

## RING Team Newsletter, March 2017

### In This Issue. . .

- [Latest Publications](#)
- Team News :
  - [New PhD Student](#)
  - [EAGE, Paris](#)
- Focus on Technologies :
  - [RINGMesh 4.0.0](#)
  - [FaultMod](#)
  - [Channel modeling](#)

Dr **Laurent Ailleres** from Monash U., Australia, visited to teach structural geophysics and 3D targeting. This offered opportunities to develop our collaboration on fold modeling, hard-rock geology and poly-deformed terranes.

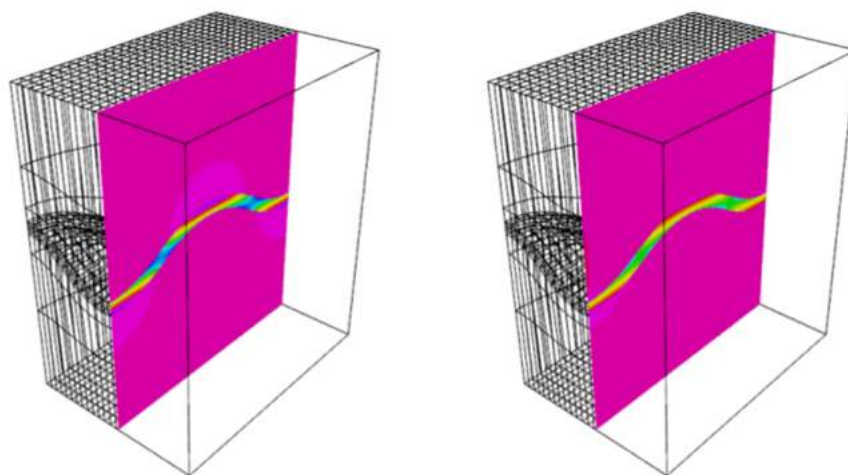
### Meeting 2017, Sept. 19-22

- Call for abstract: April 15
- Papers due to: July 15
- Registration opens: May 1

[Visit the conference website.](#)

## RINGMesh... a collaborative work

The RINGMesh project is now the topic of a [paper recently published](#) in Computers & Geosciences. We are very proud that the project is more and more fed by sponsors developments. We welcome external contributions.



Reference result

Inverse result

-130.4

$\sigma_{xx}$  (MPa)

34.15

*In this picture, RINGMesh is used to store and visualize the deformed geometry and stress field estimated by a large deformation elastic code. The right picture results from an inverse process that aims at retrieving the stress state by [updating boundary conditions](#).*

## RINGMesh 4.0.0 is out !! [sources on BitBucket.](#)

We are very pleased to announce that the new release is now available. Here is a non exhaustive list of new features :

- Support C++ 11,
- Mesh is now defined as low level abstract classes in order to open the library to any mesh data structure. The implemented default data structure is still based on the Geogram library developed by [B. Levy](#) (INRIA),
- New exports: ADELI and ABAQUS mechanical simulators,
- The new version integrates a new implementation of AABB tree for quick geometrical search in all Mesh Entities of the geological model,
- RINGMeshView (an extension of Geogram viewer for geological model visualization) has now intuitive menus to display every geological model entities.

## Journal Papers since September 2016

- Jeanne Pellerin, Arnaud Botella, François Bonneau, Antoine Mazuyer, Benjamin Chauvin, Guillaume Caumon, Bruno Lévy, [RINGMesh: A programming library for developing mesh-based geomodeling applications](#). *Computers & Geosciences*, DOI:10.1016/j.cageo.2017.03.005.
- Pauline Collon, David Bernasconi, Cécile Vuilleumier, Philippe Renard. [Statistical metrics for the characterization of karst network geometry and topology](#). *Geomorphology*, 283, (122-142).
- Guillaume Rongier, Pauline Collon, Philippe Renard. [A geostatistical approach to the simulation of stacked channels](#). *Marine and Petroleum Geology*, 82, (318-335).
- Xinming Wu and Guillaume Caumon. [Simultaneous multiple well-seismic ties using flattened synthetic and real seismograms](#). *GEOPHYSICS*, 82:1 (IM13-IM20).

## Welcome to Nicolas Clausolles

*Seismic interpretation of salt geobodies.*



Nicolas holds a master's degree in numerical geology from ENSG (Nancy) and joined the RING team as a PhD student in November 2016. He works on developing new methodologies to help the interpretation of salt geobodies from seismic data, focusing on topological problems arising from the salt structures specificities, and the use of seismic attributes and image processing techniques in sampling structural uncertainties related to salt. He is advised by Pauline Collon and Guillaume Caumon.

Outside the lab, Nicolas enjoys all kinds of outdoor activities - especially when considering the wonderful climate of Nancy.

## Come and meet the RING Team at the 79<sup>th</sup> EAGE C&E, June 12-15, Paris

Technical Presentations & E posters by :

- Antoine Mazuyer - [Integrated inverse method to estimate virgin stress state in reservoirs and overbur-](#)

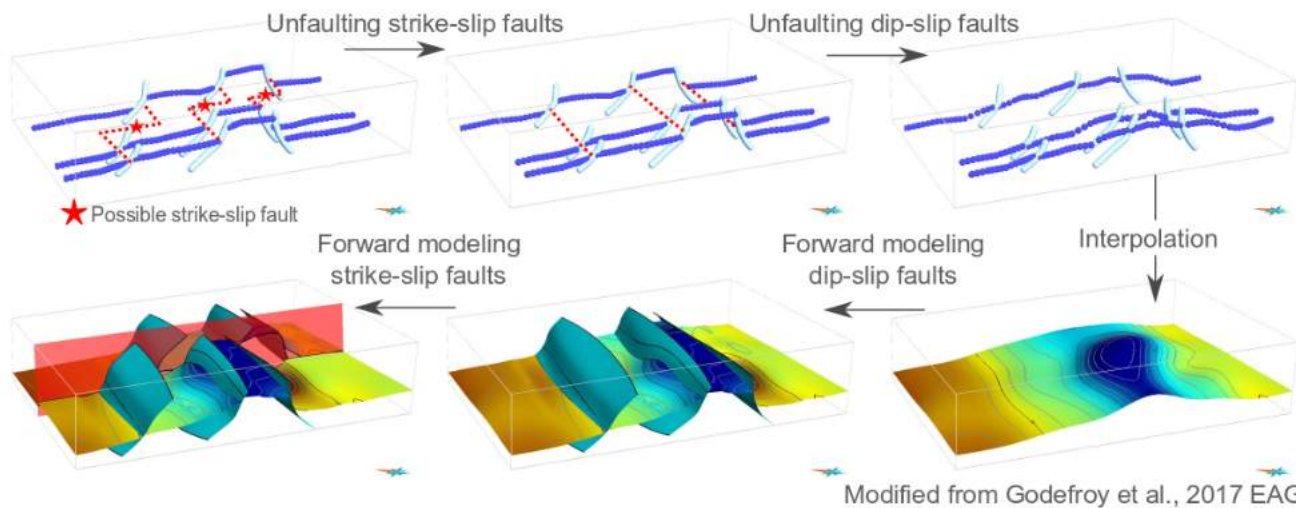
[den.](#)

- Pierre Anquez - [Automatic sealing and simplification of 3D geological surface models using topology recovery.](#)
- Pauline Collon - [3D geomodelling in structurally complex areas: implicit vs. explicit representations.](#)
- Gabriel Godefroy - [A parametric Unfault-and-Refault method for chronological structural modeling.](#)
- Francois Bonneau - [Simulating Micro-Seismic Activity with a Discrete Geomechanical Model.](#)
- Marion Parquer - [On the chronological ordering of oxbow lakes for reverse migration of channels conditioned to subsurface data.](#)
- Paul Cupillard - [Performance and convergence of the non-periodic homogenization for the 3D elastic wave equation.](#)
- Modeste Irakarama - [Appraising structural interpretations using seismic data misfit functionals.](#)
- Margaux Ragueneil - [Sensitivity analysis on the modeling of flows and heat transfers in the geothermal field of Basse-Terre, Guadeloupe.](#)

Guillaume Caumon and Pauline Collon are also going to animate the student workshop called: "New Trends in Geomodelling". **Please come and meet the team on the booth of the Nancy School of Geology (ENSG)!**

## A kinematic method for chronological fault modeling

FaultMod is a SKUA-GOCAD research plugin dedicated to stochastic and kinematic fault modeling. It allows [interpreters to generate structural scenarios from sparse data and regional tectonic knowledge](#) and to downscale faults to [generate possible segmentations](#). Among recent developments, Gabriel Godefroy has significantly refactored the code and has added kinematic rules to generate structurally consistent scenarios in complex faulted domains.

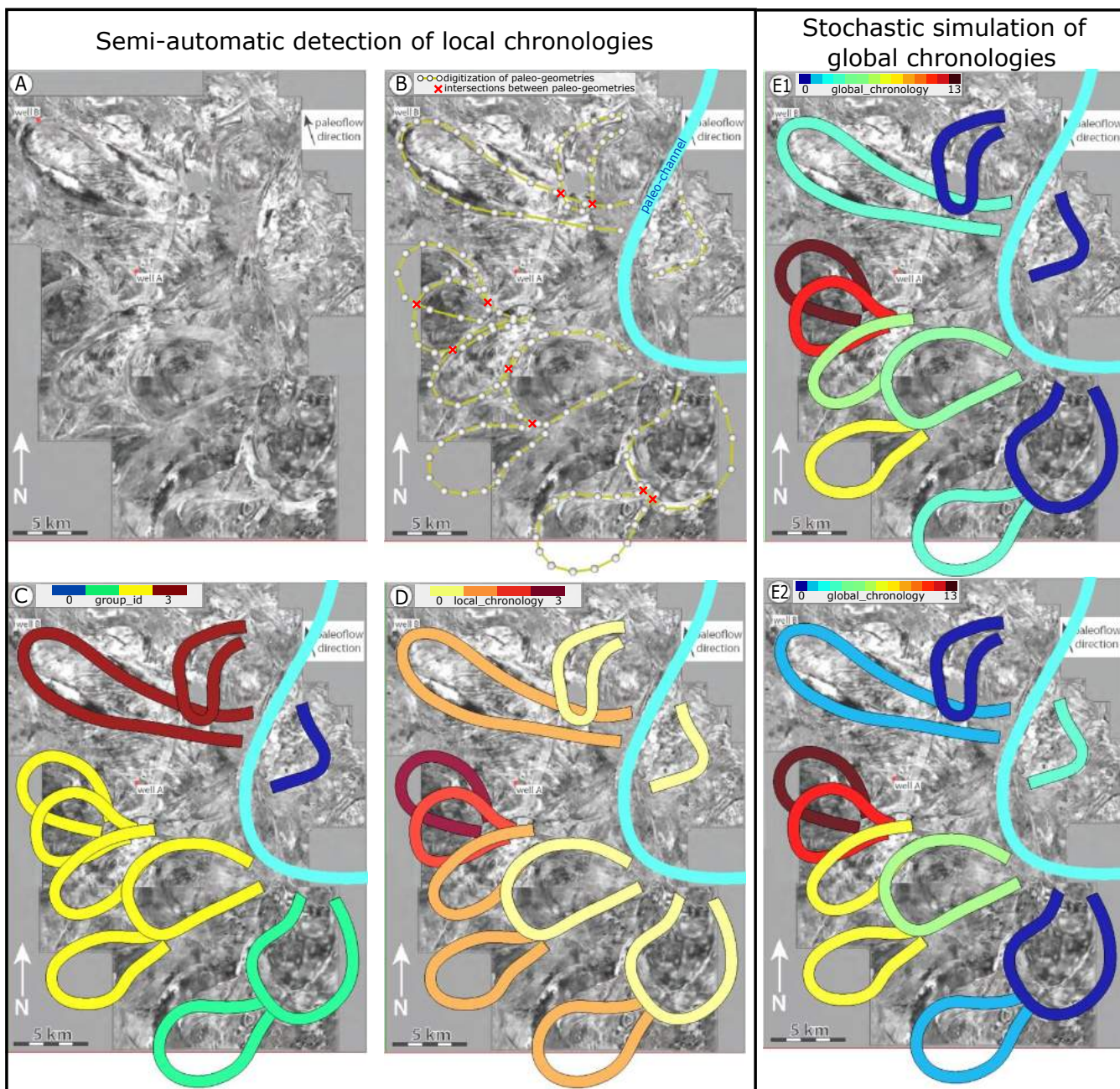


The FaultMod plugin is now able to use a kinematic fault operator to chronologically model the impact of faults, and control the deformation during structural modeling (parameters setting are guided by numerical optimization).

[Back to Contents](#)

## Advances in channel modeling

Marion Parquer improves the stochastic simulation of channelized systems taking into account the chronology of channel abandonment. This method integrates seismic image observations and proposes automatic interpretation scenarios reflecting the uncertainties. Intersections between abandoned meanders reveal the local chronologies, but additional conditioning data must be considered to establish the global chronology. The proposed method has been tested on a seismic image of the McMurray Cretaceous formation (Canada). The following illustration gives a preview of the results that will be discussed by Marion during her presentation at the 79 EAGE Conference & Exhibition in June.



(A) Seismic image of McMurray Cretaceous formation (Canada) after Durkin (2016), from ConocoPhillips Canada. (B) Digitization of all the observed paleo-geometries and of the main channel path. Detection of their intersections. (C) Automatic deduction of groups of related paleo geometries inside which local chronologies can be semi-automatically deduced (D). (E1) and (E2) Two realizations of simulated global chronologies of the observed paleo-geometries.