

what's the problem with danube delta?

liviu giosan



what's important

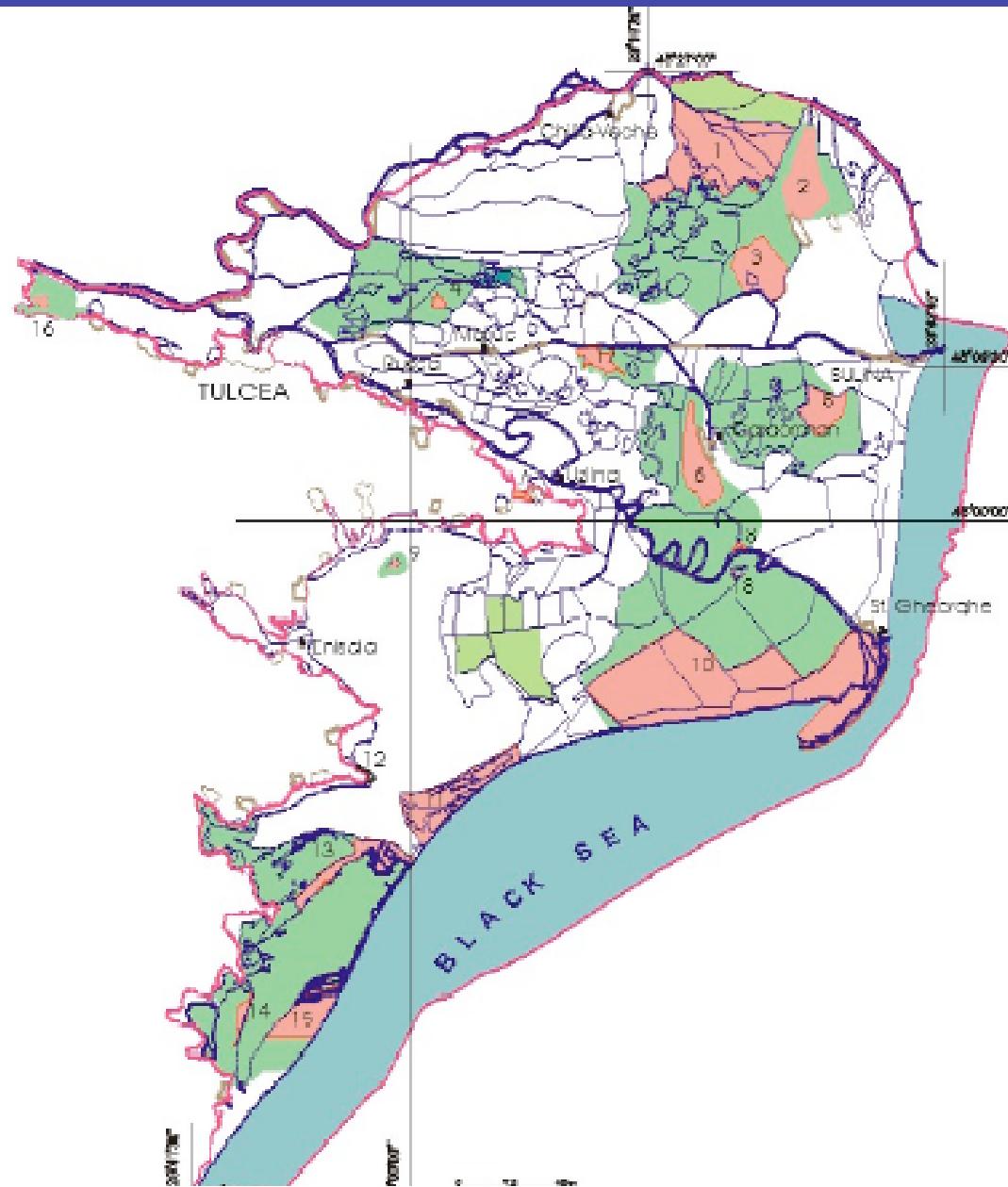


- largest wetland in Europe
- 2nd largest compact reedbed in the World
- species: ~300 birds; ~90 fish

Established as Biosphere Reserve in 1998 – shared by Romania (~80%) and Ukraine

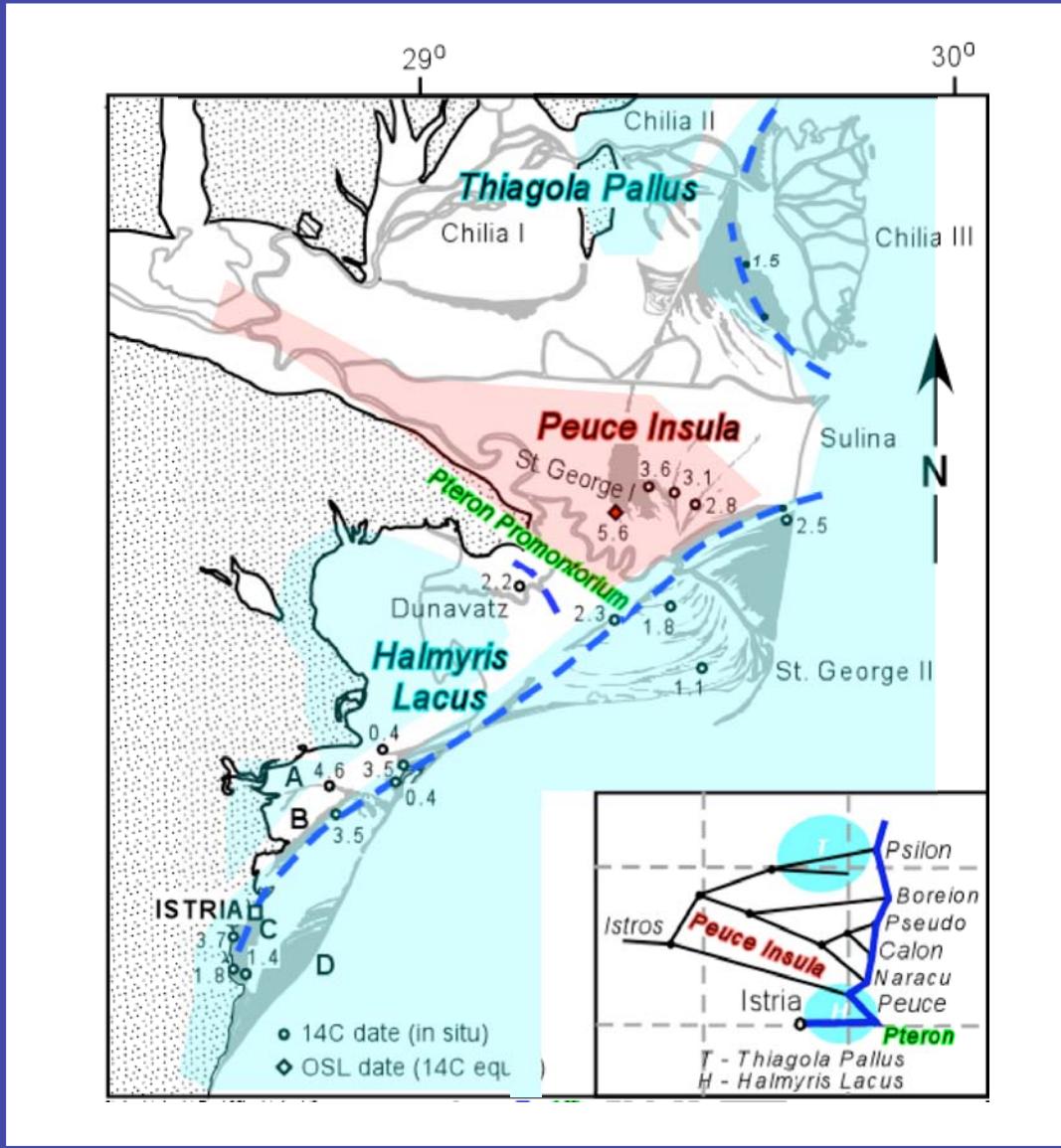
**Populated since Neolithic
Exploited by Greeks, Romans,
Byzantines, Ottomans**

what's important

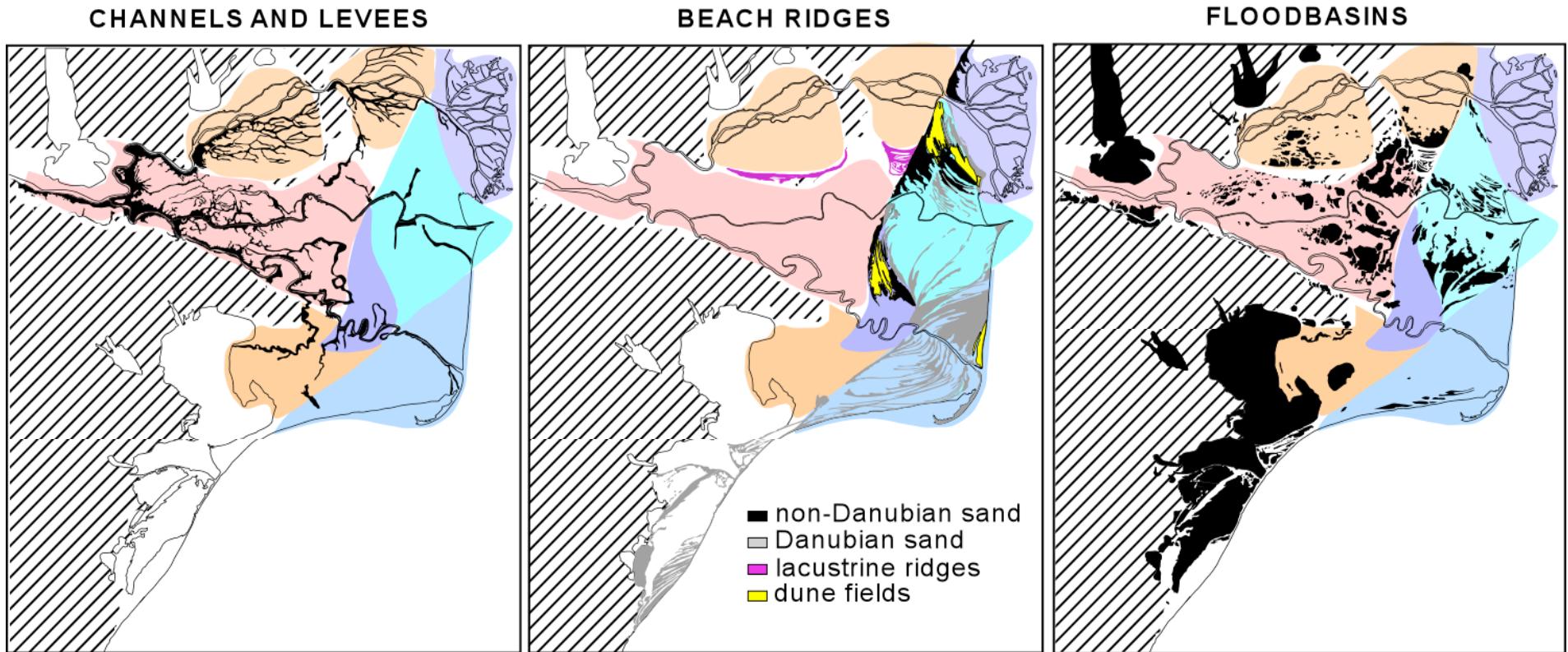


NIDD, 2005

the delta - evolution



the delta - morphology



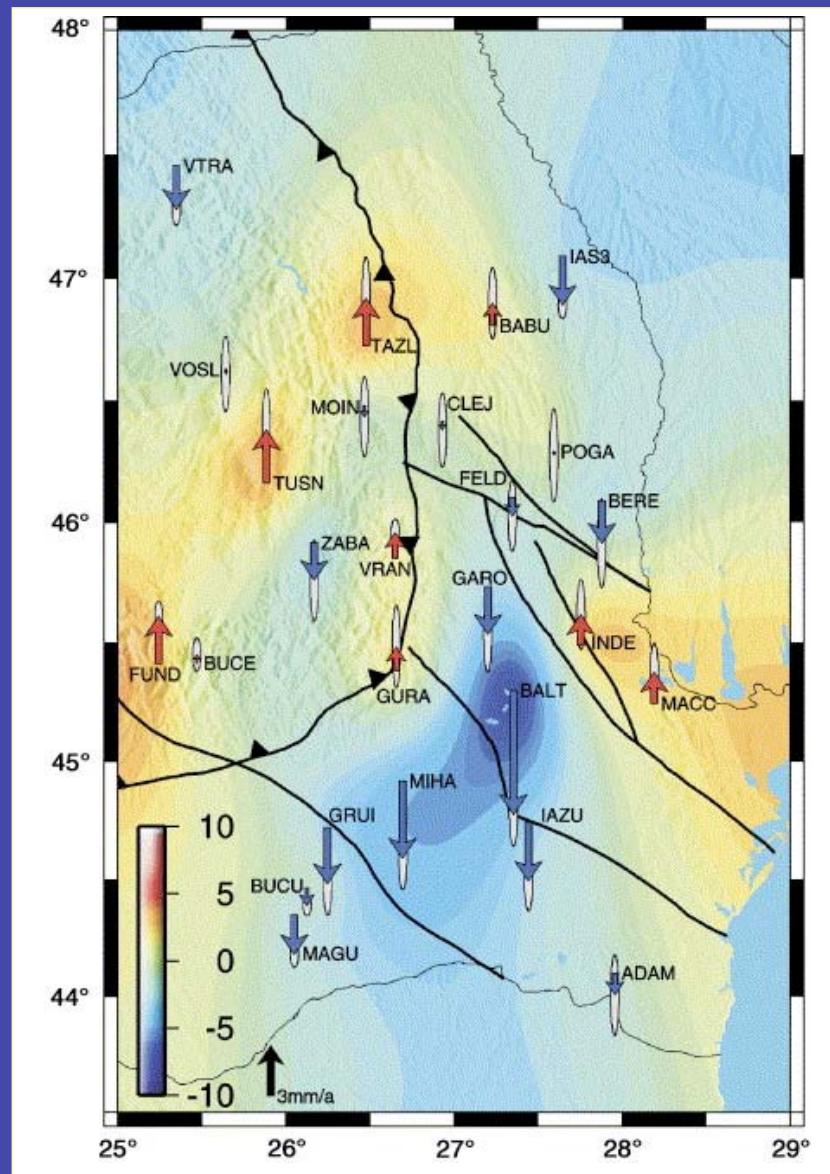
global influences



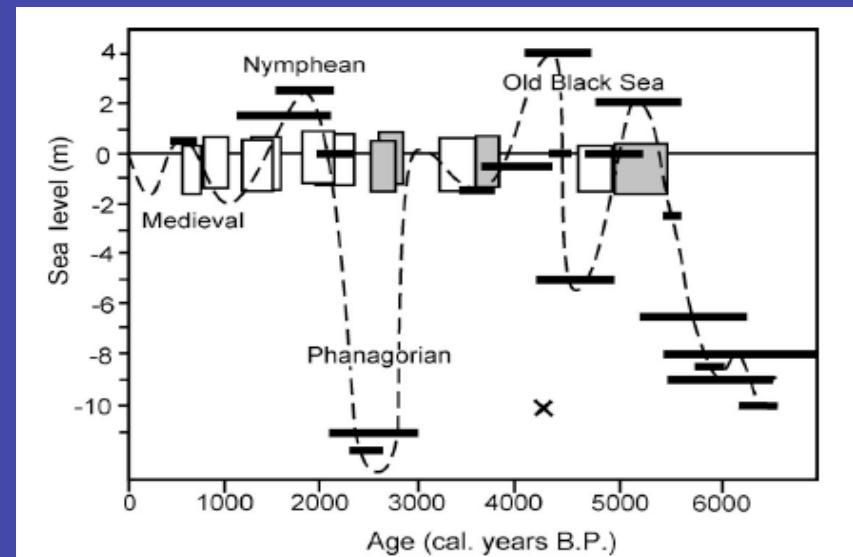
sea level

climate

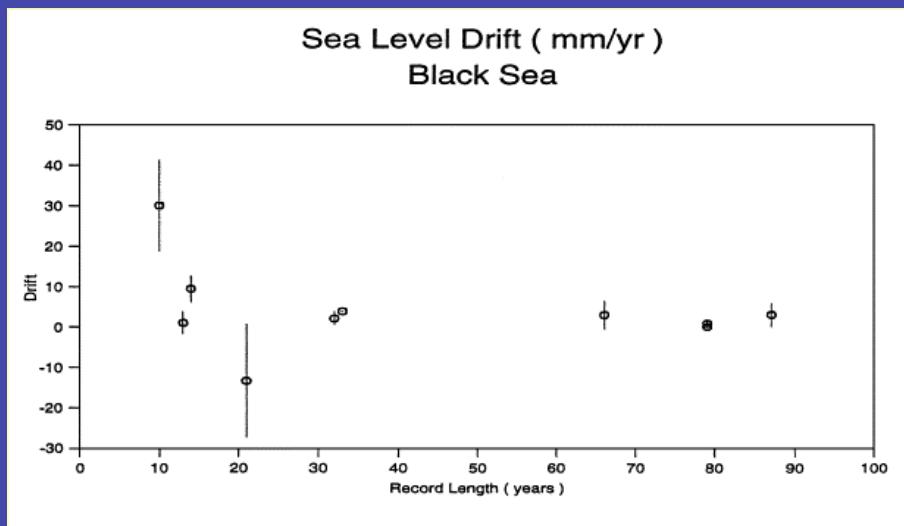
sea level (subsidence)



van der Hoeven et al., 2006

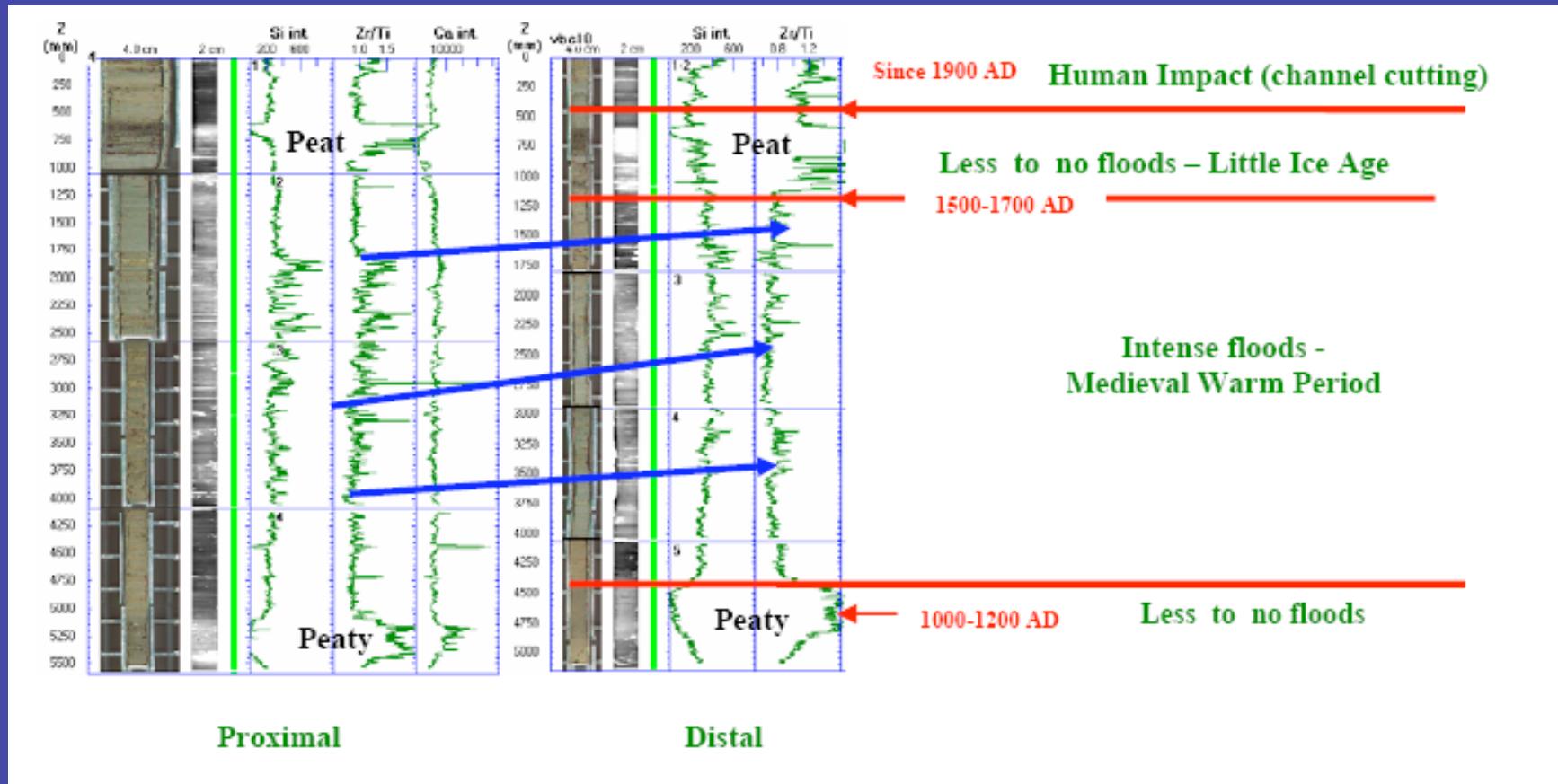


Giosan et al., 2006



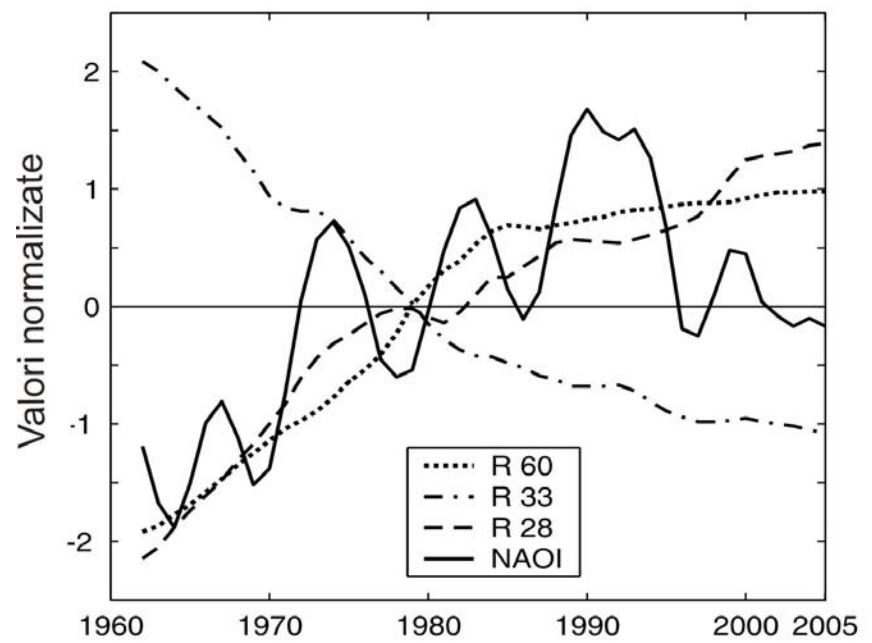
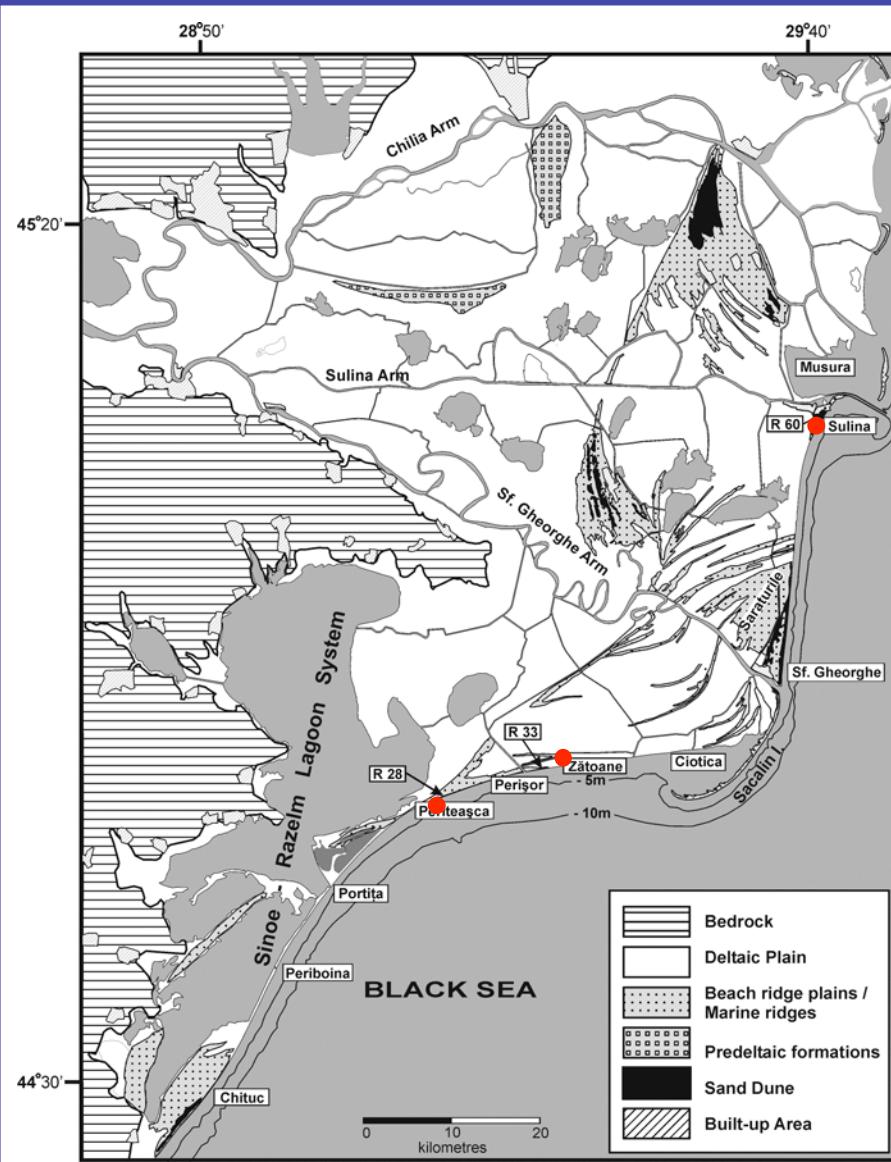
Cazenave et al., 2002

climate - river



Giosan et al., in prep.

climate - basin



Vespremeanu-Stroe et al., 2007

upstream:

- discharge
- deforestation
- dam
- irrigation
- pollution

basin:

- morphodynamics
- salinization



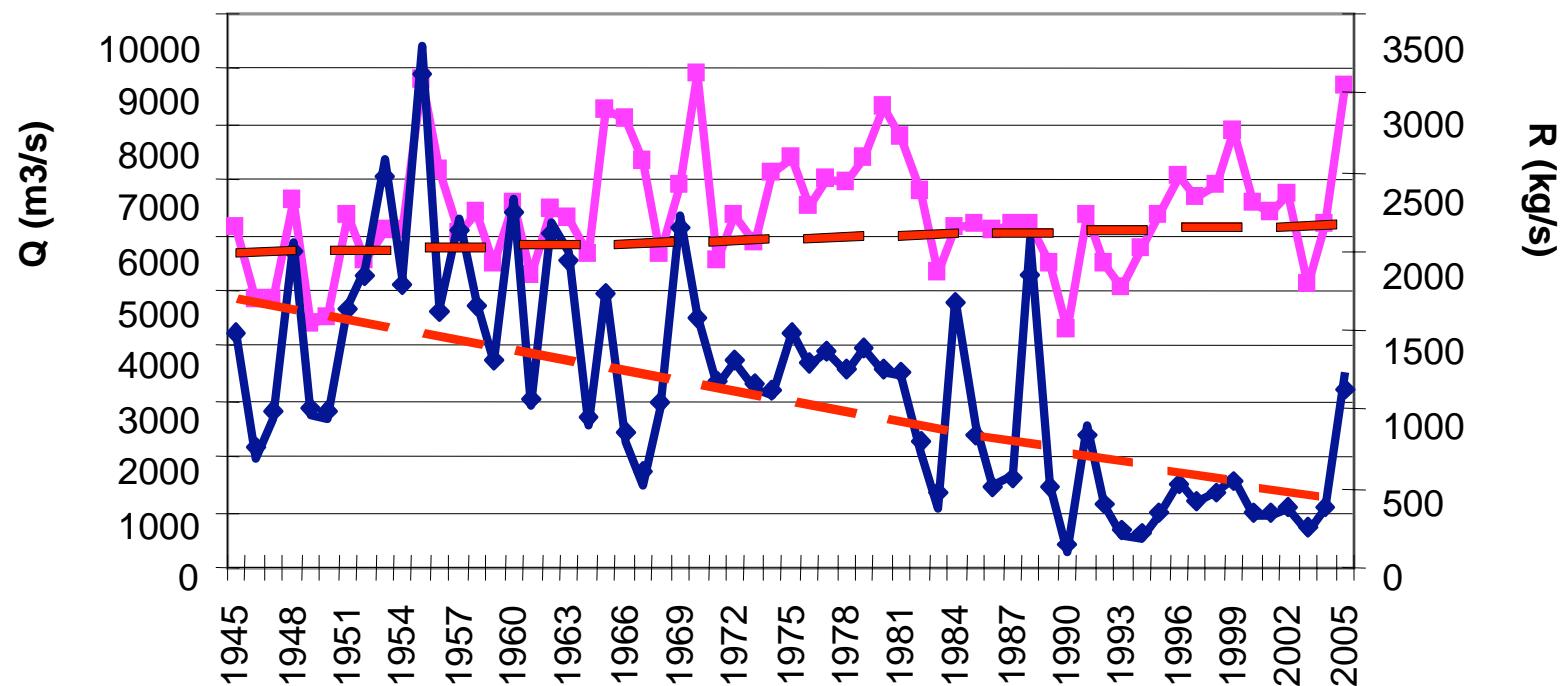
the river



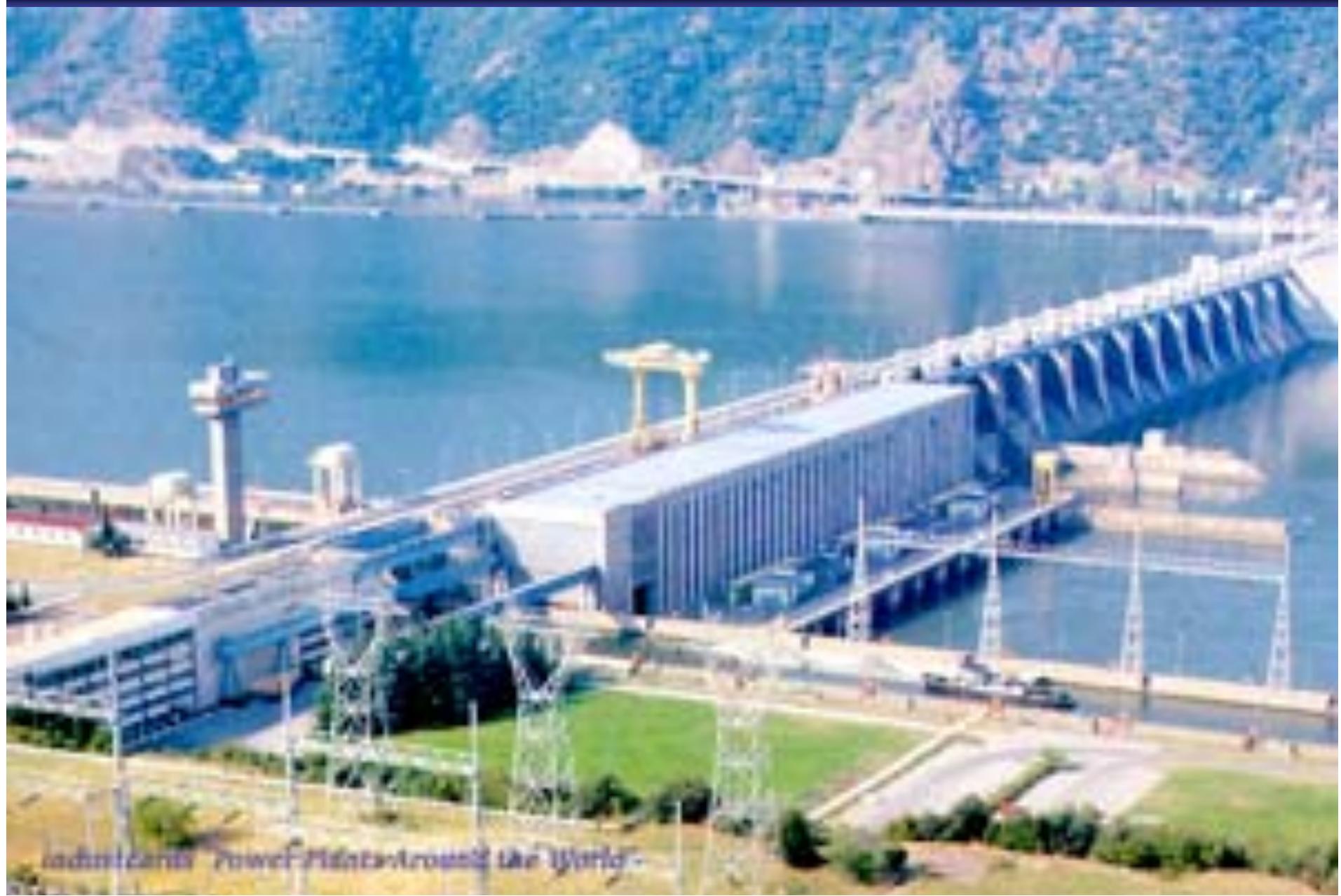
the river – water and sediment discharge



**Water and Suspended Sediment Discharge
1945-2005, CEATAL IZMAIL**

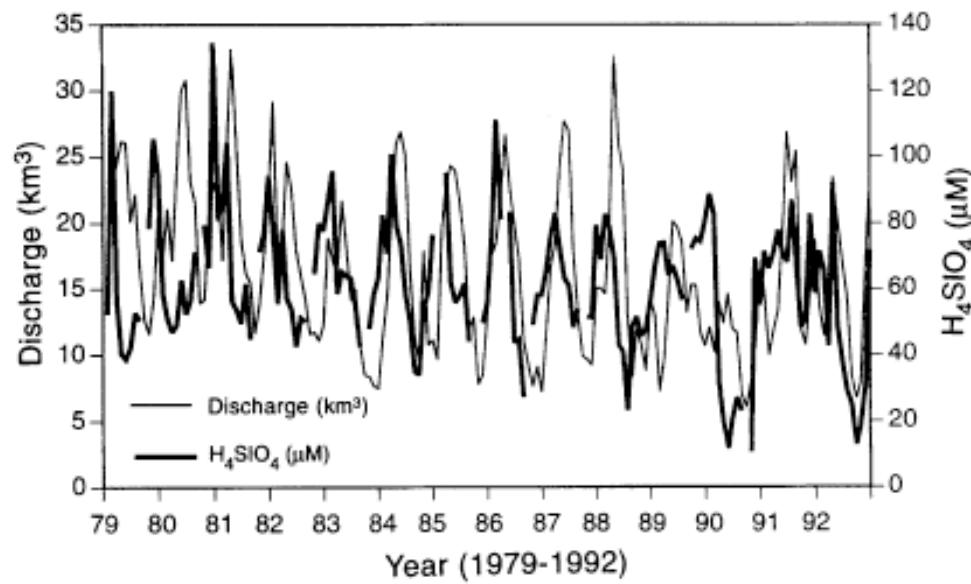


the river – dams

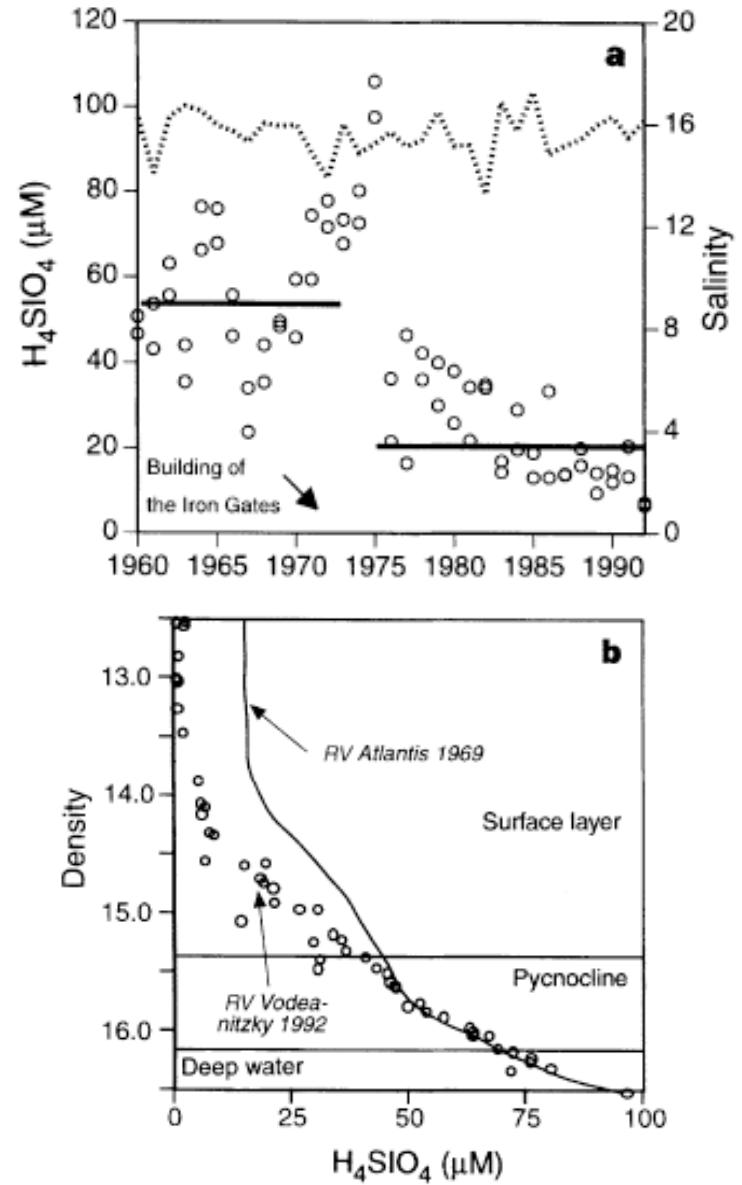


industries - Power Plants Around the World -

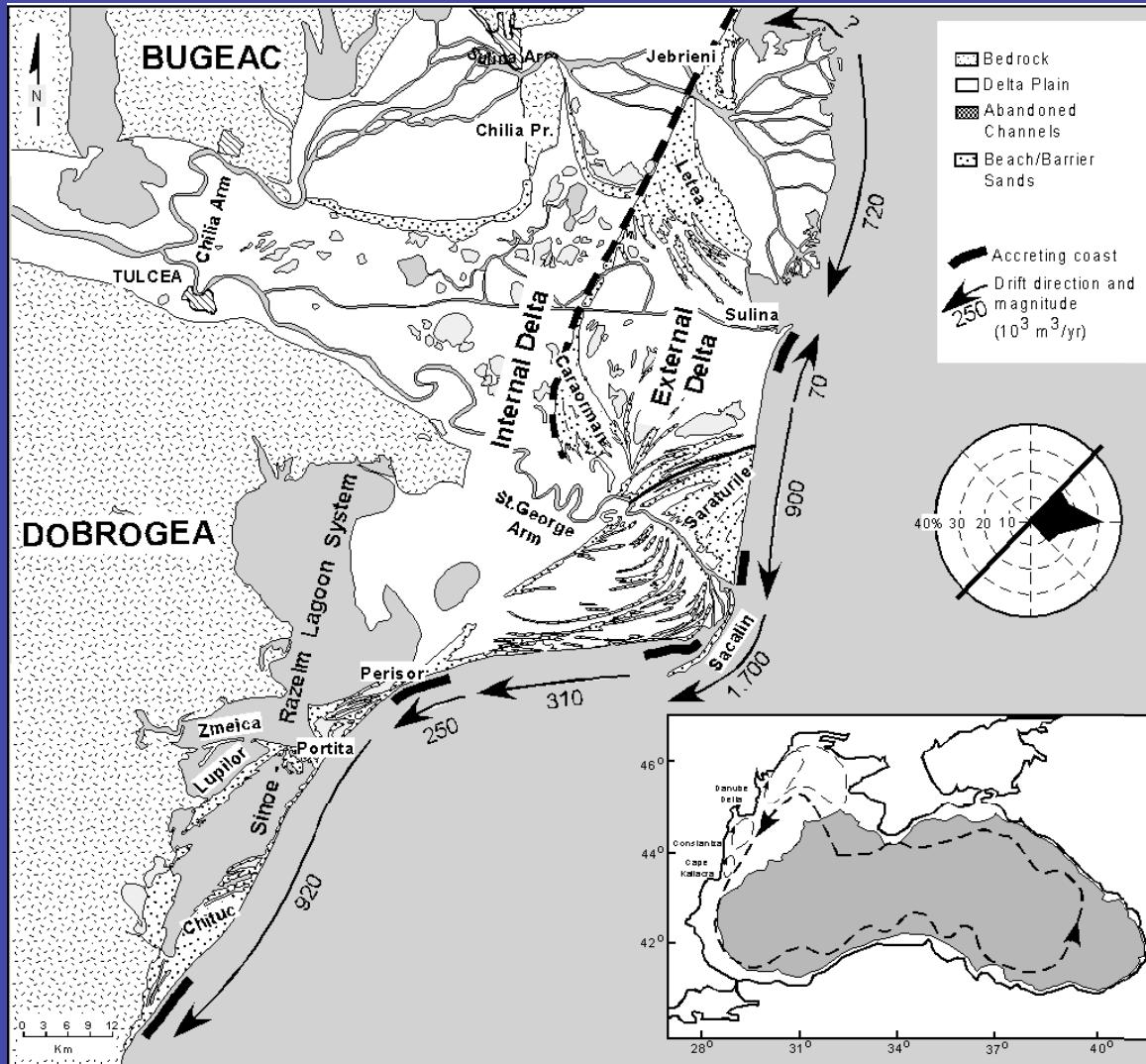
the basin – ecosystems



Humborg al., 1997

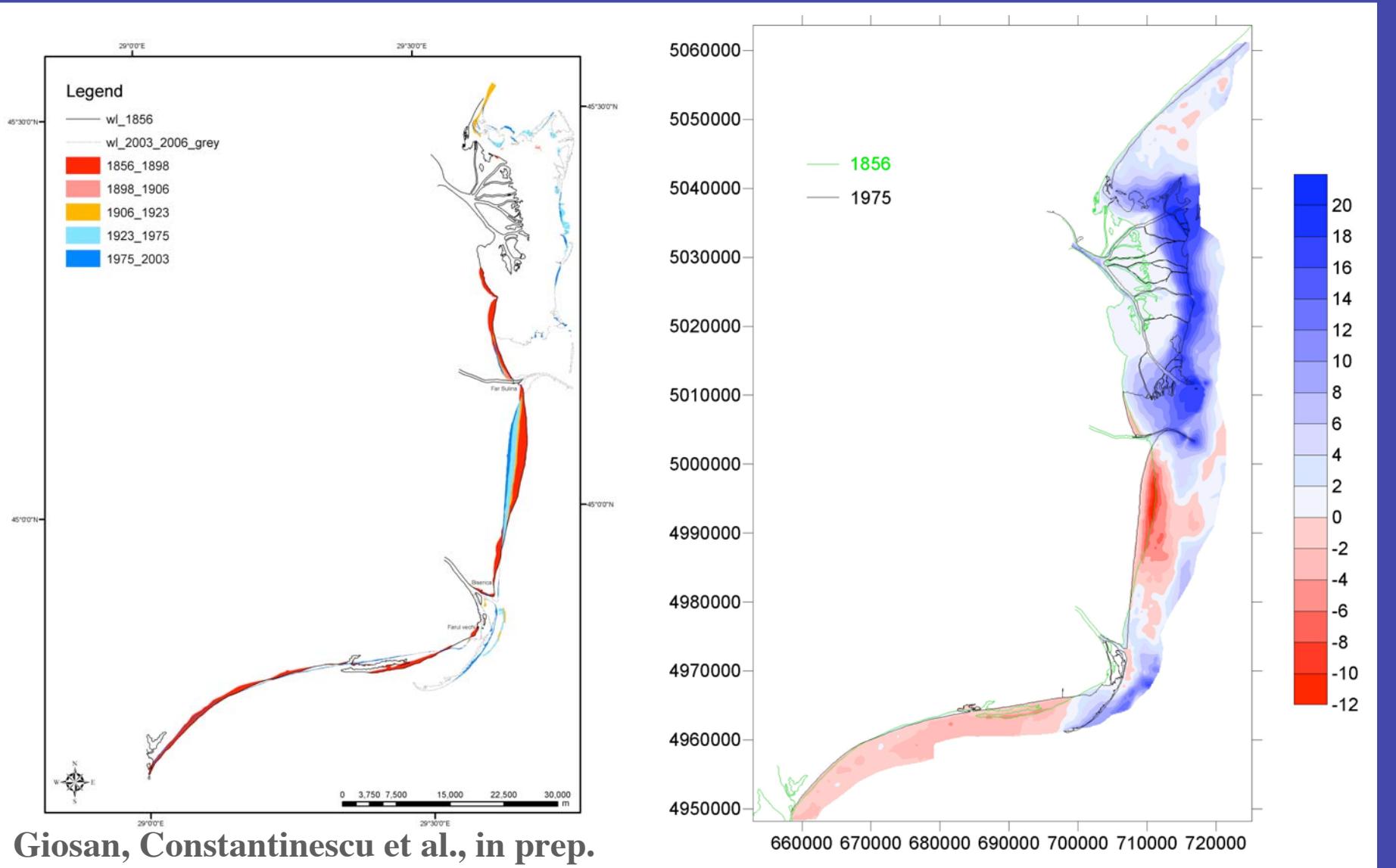


the basin – waves, currents sediment transport



Giosan et al., 2005

the basin – shelf morphodynamics

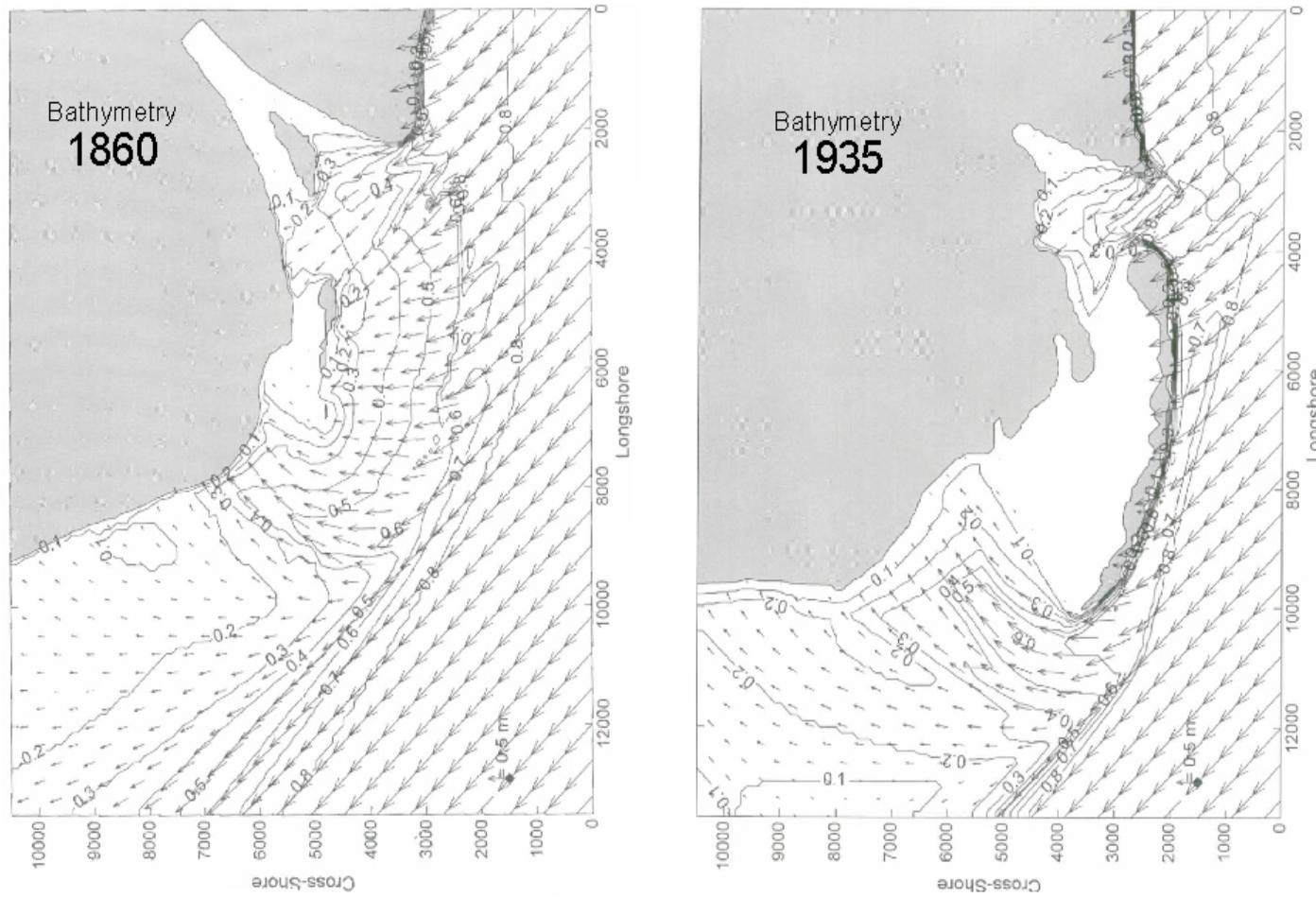


Giosan, Constantinescu et al., in prep.

the basin – river mouth morphodynamics

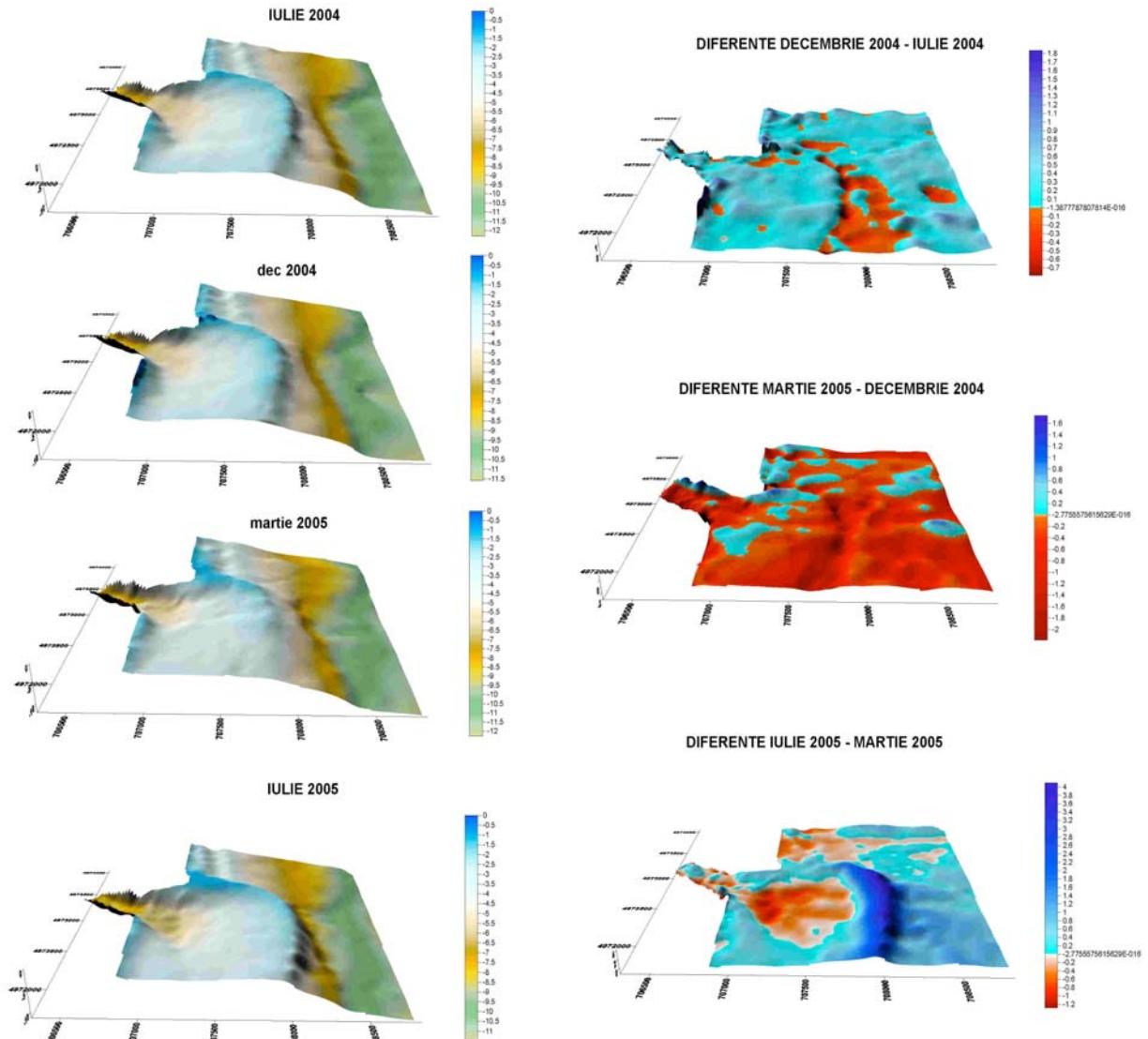


WAVE CONDITIONS: direction - NE; height - 1m; period - 4.5 s

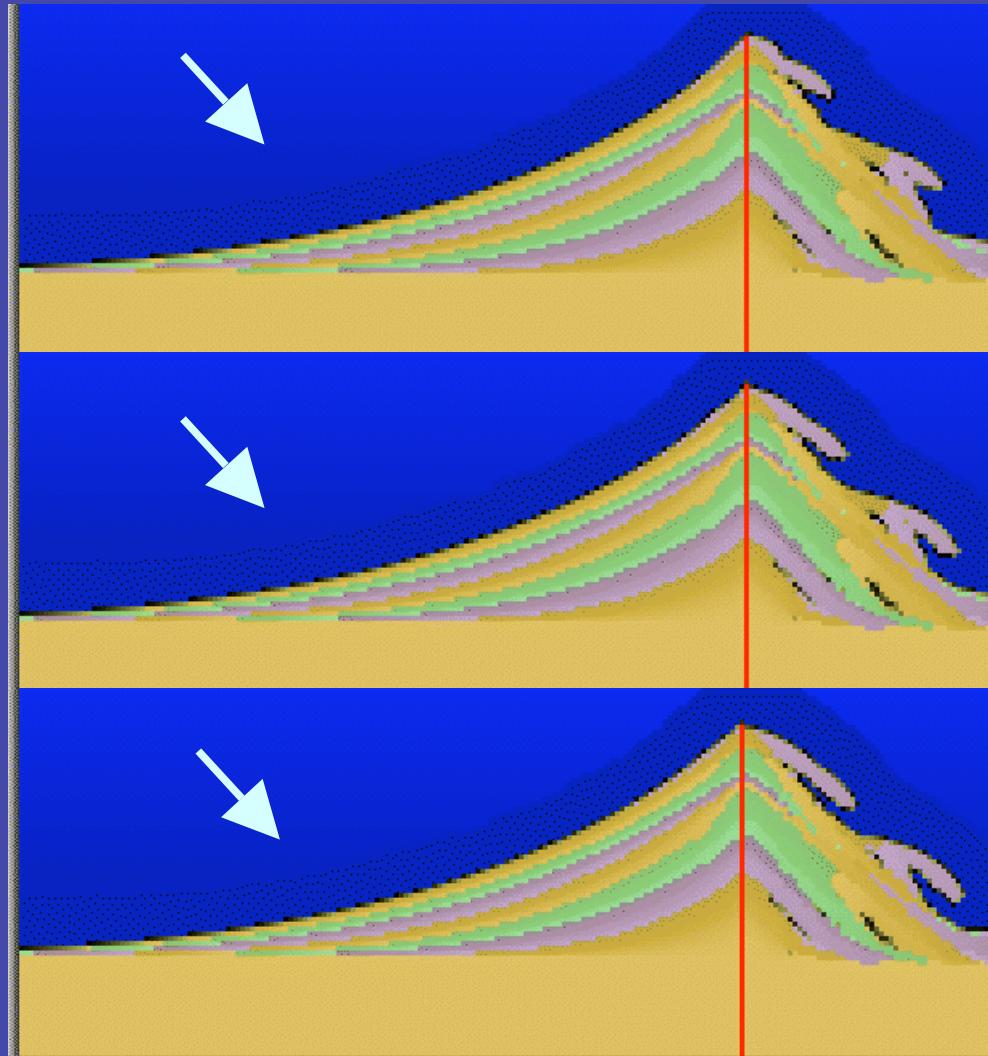


Giosan et al., 2005

the basin – river mouth morphodynamics



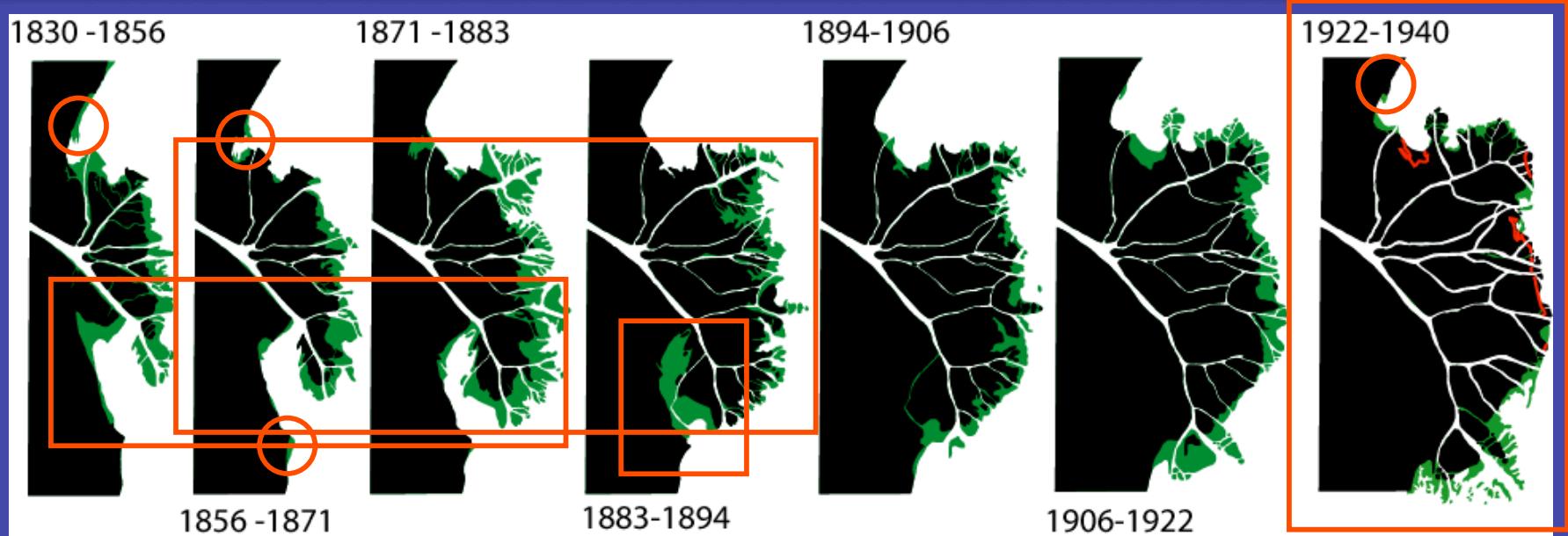
the basin – coast morphodynamics



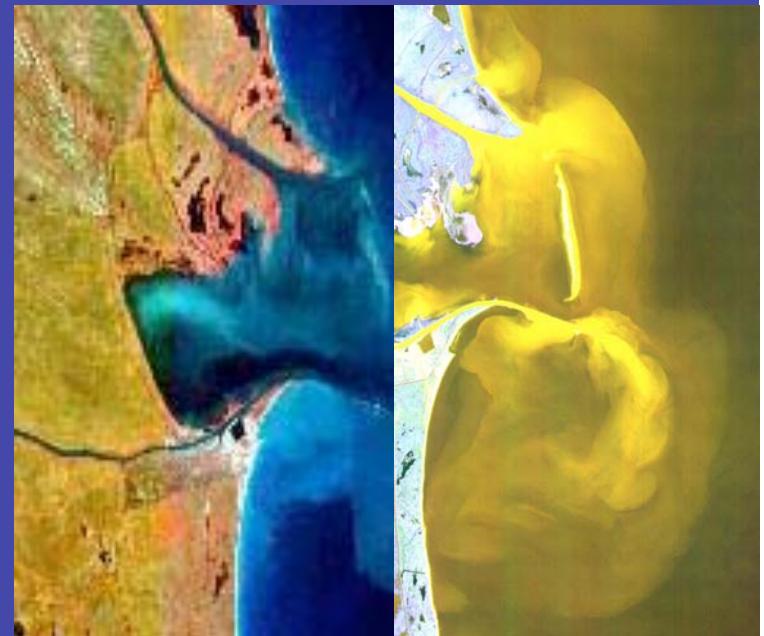
Ashton and Giosan, in prep.



the basin – coast morphodynamics



Giosan et al., in 2005



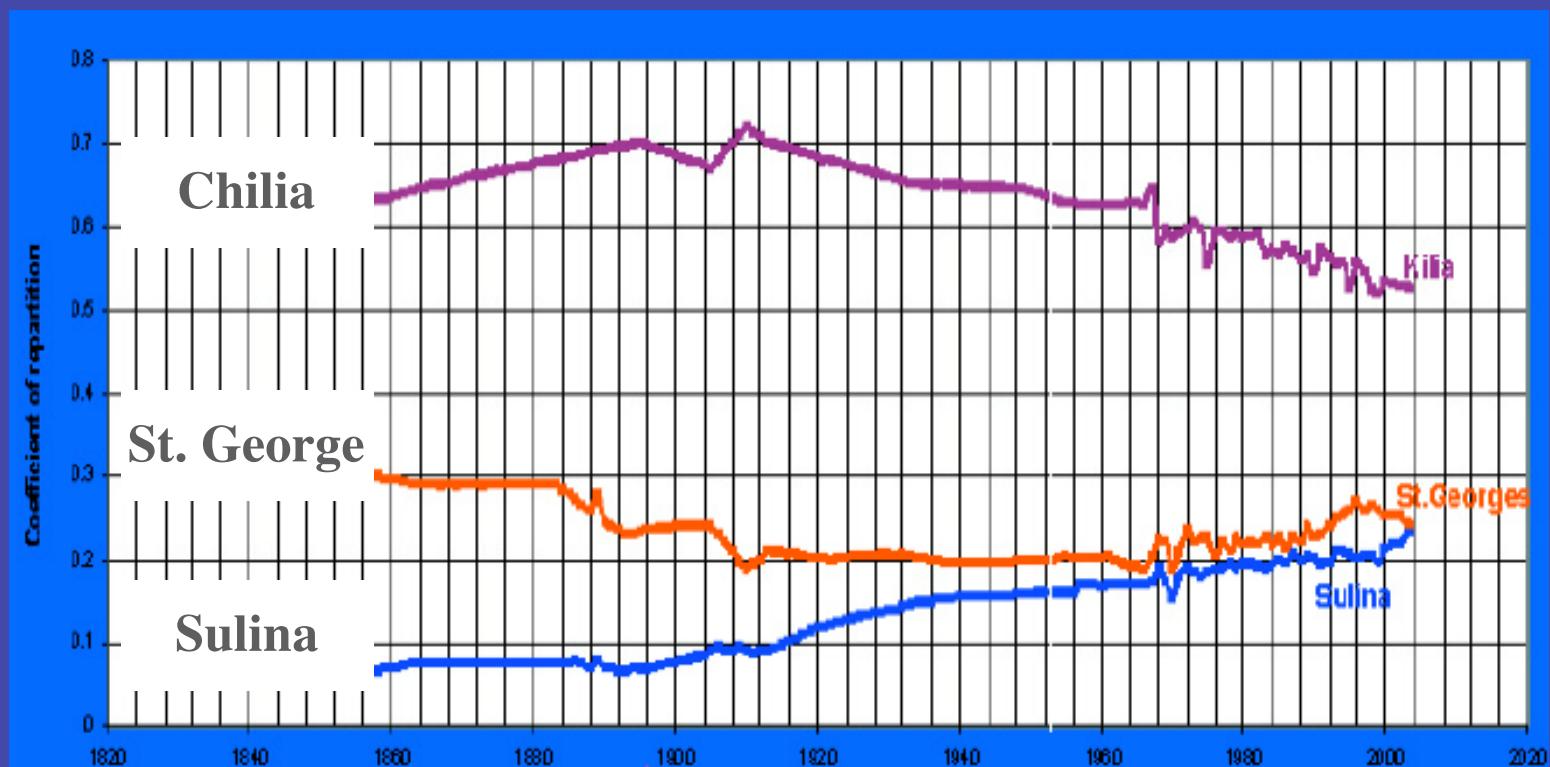
local



human perspective:
urbanization
agriculture-fishing
tourism
transport
population
property issues

hazards:
inundation
erosion
shoaling (sediment routing across delta)

the delta – water and sediment routing



Bondar, 2003

the delta – fishing



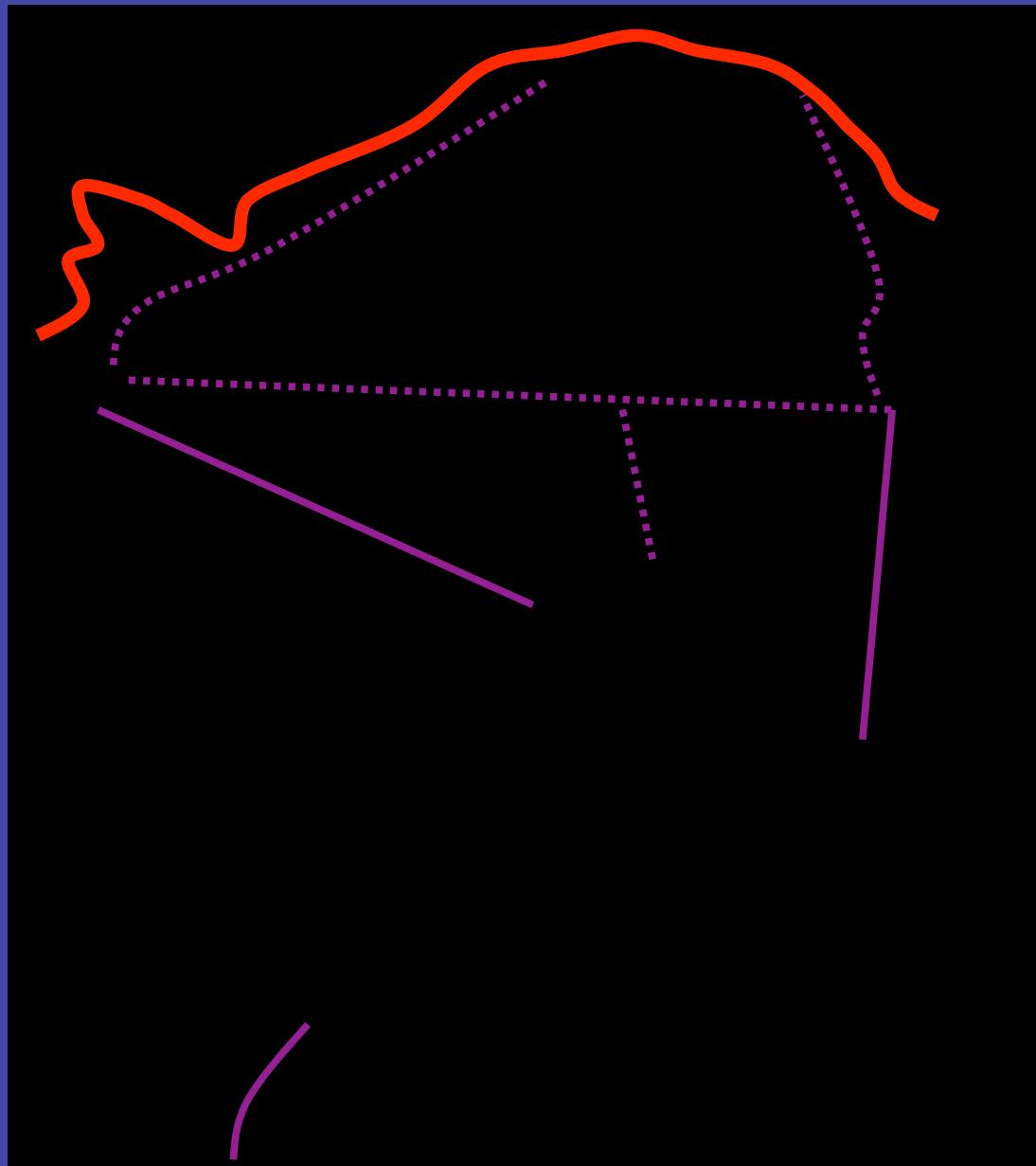
NIDD, 2005

the delta – water and sediment routing



NIDD, 2005

the delta – transport



the problems



DD evolved in stable sea level regime –
now sea level rise accelerated

DD evolved in stable? sediment regime –
now sediment less than half

DD evolved in a natural coastal regime –
now engineered

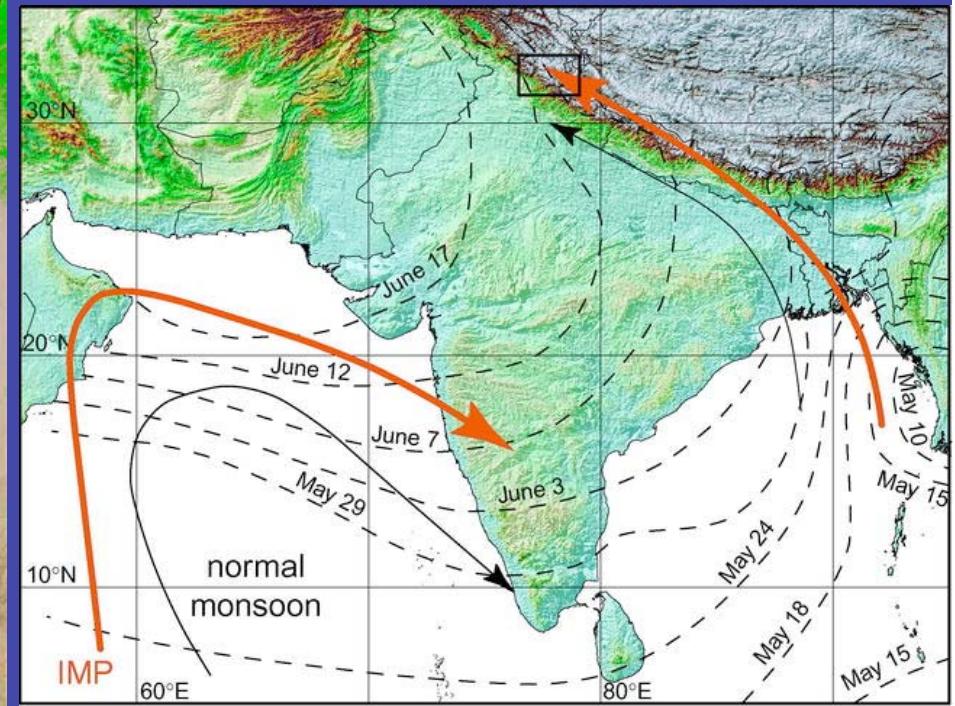
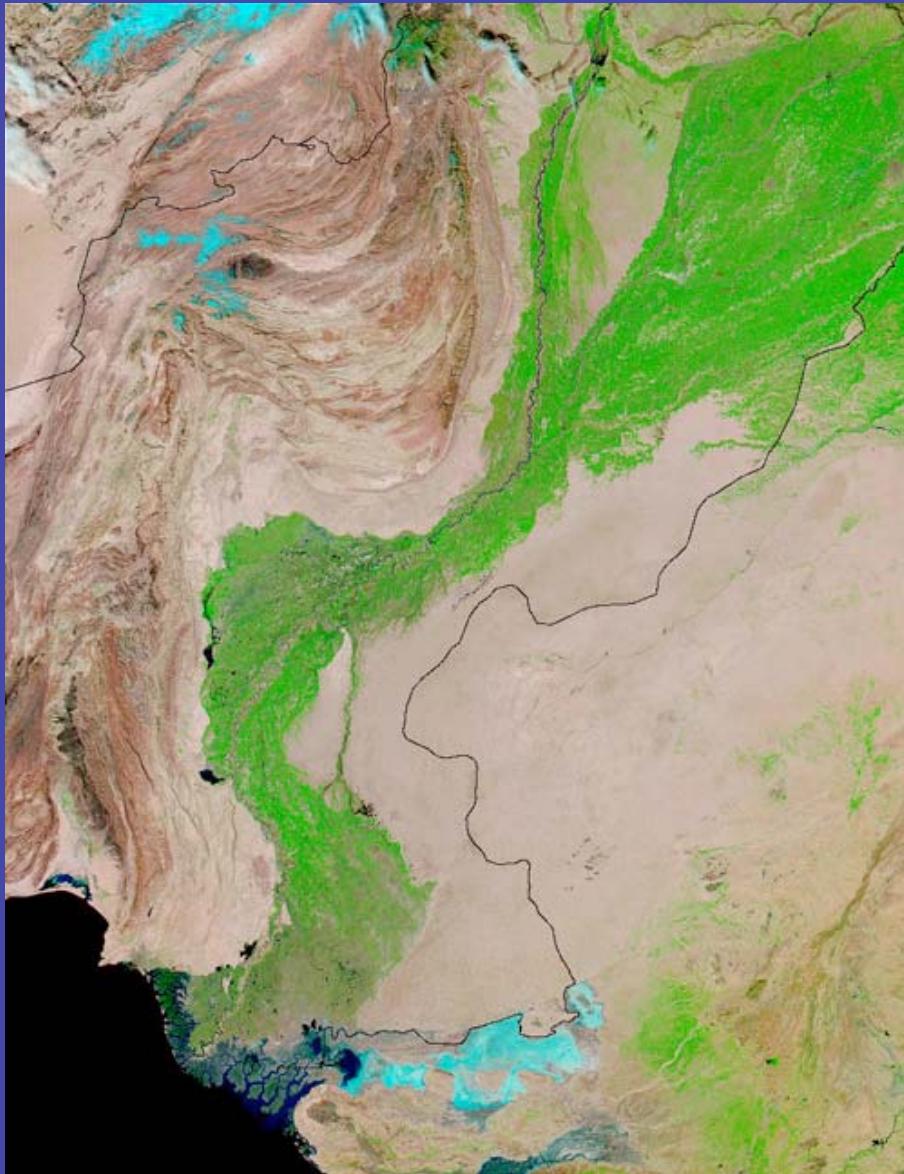
DD escaped heavy development –
now at the horizon

indus delta: what do we know?

liviu giosan

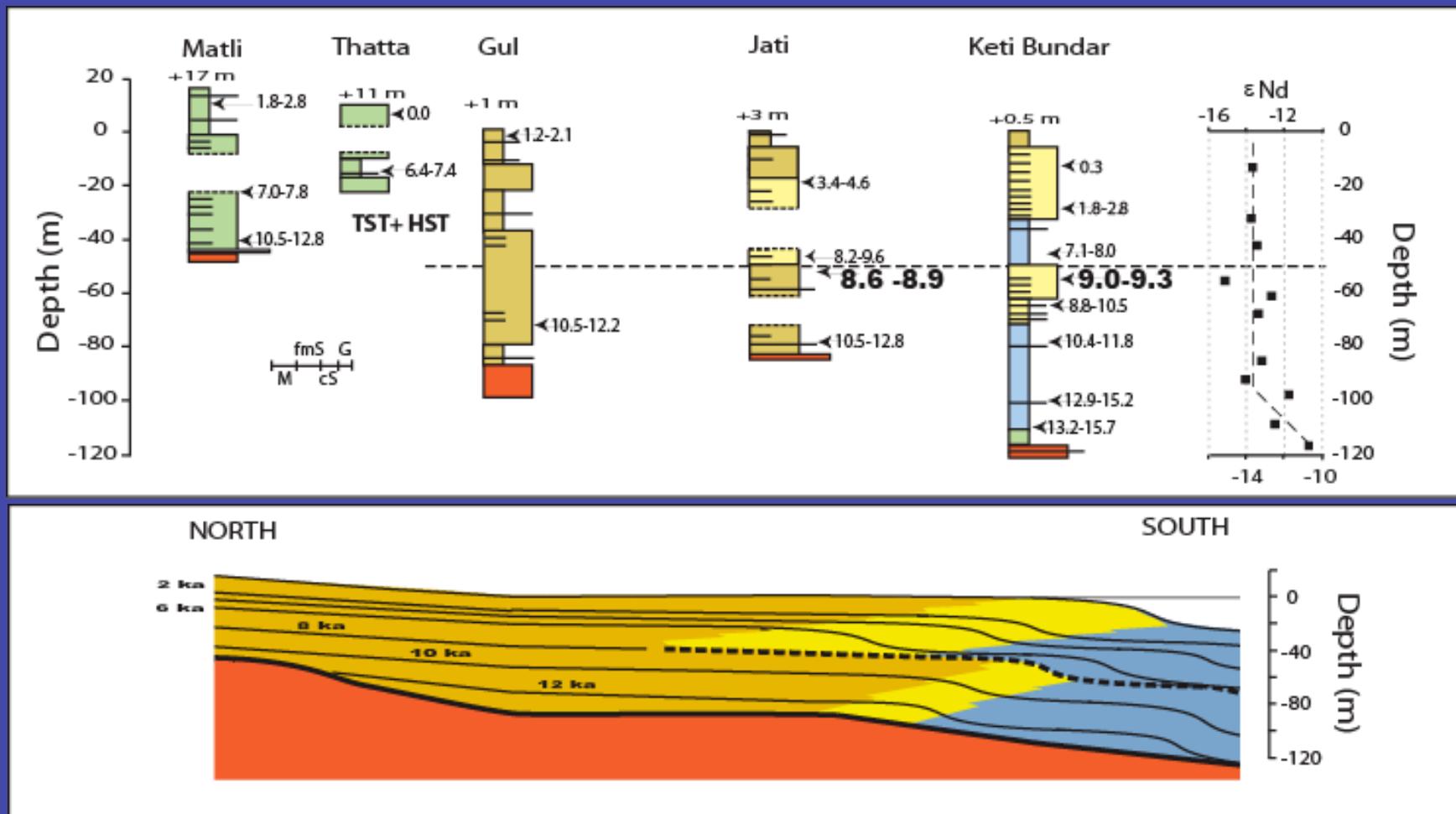


climate



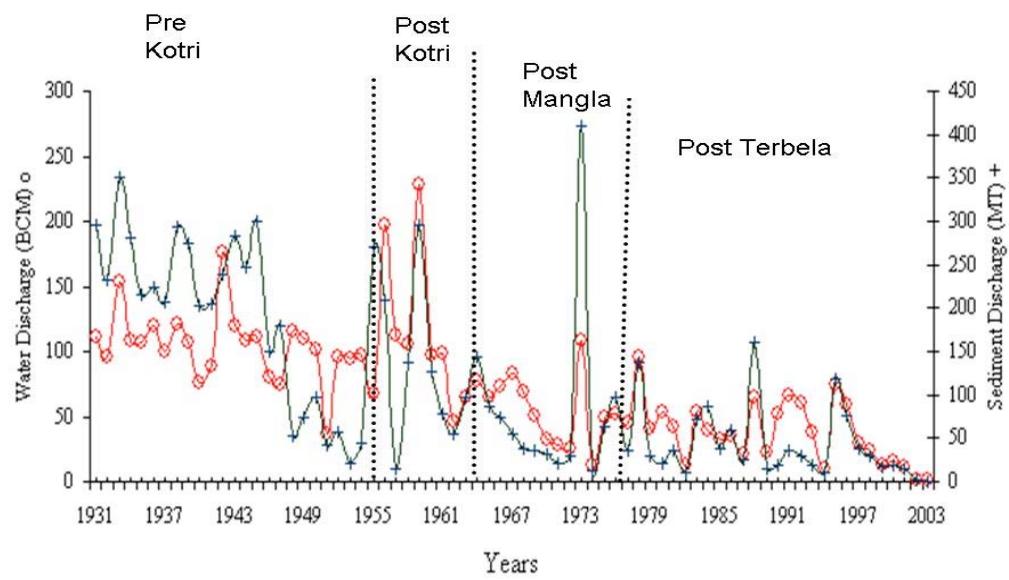
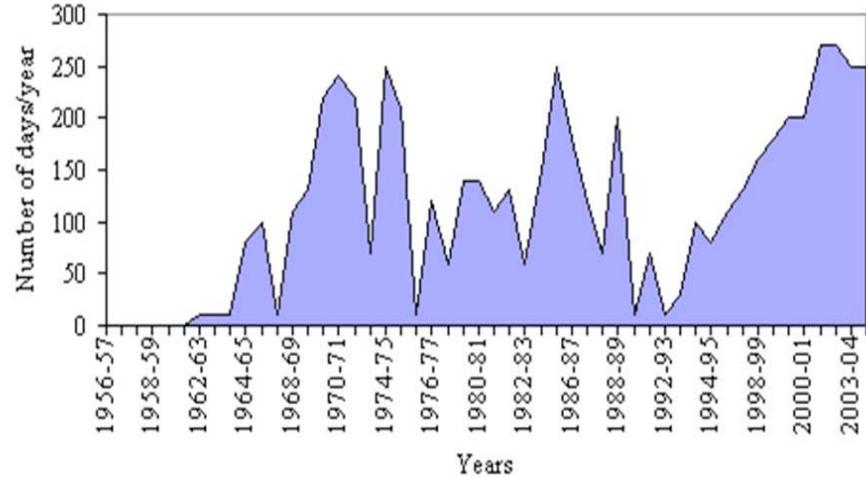
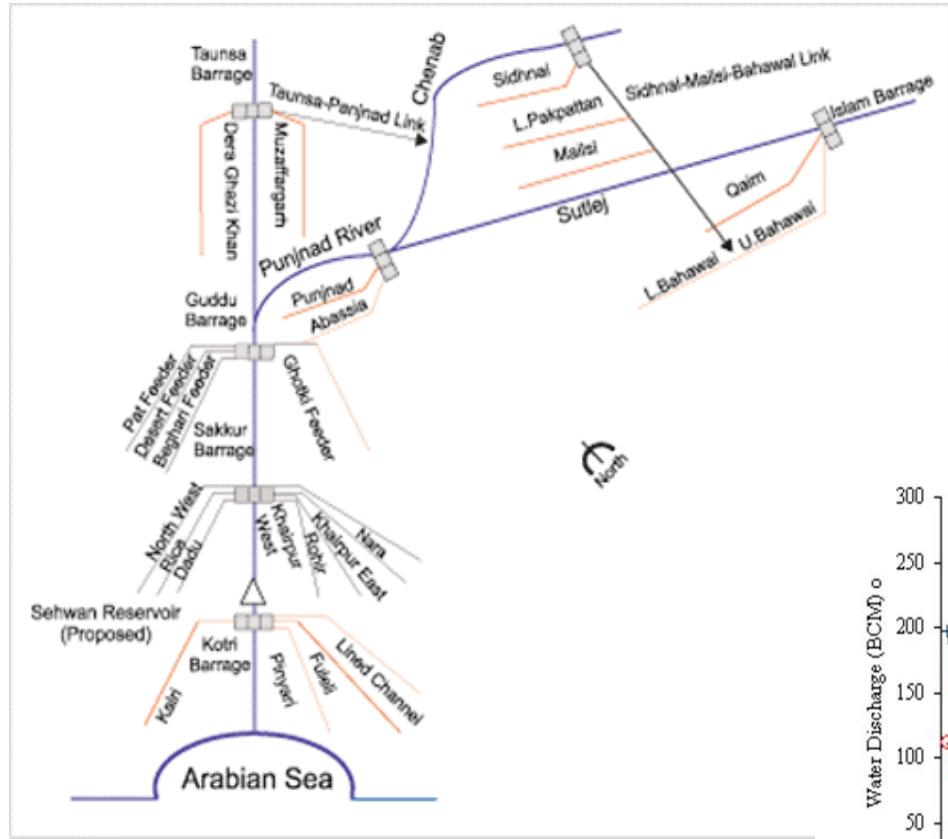
Bookhagen et al., 2006

evolution (climate, sea level, subsidence)

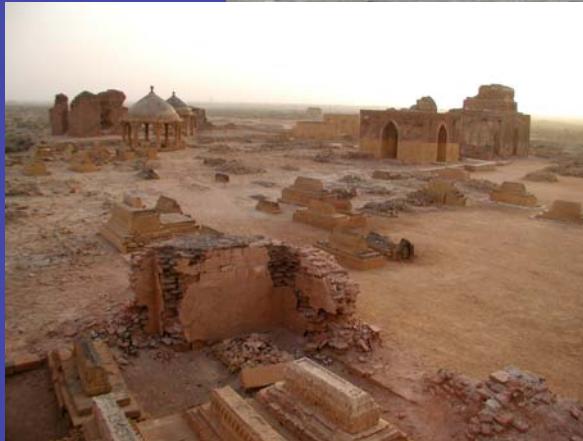


Giosan et al., in prep.

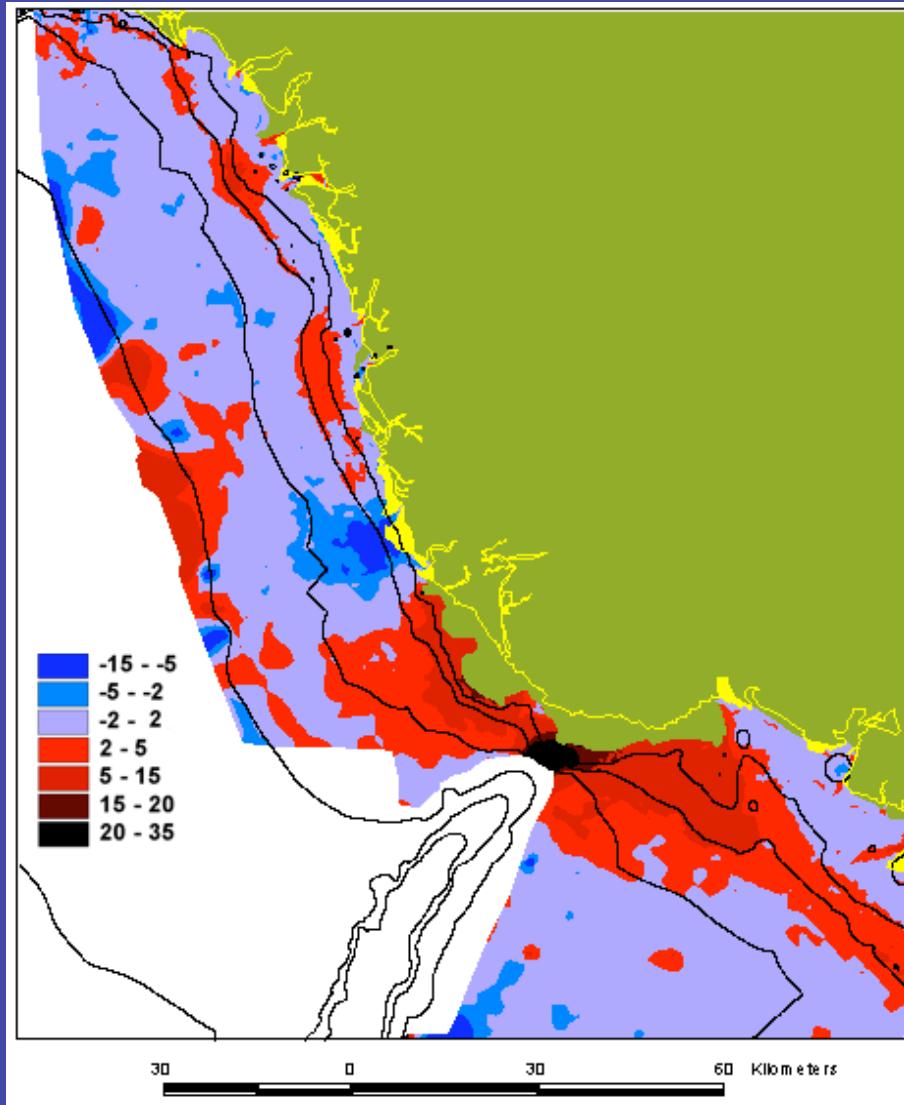
largest irrigation system



salinization, desertification

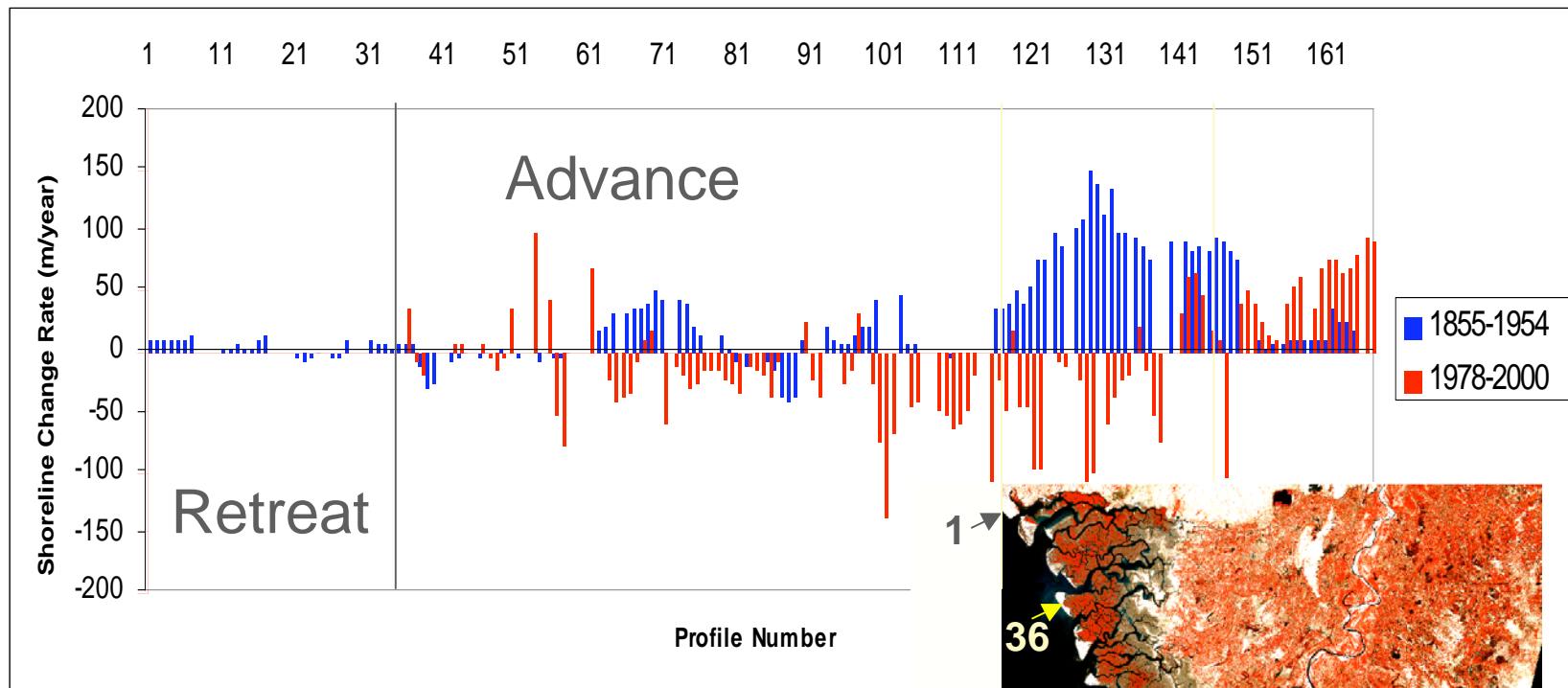


the shelf



Giosan et al., 2006

the coast



Giosan et al., 2006

Thank You !

































