Land Based Vertical Seismic Profiling in Canada

case study
oil & gas


Courtesy of www.aquistore.ca

Challenge Using Fibre Optic Sensing for time lapse monitoring of injected fluid and compare with existing electronic technology. This entailed creating geophone equivalent VSP seismic data from a fibre optic cable cemented behind casing of a near vertical well.

Solution Silixa's iDAS™ provided VSP seismic data acquired from both a singlemode and a multimode fibre from the cemented behind casing FO cable. Using Silixa's advanced algorithms, the signal to noise ratio was significantly improved and data converted to geophone equivalent units. This enabled direct comparison with a conventional VSP tool that acquired data simultaneously in the same well.

Results The iDAS results after migration are superior when compared to geophones regardless of the fibre type. Geophone equivalent processing can be used to produce iDAS traces which have the same phase-alignment as the conventional geophone traces. Since the sensor is permanently fixed in the well and tolerant to temperature, repeat surveys will eliminate position and drift errors. The full well aperture and high channel density of iDAS fibre optic surveys give the data processors much more earth signal with which to create a superior image.

Introduction

In 2013, Silixa's technology was used for time-lapse VSP monitoring of CO2 injection at the Aquistore well site in SE Saskatchewan. The project is part of long-term sequestration of CO2 from a coal-fired power plant. Monitoring will be needed to confirm the CO2 does not migrate away from the storage formation. This same time-lapse technique can also be used for EOR and identifying stranded reserves in oil fields.

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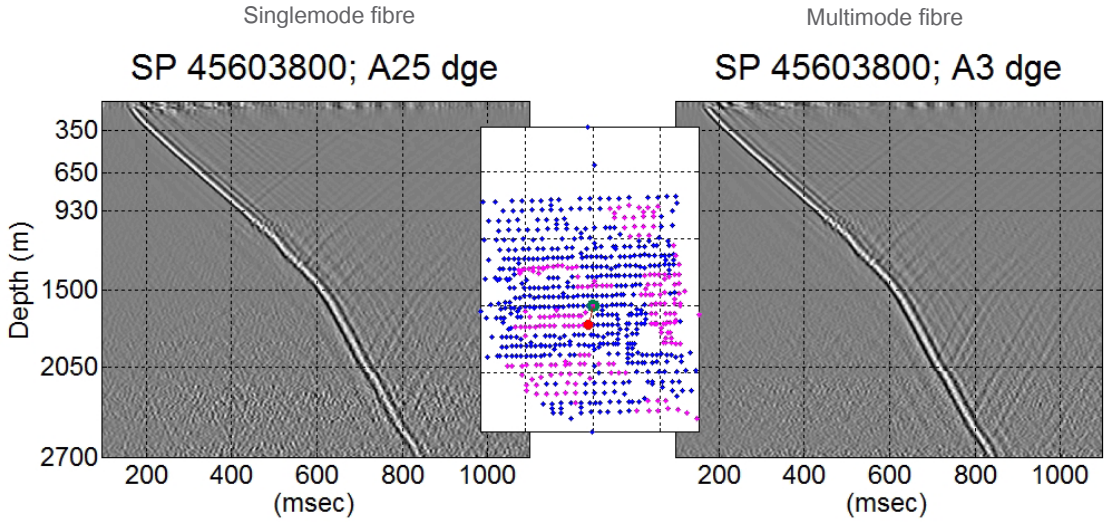
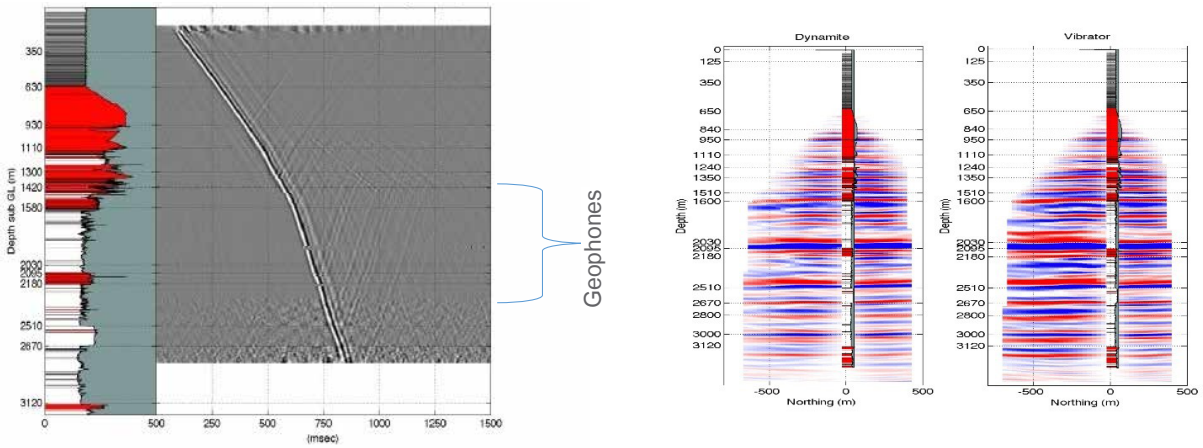
Conclusions

The presence of geophones in combination with permanently installed optical fibre allowed for a direct comparison of iDAS output with geophone output. Geophones are the conventional form of acquiring one off VSP data but CO2 projects are of such long term, harsh conditions, that geophones are not practical. Fibre optics have no electronics to fail and being made of glass are highly stable. Perfect for a permanent sensor. The fibre optic cable within this well featured both singlemode and multimode fibre. Typically, single mode is for acoustics and multimode is for temperature but iDAS is unique in that it can be used on both types of fibre. This project also provided an opportunity to do a direct comparison of iDAS seismic data acquired with the two fibre types and two source types.



Singlemode fibre with 60 level geophone superimposed



Reference:

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