



University of Brighton

Centre for Aquatic
Environments

Medmerry and Pagham: Sediment cycles – the links between land and sea

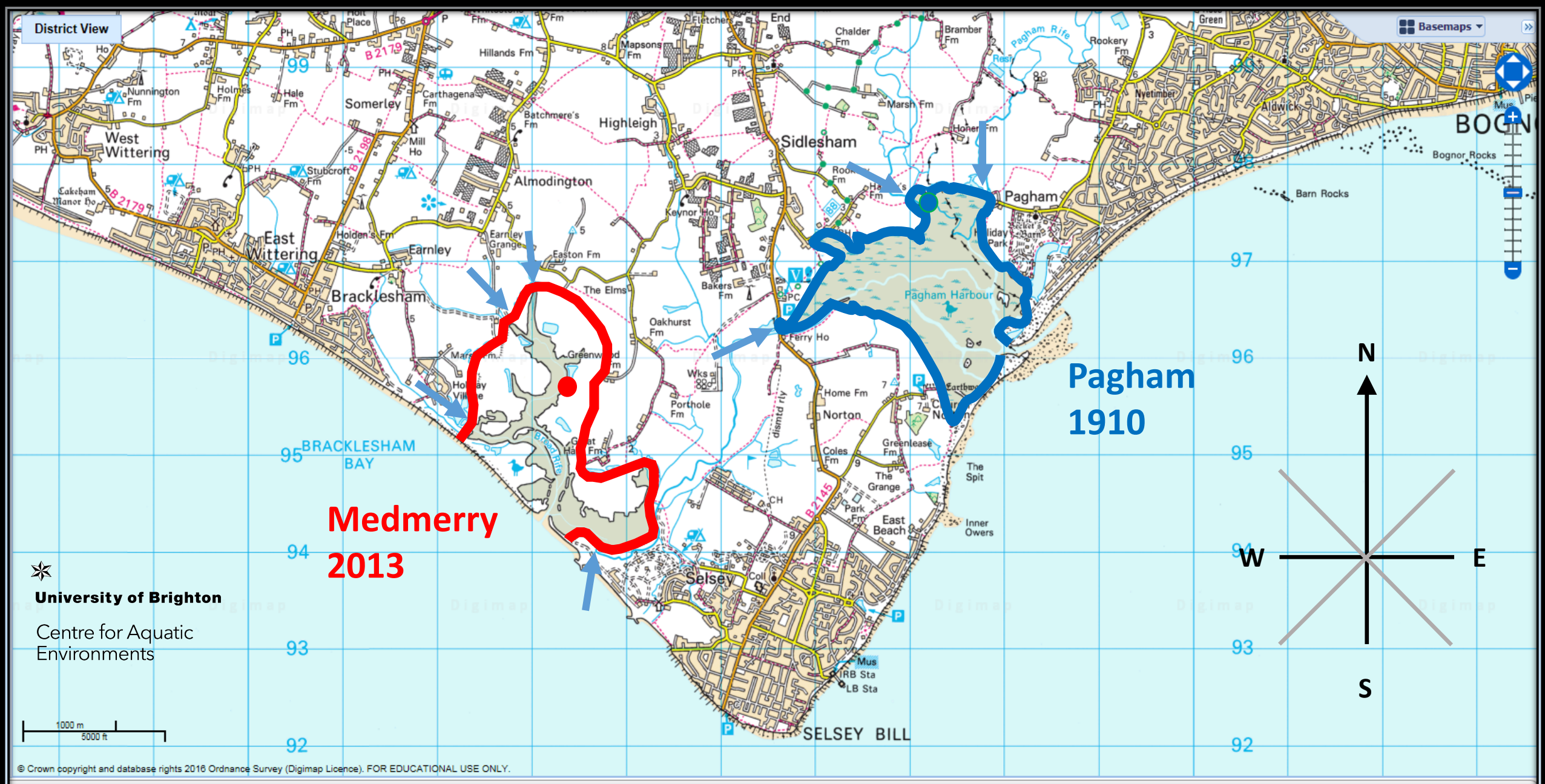
Heidi Burgess, University of Brighton
Jonathan Dale, University of Reading

Seafront at Medmerry during Storm Imogen

*(Many thanks to Peter Hughes from Chichester Conservancy for
remaining vertical, against the wind, for long enough to take this picture)*



The Sites and the terrestrial exchange





The Equipment



- ALTUS (NKE)



Image from YSI

- EXO2 Sonde (YSI)



The Two Sites



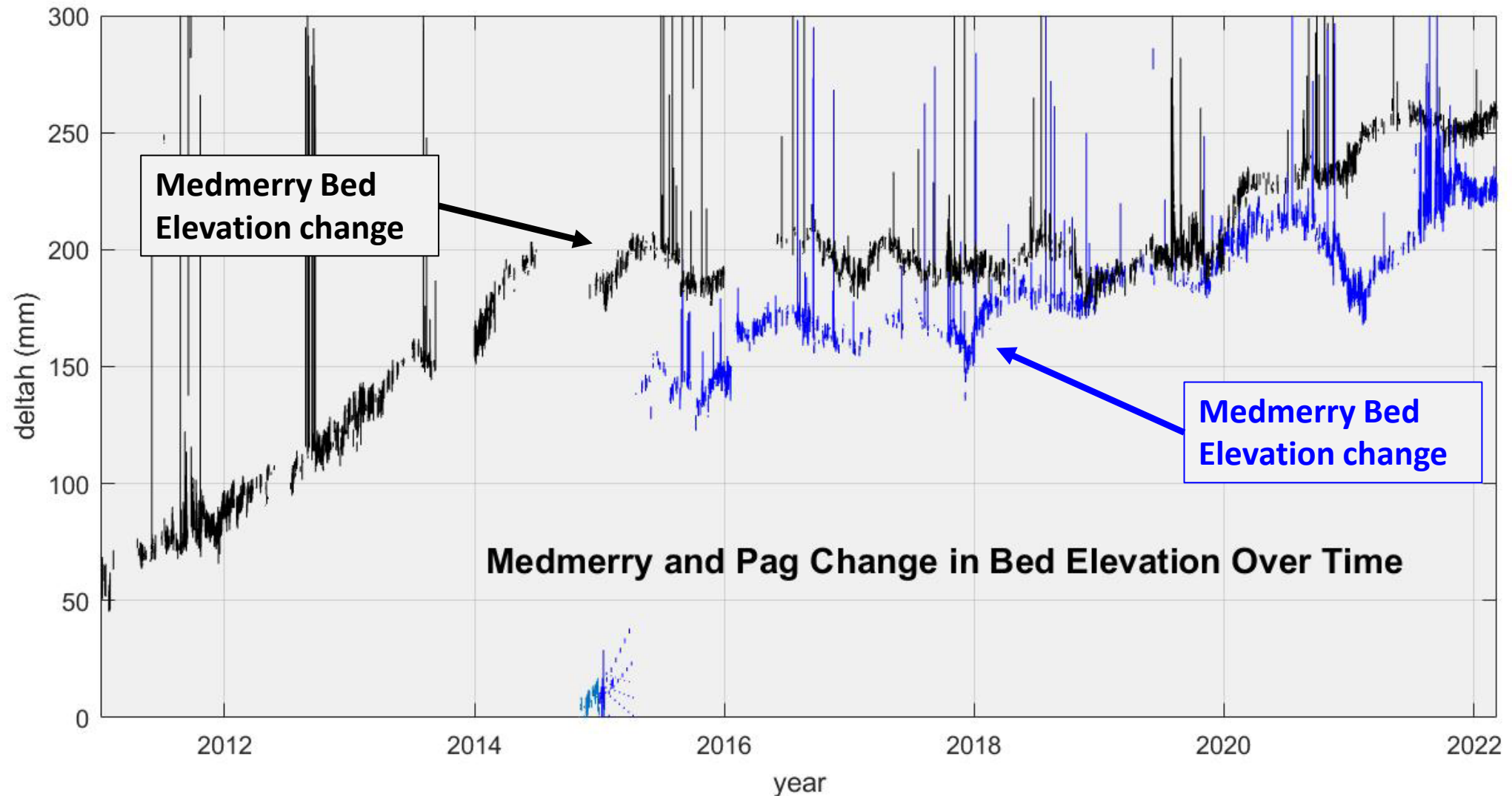
• Pagham – Extremity Site



• Medmerry – Mid Site

The Hydro-Geomorphology

Sediment Rhythms - Bed Elevation Data



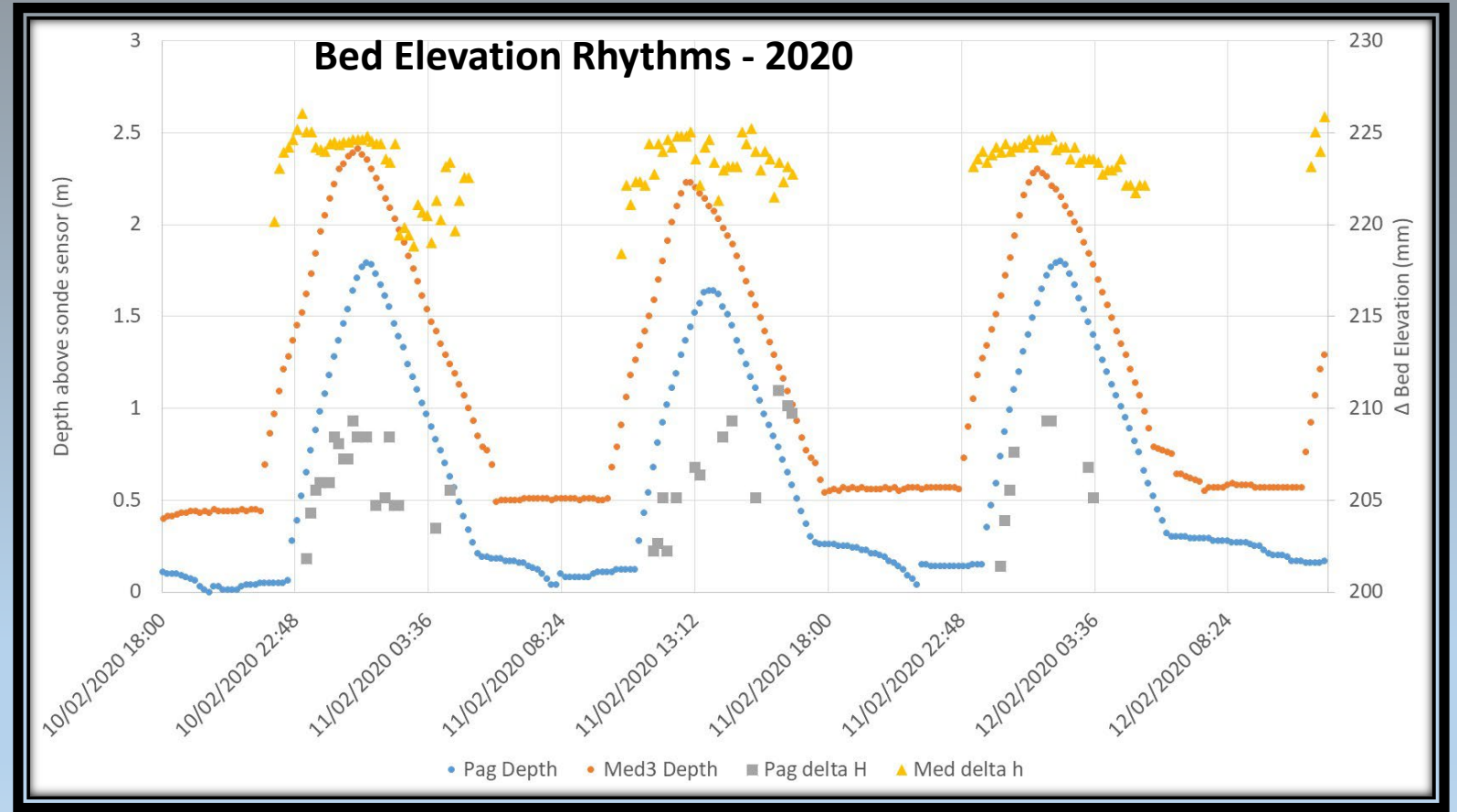


The Hydro-Geomorphology

Sediment Rhythms - Bed Elevation Data

Sediment Rhythms

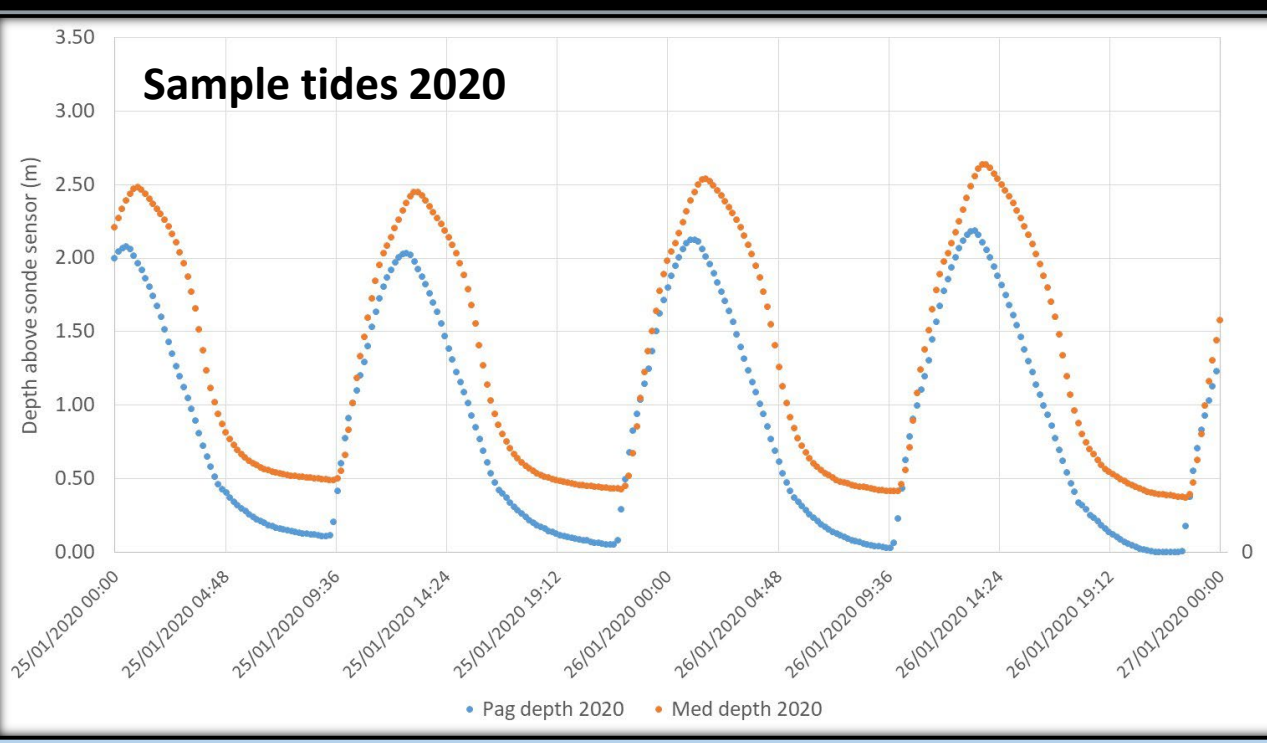
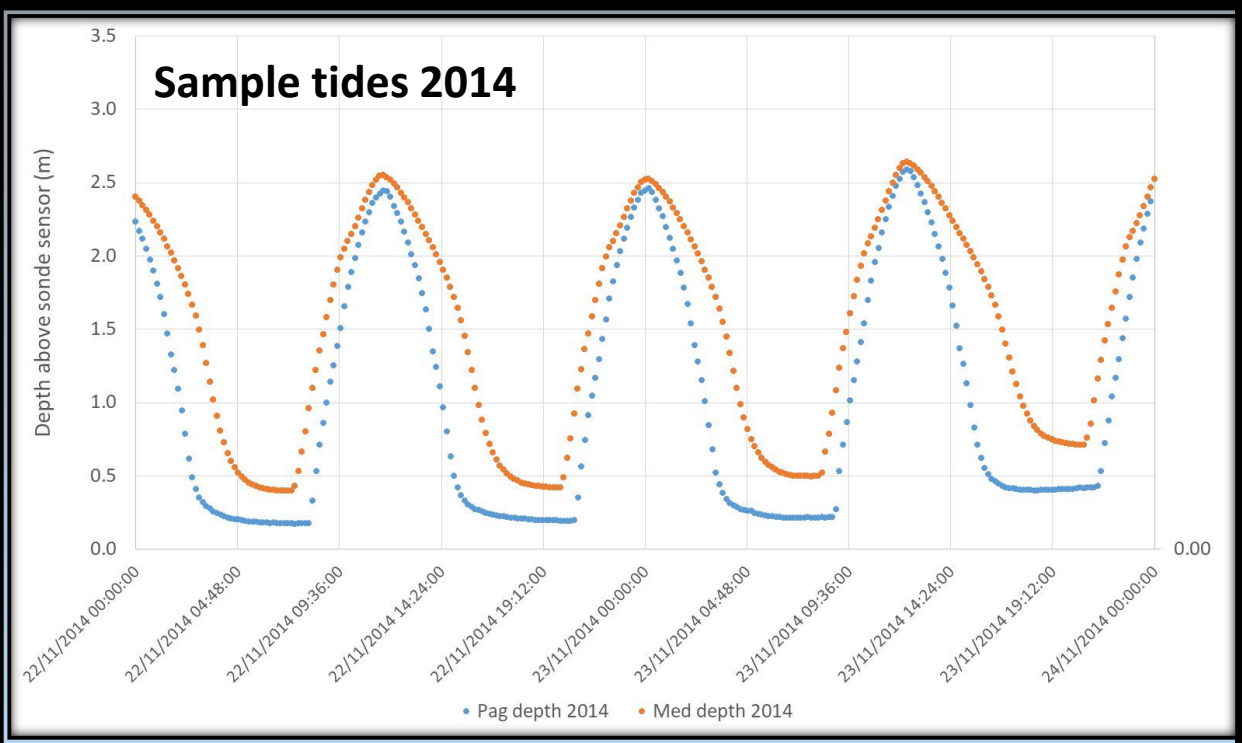
- Deposited on flood tide and eroded on ebb tide.
- Accretion during spring tides and erosion during neap.
- Bed elevation increased during the winter and decreased during the summer





The Hydro-dynamics

Evolution of the tidal curve - Rising limb gradient



Medmerry				Pagham			
	Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)		Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)
Tide 1	2140	270	7.9	Tide 1	2260	220	10.3
Tide 2	1720	260	6.6	Tide 2	2260	210	10.8
Tide 3	2110	260	8.1	Tide 3	2360	220	10.7

Medmerry				Pagham			
	Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)		Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)
Tide 1	1950	210	9.3	Tide 1	1920	200	9.6
Tide 2	2110	220	9.6	Tide 2	2080	210	9.9
Tide 3	2220	230	9.7	Tide 3	2150	220	9.8



The Hydro-dynamics

Evolution of the tidal curve - Rising limb gradient

2014	Medmerry					Pagham					Ratio Med:Pag (2014)			
	Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)			Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)			Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)	
Tide 1	2140	270	7.9		Tide 1	2260	220	10.3			Tide 1	0.95	1.23	0.77
Tide 2	1720	260	6.6		Tide 2	2260	210	10.8			Tide 2	0.76	1.24	0.61
Tide 3	2110	260	8.1		Tide 3	2360	220	10.7			Tide 3	0.89	1.18	0.76

2020	Medmerry					Pagham					Ratio Med:Pag (2020)			
	Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)			Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)			Tidal Range (mm)	Tidal rise duration (min)	Rising gradient (mm/min)	
Tide 1	1950	210	9.3		Tide 1	1920	200	9.6			Tide 1	1.02	1.05	0.97
Tide 2	2110	220	9.6		Tide 2	2080	210	9.9			Tide 2	1.01	1.05	0.97
Tide 3	2220	230	9.7		Tide 3	2150	220	9.8			Tide 3	1.03	1.05	0.99

- Gradient in Medmerry has morphed to that similar to Pagham
- Important for understanding site development stage

**THIS IS ONLY A SNAPSHOT FULL
ANALYSES NEEDS TO BE
COMPLETED**



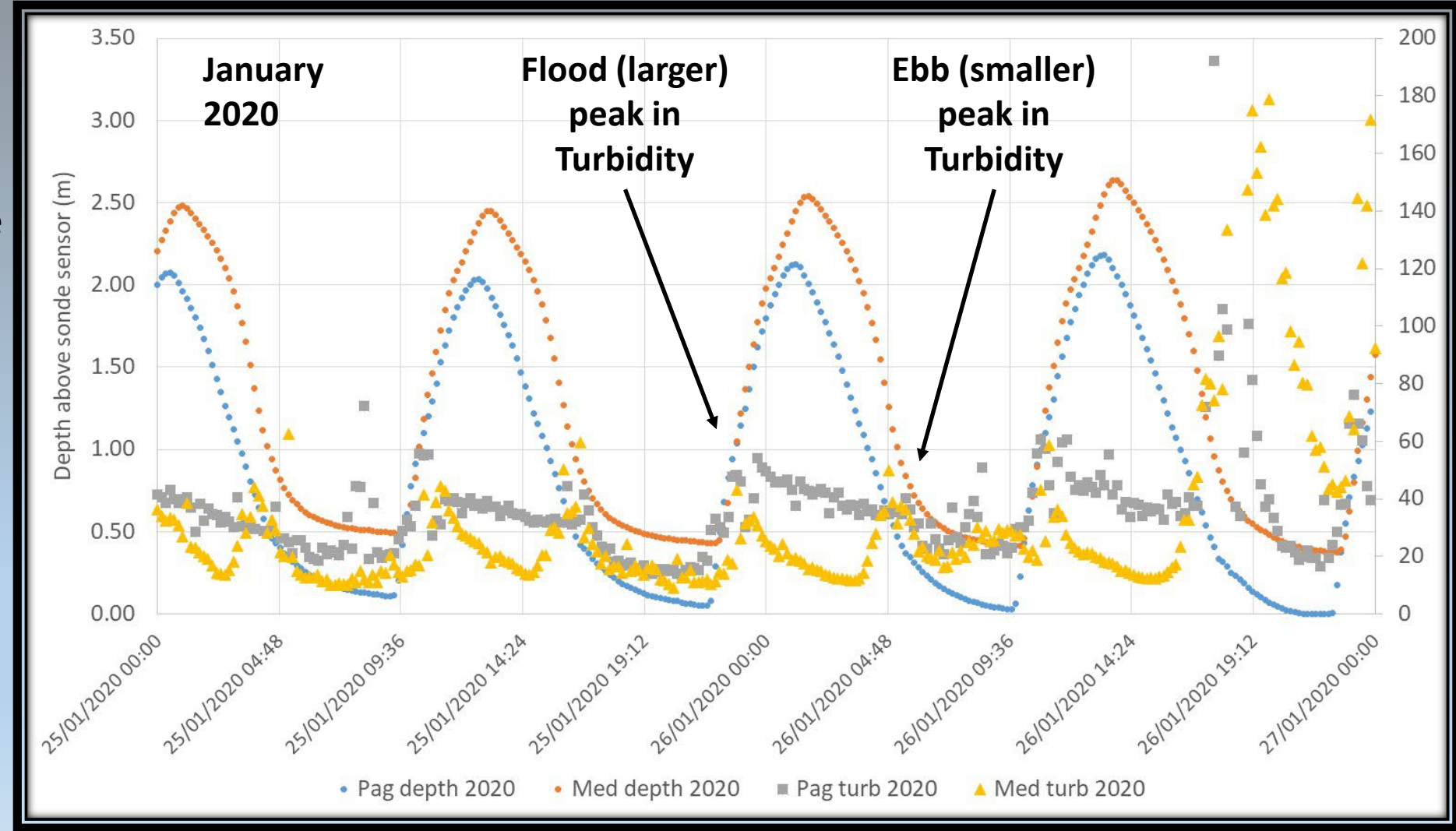
The Hydro-Geomorphology

Sediment Rhythms – Turbidity / Suspended Sediment

In 2020 the two sites are in phase for the dates analysed

- Medmerry more available sediment (likely be the mid site position and larger freshwater source)

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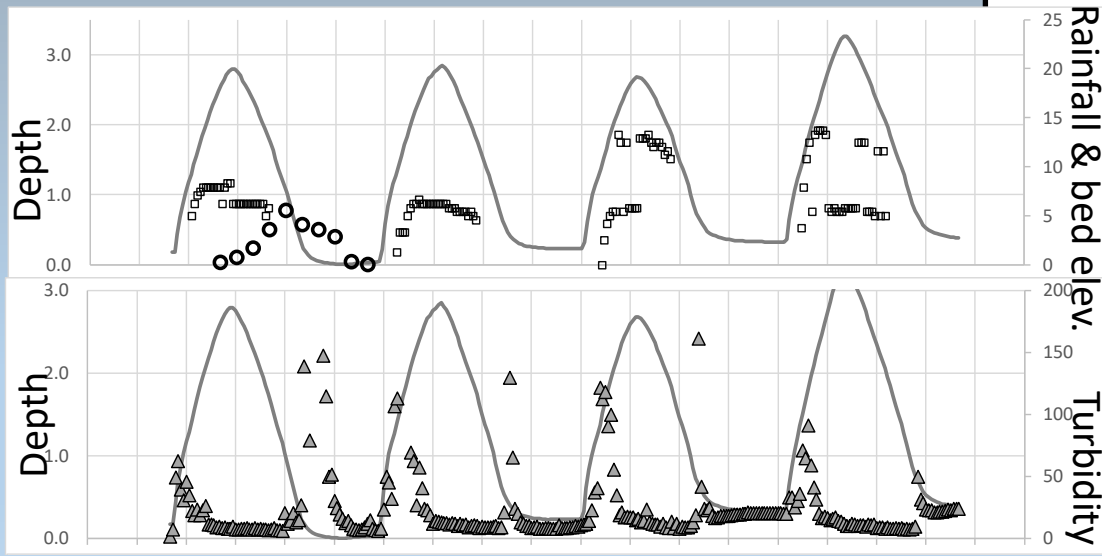
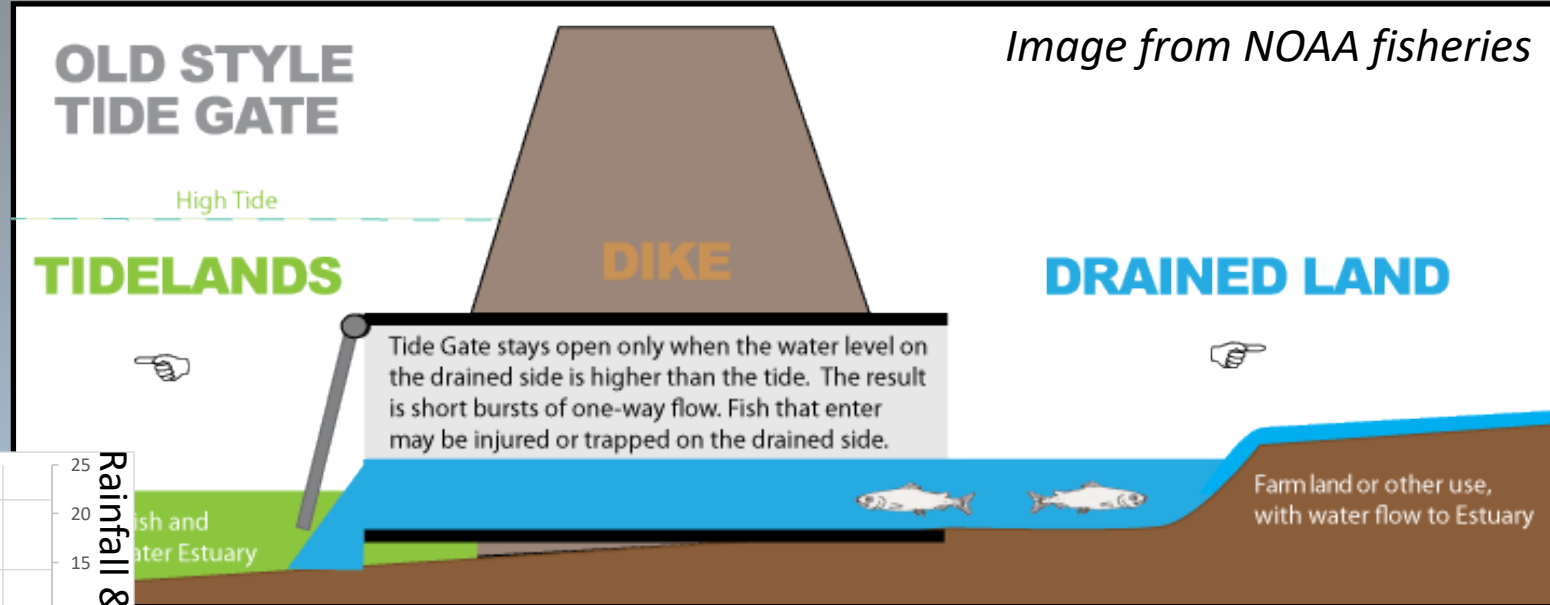
The Hydro-Geomorphology

Sediment Rhythms – Impact of Freshwater and Rain

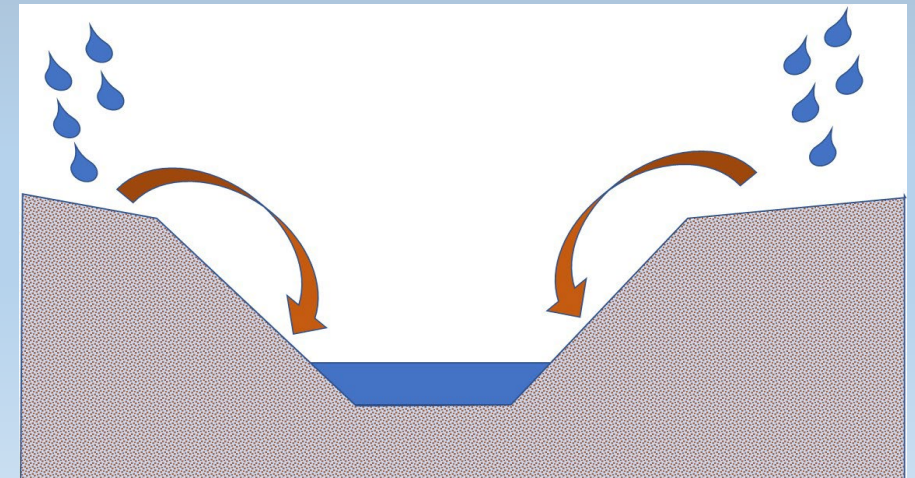
Freshwater input can be significant.

- Through the tidal flaps / gates (low tide – tidal locking)
- Rain falling within the system

This water carries and moves sediment.



- Rainfall (mm/h)
- change in bed elevation (mm)
- Depth (m)
- ▲ Turbidity (NTU)





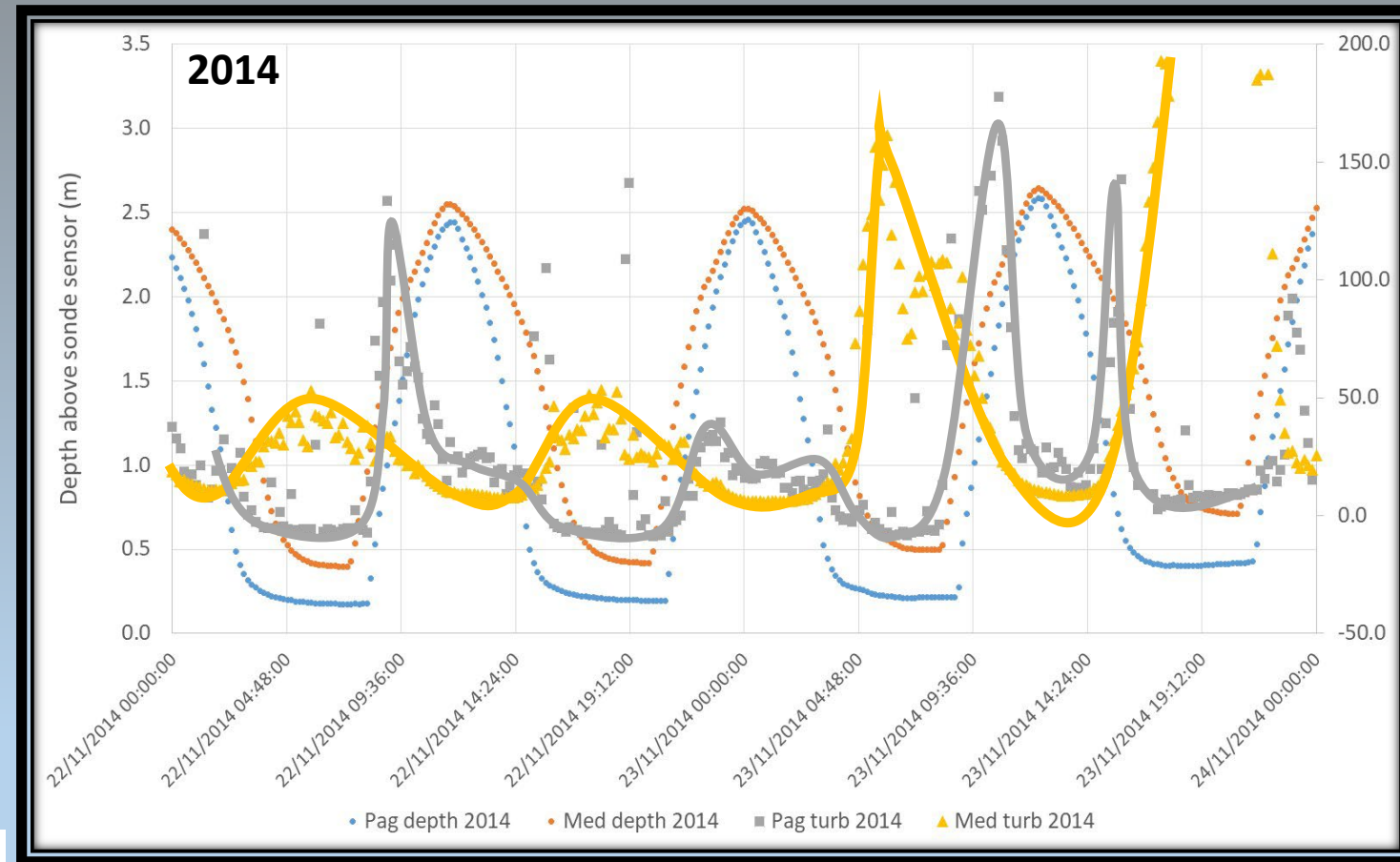
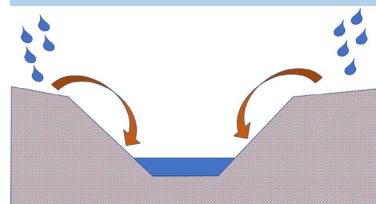
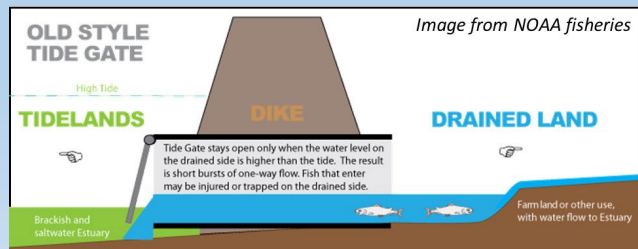
The Hydro-Geomorphology

Sediment Rhythms – Impact of Freshwater and Rain

In 2014 the two sites could be completely out of phase.

- Pagham peak turbidity on rising leg
- Medmerry on low tide, indicating that terrestrial water has higher sediment load (exporting to Bracklesham Bay)

**THIS IS ONLY A SNAPSHOT.
FULL ANALYSES NEEDS TO BE COMPLETED**





Sediment links between Land and Sea

Freshwater input can be significant

- Tidal locking.
- Terrestrial bypassing the intertidal system
- Low-tide rain remobilises deposited sediment.
- Saline wedge / stratification.
- Impacts on the shape of the ebb tide.
- Primary source of sediment into the system.
- Impacts on flora and fauna colonisation.

Tidal exchange

- Controlled by the tidal conditions and the size, position and number of breaches.
- Impacts on development of geomorphology as sediment is imported onto the marsh during flood tide.
- Primary factor controlling flora and fauna colonisation.



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Sediment links between Land and Sea

Sediment only
exported from the site
following intensive
rainfall events.



Tides import sediment
into, and re-circulate
around, the intertidal
systems.

On Balance

The systems are extremely complicated, but we are starting to gain a better understanding, but there is a lot more work to do.

**Any Questions /
Observations /
Comments**

