Unique strategies are required to develop unconventional reservoirs such as those found in shale, tight gas and oil, and oil sand formations. Recent advances in exploration, drilling, and completion technologies have unlocked new plays in North America. The E&P industry strives to develop these resources more cost-effectively, accelerating demand for information to locate sweet spots to exploit. High-quality 3-D multicomponent seismic data can play a key role in achieving that objective.

To enable E&P companies to better understand unconventional reservoirs, ION developed 3-D multicomponent onshore reservoir imaging and characterization programs called ResSCANs. Unlike traditional seismic programs, ION’s programs are designed to deliver rock property and engineering parameters. Essential to the programs’ success is the use of multicomponent seismic data acquired with full-azimuth geometries. Multicomponent seismic data provide a more detailed and accurate view of in situ stress and rock and natural fracture properties in unconventional reservoirs.

A comprehensive solution integrating a wide variety of disciplines is required to resolve reservoir development questions. ION’s ResSCAN workflow integrates upfront geological, petrophysical, and rock physics analyses to establish which seismic attributes best predict key reservoir properties and, most importantly, impact drilling and completions decisions.

Through these programs and its integrated microseismic offering, ION is proving the value of multicomponent data to address the three key uncertainties in unconventional reservoirs – geohazard identification, reservoir quality, and completions effectiveness. With this insight, operators can focus their drilling plans on the most productive acreage and define more cost-effective completions designs, essential in today’s oil and gas price environment.

ION’s 10 ResSCAN programs cover more than 3,626 sq km (1,400 sq miles) across the Marcellus, Niobrara, and Mississippi Lime shale plays and have delivered key insights. For example, ION’s Krause ResSCAN program in Tioga County of north-central Pennsylvania has demonstrated that large J1 fault systems are rooted in mobile salt and produce sag structures into the salt, structures that are steadfastly avoided by operators drilling lateral wells. Instead, laterals are placed between these large J1 fault systems in areas that are clearly orthorhombically fractured as indicated by downward and upgoing P (PP) velocity anisotropy. ION is able to quantify this anisotropy due to its full-azimuth