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NEXT-GENERATION SEISMIC TECHNOLOGY

The Middle East Technology Forum "Geophysics, From Planning to Final Image" was organized by Input/Output on February 21-23, 2005, at the Hatta Fort Hotel, United Arab Emirates. The forum brought together 50 managers and technical experts from leading oil & gas companies, service contractors and academics. The 15 presentations covered many developments in current trends and next-generation seismic technologies.

After a welcome by I/O's Mike Burrett, keynote speakers Kamal Al-Yahya (Saudi Aramco) and Paul Brettwood (I/O) explained their vision for Seismic in 2020, and the challenge of imaging the subsurface with much higher resolution, especially with full-wave imaging.

Full-wave Vectorseis imaging includes wide-azimuth survey designs, high vector fidelity 3-component single point sensors and the application of advanced processing techniques. In the Middle East, Petroleum Development Oman pioneered full-wave imaging on the giant Natih field in Oman (see Hitchings and Potters, GeoArabia, 2000, p. 511-524). The Natih field survey was acquired with three vibrator sources (P-Wave and two perpendicular S-Wave) and 3-component geophones, thus resulting in a 9-component 3-D image (9C3D). The survey significantly improved the fault/fracture model of the Cretaceous Natih reservoir, and resulted in better locations for development wells and reservoir management.

Former SEG President, Peter Duncan (MicroSeismic), led the next forum session by explaining how microseismic events can be used to image the subsurface in difficult terrains using passive receivers. This new technique may be applicable in the Middle East where variable, near-surface zones (like sand dunes and buried wadis) make acquisition of seismic data difficult. In contrast to microseismic events, the other presentations relied on more conventional seismic sources and techniques. They included multi-component, full-wave imaging both onshore and offshore by M. Gorski (Geofizyka Torun), Paul Brettwood and Mike Hall (both with I/O). Presentations by Paul Brettwood, Alan Faichney (I/O Concept Systems), Mike Hall (I/O GX-Technology), and Chris Walker (RXT) described

improved offshore (OBC, PP & PS) and onshore acquisition techniques (full-wave acquisition), while Saudi Aramco's Hashim Hussain showed the results of shaped-sweep Vibroseis tests in Saudi Arabia.

Near-surface velocity variations continue to be one of the primary challenges faced by seismic techniques. Peter Bell (Central Geophysical Services) showed how VSP data can be used to address this problem. How to integrate seismic across the value chain was presented by Jorge Machnizh (I/O). Karl-A. Berteussen (The Petroleum Institute, Abu Dhabi) added a financial perspective to the forum with a presentation on the value of seismic data.

The objective of obtaining greater vertical resolution at the reservoir level (perhaps 50 feet by 2020) was raised by Al-Yahya in his keynote speech, and addressed in more detail by M. Al-Marhoon (Saudi Aramco). An innovative 3-D processing and imaging technique was shown by Tariq Alkhalifa (King Abdul Aziz City for Science and Technology, KACST), and his paper has been submitted for publication in GeoArabia. Improved resolution through wide-azimuth processing in heterogeneous media was illustrated with a case study by Mike Hall.

Roundtable discussions focused on new technologies for improved oil and gas recovery, and the benefits of digital full-wave imaging, from improved image quality to increased operational efficiency. One participant stated: "This forum gave us the opportunity to network with other key players and stay abreast of emerging technologies. Altogether excellent! We generated some very interesting ideas for the future."

Commenting on the forum, Jorge Machnizh (President of I/O's Imaging Systems Group) said: "The Middle East plays a significant role in the global energy market. This forum is just one example of how we are ensuring that our developments in seismic imaging solutions align directly with the business needs and growth demands in the Middle East, and meet the requirements of both seismic contractors and E&P operators." I/O is becoming increasingly active in the Middle East, and intends to conduct regular forums in this region.