#### Question today imagine tomorrow create for the future

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### **Summary**

- Regional scale models
  - English Channel model
  - Continental Shelf model

#### English Channel Model

- A regional model developed to inform tidal dynamics in the Solent area.
- Mesh extends between Newlyn, UK to Plousecat, France in the west and between Lowestoft, UK and Leiden, Holland in the north east.
- Mesh uses WGS84 coordinate system and mean sea level (MSL) vertical datum.





# wsp



← → C ③ Not secure portal.emodnet-hydrography.eu





#### **Bathymetry**

← → C ③ Not secure | aws2.caris.com/ukho/mapViewer/map.action



# vsp

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#### Bathymetry

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# Boundary conditions

- Boundary conditions were obtained from the DHI Global Tidal Model.
- Spatially varying time series of water levels.
- The 0.125 degree resolution data set were used.
- Data were extracted along the boundaries to the west and north east.
- 85 data points characterise the western boundary.
- 47 data points cover the north eastern boundary.
- Consistent with the model mesh the vertical datum of boundary information is MSL .
- No additional sources of inflow, such as rivers, are included in the regional scale model.

#### Bed Roughness

- Spatially varying bed roughness was applied to the regional model
- Mannings M values used
- The Mannings M values were calculated as a function of seabed or sediment type and water depth

M = 
$$\frac{1}{\sqrt{Cd/g} \cdot h^{1/6}}$$
 Cd =  $\left(\frac{1}{\sqrt{0.32 h}}\right)^{1/7} \cdot C_{100}$ 

- C100 is the drag coefficient 1m above the bed.
- Values were obtained from Soulsby (1997).
- Spatial distribution of sediment type was obtained from EMODnet.

Substrate	C <sub>100</sub>
Rock or other hard strata	0.0010
Coarse sediment	0.0017
Seabed	0.0015
Sand to muddy sand	0.0017
Mud to sandy mud	0.0015



#### Bed Roughness



#### Mannings M 54-32

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#### Spring tide 05.10.17 -09.10.17

#### **Devonport**



#### Spring tide 05.10.17 -09.10.17

#### Portsmouth



Std. deviation

1.4010

1.3340

0.2421

0.9629

0.9911

Coefficient of Efficiency

Index of Agreement

[-]

[-]

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#### Spring tide 05.10.17 -09.10.17

#### Newhaven

Index of Agreement

0.9966



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#### Spring tide 05.10.17 -09.10.17

#### Dover



2.3715

0.0505

1.4324

Maximum Average

Std. deviation

2.4235

0.0725

1.5234

0.2227

-0.0220

0.1134

	Indice	Value	Unit
•	Mean Error	-0.0220	[m]
	Mean Absolute Error	0.0997	[m]
	Root Mean Square Error	0.1155	[m]
Std. dev of Residuals	0.1134	[m]	
	Coefficient of Determination	0.9979	[-]
	Coefficient of Efficiency	0.9943	[-]
	Index of Agreement	0.9985	[-]

#### Neap tide 12.10.17 -16.10.17

#### Devonport



Maximum

Average Std. deviation 1.5799

-0.0365

1.0004

1.7362

-0.0351

1.0489

0.1653

-0.0015

0.0752

	Indice	Value	Unit
•	Mean Error	-0.0015	[m]
	Mean Absolute Error	0.0625	[m]
	Root Mean Square Error	0.0752	[m]
	Std. dev of Residuals	0.0752	[m]
	Coefficient of Determination	0.9969	•
	Coefficient of Efficiency	0.9949	H
	Index of Agreement	0.9987	Ð

#### Neap tide 12.10.17 -16.10.17

#### Portsmouth



-1.4211

1.5097

0.0511

0.9041

Minimum

Maximum

Average

Std. deviation

-1.6209

1.5235

0.0834

0.9853

-0.3541

0.2643

-0.0323

0.1416

•	Mean Error	-0.0323	[m]
	Mean Absolute Error	0.1189	[m]
	Root Mean Square Error	0.1453	[m]
	Std. dev of Residuals	0.1416	[m]
	Coefficient of Determination	0.9849	[-]
	Coefficient of Efficiency	0.9783	Ð
	Index of Agreement	0.9941	[-]

#### Neap tide 12.10.17 -16.10.17

#### Newhaven

Index of Agreement

0.9989

[-]



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Neap tide 12.10.17 -16.10.17

#### Dover



	Indice	Value	Unit
•	Mean Error	-0.0220	[m]
	Mean Absolute Error	0.0997	[m]
	Root Mean Square Error	0.1155	[m]
	Std. dev of Residuals	0.1134	[m]
	Coefficient of Determination	0.9979	H
	Coefficient of Efficiency	0.9943	Ð
	Index of Agreement	0.9985	H

•	Item Name	Predicted tidal elev	Dover: Surface ele	Difference
	Item Unit	[m]	[m]	[m]
	Minimum	-2.3077	-2.3456	-0.2580
	Maximum	2.3715	2.4235	0.2227
	Average	0.0505	0.0725	-0.0220
	Std. deviation	1.4324	1.5234	0.1134

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#### **Bad data**

#### Bournemouth



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