

Reducing reservoir risk using 3D-seismic based stratigraphic and geomorphologic analyses

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3D seismic data can play a vital role in hydrocarbon exploration and development especially with regard to mitigating risk associated with presence of reservoir facies. Such data can afford direct imaging of depositional elements, which can then be analyzed by applying seismic stratigraphic and seismic geomorphologic principles to yield predictions of lithologic distribution, insights to compartmentalization, and identification of stratigraphic trapping possibilities. Benefits can be direct, whereby depositional elements at exploration depths can be identified and interpreted, or they can be indirect, whereby shallow-buried depositional systems can be clearly imaged and provide analogs to deeper exploration or development targets.

Examples of imaged depositional elements from both shallow- and deeply-buried sections are presented. In addition, depositional settings ranging from non-marine to deep-marine clastic as well as carbonate environments will be shown (Figs. 1-5).

Common techniques for geologic visualization include

- 1) visualizing stratigraphic horizons,
- 2) time slicing and flattened time slicing,
- 3) interval attribute analysis (including seismic waveform analysis),
- 4) voxbody interpretation and mapping,
- 5) 3D perspective rendering, and 6) opacity rendering.

Continued on Page 7



Henry W. Posamentier is the Chief Geologist for Anadarko Petroleum Corporation and Distinguished Advisor. Prior to joining Anadarko in 2001, he was with Veritas Exploration Services (2000-2001), the Atlantic Richfield Co. (1991-2000), Exxon Production Research Co. and Esso Resources Canada, Ltd. (1979-1991), and at Rider University, Assistant Professor of Geology (1974-1979).

Dr. Posamentier's research interests have been in the fields of sequence stratigraphy and depositional systems analysis, where he has published widely. Most recently, he has employed an interdisciplinary approach using 3D seismic visualization integrated with borehole data to interpret depositional systems and develop basin fill histories, in particular with reference to deep-water depositional settings. His current responsibilities include maintaining technical excellence with the G&G staff and ensuring integration of appropriate technologies into the exploration process. In 1971-1972, Dr. Posamentier was a Fulbright Fellow to Austria. He has served as an AAPG Distinguished Lecturer to the United States (1991-1992), an AAPG Distinguished Lecturer to the former Soviet Union (1996-1997), and an AAPG Distinguished Lecturer to the Middle East (1998-1999).



APRIL LUNCHEON

DATE: April 25, 2006
 TIME: 11:30 A.M. Lunch
 LOCATION: Telus Convention Centre, Calgary
 TICKETS: Carmen Swalwell
 Geophysical Service Inc.
 TELEPHONE: 514-6285 or Fax: 263-8978

MAY LUNCHEON (CONVENTION)

May 15, 2006
 Pitfalls of Communicating Science
 Speaker: Jay Ingram
 Co-host of Discovery Channel

Reducing reservoir risk using 3D-seismic...

Continued from Page 5

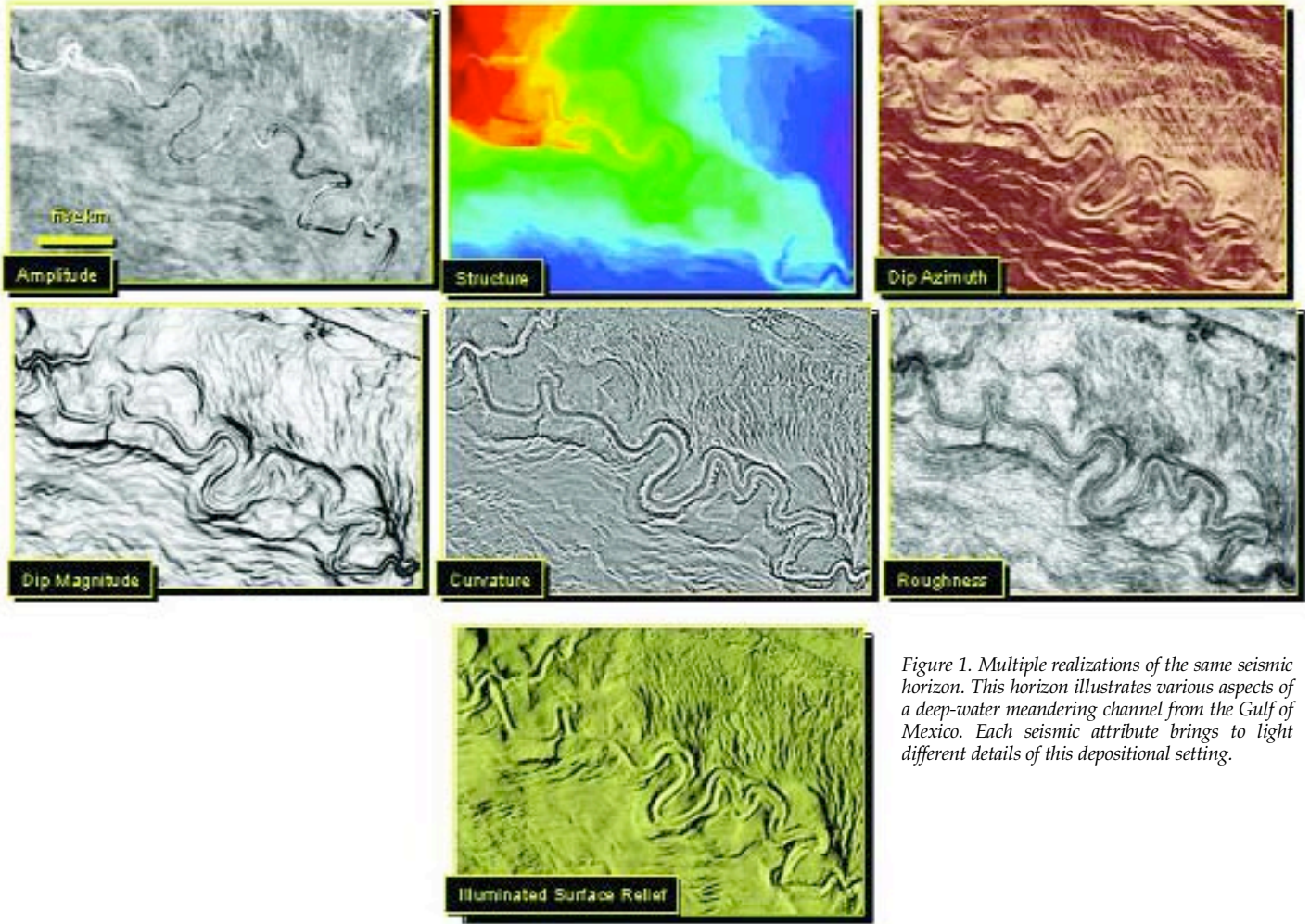


Figure 1. Multiple realizations of the same seismic horizon. This horizon illustrates various aspects of a deep-water meandering channel from the Gulf of Mexico. Each seismic attribute brings to light different details of this depositional setting.

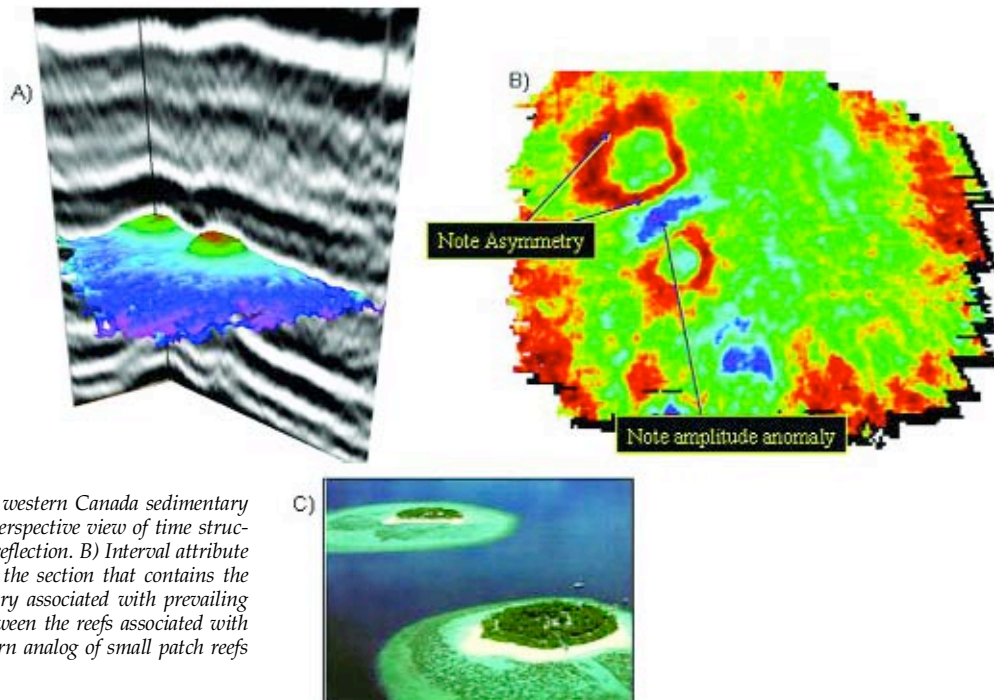


Figure 2. Devonian patch reefs, western Canada sedimentary basin. A) seismic section with perspective view of time structure draped on the top reef reflection. B) Interval attribute (maximum positive polarity) of the section that contains the reef, illustrating facies asymmetry associated with prevailing winds, and likely deepening between the reefs associated with tidal current focusing. C) Modern analog of small patch reefs from the Maldives.

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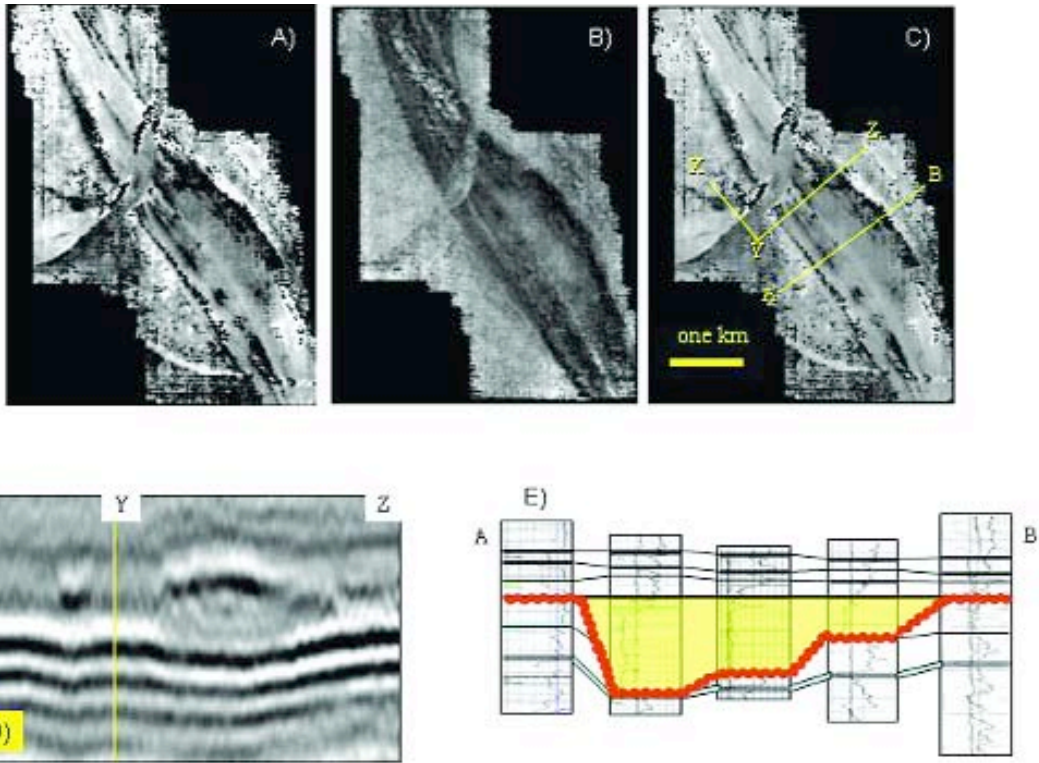
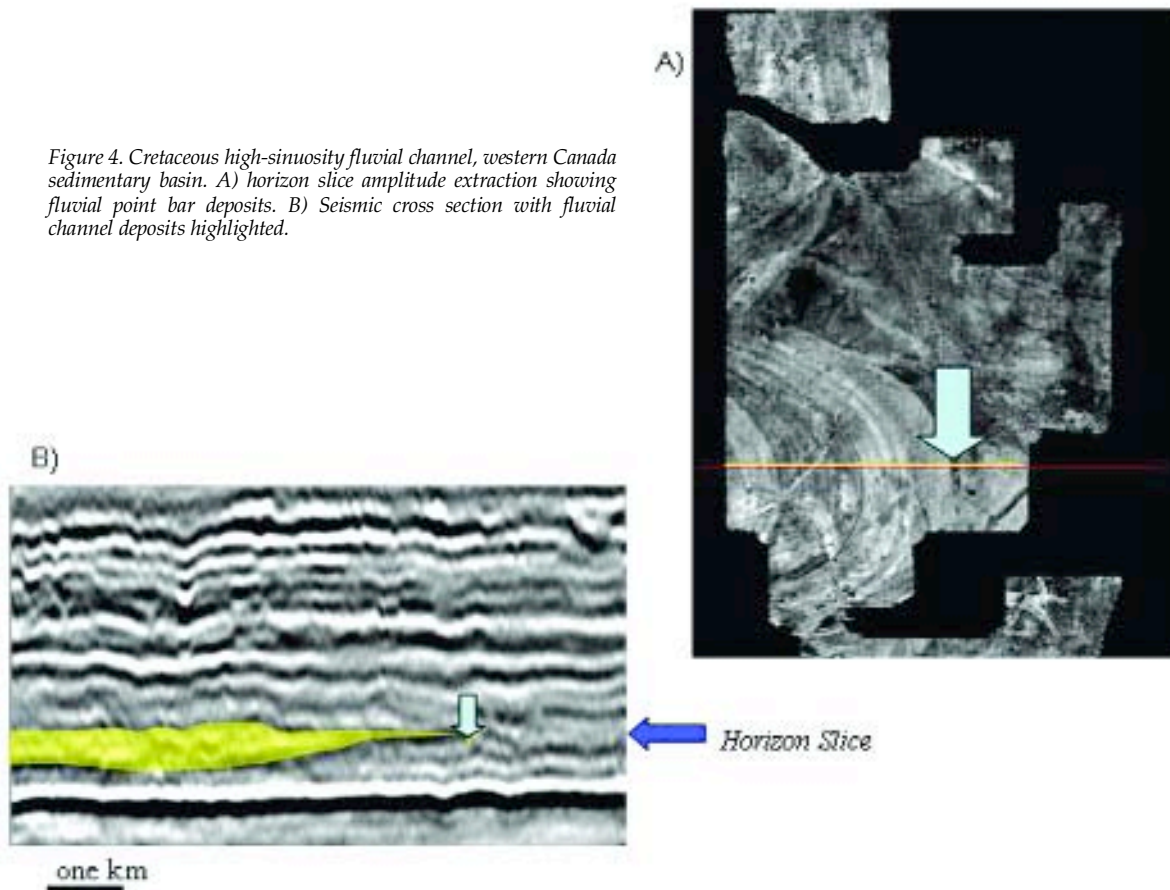


Figure 3. Cretaceous distributary channel, western Canada sedimentary basin. Three seismic attributes are shown: A) Near-reflection geometry interval attribute, B) Horizon slice reflection amplitude, and C) Maximum positive polarity interval attribute. Vertical seismic section is shown in B. C) Well-log cross section across distributary channel

Figure 4. Cretaceous high-sinuosity fluvial channel, western Canada sedimentary basin. A) horizon slice amplitude extraction showing fluvial point bar deposits. B) Seismic cross section with fluvial channel deposits highlighted.



Reducing reservoir risk using 3D-seismic...

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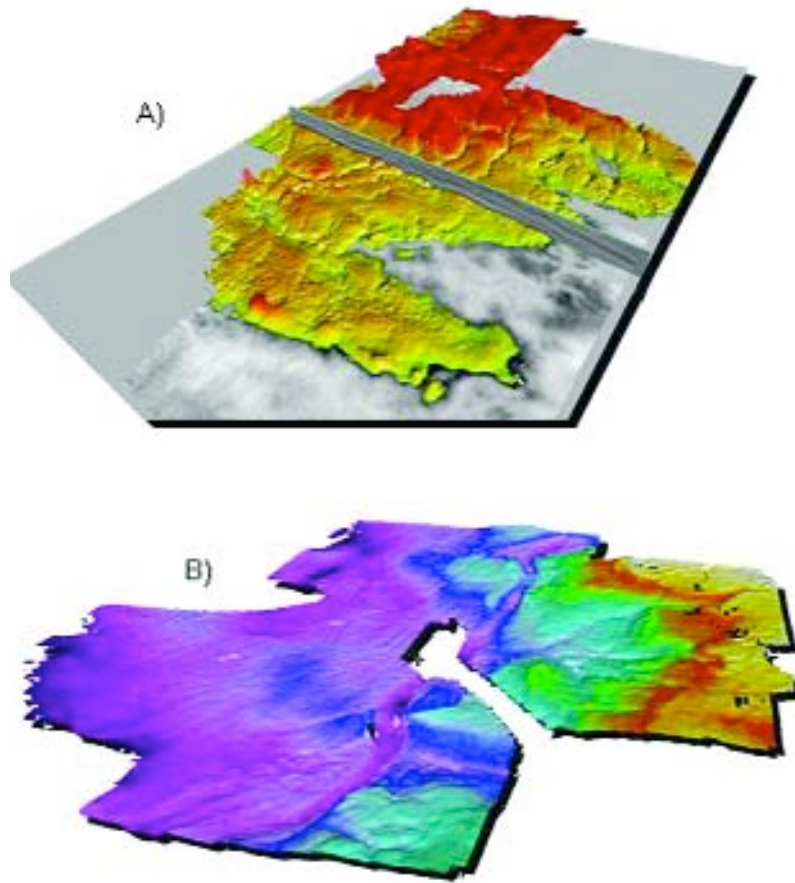


Figure 5. A) Small fluvial channel, Devonian, western Canada sedimentary basin. Perspective view with time structure draped onto the horizon. B) Time structure mapped onto base Cretaceous unconformity, characterized by fluvial channels incised into Devonian carbonates.



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Continued from Page 6

- Utilize existing courses from organizations such as Enform and resources from organizations such as CERL, the Centre for Energy and others, to get pertinent information and training materials in the hands of students;
- Develop an oil and gas orientation program for educators (for example, the "Oil and Gas 101" course in Nova Scotia that was created specifically for secondary teachers);
- Work with school districts and educators to offer basic safety training as an option in high school, which could include H2S Alive, WHMIS (or Petroleum Safety Training), First Aid (with Transportation Endorsement), GODI, TDG.
- Develop partnerships that increase interaction between industry and high schools, for instance, team-teaching, industry mentorship program, guest speakers, and guided field trips such as Seismic In Motion and Project Heavy Duty;
- Provide learning materials that increase the emphasis on science subjects across the school curriculum (including Grades K-5, 6-9 and 10-12);
- Develop new materials and create links into standard curriculum for sciences and trades showing how various aspects of industry lead to a career;
- Offer interactive opportunities for students to visit job sites, take practicum positions or experience working environments in oil & gas.

Enform, together with the Petroleum Human Resources Council of Canada, would form a nucleus which can effectively represent industry interests, while promoting careers and delivering world class training. No formal relationship currently exists between the two organizations, so a first step would be to define their roles and to design a stable funding model for the PetroHRC. Whether this would be best accomplished through a strategic partnership, a joint venture or a merger requires further research and consideration.

While the human capital shortage presents distinct and serious challenges, the prospects for the Upstream Oil & Gas Industry will remain positive if a unified and coordinated approach is taken in developing the necessary solutions. *R*

From the Thursday Files

The most aggravating thing about the younger generation is that I no longer belong to it.
— John Dryden