

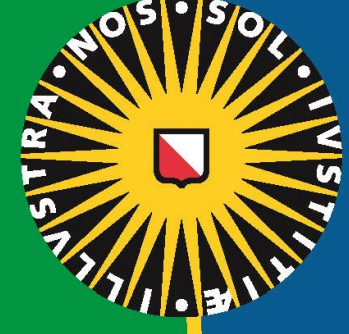
Combined effects of mud and vegetation on river morphology

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River and delta morphodynamics

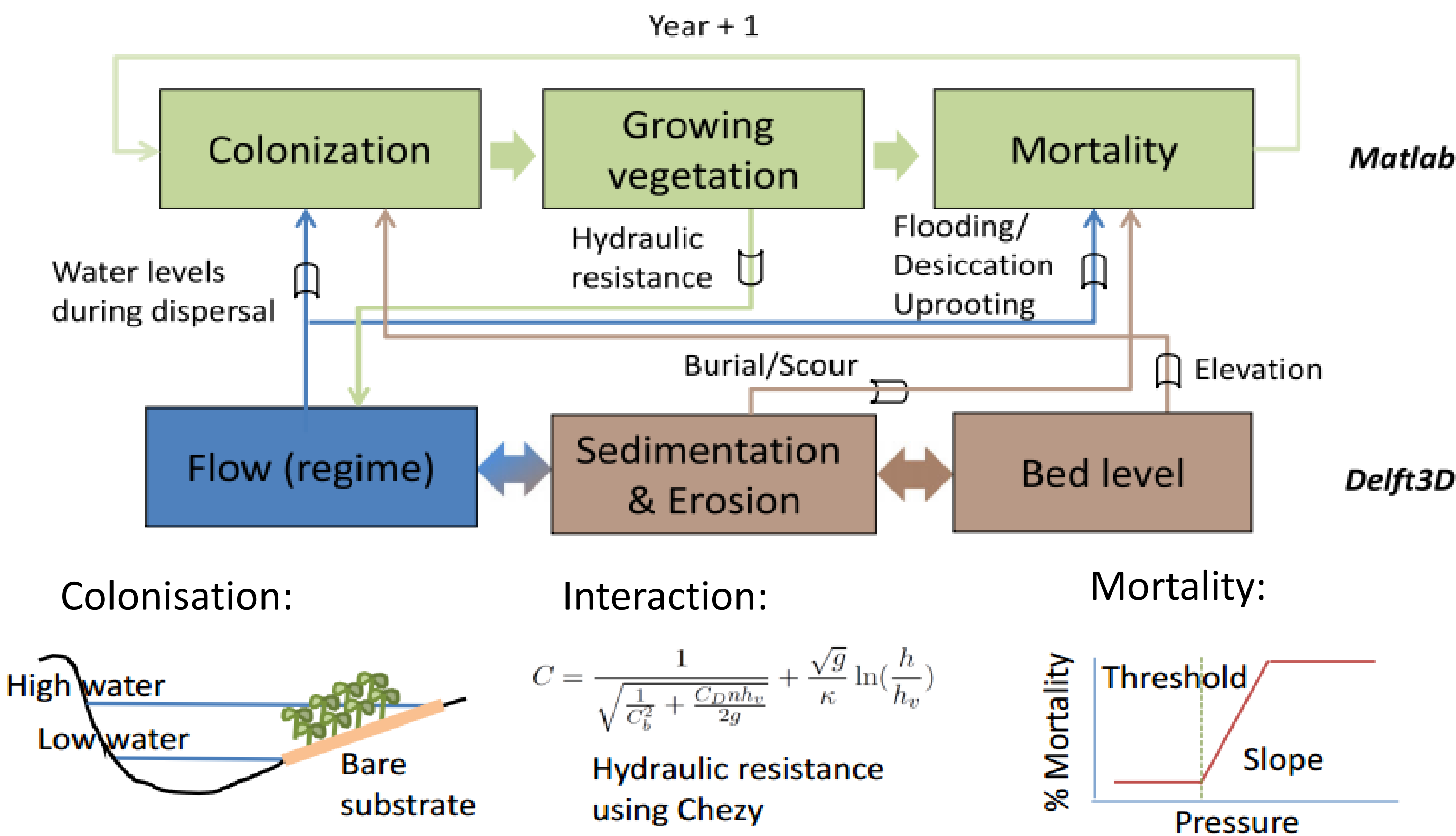


Background

Both cohesive sediment (mud) and riparian vegetation interact with river morphodynamics and affect the formation of river channel patterns (for reviews: Kleinhans, 2010; Gurnell, 2014). It is still unknown how the two-way interaction between mud and riparian vegetation affects the morphological development of river systems. A better understanding of this interaction would improve predictive models for river management.



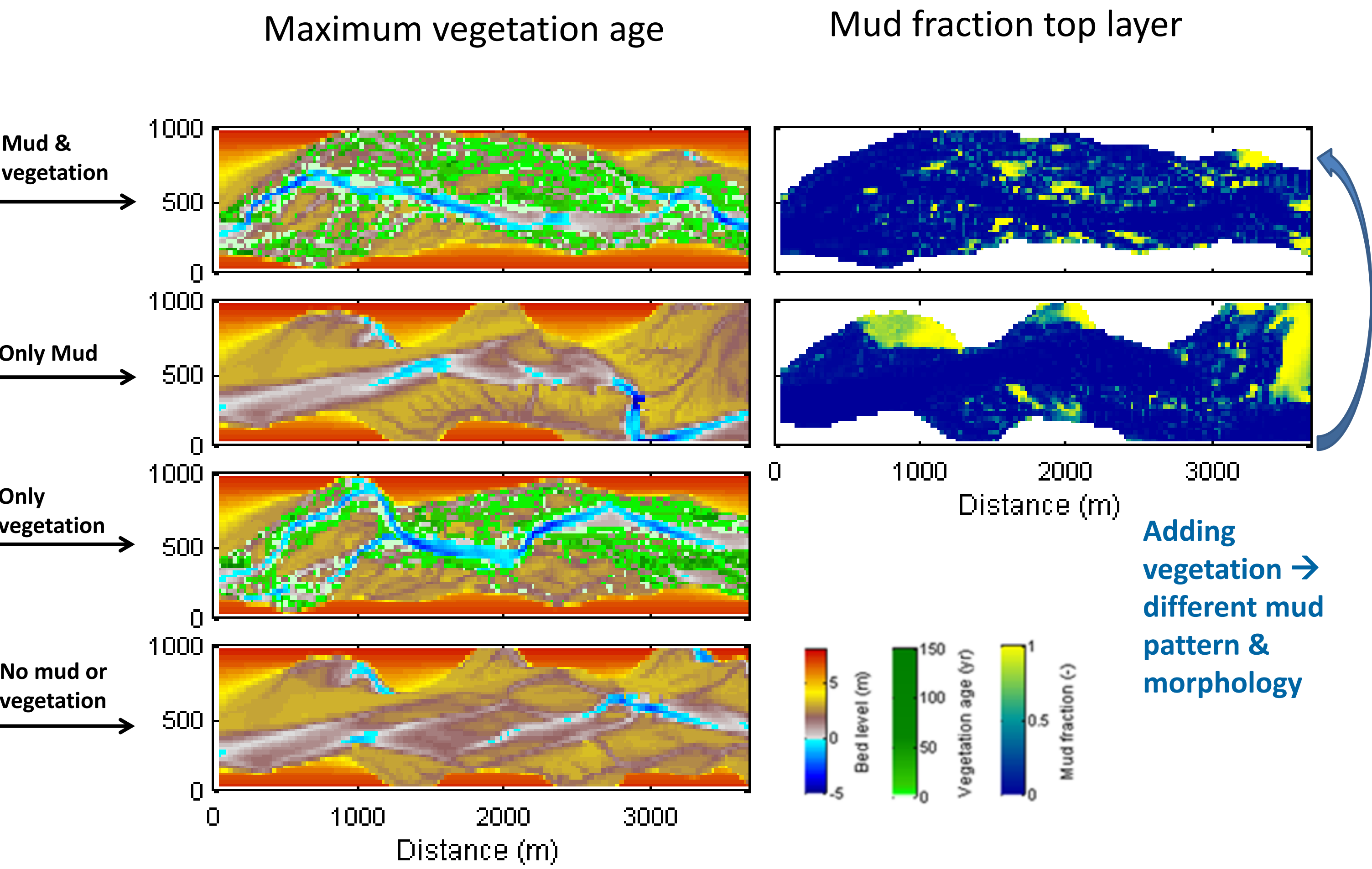
Method



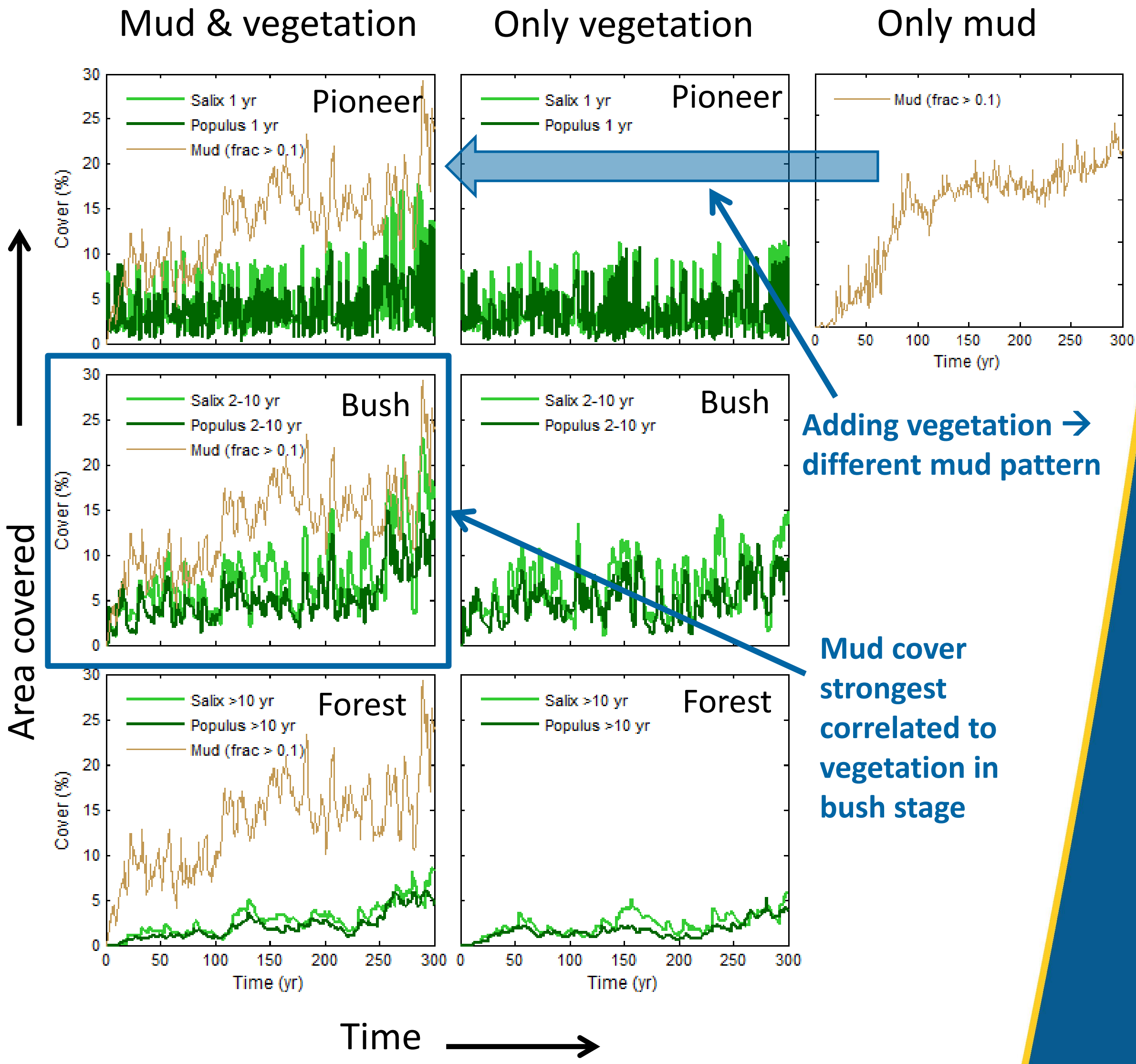
Additional model settings:			
Parameter	Low	Default	High
Mud supply (kg/m ³)	5e-3	2e-2	5e-2 & 1e-1
PmCrit (-)	0.2	0.4	0.6
Critical shear stress for mud erosion (N/m ²)	0.1	0.2	0.5
Active layer thickness (m)	-	0.03	0.1



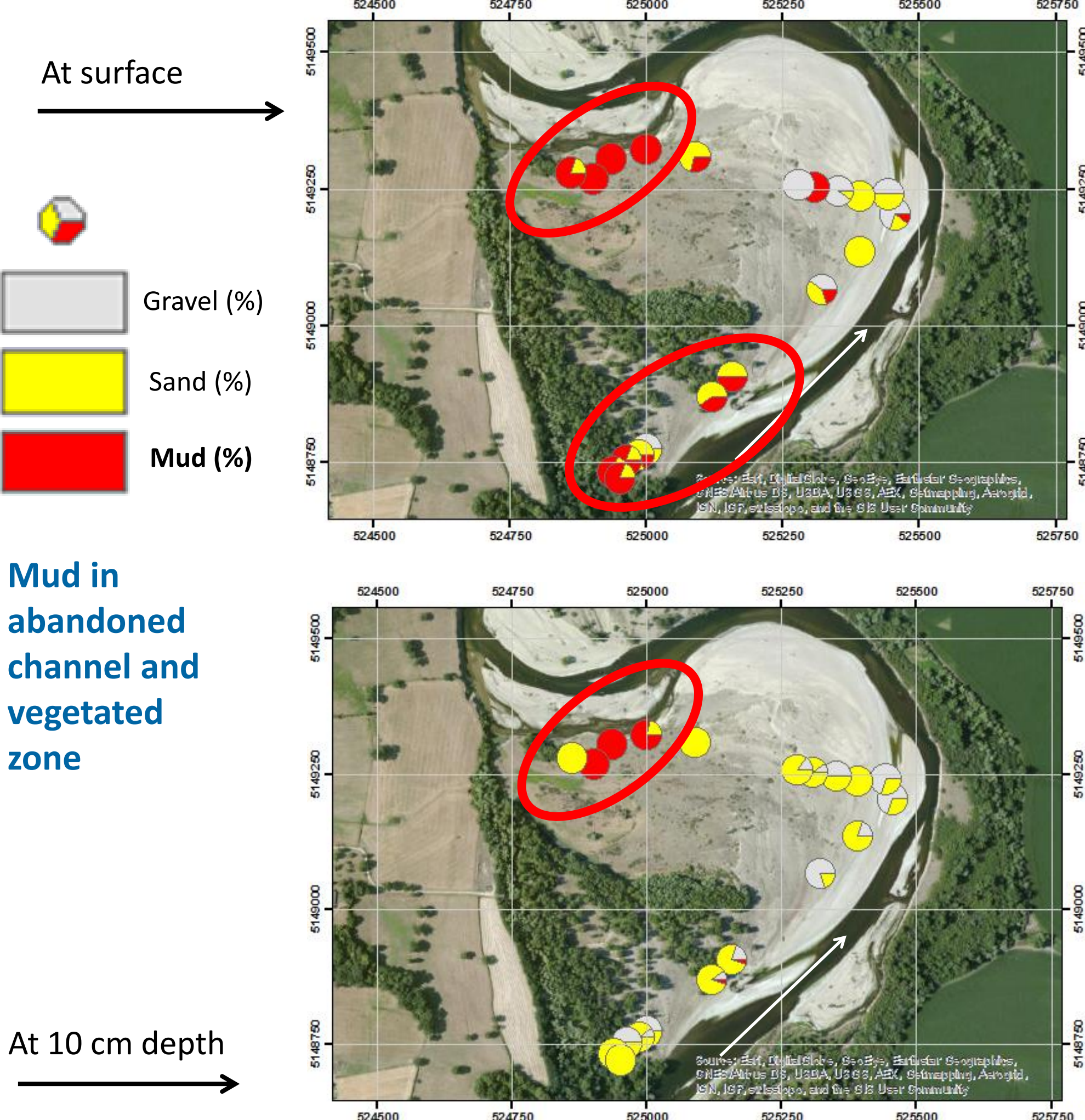
Morphology after 300 years



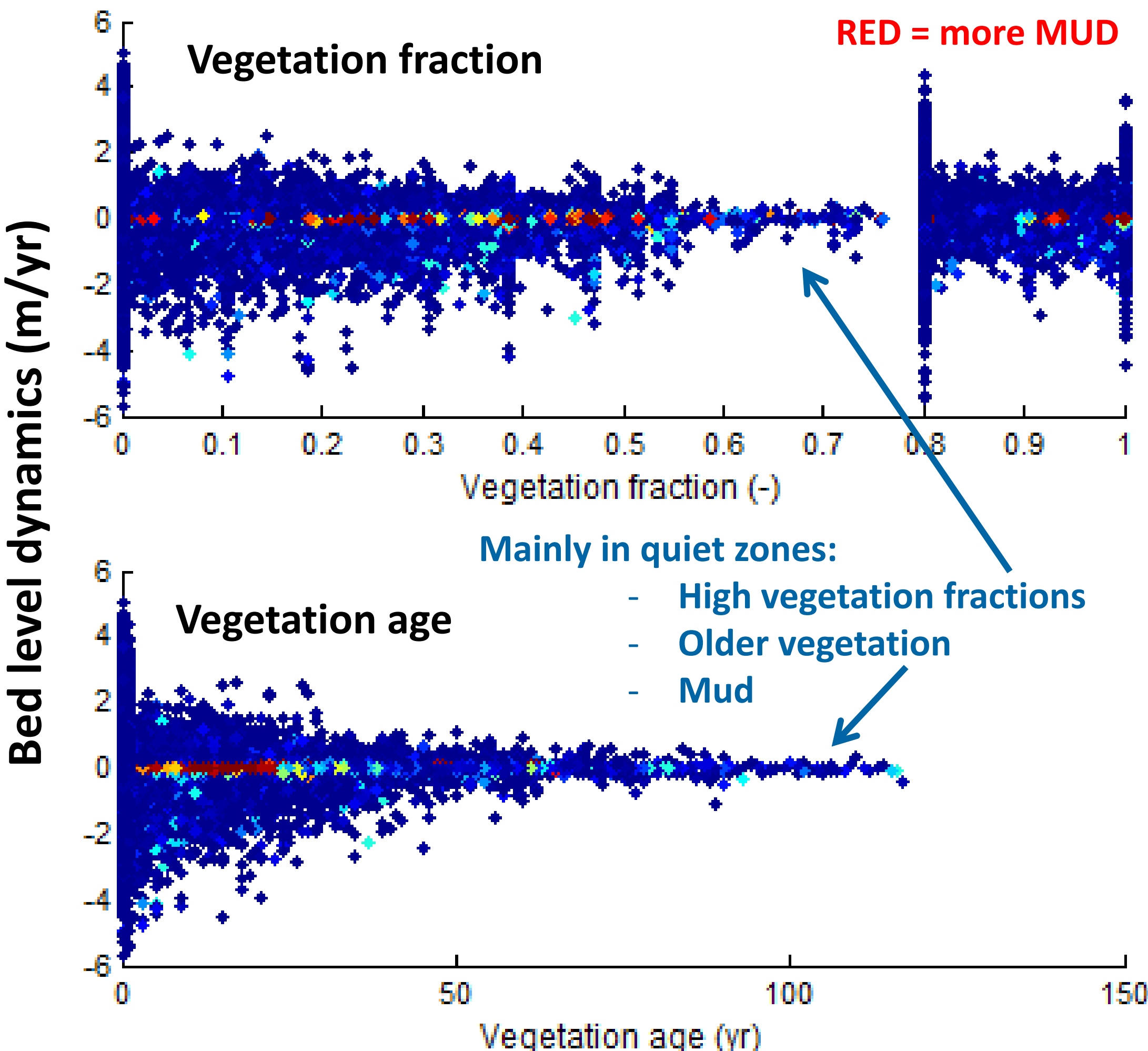
Mud and vegetation cover over time



Comparison to field data



Mud, vegetation and bed dynamics



Conclusions

- New: combination mud and vegetation in numerical river model
- Vegetation causes increased mud deposition, especially near the channel
- Mud had little effect on morphodynamics and vegetation development
- Positive feedback between channel stability and vegetation development near non-erodible points may lead to a decrease in system dynamics

References

Gurnell, A. (2014). Plants as river system engineers. Earth Surface Processes and Landforms, 39(1), 4-25.
Kleinhans, M. G. (2010). Sorting out river channel patterns. Progress in Physical Geography, 34(3), 287-326.
Van Oorschot, M., Kleinhans, M., Geerling, G., and Middelkoop, H. (2015). Distinct patterns of interaction between vegetation and morphodynamics. Earth Surf. Process. Landforms, 41, 791-808.