

*Current- and Wave-Induced Loads on  
Objects on the Seafloor*

## **Part 2. Field- Scale Studies and Conclusions**

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Concurrent:

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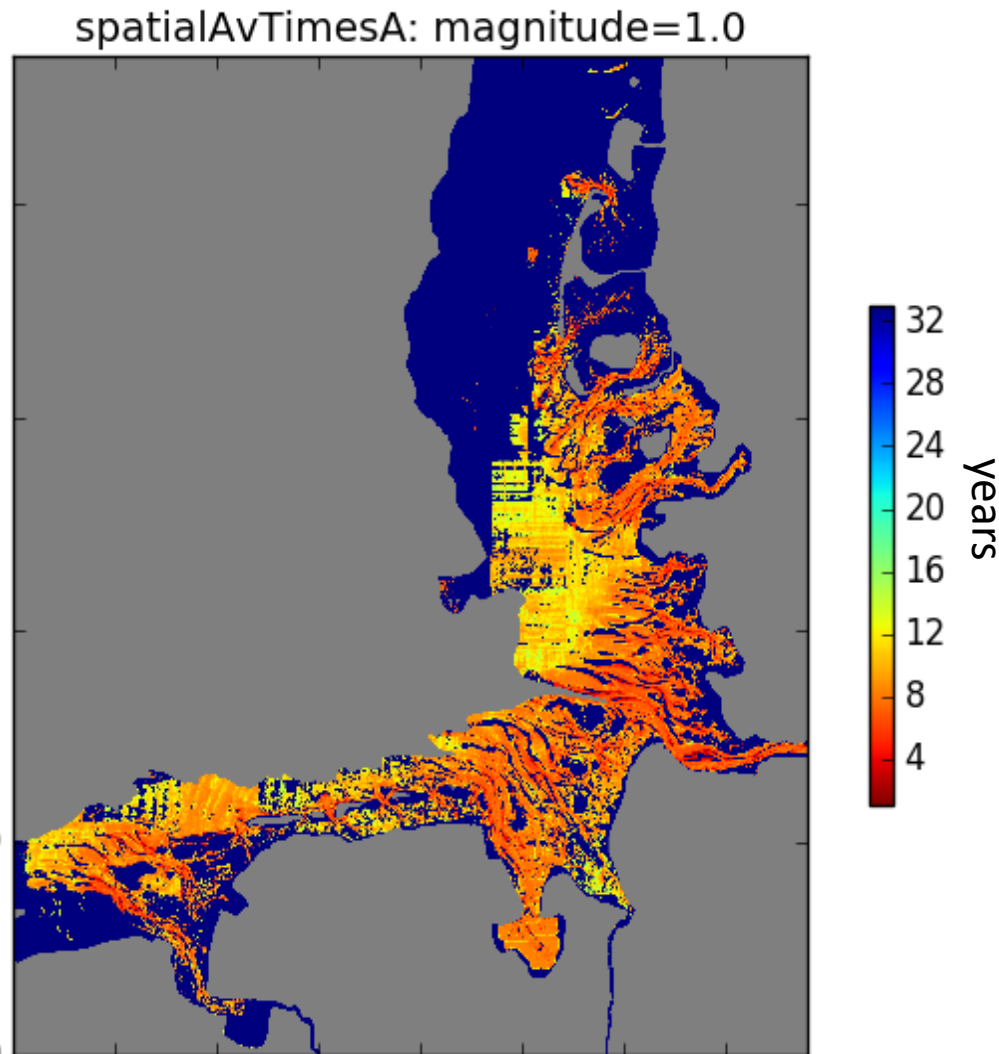
jenkinsc0@gmail.com

# ***USA SERDP Programs: Calantoni et al 2016***

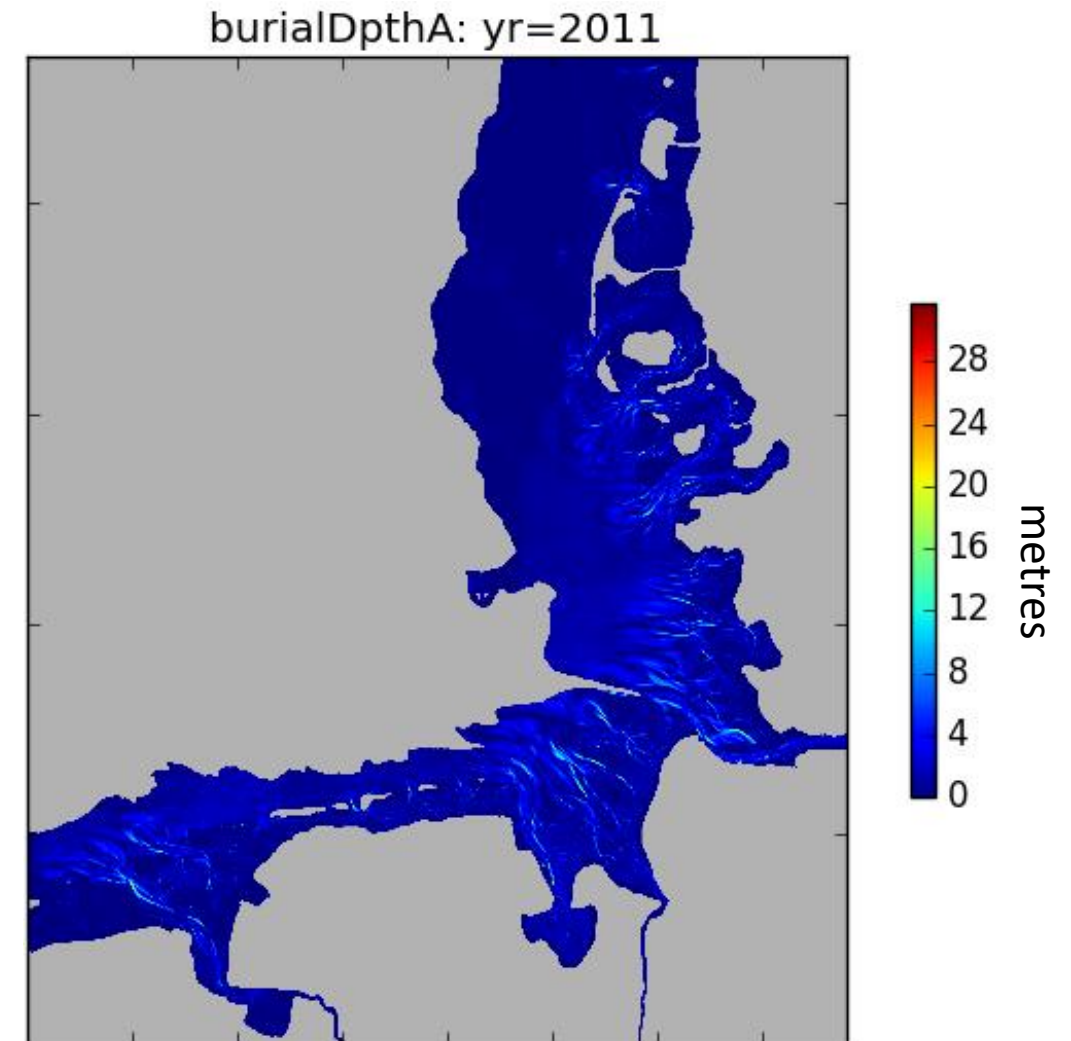
## Storm Event, 4-7 May 2013

# I. 'Far-field' object burial/unburial

*Using BSH repeat hydrographic surveys 1982-2011  
integrated under hydrographic standards*

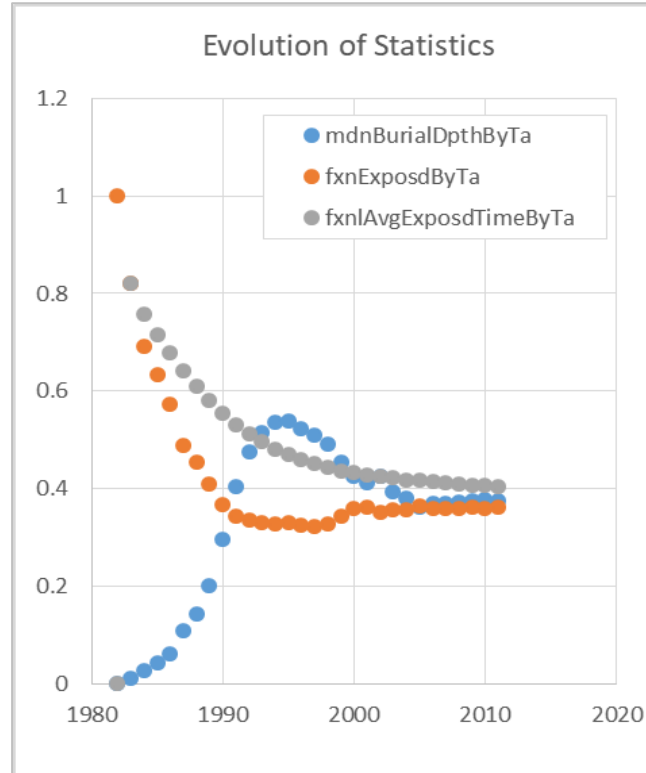


*Return Periods for 1m of seabed change*

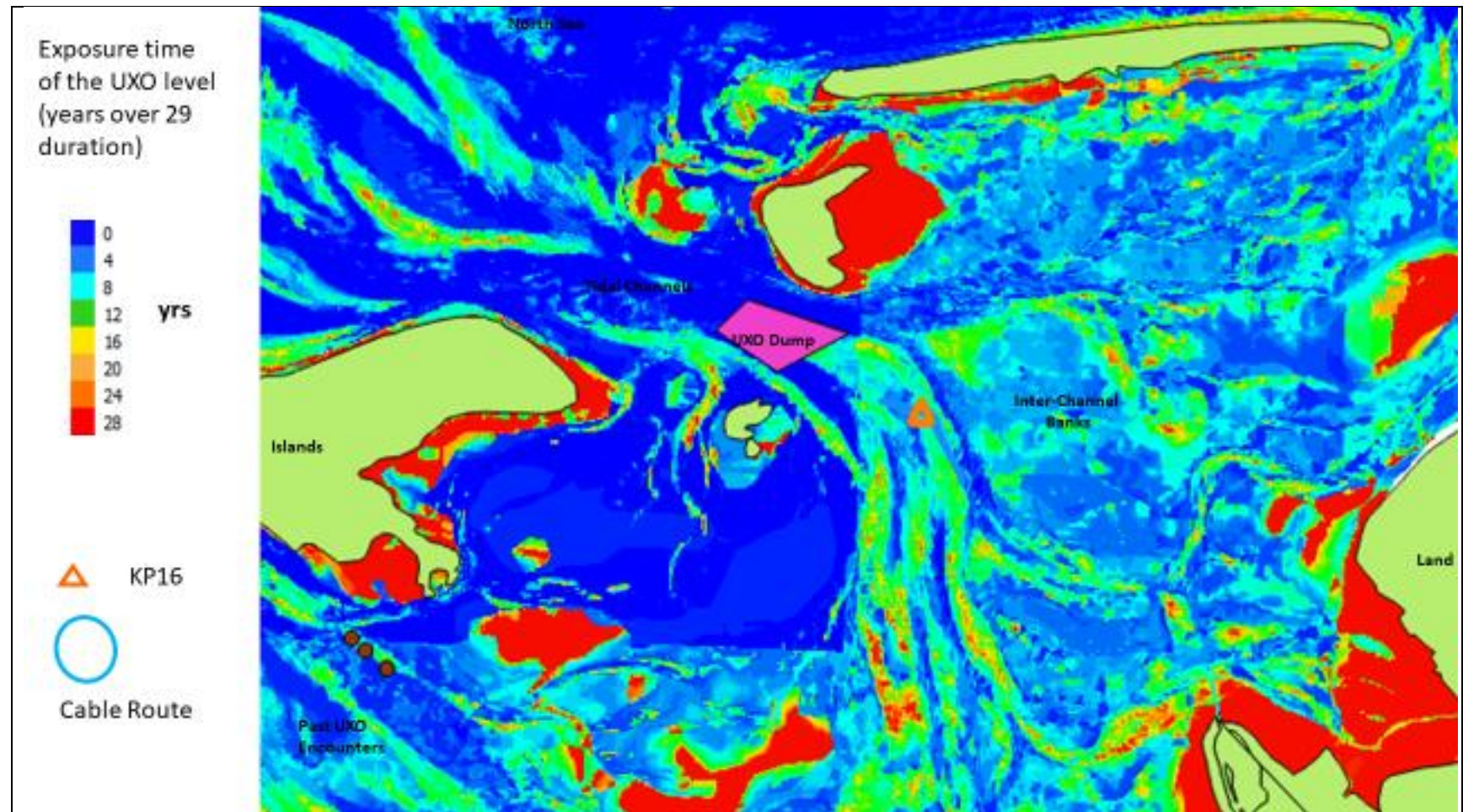


*Modeled depths (m) of burial of objects  
after 30 years*

# Object burial/unburial



*The whole-area statistics suggest that a steady state on exposure is reached after about 18 years, which would fall in calendar year 1964 after WW2.*



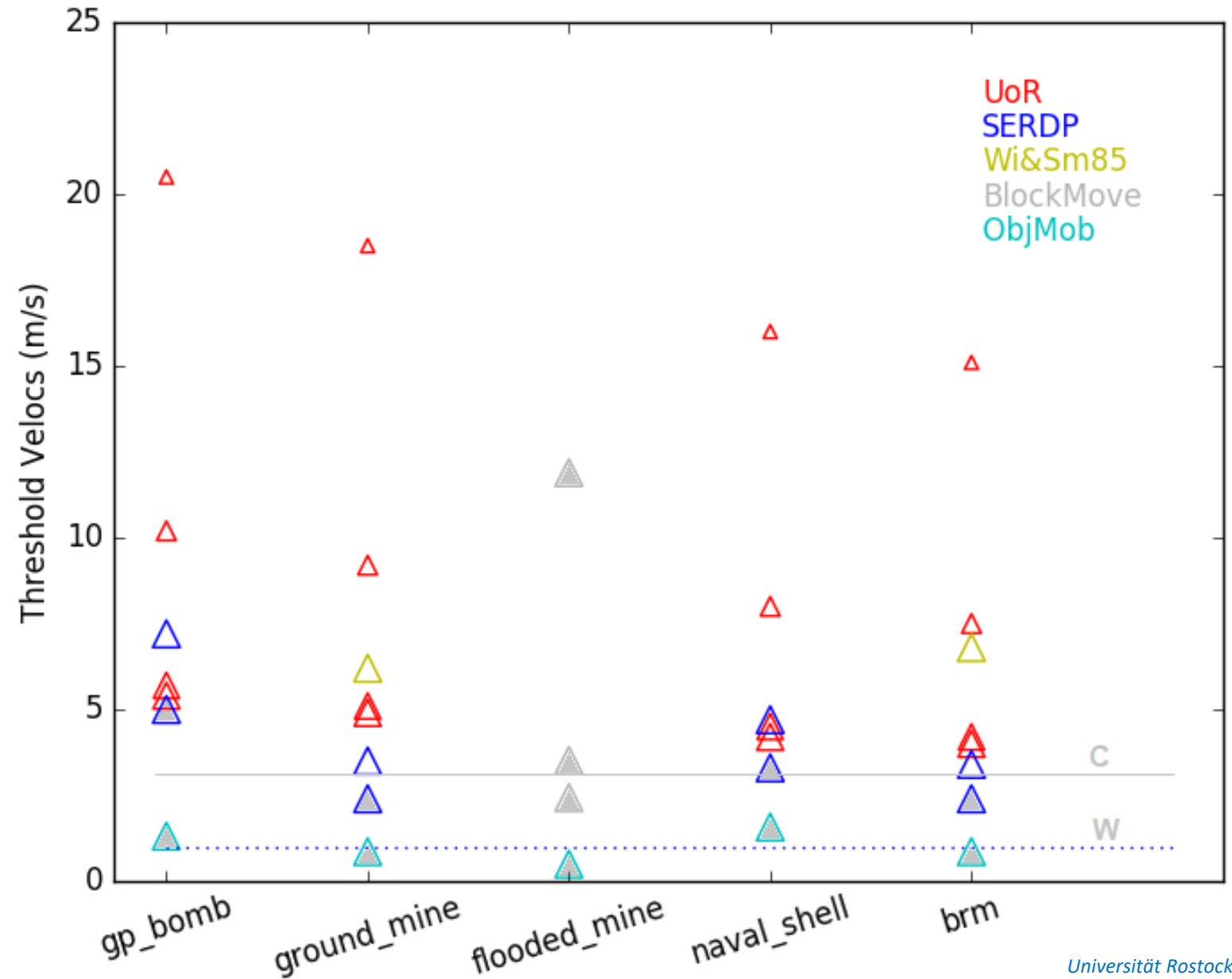
*Amount of time objects would have been exposed (/30 years) according to the simulation*



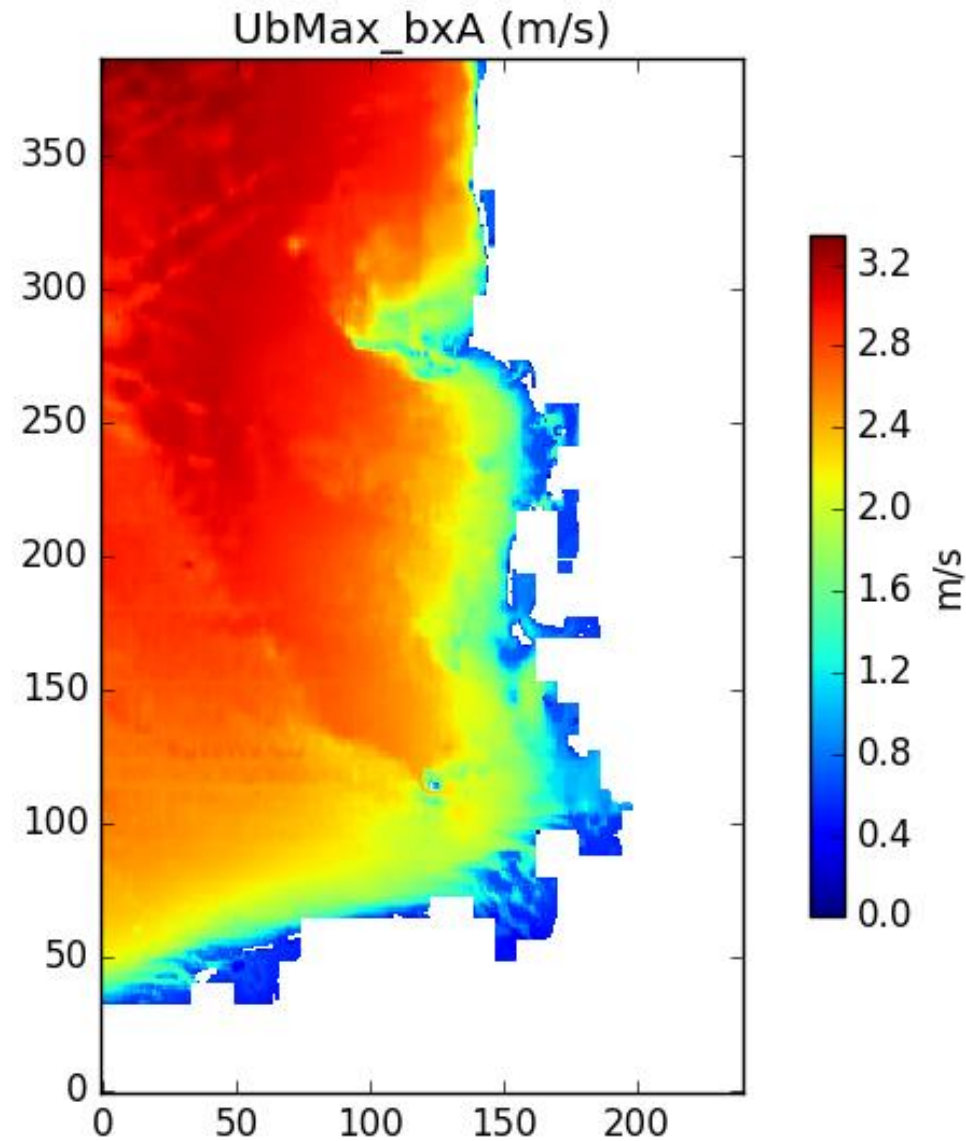
# II. The Models: UXO Thresholds of Motion

Model results on thresholds for movement of UXO under waves and/or currents.

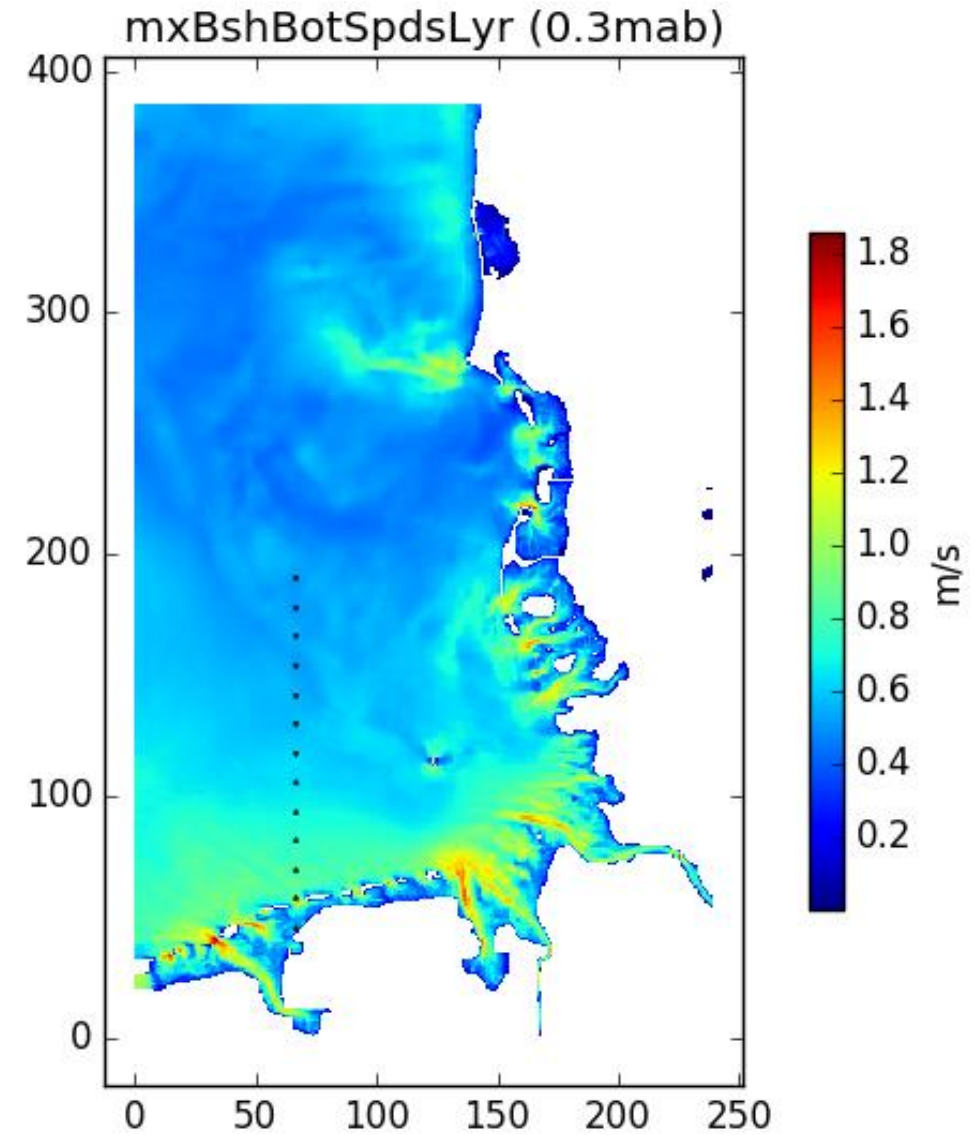
C=Currents; W=Waves



## Current/Wave Forcings: Data



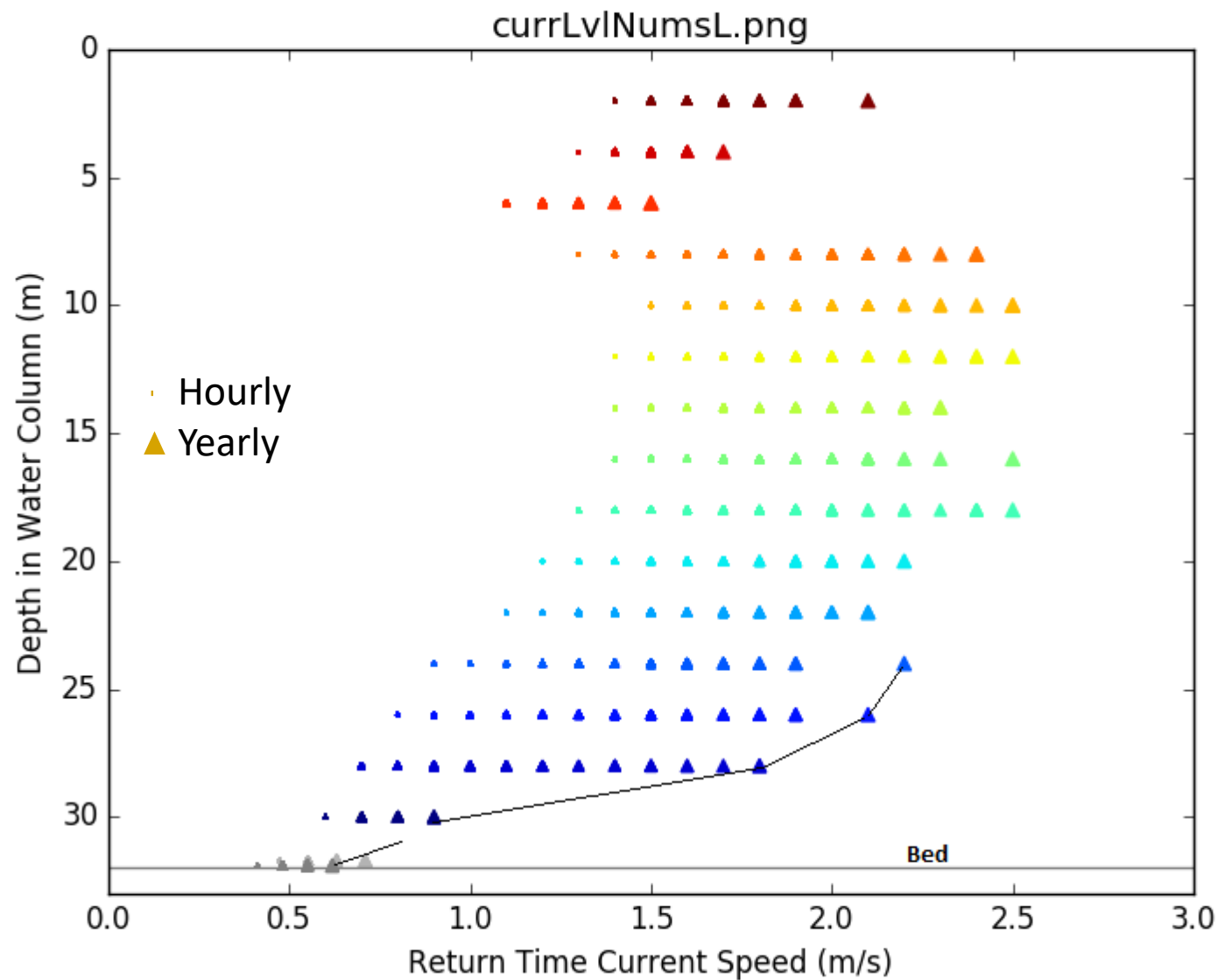
*A strong event: bottom wave-induced flows*



*An annual maximum: Near-bottom currents*

### III. The use of Return Times

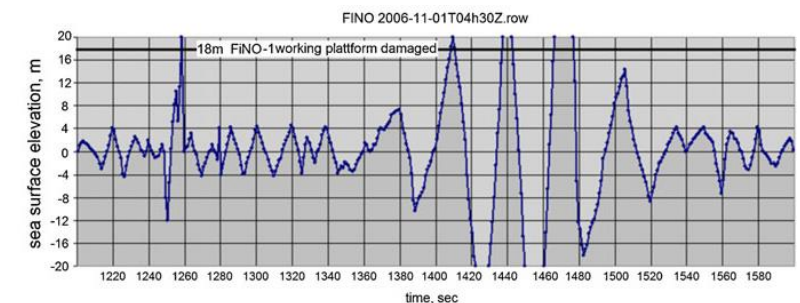
*We know that extreme events happen (e.g. Britta, 2006)*



*Note strong slowing of bottom currents at bottom*

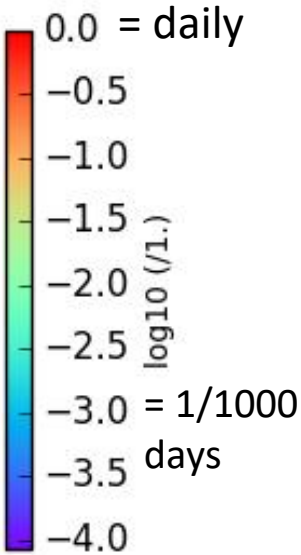
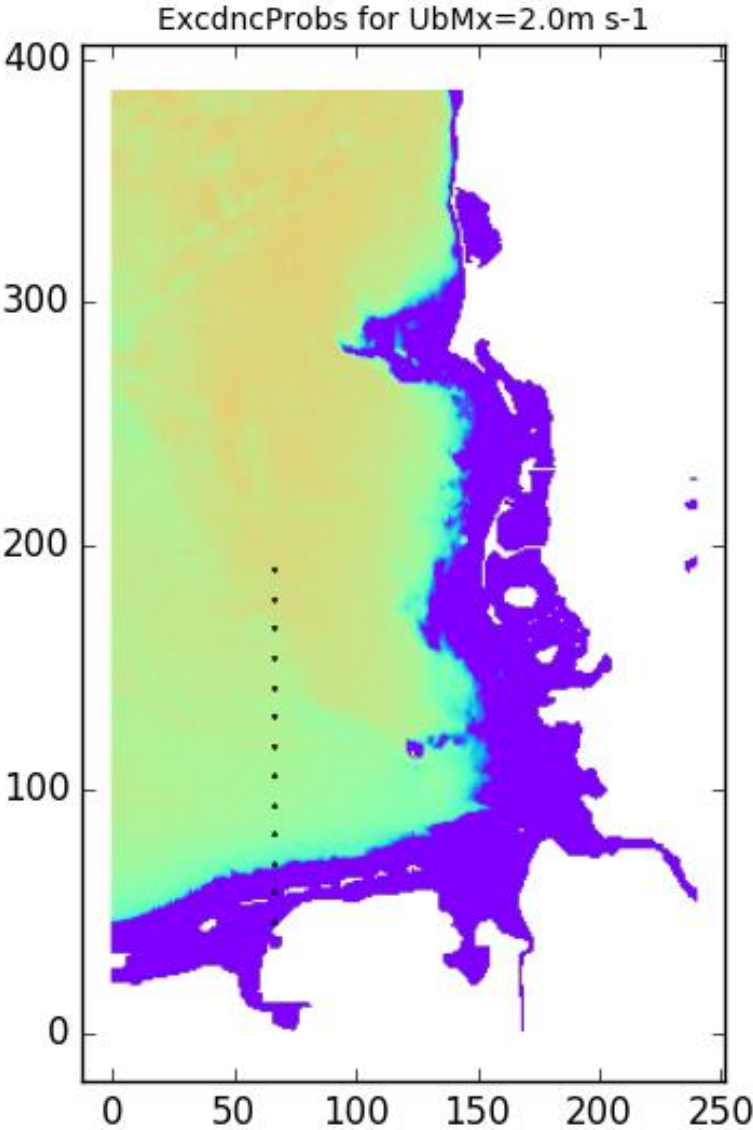


*Pleskachevsky Lehner & Rosenthal 2012*

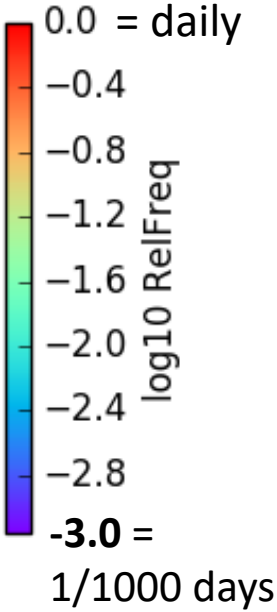
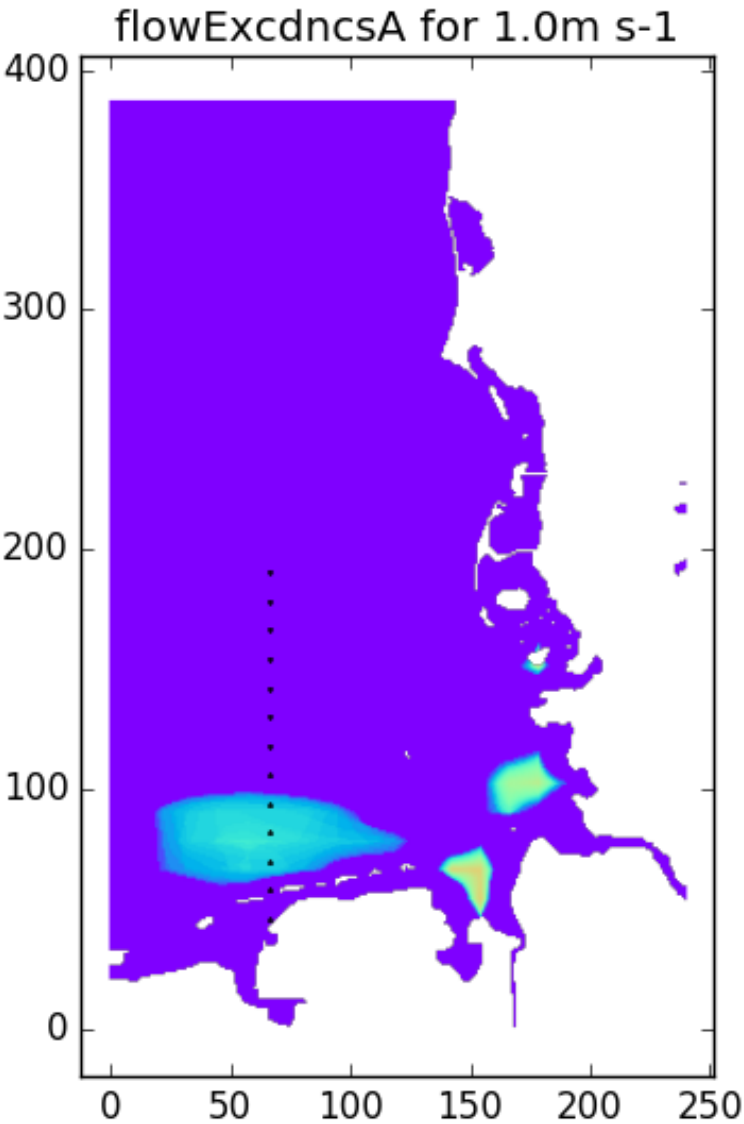


# Exceedance statistics on near-bottom flows

Wave-induced

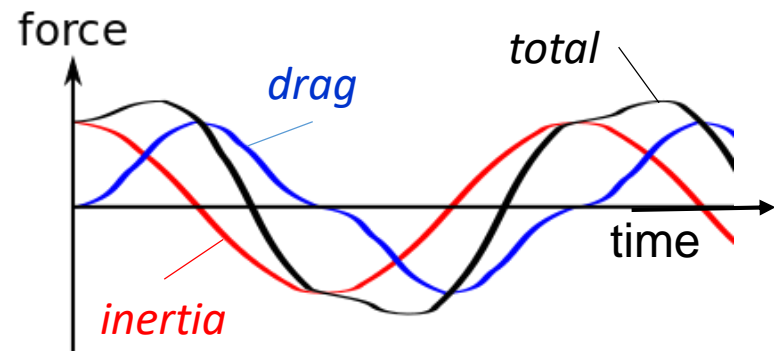


Current



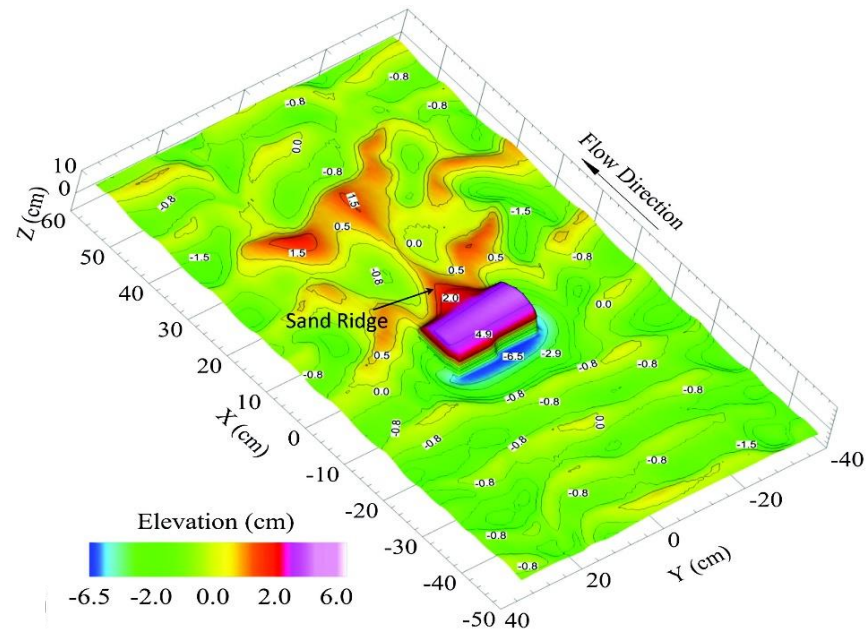


# Movement/Migration Simulations

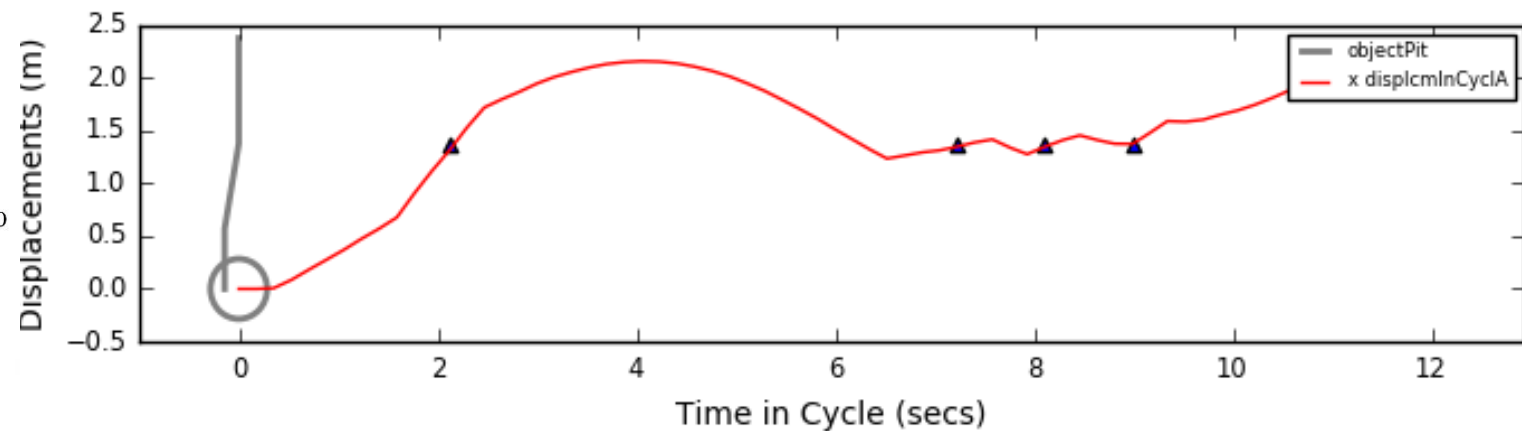
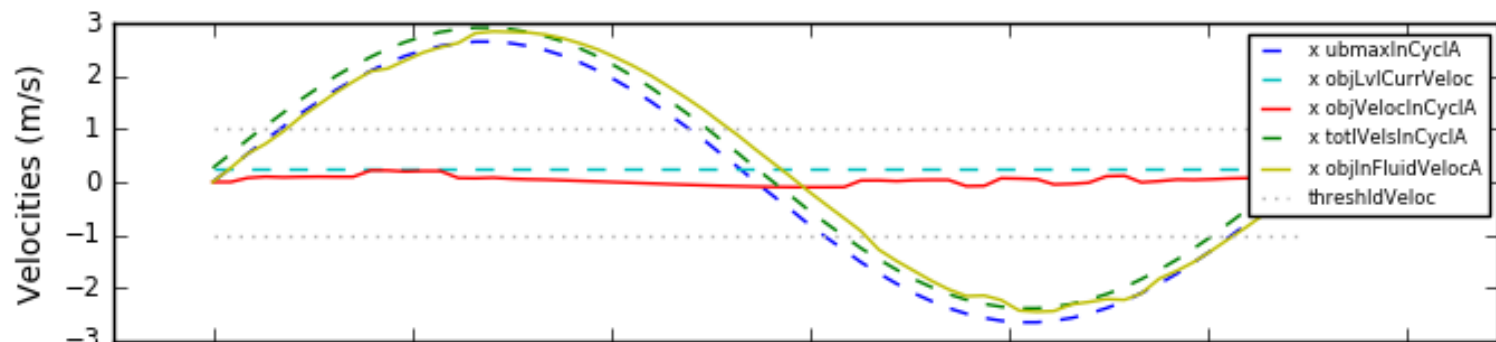
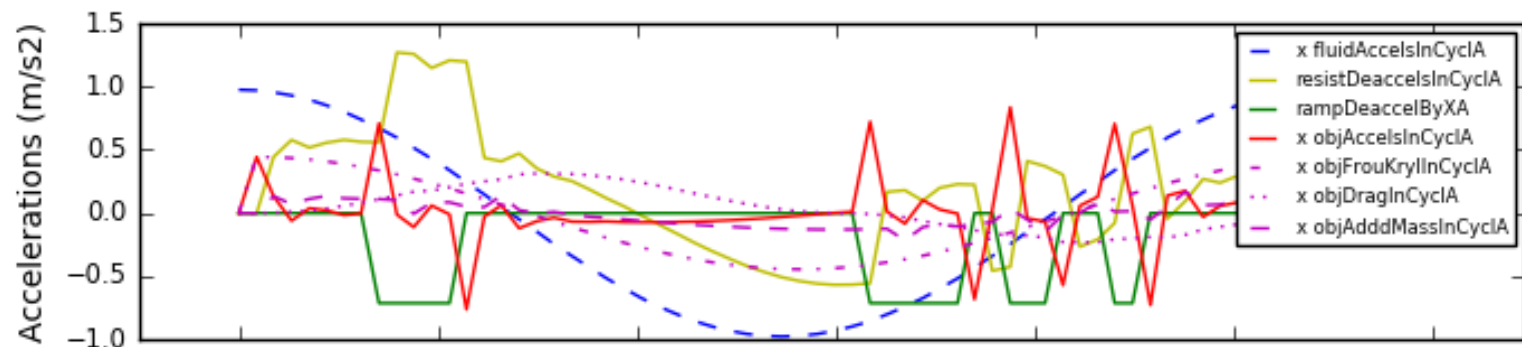


## Morison formulation

Wikipedia Contributors 2018

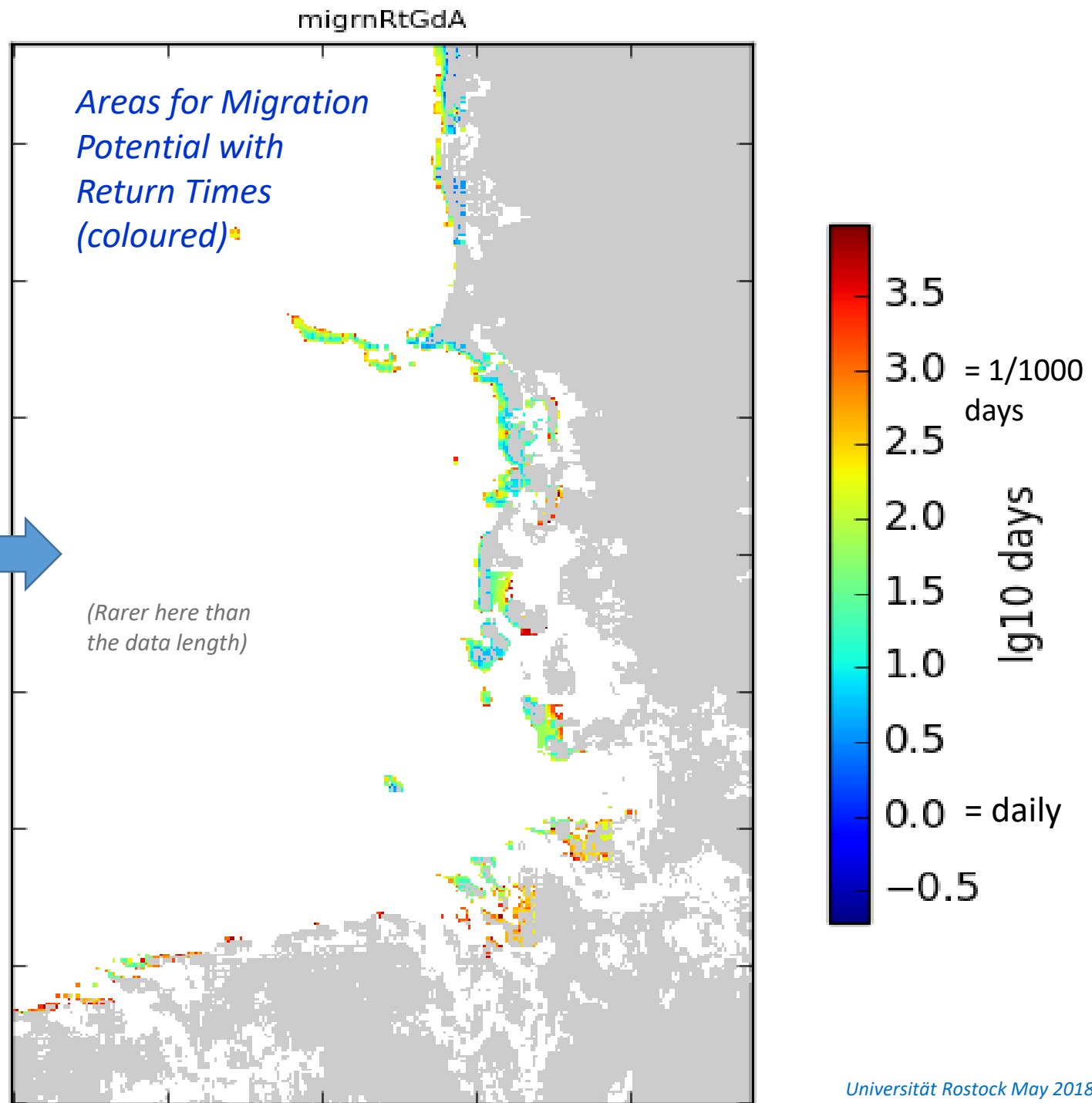
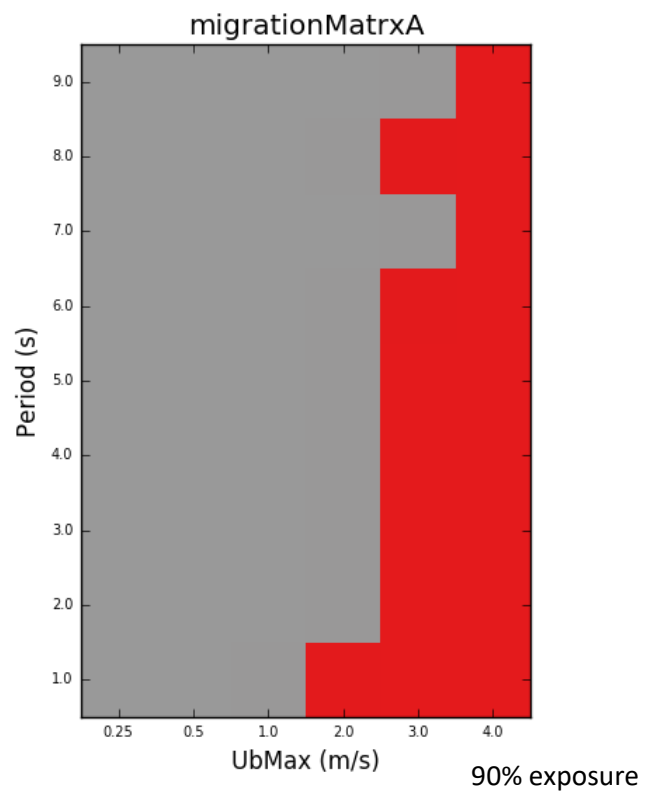


Object under Wave Cycle: 2.7UbMax m/s 11Pd secs



# Object Migration Potential Statistics

Yes/No Matrix for Migration out of Pit



- Reynolds Number scalings are a successful summarizing of UXO mobility behaviour.
- UXO migration is quite limited: by zone due to water depth, substrates; by long-term burial; due to the timings of rare event; especially by the slowing of currents near-bottom.
- Scientifically, the risk can be realistically known and quantified – and reduced for projects through planning, especially using return times

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