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Forward model applied to channelized turbidite systems: a case study of the Benin major valley fill

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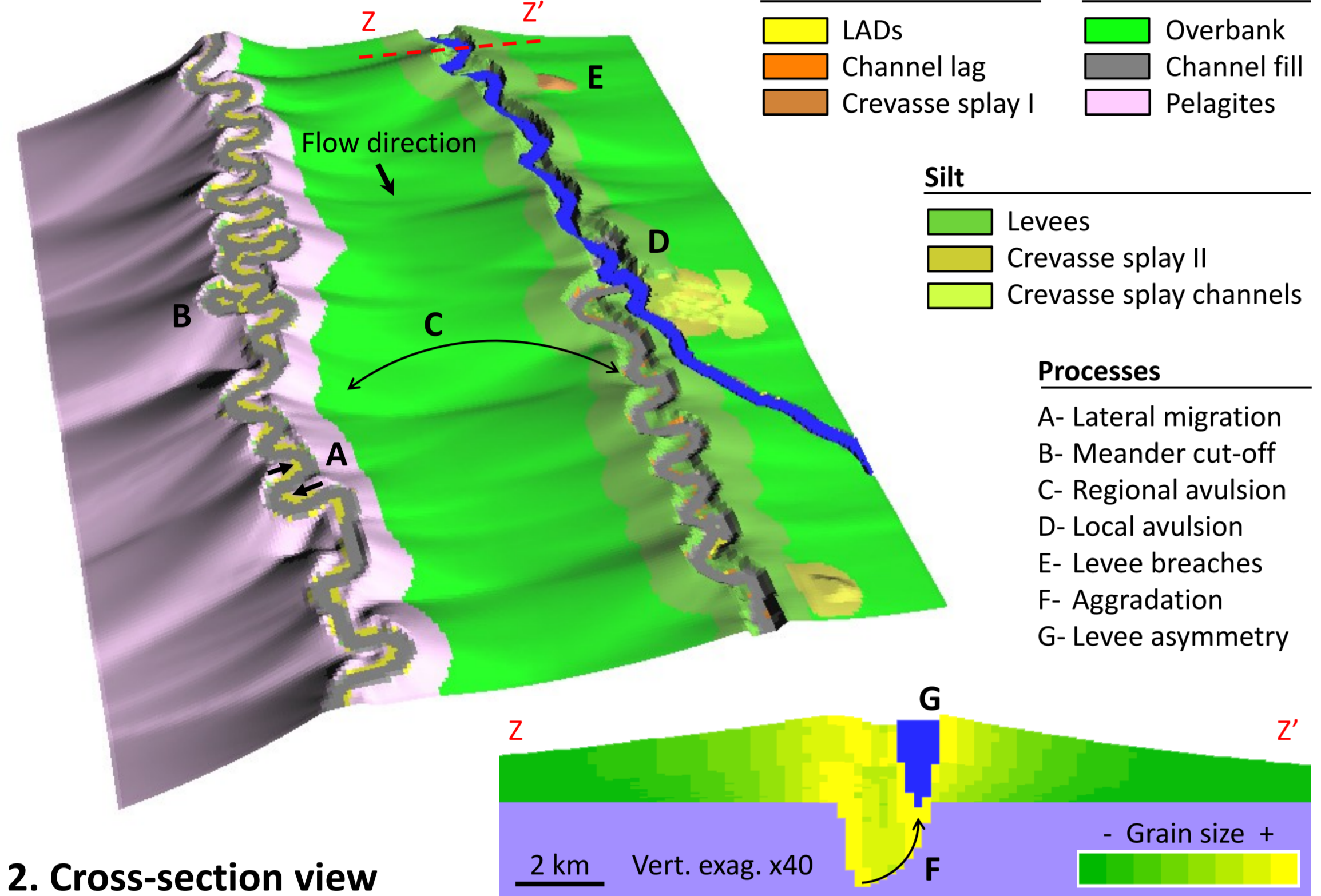
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Objectives

Channelized turbidite systems are associated with extensive hydrocarbon reservoirs. Yet building realistic turbidite reservoir models is still a challenge. We take advantage of some similarities between fluvial and turbidite environments to transpose the **Flumy model**, initially dedicated to fluvial reservoirs (Lopez et al., 2008), to channelized turbidite systems by **simulating the main processes** at play in the **submarine realm**: channel lateral migration, avulsion, aggradation, overflowing, flow stripping, and sediment transport (Lemay et al., 2018). A flow compatible with the input channel geometry parameters is first built. This flow controls the channel evolution through time and thus the stratigraphic architecture of deposits, as well as their grain size. In this study, we present the **application of Flumy** to the case study of the **Benin major valley**.

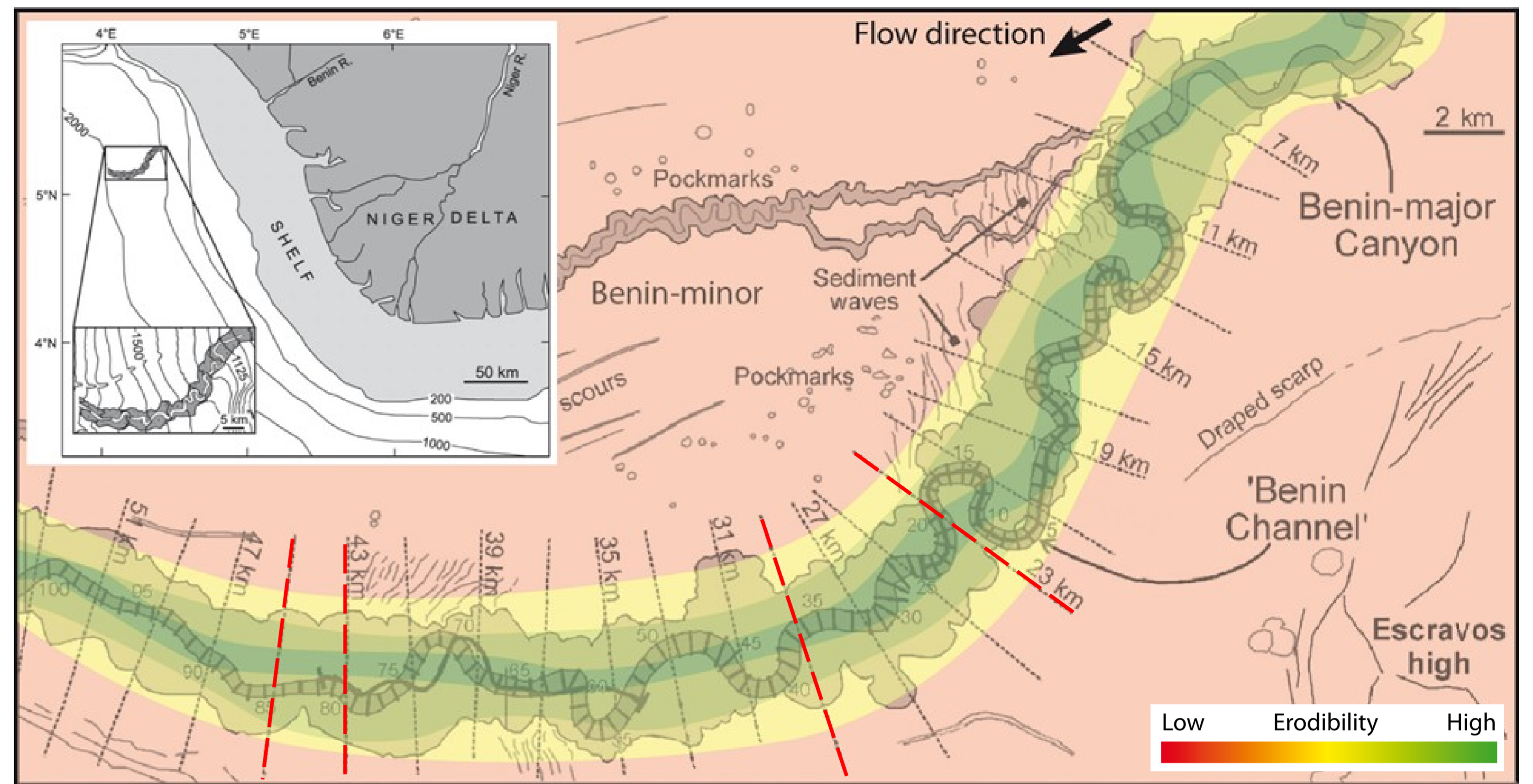
Turbidite Model Overview

1. Aerial 3D view

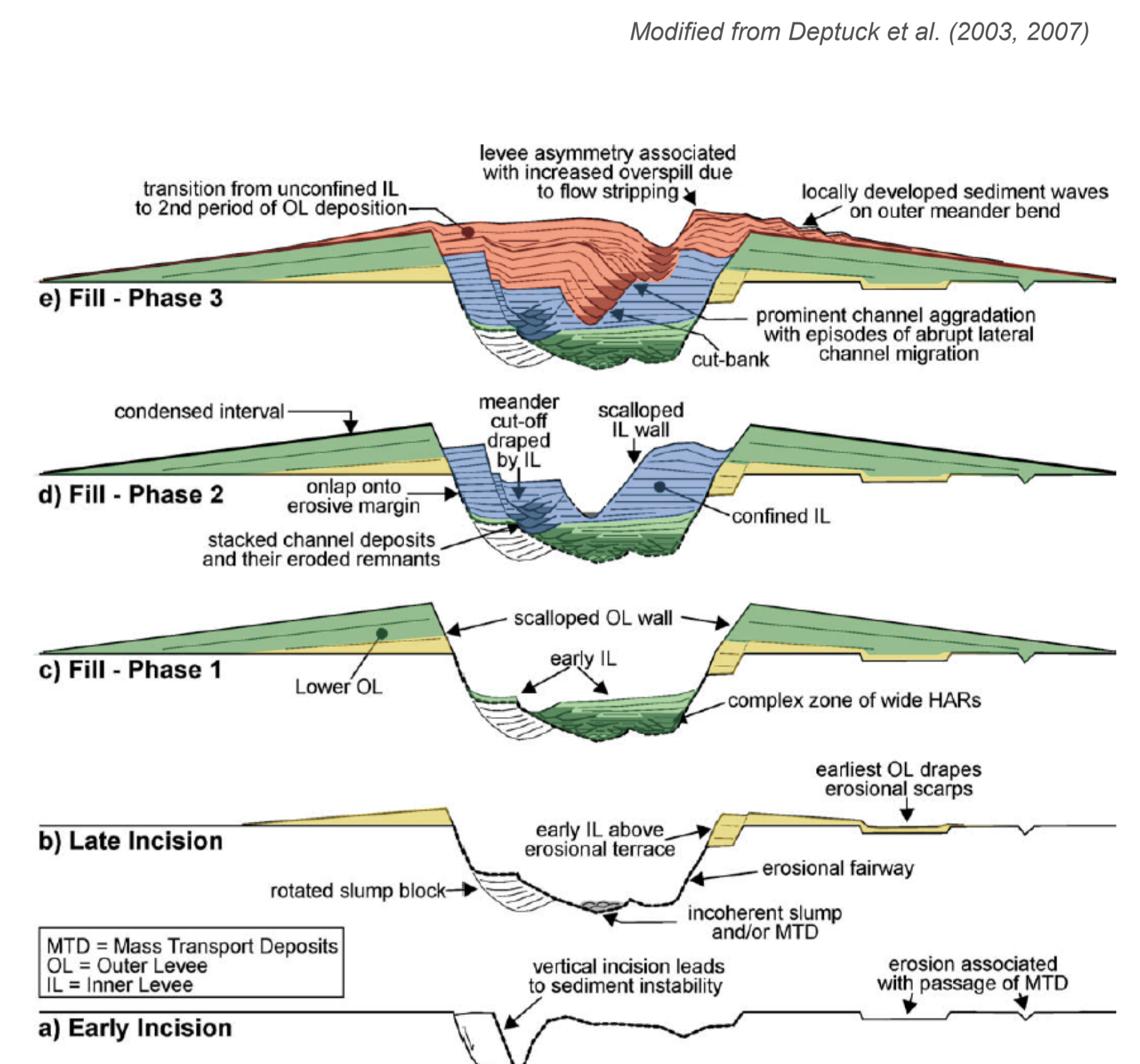


2. Cross-section view

Study Area & Simulation Scenario

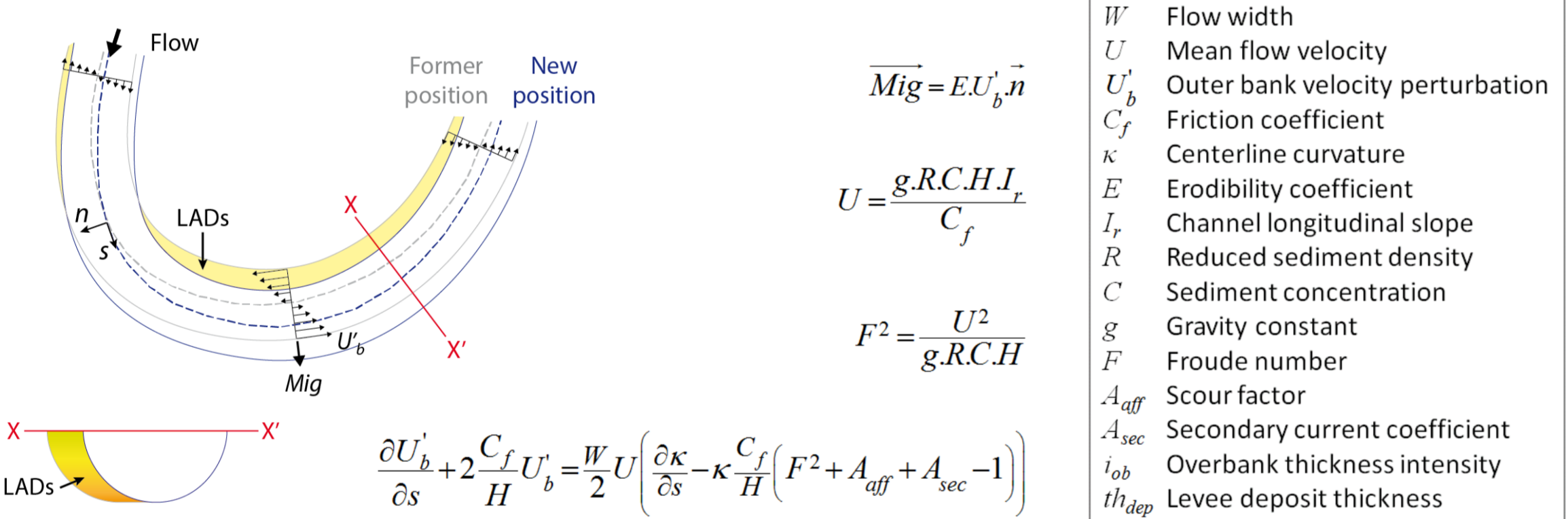


Geometry		Kinematics		
W (m)	H _{ch} (m)	λ (m)	Aggrad (m/k-iter)	T (iter)
750	35	3500	+30	3000
600	25	3000	+6	2000
			+6	2500
			+4	2500
			-6	29000
400	15	2000	0.5	1000

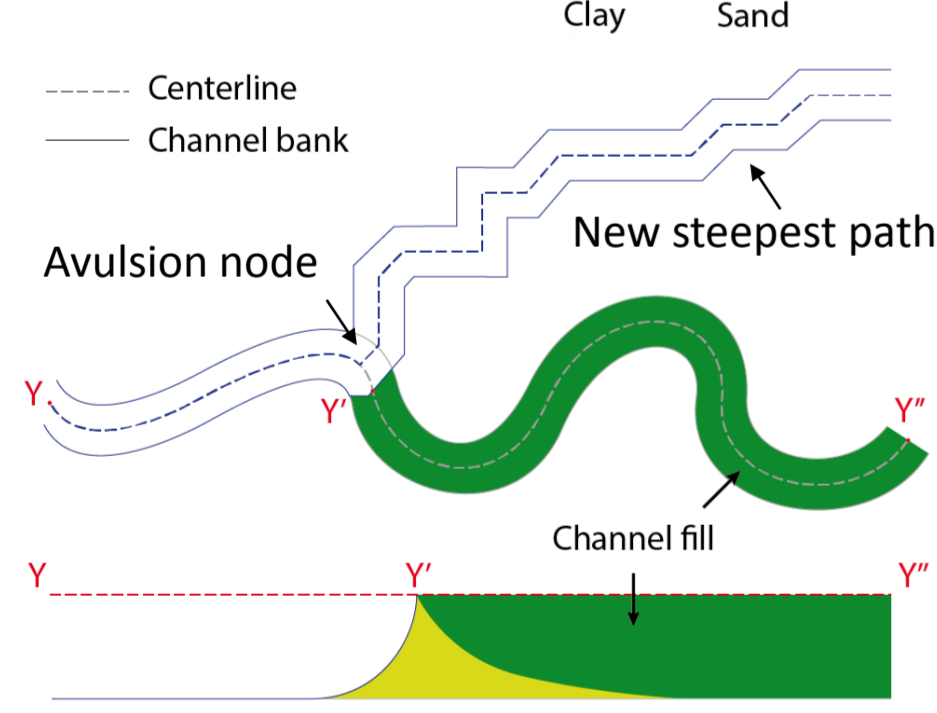


Description of Main Processes

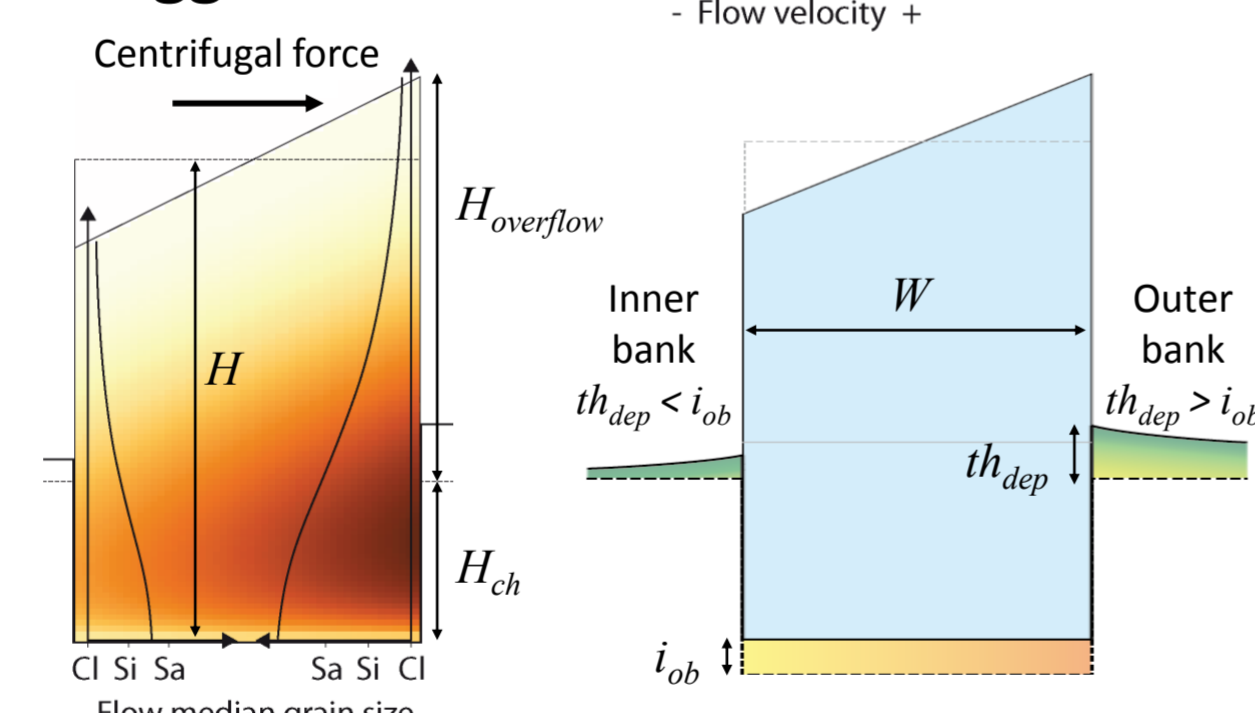
1. Migration



2. Avulsion



3. Aggradation



Conclusion

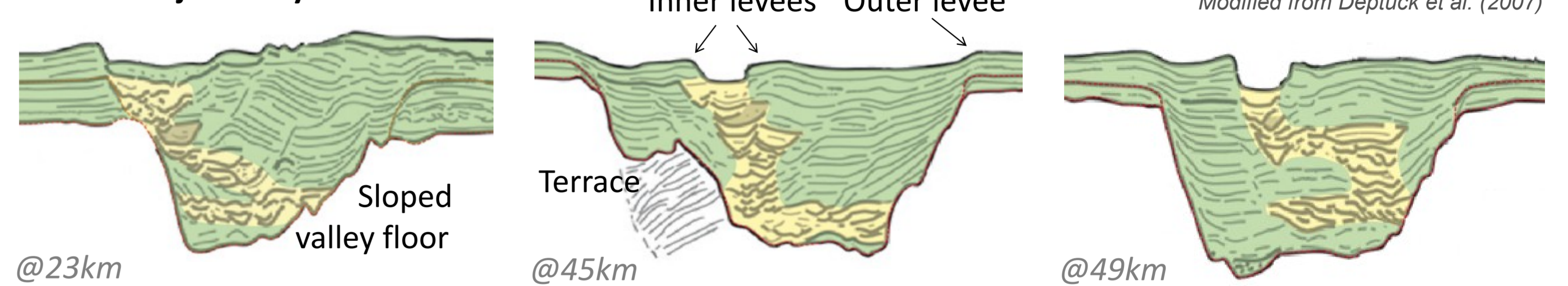
The simulation successfully reproduces the morphology of the valley, most of observed geomorphic features, and the various styles of filling architectures. It also results in a complex grain size arrangement which controls reservoir connectivity. This study shows that the model reproduces **realistic stratigraphic architecture** and can be used to simulate **channelized turbidite reservoirs**.

Bibliography

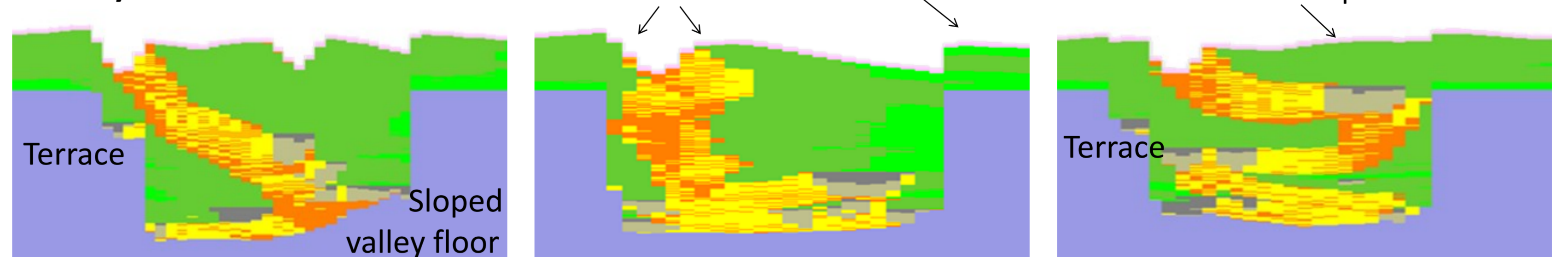
Deptuck, M. E., Sylvester, Z., Pirmez, C., & O'Byrne, C. (2007) Marine and Petroleum Geology, 24(6-9), 406-433.
 Imran, J., Parker, G., & Pirmez, C. (1999) Journal of Fluid Mechanics, 400, 295-331.
 Lemay, M. (2018), PhD, PSL Université Paris, 176p.
 Lopez et al. (2008) Analogue and Numerical Modelling of Sedimentary Systems: From Understanding to Prediction, 139-144.

Model Results

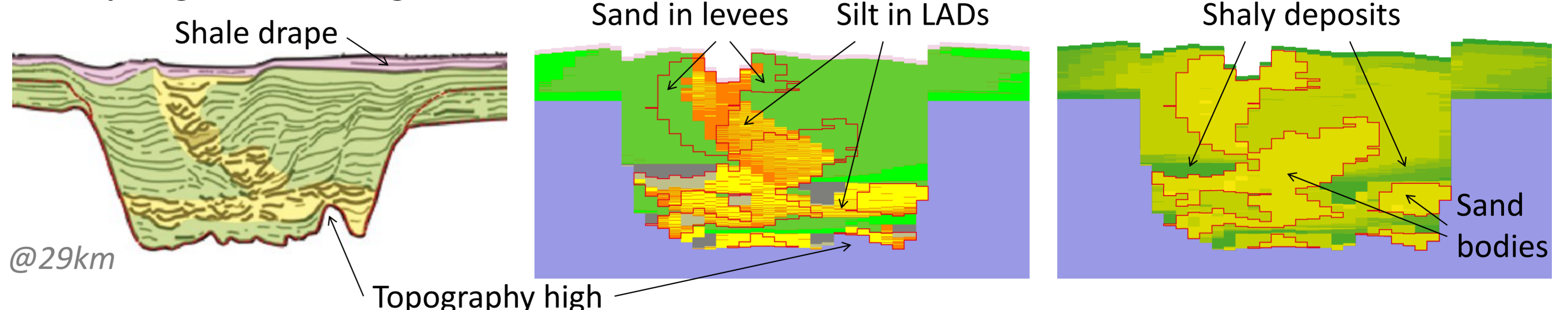
1. Benin major valley cross-sections



2. Flumy model cross-sections



3. Complex grain size arrangement



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