Turbulence control of Floc size in Suspended Particulate Matter (SPM) in the River Estuary Transition Zone (RETZ)

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**Background**

- **TERRIGENOUS** biogeochemical pathways

**Study Area**

- **RIVER ESTUARY TRANSITION ZONE** (RETZ)

**Data Collection**

**Results**

**Conclusion**

Formation & Evolution of FLOCS composed of **ORGANIC** and **INORGANIC** fractions.
Kolmogorov microscale refers to the length scale of the smallest eddies in a turbulent fluid.

\[ \mu_k = \left( \frac{v^3}{\varepsilon} \right)^{1/4} \left( \frac{Viscosity^3}{TKE \text{ dissipation}} \right)^{1/4} \]
Study area: the Dyfi system in West Wales
Bed-mounted mooring configuration

CTD and Flurorometer

ADCP 1228.8 kHz Burst mode

ADV 32 Hz Burst mode

LISST 100X type C 30cm above bed Continuous sampling
MOORING A
Tidally Influenced River (TIR)

MOORING B
River Estuary Transition Zone (RETZ)

March 2011

September 2010

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River Flow (m$^3$s$^{-1}$)

Time

River Flow (m$^3$s$^{-1}$)

Time

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March 2011: TIR Mooring A
March 2011: RETZ Mooring B

Graphs showing data for SPRING and NEAP conditions.

- **Log(D)**

- **h(m)**

- **u_h(ms^-1)**

\( \mu \)
Scenario 1: Both terrestrially derived SPM and SPM of a marine origin scale with turbulence regime whereas SPM of a marine origin does not respond to the local turbulence regime.

Scenario 2: Terrestrially derived SPM does not respond to the local turbulence regime whereas SPM of a marine origin does.

Scenario 3: Terrestrially derived flocs continue to grow as eddy length scales decrease until a critical point is reached and the positive linear relationship is restored.
SEPTEMBER MOORING: IN TIDALLY INFLUENCED RIVER:

FLOOD EVENT
- Tidal range reduced.
- Current velocities remain negative throughout major river flood event.
- Large particles exported from the RETZ.
- Distinct particle properties during river flood event, low density particles.
Estuary mouth: Post flood event

- Potential evidence of material advected from TIR during the ebb.
- During a river flood event what goes in must come out?
In summary:

- A simple linear relationship between Kolmogorov microscale and median particle size was not observed in the RETZ.

- The origin of SPM can affect the relationship with the local turbulence.

- River flood events gave rise to disruption of tidal currents and the export of large low density particles observed at the mouth of the estuary.