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

Martin Lemay, Fabien Ors, Jean-Louis Grimaud, Jacques Rivoirard, Isabelle Cojan, Xavier Freulon

► To cite this version:

Martin Lemay, Fabien Ors, Jean-Louis Grimaud, Jacques Rivoirard, Isabelle Cojan, et al.. Forward model applied to channelized turbidite systems: a case study of the Benin major valley fill. EAGE Petroleum Geostatistics 2019, Sep 2019, Florence, Italy. hal-02331089

HAL Id: hal-02331089

<https://hal.science/hal-02331089>

Submitted on 24 Oct 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Martin Lemay*, Fabien Ors, Jean-Louis Grimaud, Jacques Rivoirard, Isabelle Cojan, Xavier Freulon
MINES ParisTech, PSL University, Centre de Géosciences, Fontainebleau, France
* now at IFP Energies Nouvelles, Rueil-Malmaison, France

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

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.

Acknowledgments

This study has been conducted within the scope of the **Flumy Research Program**. The authors are grateful to ENGIE and ENI partners for support.

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

Model Results

1. Benin major valley cross-sections

2. Flumy model cross-sections

3. Complex grain size arrangement

Contacts

fabien.ors@mines-paristech.fr
flumy@geosciences.ensmp.fr
FLUMY® (2019) © MINES ParisTech / ARMINES
www.cg.ensmp.fr/flumy