water level)	0.1% Annual Exec. Prob (500- year water level)	Data Location
No Data	No Data	JPM-OS	No Data	JPM-OS	JPM-OS	JPM-OS	No Data	Data Not A	Data Not A	Data Avai	Data Not	Data Avai	Data Avai	Data Avai	Data Not A	Submitted	Data Not	Data Not A	Data Not	Data Not	Data Not	Data Avail	Data Avail	able	Submitted
No Data	No Data	JPM-OS	No Data	JPM-OS	JPM-OS	JPM-OS	No Data	Data Not A	Data Not A	Data Avai	Data Not	Data Avai	Data Avai	Data Avai	Data Not A	Submitted	Data Not A	Data Not A	Data Not	Data Not	Data Not	Data Avail	Data Avail	able	Submitted
No Data	No Data	JPM-OS	No Data	JPM-OS	JPM-OS	JPM-OS	No Data	Data Not A	Data Not A	Data Avai	Data Not	Data Avai	Data Avai	Data Avai	Data Not A	Submitte	Data Not A	Data Not A	Data Not	Data Not	Data Not	Data Avail	Data Avail	able	Submitted
Tide Gage	Tide Gage	Tide Gage	Tide Gage	JPM-OS	JPM-OS	JPM-OS	No Data	Data Avail	Data Avail	Data Avai	Data Avai	Data Avai	Data Avai	Data Avai	Data Not A	Submitte	Data Not A	Data Not A	Data Not	Data Not	Data Not	Data Avail	Data Avail	able	Submitted
Tide Gage	Tide Gage	Tide Gage	Tide Gage	JPM-OS	JPM-OS	JPM-OS	No Data	Data Avail	Data Avail	Data Avai	Data Avai	Data Avai	Data Avai	Data Avai	Data Not A	N/A	Data Not A	Data Not A	Data Not	Data Not	Data Not	Funded; D	Funded; D	ata Not Ye	N/A
Tide Gage	Tide Gage	JPM-OS	JPM-OS	JPM-OS	JPM-OS	JPM-OS	No Data	Data Avail	Data Avail	Data Avai	Data Avai	Data Avai	Data Avai	Data Avai	Data Not A	N/A	Data Not A	Data Not A	Data Not	Data Not	Data Not	Funded; D	Funded; D	ata Not Ye	N/A





Coastal MultiFrequency Data – Spatial Version 1.0



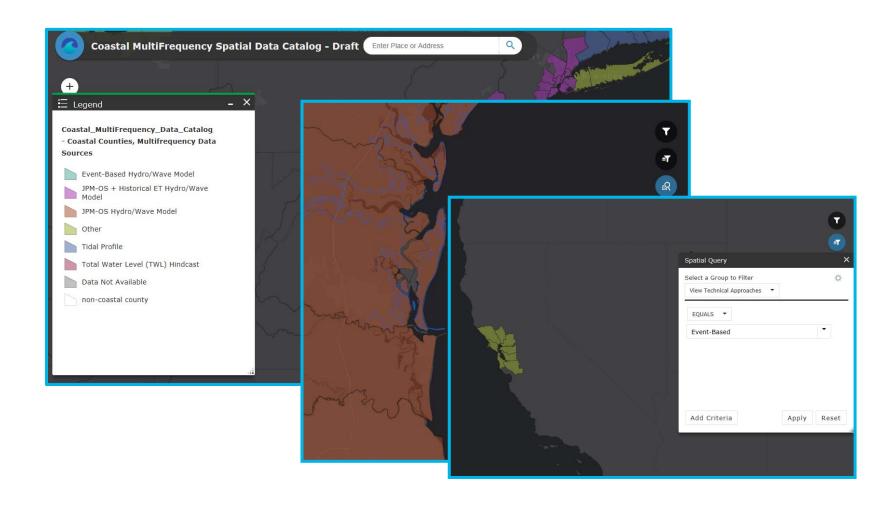






Coastal MultiFrequency Data – Spatial Version 1.0



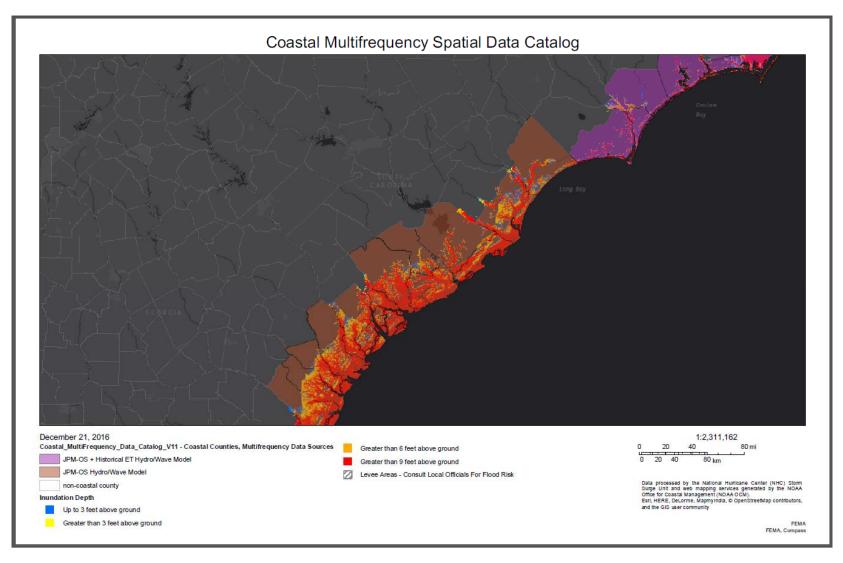






Coastal MultiFrequency Data – Spatial Version 1.0



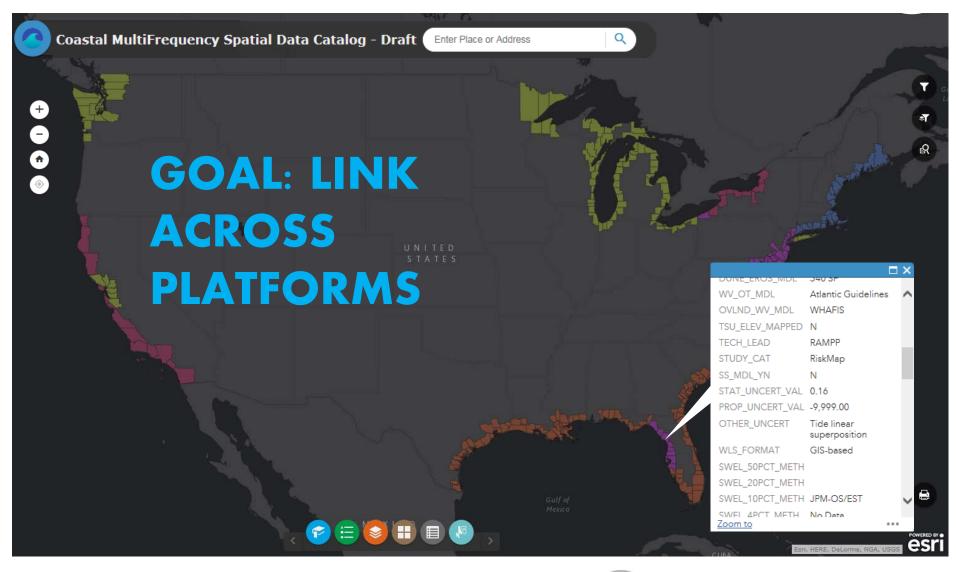






Version 1.0 Means Expanded Data in the Future









Coastal MultiFrequency Data – Future Vision



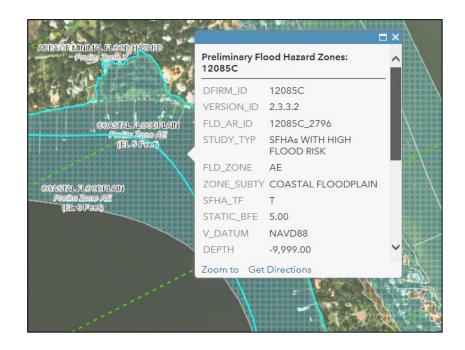
- The Catalog is being expanded to include many additional inventory attributes.
- Being implemented in the spatial data in phases during the current hurricane season, starting with Regions 4 & 6.
- Includes, not limited to:
 - Surge/Stillwater study Summary Polygons
 - Coastal Flood Zone (SFHA) footprints, including CP areas
 - County FIPS code link, MIP Case Number links where possible
 - Data represented at "smallest" common denominator of SFHA footprints so that queries, summaries, filters, etc. can always be applied "up" at a more general basis when needed



Coastal MultiFrequency Data - Ongoing



- The end goal of this is <u>not</u> to duplicate the NFHL or other datasets (CNMS, Coastal Tracker, etc.)
- Key is to leverage as much of the existing data as possible to "connect the dots" within coastal datasets and across other platforms







Coastal MultiFrequency Data – Expanded Inventory



State	County	Study	FEMA Case Number	udy Contrac	Study Point of Contact
Florida	Flagler	IDS 1 -3	11-04-1621S	BakerAECOM	Michael DelCharco
Florida	Flagler	IDS 4-5	11-04-1996S	BakerAECOM	Chris Mack
Florida	Flagler	Products/		BakerAECOM	Chris Mack

DCS Section (May 2014)	Data
DC3 Section (Iviay 2014)	<u>Data</u>
2.1 - General	
Documentation	IDS Report 1 - 3
	IDS Report 4-5
	Final/Draft FIS Report
	Project Narrative
	Certification
	White Papers, Tech memos, issue papers
	Metadata files
2.2 - Corresponence	
	Letters, Transmittals, Memos, status reports, special
	problem reports, scientific resolution panel
2.2 Sailleanna Dana	documentation
2.3 - Stillwater_Data	
	Tidal Data (historic hourly data, annual max)
	High Water Marks
	Wave Data (Atlantic and Gulf Coast only)
2.4 - Stillwater Analysis	
	Desktop Hydro analysis
	2D Hydro Modeling - Geometry (final Mesh, DEM, other El
	2D Hydro Modeling - Tidal Calibration
	Wind and pressure Fields
	2D Hydro Modeling - Historic storm verification
	2D Hydro Modeling - Production Runs
	2D Hydro Modeling - Statistical Analysis
	2D Hydro Modeling - Supplemental
	2D Hydro Modeling - Spatial files
	2D Hydro Modeling - Field Data
	Issue Resolution

2.5 - Wave Analysis	
	Desktop Wave Analysis
	2D Wave Model - Geometry (final mesh, DEM, other eleva
	2D Wave Model - Historic Storm Verification
	2D Wave Model - Wave Production Runs
	Supplemental Data
2.6 - Transect Based Wave	2
	Wave Statistical Analysis - where 2D wave modeling is us
	Wave Hazard Model - Erosion (geometric or numeric mod
	Wave Hazard Analysis - Dune Erosion Modeling for Pacific Coast (various models)
	Wave Hazard Model-waves
	Wave Hazard Model - runup
	TWL Hindcast (wave Setup and Runup) - Response Based
	Structures Analysis/Treatment
	Wave Hazard Model - overtopping
	1-percent-annual-chance wave envelop profiles
	0.2-percent-annual-chance wave analysis
	Spatial Files - field data, landuse, transect layouts
	Spatial Files - terrain or DEM, or survey data used for 1-D
	Spatial Files - Starting wave extraction locations
	Combined Probability Analysis
	Issue Resolution
	LOMRs
	Supplemental Data
	Appeal Modeling

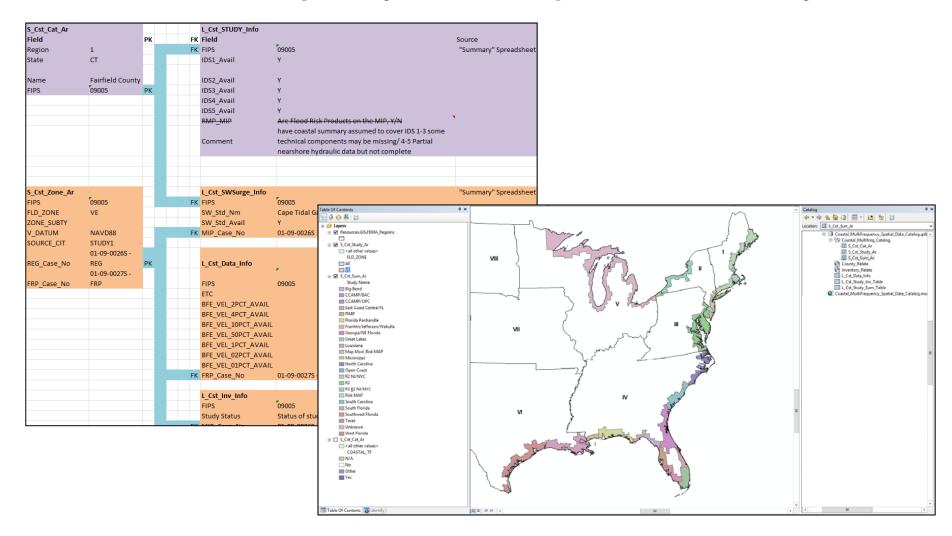
2.7 - Spatial Data	
	FIRM Database
	PFD
	Workmaps
2.8 - Coastal Flood Risk Sp	atial Files
	Flood Risk Products
	Additional Non-regulatory products





Coastal MultiFrequency Data – Expanded Inventory

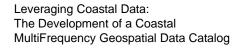








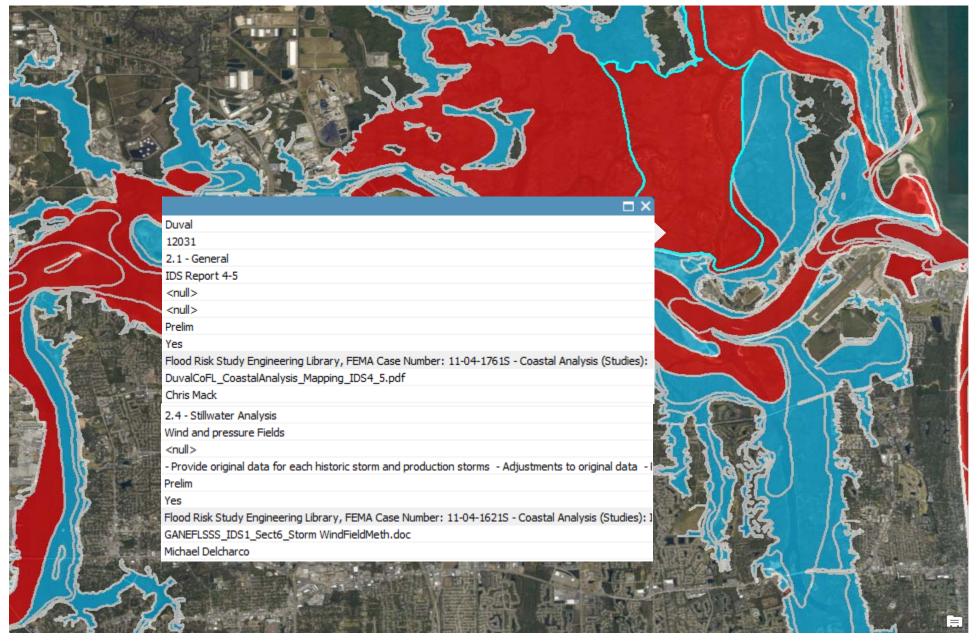












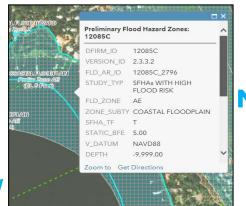




Future Vision?

CATALOG





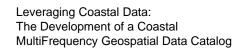
NFHL

		Existing & Forecas	t .			
PERCENTAGE OF PEMA COASTAL STUDY MILES	Year Installed	Year Pretiminary	Year Effective	MIF Case No.	Last Task Completed (as of C Johnson Sheets on 30/20/2016)	Comments (as of Cisheson Sheets on 35/20/2016)
1-12			il no mari		Other (add comment)	Under Contract
0.5%	MapMod	PY10	PYS4-Complete	Control Control	Maps Effective	Maps Effective
2.1%	FY13	FY14-Complete	PY17	12-10-09555	LFD Issued	Work Maps
1.4%	PY15-Comprete	FVLT	FY38	14-10-06035	Work Maps	Data (topo/bathy/str)
1.5%	FY13-Complete	FY16-Complete	FY18	14-10-05965	Pretim's issued	Data (topo/bathy/str)
2.6%	FY12-Complete	FY14-Complete	FY35-Complete	(Condova)	Maps Effective	Work Maps
1 1276	FY13-Complete	FY16-Complete	PT38	(Valder)	Prelim's Issued	Overland Waves
0.4%	PYDS	FY18	FY20	11-00-03555	Overland Waves	Model Setup
	FYDS	FY16-Conglete	FY28	1000000	Prelim's Issued	
0.3%	MepMod	FV11	FY13-Complete	09-10-08425	Mage Effective	Maps Effective
0.2%	FY11	FY16-Complete	PYSE	12:00:04075	Pretim's Issued	Data (topo/bethu/str)
0.2%	FY13-Comprehe	PT17	FY29	14-10-05745	Work Maps	Under Contract
0.1%	FY13-Comprete	PULT	PY39	12:10:04005	Dverland Waves	Under Contract
0.3%	FYDS	PY16-Complete	FY19 .	11-10-03505	Frelim's Issued	Overland Waves
0.2%	FYDS:	FY17	FYSE	+ 1-10-03495	Work Maps	Work Maps
0.3%	FY13-Complete	FY1.7	PYSE	14-10-05955	Work Meps	Under Contract
0.3%	FYDS	FY14-Complete	8937	11-10-01405	LFD issued	freilm's issued
0.2%	FY13-Complete	FY15-Complete	PY57	11-10-04215	UFD Issued	Data (topo/bathy/str)
0.3%	FY13-Complete	FY15-Complete	FYSE	14-10-05865	Prelim's Issued	Data (topo/bathy/str)
0.2%	FY09:	FY13-Complete	PIGE.	11-10-01025	Appeals Resolved	Appeals Period
0.2%	FY11	PY15-Complete	FY17	13-10-09605	LFD Issued	Work Mags
0.2%	FY13-Complete	PT16-Complete	FYSB	11-10-04275	Pretire's Issued	Data (topo/trethy/str)
0.2%	FY09	FY15-Complete	FY15-Complete	11-10-01115	Maps Effective	Fretim's Issued
0.2%	FY11	FY15-Complete	PYST	12-10-03985	LFD Issued	Work Maps
0.3%	FY13-Complete	FY16-Complete	FY38	14-10-07215	Pretim's Issued	Data (topo/bathy/str)
0.2%	FV13-Complete	face to be issue	FY20	13-10-03475	Work Maps	Data (topo/trathy/str)
0.7%	EVII.	FY16	FY18	17-14-0966	finalism's immuned	Work Many

TRACKER



CNMS



June 21, 2018

Page 20





Thank You

christopher.macdougall@aecom.com