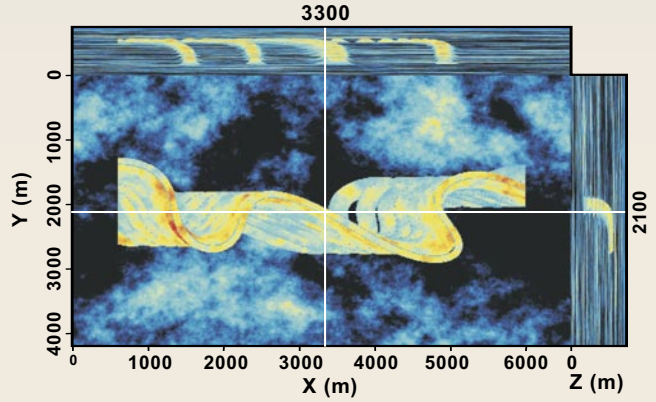
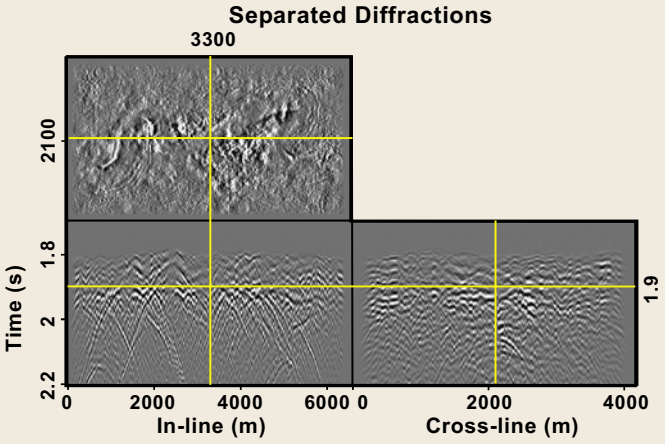
"Madagascar" Open-Source Project

Researchers doing computational data-processing experiments need software tools that make conducting experiments and exchanging experimental results both convenient and efficient. "Madagascar" is a project that addresses these goals. Started by Bureau Scientist Sergey Fomel in 2003 under the name "RSF" (Regularly Sampled Format), the package was released to the public in June 2006 at the EAGE Workshop, "Open Source E&P Software—Putting the Pieces Together" in Vienna. In August 2006, the Madagascar package was the focus of a School and Workshop in Vancouver titled "Reproducible Research in Computational Geophysics." Fifty participants representing fifteen different companies and fifteen different universities attended the school and received certificates for completing basic Madagascar training. More schools are being planned for next year.



3-D reservoir model of a channelized system.

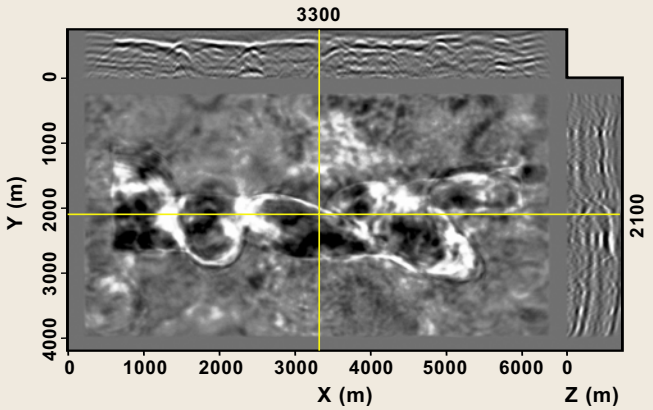


Seismic diffractions separated from the data.

Although developed from scratch, Madagascar follows the tradition of geophysical data-processing packages such as SEPlib (developed at Stanford), Seismic Unix (developed at Stanford and Colorado School of Mines), and FreeUSP (developed at Amoco and BP). It reimplements some of the functionality and ideas from these other packages, while updating them to modern software design practices.

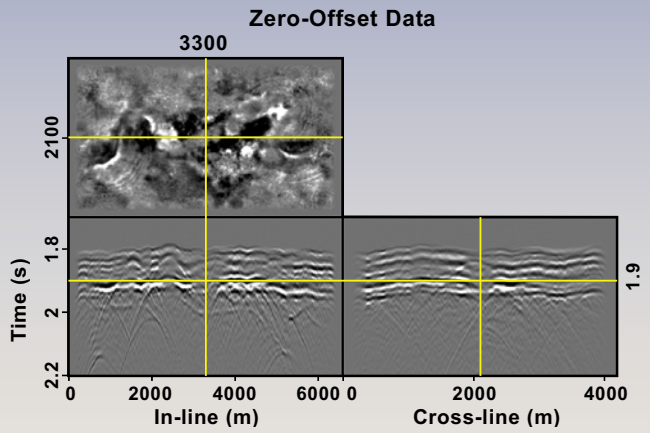
The distinguishing feature of Madagascar is its orientation toward reproducibility of computational experiments. Bringing reproducibility to the field of computational geophysics and enabling fast, convenient technology transfer were the main motivations for the package's development. Madagascar consists of two levels: low-level main programs and high-level processing flows that combine main programs and thoroughly document data-processing histories for testing and reproducibility. Experience shows that high-level programming is easily mastered—even by beginning students that have no previous programming experience.

Madagascar follows the open-source tradition, which is responsible for now-famous products such as the Linux operating system, the Mozilla Firefox Web browser, etc. The main model for the open-source development is an open collaboration among different developers from around the world. Madagascar is hosted by Sourceforge, the main repository of open-source projects. Major contributors include Sergey Fomel and Jim Jennings from BEG; Paul Sava (now at Colorado



Conventional seismic image of the reservoir model.

School of Mines); and Gilles Hennenfent, Henryk Modzelewski, and Colin Russell (University of British Columbia). During the first 4 months of public existence, the package was downloaded from Sourceforge about 400 times and installed by many different organizations.



Modeled zero-offset seismic data.

"Madagascar" poster created by Scott Rodgers for the Jackson School booth at the SEG Annual Meeting.

Madagascar is used primarily for processing and analyzing seismic data. However, its flexible data format makes the package applicable to many other areas that involve computational experiments involving large datasets. An example is the stochastic modeling tools developed by Jim Jennings, which are easily integrated with forward seismic modeling and imaging tools for studying seismic responses of realistic reservoir models.

Contact
Sergey B. Fomel
sergey.fomel@beg.utexas.edu
(U.S.) 512-475-9573
http://www.beg.utexas.edu/mainweb/services/madagascar.htm

Updates on 2005 Energy Stories: Where Are They Now?

In the 2005 Annual Report, we reported on seven Bureau energy projects current at the time. We decided to publish an update of five of those stories this year. The projects on High-Resolution Seismic Inversion for Reservoir Modeling and 3-D Characterization of a Sinuous Slope Channel: the Beacon Channel, Brushy Canyon Formation, West Texas, have since been completed.

Jackson School Royalty Assistance. In 2006 the Jackson School Royalty Assistance team continued its Barnett Shale studies, in conjunction with the STARR and Permian Basin Geological Synthesis teams, who are conducting regional and rock-based research. On the basis of recent commercial successes of horizontal wells with multiple frac stages, we revised our estimate of Barnett potential upward for the Jackson School royalty lands. Research on the shallower Bend productive interval continued, and we visited companies who operate production in or near the JSG footprint. We showed these companies our new Bend correlation results and suggested infill and recompletion targets. We presented the same information in a poster session at AAPG, and several companies are following up on our recommendations. The research team comprises