

# Arctic Operational Services

## UNIQUE, COLLABORATIVE APPROACH

The Arctic presents unique imaging challenges. To properly assess the subsurface in this complex environment, our customers are applying novel, integrated technical services designed by highly skilled industry professionals of ION's GeoVentures group. By first identifying project objectives, our team of experts works backwards through the workflow to develop the most effective, state-of-the-art technologies and methods available.

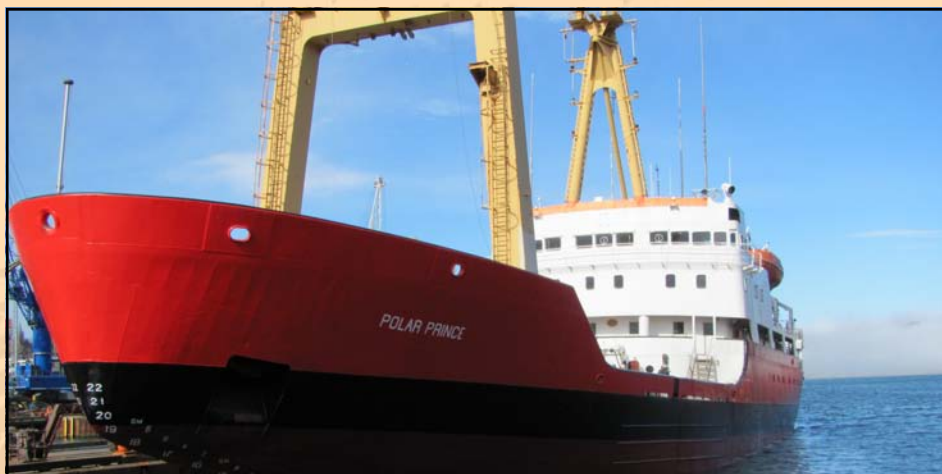


## EXPERIENCE IN THE ARCTIC

ION has been on the forefront of Arctic exploration activity since 2006. Over the last few years, ION has acquired over 35,000 km of seismic data in the Arctic through multi-client programs in Greenland, the Canadian Beaufort, and US Chukchi seas. In 2009, ION acquired the first in-ice, long-offset, marine towed streamer survey off of Northeast Greenland. Collectively known as ArcticSPAN™, these geologically-driven, basin-scale programs help oil and gas operators better understand the petroleum systems of these frontier regions and more effectively determine the Arctic's hydrocarbon potential.

## EXTENDING THE WEATHER WINDOW

Since 2006, ION has been working to extend the very short operational season common in the Arctic due to extreme weather conditions and vast polar ice. This effort extends to both traditional seismic operations and sight surveys. To ensure our customers' success, ION has secured the long term services of a multi-purpose medium duty ice breaker, the Polar Prince, with specifications designed to handle complex operations in harsh climates characteristic of the Arctic. The Polar Prince offers a complete suite of high-resolution, geo-technical services.



Polar Prince—A multi-purpose vessel suitable for Arctic seismic operations support and high resolution surveys

## Built-to-Fit Toolkit

ION's highly skilled program management team with extensive Arctic expertise pulled together a complete solution in 2009 to image the Northeast Greenland coast, an area thought to be one of the largest untapped reserves. Northeast Greenland presented the challenge of possessing the heaviest concentration of seasonal polar ice due to the Arctic Ocean outflow through the Fram Straits. In response ION custom-designed equipment and services that enabled long offset acquisition under the ice in areas thought to be previously inaccessible. ION's success in Northeast Greenland is breaking barriers on what is possible in the Arctic by:

- Increasing Arctic operating window
- Improving operational success
- Expanding exploration opportunities
- Mitigating risk in the field
- Reducing operational costs

ION is the "go-to" company when it comes to customized seismic imaging programs to meet your Arctic exploration needs. You can count on ION's proven experience, leading-edge toolkit, and world-renowned team of geoscientists and seismic operations experts to maximize the economic value of your resource play.

## ARCTIC SIGHT SURVEY SERVICES - POLAR PRINCE

- Vessel is capable of single beam, dual frequency bathymetry surveys with its ODOM CV - 200 echosounder
- ION, in cooperation with NCS Subsea, can provide a full suite of hi-res capabilities utilizing the Polar Prince as the base platform
  - Multibeam bathymetry
  - High resolution seismic
  - Sidescan sonar
  - Sub-bottom profiling
  - Seafloor sampling and classification
- Vessel is fitted with tow points, booms for multi-sensor towing, and a stern A-frame for equipment handling
- Vessel has three point mooring system

## START-TO-FINISH ARCTIC GEOPHYSICAL LAND AND MARINE OFFERINGS

ION delivers integrated technologies and services throughout the seismic workflow, reducing E & P risks, lowering costs, and increasing operational efficiencies:

- Feasibility Studies
  - Forward modeling based on geologic understanding, physical measurements, and project requirements
- Survey Design & Planning
  - Ensuring field effort will deliver the required image efficiently
- Data Acquisition
  - Project management
  - Technology application
  - Identify, assess, mitigate risk
  - Service delivery
- Data Processing by ION's GX Technology Experts
  - Focusing on Image-Driven™ quality
- Reservoir Analysis
  - Unlocking the secrets of your reservoir



ION's Unique Arctic Capabilities



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