

Morphodynamics and sediment dynamics

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EURODELTA (F. Trincardi, CNR, IGS, Italy)

EUROSTRATAFORM (P. Weaver, SOC, UK)

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Major scientific discoveries

OVERALL CONCLUSION

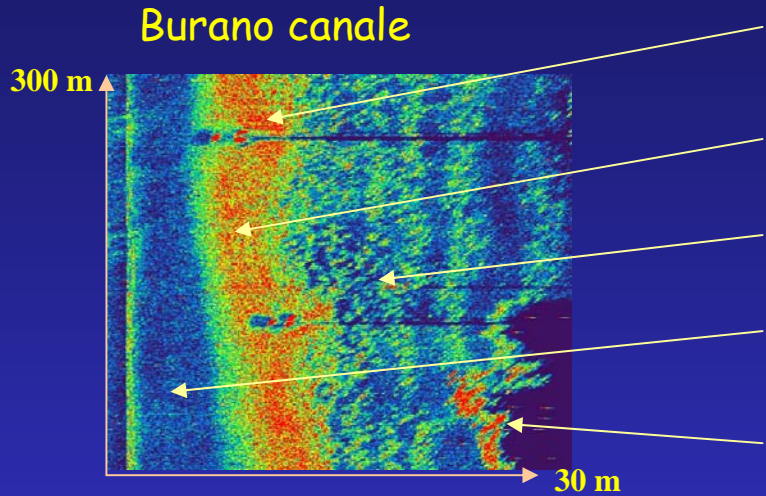
the dominant morphological control on northern Lagoon is SAND reworked from ancient barrier islands into submerged beaches and banks which protect the palude

“we propose that the disappearance of tidal flats south of Venice is the result of the absence of SAND”

OTHER IMPORTANT FINDINGS

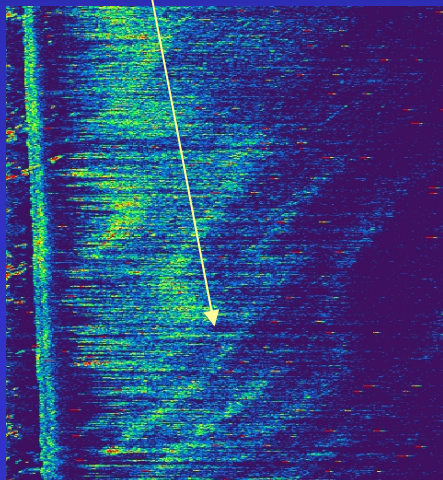
- sand acts as an anchor for the tidal flats of the northern lagoon
- submerged beaches are a natural source of defense against erosion
- submerged beaches are widespread in the northern lagoon and dissipate wave energy EFFECTIVELY
- scour holes (20 m deep) are abundant and result from frontal turbulence
- scouring is enhanced by the solid transmitted stresses imparted by bedload transport
- gas escape was observed in Lido (at the drilling site) - risks ???
- gas escape was observed along Treporti canal - risks ???
- resuspension maximum at turn of tide in Burano canal

Winter field work in Venice Lagoon - February, 2003



- bricole (with acoustic shadow behind)
- submerged sandy beach
- dredging marks
- Burano canale
- geotextile - wooden fence (palude)

Lido - sand waves (flood oriented)



Lido - gas escape from seabed

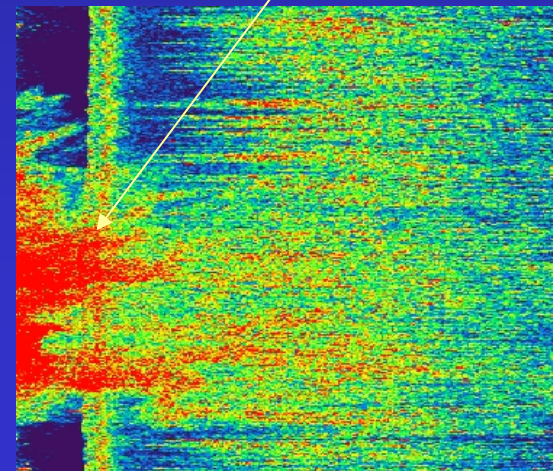


Figure 6: Graph Displaying the Concentrations of SPM and Suspended Sediments in relation to the Acoustic Backscatter levels

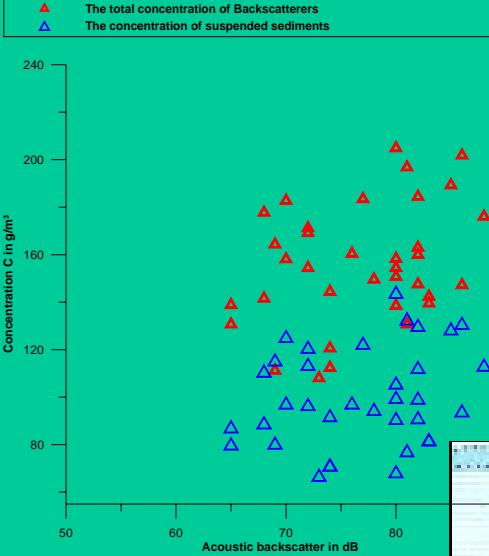
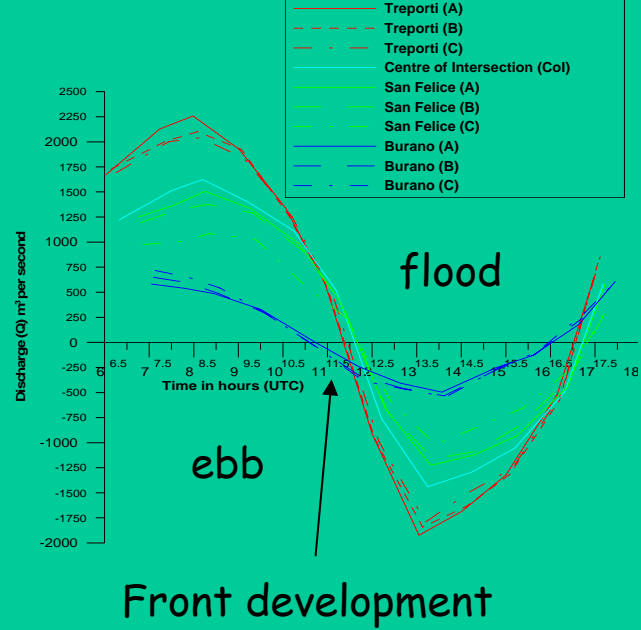
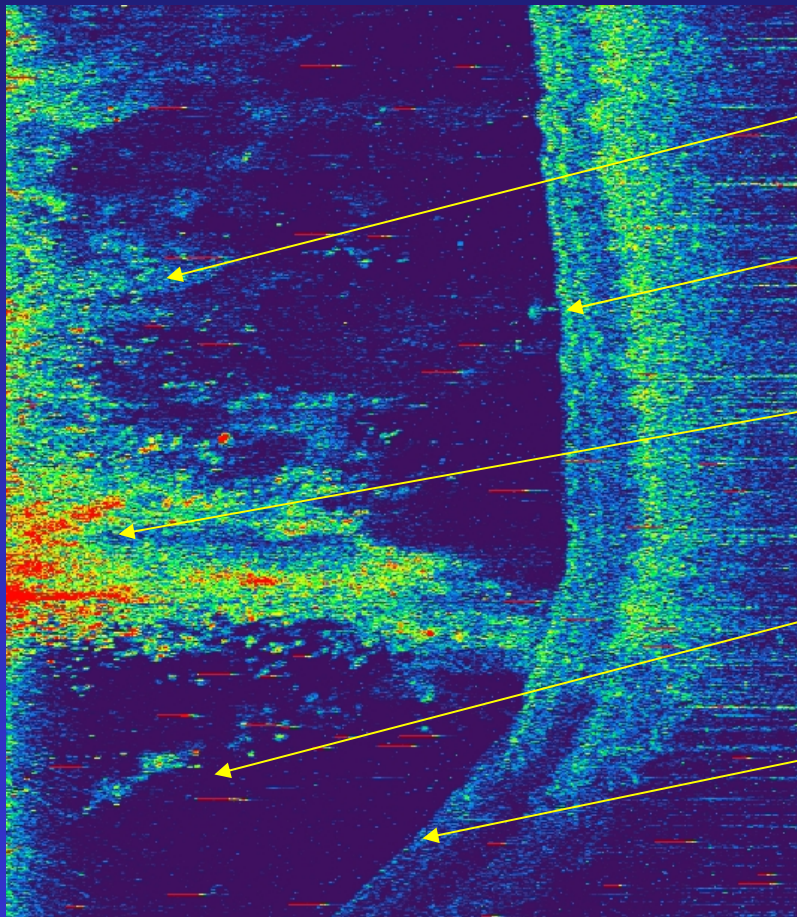


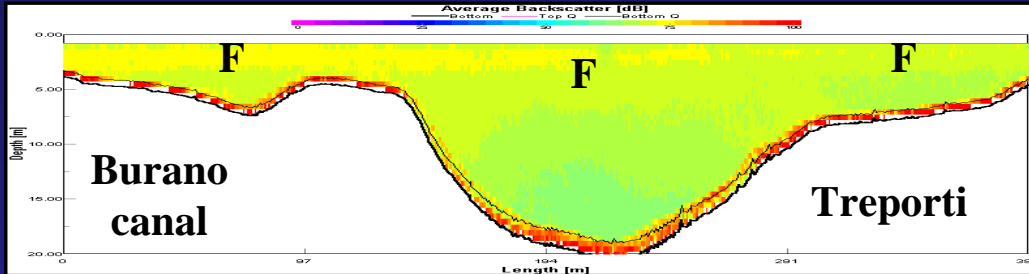
Figure 7: Comparative graph of the Discharge levels (Q) from the 10 transects as legend below:



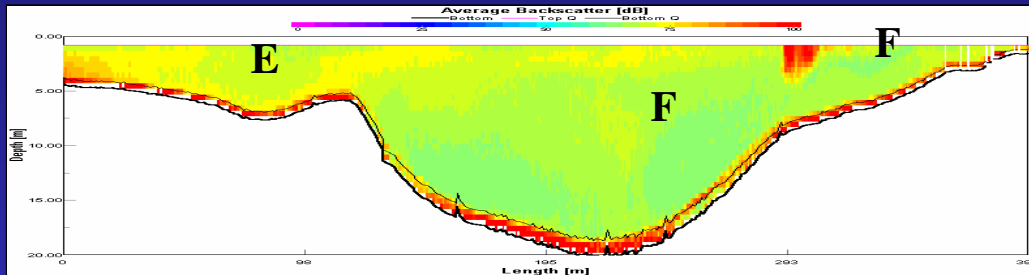
Winter field work in Venice Lagoon February, 2003



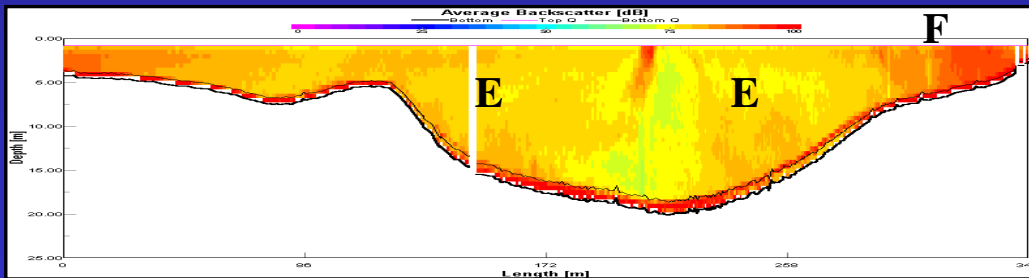
- Phytoplankton in Burano water mass
- Scour hole (hard return - sandy)
- Turbulent front (ebb tide only)
- clear water mass (San Felice)
- muddy flank (Treporti)



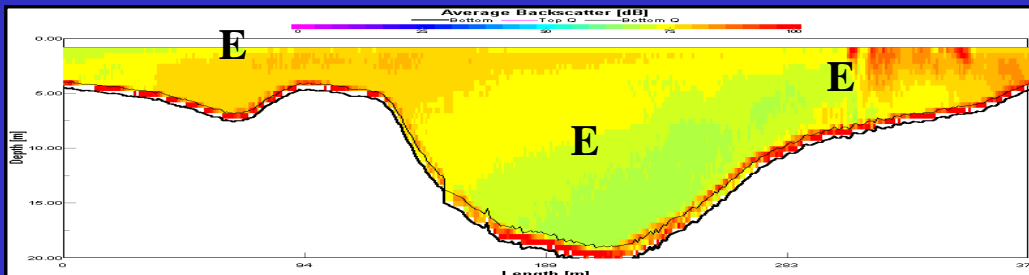
HT - 0.5 hours
 high surface backscatter
 abundant phytoplankton
 low resuspension



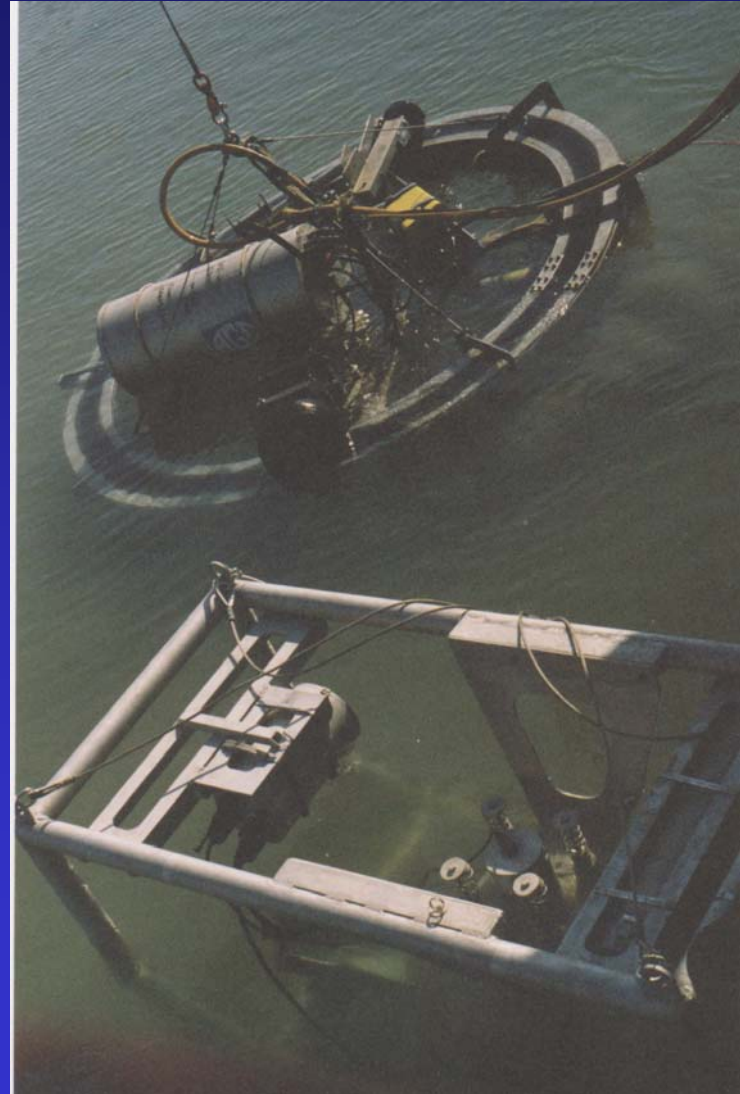
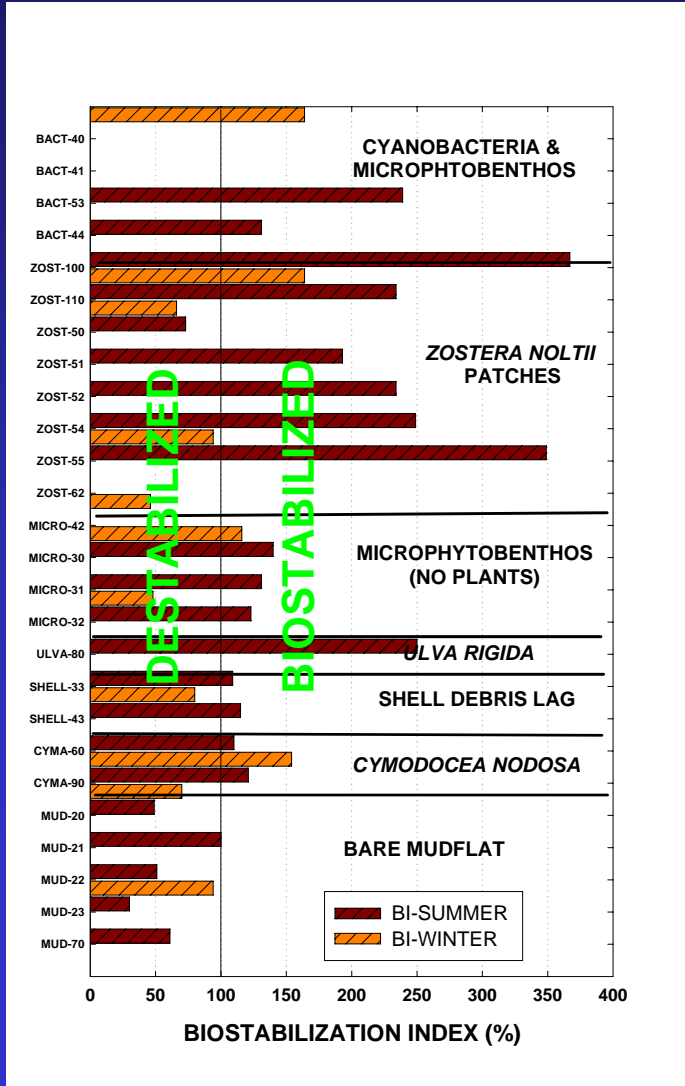
HT + 0.5 hours
 frontal mixing at scour centre
 high shear Treporti/S. Felice
 low resuspension



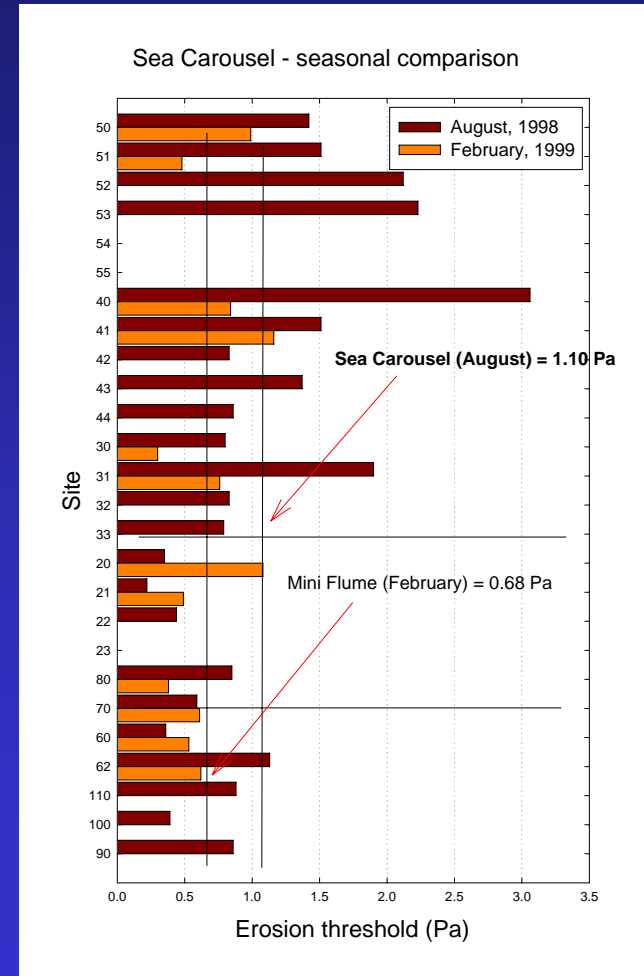
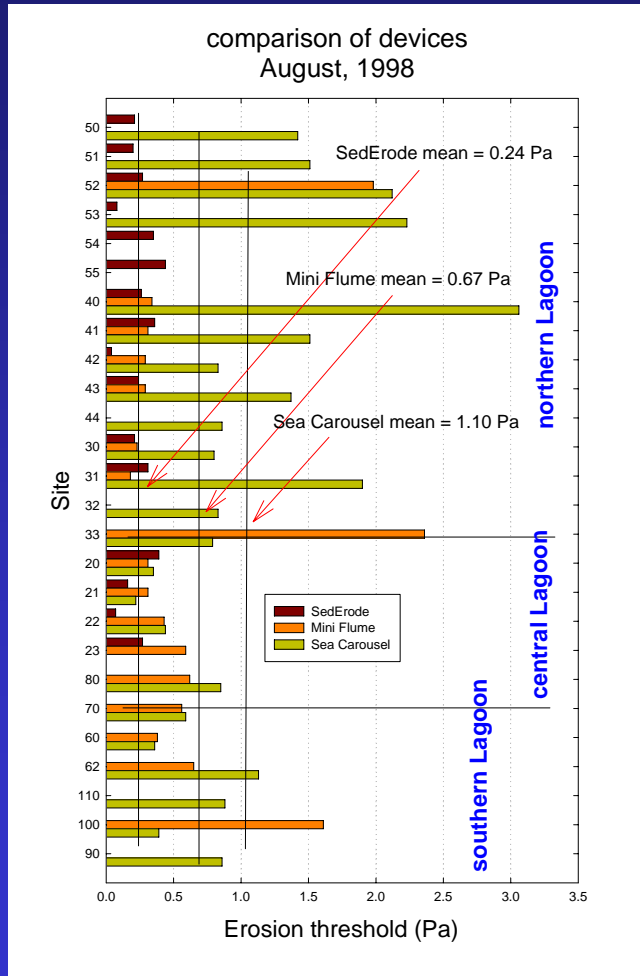
HT + 1 hour
 strong frontal mixing over scour
 resuspension in scour
 resuspension at channel margins



Mid ebb
 no front present
 no resuspension in scour
 resuspension at channel margins

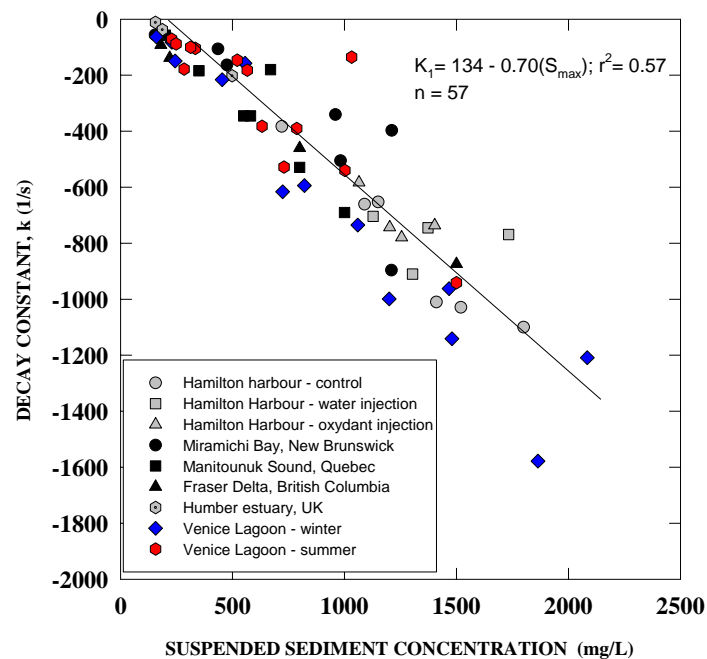
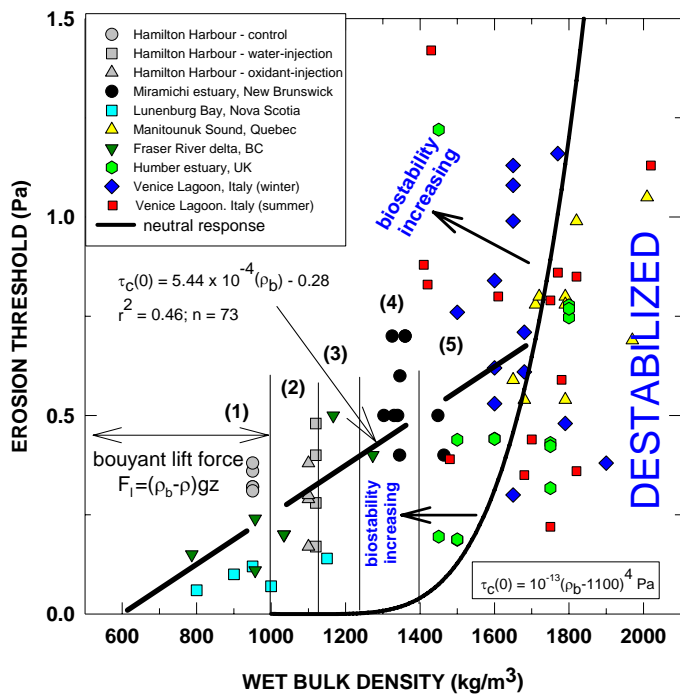


Synthesis of input values for numerical simulation



Erosion of the bed

Deposition to the bed



Scientific deliverables to CORILA project

- Paper 1: Bio-roughness evaluation and accurate estimations of bed stress (Lab Carousel) (JGR, accepted)
- Paper 2: Box model and sensitivity analysis of sedimentation of P. di Cona (Gacic Volume)
- Paper 3: Sedimentation parameters in Venice Lagoon (Sea Carousel/Mini Flume) (Gacic Volume)
- Paper 4: Algal mass transport & contribution to bed scour (ERF Conference Proceedings)
- Paper 5: In situ spectral estimates of bed stress and suppression by turbidity (Gacic Volume)
- Paper 6: Wave resuspension in Venice Lagoon - (Completed data collection/analyses)
- Paper 7: The role of submerged beaches in coastal protection - (completed data collection)
- Thesis 1 (M.Sc): Mass transports and frontal impact on scour (Examined June, 2002)
- Thesis 2 (B.Sc): Residual sand transport as bedload & mechanisms (Examined June, 2002)
- Thesis 3 (B.Sc): Submerged beaches - role in wave suppression (Examined June, 2002)
- Thesis 4 (B.Sc): Residual fines transport in suspension & mechanisms (Examined Feb. 2002)
- Thesis 5 (B. Sc): Role of buoyant aggregates on Palude stability (P. dei Lagi)
- Thesis 6 (P.hD): Factors controlling sedimentation on P. di Cona (examined Oct. 2002)
- Thesis 7 (P.hD): The role of the solid-transmitted stress of mobile sand in bed erosion (under examination)

Timetable of events

2002

Update SEDTRANS @ SOC ✓
Examination of Thesis 1 - submit to CORILA ✓
Examination of Theses 2,3,4 & 6 - submit to CORILA ✓
Submit Paper 1 - Journal of Coastal Research..... ✓
Submit Papers 3 & 4 - Sedimentolog..... ✓
Submit CD-rom of papers and data ✓

2003

Wave resuspension field monitoring ✓
Complete box model - submit Paper 2 ✓
Examination of Thesis 5 ✗
Euro-Delta - high resolution geophys. survey ✓
Submit Paper 5 - Journal Geophysical Research ✓
Submit Papers 6 and 7 - Estuarine, Coastal, Shelf Science
Submit CD-rom of papers and data ✓

2004(ext)

Examination of Thesis 7 - submit to CORILA ✓
EUROSTRATAFORM - Sea Carousel ✓
BIOFLOW workshop - in situ methods ✓

Seabed measurements in Venice Lagoon

Re-analysis and publication of results collected in 1998/1999 (Sea Carousel & Mini Flume)

- Digital data base (CR-rom) completed

- 6 scientific papers submitted

Factors affecting mudflat stability discovered

Turbulence measurements in estimating - bottom roughness/shear stress (paper completed)

- turbidity suppression of stress (paper in submission)

Laboratory analyses of solid-transmitted stress completed (2 papers completed)



SEDTRANS