ION GEOPHYSICAL CORP
Form 10-K
February 08, 2018

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549
Form 10-K
(Mark One)
þ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the Fiscal Year Ended December 31, 2017
or
¨ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
Commission file number 1-12691
ION Geophysical Corporation
(Exact Name of Registrant as Specified in Its Charter)

Delaware	22-2286646
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)

2105 CityWest Blvd
Suite 100
Houston, Texas 77042-2839
(Address of Principal Executive Offices, Including Zip Code)
(281) 933-3339
(Registrant's Telephone Number, Including Area Code)
Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, $0.01 par value	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act:
None
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ¨ No þ
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act Yes ¨ No þ
Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes þ No ¨
Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes þ No ¨
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ¨
Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer", "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	o	Accelerated filer	o
Non-accelerated filer	o (Do not check if a smaller reporting company)	Smaller reporting company	ý
		Emerging growth company	o

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ¨

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ¨ No þ

As of June 30, 2017 (the last business day of the registrant's second quarter of fiscal 2017), the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was $45.3 million based on the closing sale price per share ($4.35) on such date as reported on the New York Stock Exchange.

As of February 6, 2018, the number of shares of common stock, $0.01 par value, outstanding was 12,022,201 shares.

DOCUMENTS INCORPORATED BY REFERENCE

Document	Parts Into Which Incorporated
Portions of the registrant's definitive Proxy Statement for its Annual Meeting of Stockholders scheduled to be held on May 17, 2018, to be filed pursuant to Regulation 14A	Part III

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PART I

Preliminary Note: This Annual Report on Form 10-K contains "forward-looking statements" as that term is defined in the Private Securities Litigation Reform Act of 1995. Forward-looking statements should be read in conjunction with the cautionary statements and other important factors included in this Form 10-K. See Item 1A. "Risk Factors" for a description of important factors which could cause actual results to differ materially from those contained in the forward-looking statements.

In this Form 10-K, "ION Geophysical," "ION," "the company" (or, "the Company"), "we," "our," "ours" and "us" refer to ION Geophysical Corporation and its consolidated subsidiaries, except where the context otherwise requires or as otherwise indicated. Certain trademarks, service marks and registered marks of ION referred to in this Form 10-K are defined in Item 1. "Business — Intellectual Property."

Item 1. Business

We are a global, technology-focused company that provides geoscience products, services and solutions to the global oil and gas industry. Our offerings are designed to allow oil and gas exploration and production ("E&P") companies to obtain higher resolution images of the Earth's subsurface to reduce their risk in hydrocarbon exploration and development. We acquire, process and interpret seismic data from seismic surveys on a multi-client or proprietary basis. Seismic surveys for our multi-client data library business are pre-funded, or underwritten, in part by our customers, and, with the exception of our ocean bottom seismic ("OBS"), data acquisition services company, OceanGeo B.V. ("OceanGeo"), we contract with third party seismic data acquisition companies to acquire the seismic data, all of which is intended to minimize our risk exposure. We serve customers in most major energy producing regions of the world from strategically located offices in 23 cities on six continents.

Seismic imaging plays a fundamental role in hydrocarbon exploration and reservoir development by delineating structures, rock types and fluid locations in the subsurface. Our technologies, services and solutions are used by E&P companies to generate high-resolution images of the Earth's subsurface to identify hydrocarbons and pinpoint drilling locations for wells.

We provide our services and products through three business segments - E&P Technology & Services, E&P Operations Optimization, and Ocean Bottom Seismic Services. In addition, we have a 49% ownership interest in our INOVA Geophysical Equipment Limited joint venture ("INOVA Geophysical," or "INOVA").

For decades, we have provided innovative seismic data acquisition technology, such as multicomponent imaging with VectorSeis® products, technology to record seismic data below ice, and cableless seismic acquisition technology. The advanced technologies we currently offer include our Orca® and Gator™ command and control software systems, WiBand® broadband data processing technology, 4Sea® OBS acquisition system, Marlin™ operations optimization solution and other technologies, each of which is designed to deliver improvements in image quality, productivity and/or safety. We have approximately 500 patents and pending patent applications in various countries around the world. Approximately 48% of our employees are involved in technical roles and over 24% of our employees have advanced degrees.

E&P Technology & Services. Our E&P Technology & Services business provides three distinct service activities that often work together.

Our E&P Technology & Services business focuses on providing products and services that help E&P companies, National Oil Companies ("NOCs") and private equity firms maximize the value of their assets throughout the E&P lifecycle.

Our Ventures group provides full-scope two-dimensional ("2-D") and three-dimensional ("3-D") multi-client and proprietary programs, including survey design and planning, data acquisition, project management, advanced processing and imaging services, reservoir characterization, and interpretation. Our Ventures group focuses on the geologically intensive components of the image development process, such as survey planning and design, and data processing and interpretation, outsourcing the logistics components (such as field acquisition) to experienced seismic and other geophysical contractors. Our global data library consists of over 550,000 km of 2-D and over 150,000 sq km of 3-D multi-client seismic data in virtually all major offshore petroleum provinces. In addition, we have 3-D ResSCAN onshore imaging, characterization and microseismic monitoring programs.

Our Imaging Services group offers data processing and imaging services designed to help our E&P customers reduce exploration and production risk, evaluate and develop reservoirs, and increase production. We have more than 24 petabytes of digital seismic data storage in 4 global data centers, including two core data centers located in Houston and in the U.K.

Our E&P Advisors group partners with E&P operators, energy industry regulators and capital institutions to capture and monetize E&P opportunities worldwide. This group provides technical, commercial and strategic advice across the E&P value chain, working at basin, prospect and field scales.

E&P Operations Optimization. Our E&P Operations Optimization business combines our Optimization Software & Services and Devices offerings.

Our Optimization Software & Services business provides command and control software systems, related software and services for marine towed streamer and ocean bottom seismic operations, as well as survey design. Our Orca software system is installed on towed streamer vessels worldwide, and our Gator software is utilized on many ocean bottom seismic surveys.

Our Marlin solution is designed to optimize operations for a variety of offshore industries with simultaneous operations challenges such as seismic data acquisition, E&P assets, supply vessel management, offshore wind farm management, and others.

Our 4-D (time lapse) and wide-azimuth survey operations is designed to offer consulting services for planning and supervising complex surveys.

Our Devices business is engaged in the manufacture and repair of marine towed streamer acquisition and positioning systems and analog geophone sensors.

Ocean Bottom Seismic ("OBS") Services. We offer a fully integrated OBS solution designed to maximize seismic image quality, operational efficiency and safety. The integrated OBS solution includes expert survey design, planning and optimization, superior data captured using multicomponent acquisition systems available exclusively to OceanGeo; data acquisition by the experienced team at OceanGeo; and data processing, interpretation and reservoir services, by our Imaging Services experts. In addition, OceanGeo is engaged in the manufacture of redeployable ocean bottom cable seismic data acquisition systems.

INOVA Geophysical. We conduct our land seismic equipment business through INOVA Geophysical, a joint venture with BGP Inc., a subsidiary of China National Petroleum Corporation ("CNPC"). BGP is generally regarded as the world's largest land geophysical service contractor. BGP owns a 51% equity interest in INOVA Geophysical, and we own the remaining 49% interest. INOVA manufactures land seismic data acquisition systems, digital sensors, vibroseis vehicles (i.e., vibrator trucks), and energy source controllers. We wrote our investment in INOVA down to zero as of December 31, 2014.

Seismic Industry Overview

1930s – 1970s. Since the 1930s, oil and gas companies have sought to reduce exploration risk by using seismic data to create an image of the Earth's subsurface. Seismic data is recorded when listening devices placed on the Earth's surface, ocean bottom floor, or carried within the streamer cable of a towed streamer vessel, measure how long it takes for sound vibrations to echo off rock layers underground. For seismic data acquisition onshore, the acoustic energy producing the sound vibrations is generated by the detonation of small explosive charges or by large vibroseis (vibrator) vehicles. In marine acquisition, the energy is provided by a series of source arrays that deliver compressed air into the water column.

The acoustic energy propagates through the subsurface as a spherical wave front, or seismic wave. Interfaces between different types of rocks will both reflect and transmit this wave front. Onshore, the reflected signals return to the surface where they are measured by sensitive receivers that are analog coil-spring geophones. Offshore, the reflected signals are recorded by either hydrophones towed in an array behind a streamer acquisition vessel or by multicomponent geophones or MEMS sensors that are placed directly on the ocean floor. Once the recorded seismic energy is processed using advanced algorithms and workflows, images of the subsurface can be created to depict the structure, lithology (rock type), fracture patterns, and fluid content of subsurface horizons, highlighting the most promising places to drill for oil and natural gas. This processing also aids in engineering decisions, such as drilling and completion methods, as well as decisions affecting overall reservoir production and economic decisions relating to drilling risk and reserves in place.

Typically, an E&P company engages the services of a geophysical acquisition contractor to develop a seismic survey design, secure permits, coordinate logistics, and acquire seismic data in a selected area. The E&P company generally relies on third parties, such as ION, to provide the contractor with equipment, navigation and data management software, and field support services necessary for data acquisition. After the data is collected, the same geophysical contractor, a third-party data processing company, or the E&P company itself will process the data using proprietary algorithms and workflows to create a series of seismic images. Geoscientists then interpret the data by reviewing the

images of the subsurface and integrating the geophysical data with other geological and production information such as well logs or core information.

During the 1960s, digital seismic data acquisition systems (which converted the analog output from the geophones into digital data for recording) and computers for seismic data processing were introduced. Using the new systems and computers, the signals could be recorded on magnetic tape and sent to data processors where they could be adjusted and corrected for known distortions. The final processed data was displayed in a form known as “stacked” data. Computer filing, storage, database management, and algorithms used to process the raw data quickly grew more sophisticated, dramatically increasing the amount of subsurface seismic information.

1980s. Until the early 1980s, the primary commercial seismic imaging technology was 2-D. 2-D seismic data is recorded using a single line of receivers. Once processed, 2-D seismic data allows geoscientists to see only a thin vertical slice of the Earth, and that image may be distorted by reflections originating out of the place of the receiver line. A geoscientist using 2-D seismic technology must speculate on the characteristics of the Earth between the slices and attempt to visualize the true 3-D structure of the subsurface.

The commercial development of 3-D imaging technology in the early 1980s was an important technological milestone for the seismic industry. Previously, the high cost of 3-D seismic data acquisition techniques and the lack of computing power necessary to process, display, and interpret 3-D data on a commercial basis slowed its widespread adoption. Today's 3-D seismic techniques record the reflected energy across a patch of receivers that collectively provide a more holistic, spatially-sampled depiction of geological horizons and, in some cases, rock and fluid properties, within the Earth.

3-D seismic data and the associated computer-based processing platforms enable geoscientists to generate more accurate subsurface maps than could be constructed from 2-D seismic lines. In particular, 3-D seismic data provided more detailed information about and higher-quality images of subsurface structures, including the geometry of bedding layers, salt structures, and fault planes. The improved 3-D seismic images enabled the oil and gas industry to discover new reservoirs, reduce finding and development costs, and lower overall hydrocarbon exploration risk. Driven by faster computers and more sophisticated mathematical equations to process the data, the technology advanced quickly.

1990s. As commodity prices decreased in the late 1990s and the pace of innovation in 3-D seismic imaging technology slowed, E&P companies slowed the commissioning of new seismic surveys. Also, business practices employed by geophysical contractors impacted demand for seismic data. In an effort to sustain higher utilization of existing capital assets, geophysical contractors increasingly began to collect speculative seismic data for their own data libraries in the hopes of selling it later to E&P companies. There became an abundance of speculative multi-client data in many regions. Additionally, since contractors incurred most of the costs of this speculative seismic data at the time of acquisition, contractors lowered prices to recover as much of their investment as possible, which drove operating margins down. During the 1990's, the accuracy of 3-D seismic surveys improved to the point that a survey acquired after significant oil production could be compared to a pre-production survey, and a map of the drainage pattern of the reservoir could be produced. This technique became known as time lapse, or 4-D seismic.

2000s. The conditions from the 1990s continued to prevail until 2004-2005, when commodity prices began increasing and E&P companies increased capital spending programs, driving higher demand for our services and products. During this time, the use of horizontal drilling and hydraulic fracturing increased, as onshore North American production became economically viable with higher oil prices. These techniques, used to extract oil from and gas from unconventional reservoirs, made once "hard to produce" oil and gas accessible and caused an upsurge in North American onshore oil and gas activity.

The financial crisis that occurred in 2008 and the resulting economic downturn drove hydrocarbon prices down sharply, reducing exploration activities in North America and in many parts of the world. However, crude oil prices rebounded and were fairly consistent from 2011-2014 exceeding $100 per barrel, and U.S. oil production exceeded even the most optimistic forecasts. In late 2014, however, oil prices began to decline significantly, dropping by approximately half and continued into 2015 and 2016 as signs emerged that non-U.S. demand was weakening. Throughout 2014-2017, oil companies prioritized shareholder returns and cash flow generation over hydrocarbon resource growth, minimizing discretionary spending and shifting their focus from exploration to production. This shift caused a contraction in E&P spending, especially on seismic data and services for exploration. In addition, oil and gas companies have tended to shift toward reprocessing existing seismic data as a more cost-effective alternative to acquiring new data where possible.

Our Strategy

The key elements of our business strategy are to:

- Leverage our key technologies to provide integrated solutions to oil and gas companies, across the entire E&P lifecycle. More of our customers are seeking fully integrated offerings from seismic companies, from survey planning and design, to leading technology differentiation in acquisition and processing. We have transformed our company

from an equipment provider to an integrated service provider, where leading equipment and software technologies underpin our solution offerings. The growth in our E&P Technology & Services business over the past decade is a testament to our steadfast execution of this strategy. Whereas our E&P Technology & Services offerings, including our BasinSPAN™ 2-D seismic programs, were focused on the earlier frontier exploration phase of the E&P lifecycle, our newest offering, OBS Services through OceanGeo, is geared to the later, production phase of the E&P lifecycle leveraging our internally developed technology, including 4Sea®, our newest OBS data acquisition system.

- Expand and globalize our E&P Technology & Services business. We seek to expand and grow our E&P Technology & Services business into new regions, with new customers and new offerings, including data processing services through our Imaging Services group and our Ventures multi-client and proprietary programs. Historically known for our 2-D programs, we entered the 3-D multi-client market in 2013 by acquiring and processing our first survey offshore Ireland. Since then, we have expanded our 3-D seismic data library considerably by purchasing existing seismic data and reimaging the data by using new data processing techniques and algorithms. For the foreseeable future, we expect the majority of our near-term investments to be in research and development and computing infrastructure for our data processing business and to support our multi-client projects. We believe this focus better positions our company as a full-service technology company with an increasing proportion of revenues derived from E&P customers.
- Continue investing in advanced software and equipment technology to provide next generation services and products. We intend to continue investing in the development of new technologies for use by E&P companies. In particular, we intend to focus on the development of the next generation of our OBS technology, our Marlin operations optimization software, and derivative products, with the goal of obtaining technical and market leadership in what we continue to believe are important and expanding markets. In 2017, our total investment in research and development and engineering was equal to approximately 8% of our total net revenue for the year.
- Collaborate with our customers to provide products and solutions designed to meet their needs. A key element of our business strategy has been to understand the challenges faced by E&P companies in seismic survey planning, data acquisition, processing, and interpretation. We will continue to develop and offer technology and services that enable us to work with E&P companies to solve their unique challenges around the world. We have found collaborating with E&P companies to better understand their imaging challenges and working with them to ensure the right technologies are properly applied, is the most effective method for meeting their needs. Our goal of being a full solutions provider to solve the most difficult challenges for our customers is an important element of our long-term business strategy, and we are implementing this partnership approach globally through local personnel in our regional organizations who understand the unique challenges in their areas. We formed an E&P Advisors group in 2015 designed to focus specifically on this element of our strategy.

Our Strengths

We believe that we are solidly positioned to successfully execute the key elements of our business strategy based on the following competitive strengths:

- We are leveraging our key technologies to provide integrated solutions to oil and gas companies. More of our customers are seeking fully integrated offerings from seismic companies, from survey planning and design, to leading technology differentiation in acquisition and processing. ION has become an integrated solution provider for both towed streamer and ocean bottom seismic services.
- We are a broad-based seismic solutions provider, with offerings spanning the entire geophysical workflow. We are a technology-focused service provider, with offerings that span the entire seismic workflow, from survey planning and data acquisition to processing and interpretation. Our offerings include seismic data acquisition hardware, data acquisition services, command and control software, value-added services associated with seismic survey design, seismic data processing and interpretation, and multi-client seismic data libraries.
- Our “asset light” strategy enables us to avoid significant fixed costs and to remain financially flexible. We do not own a fleet of marine vessels and, with the exception of OceanGeo, we do not provide our own crews to acquire seismic data. We outsource a majority of our seismic data acquisition activity to third parties that operate their own fleets of seismic vessels and equipment. Doing so enables us to avoid fixed costs associated with these assets and personnel and to manage our business in a manner designed to afford us the flexibility to quickly decrease our costs or capital investments in the event of a downturn, as we experienced from 2014-2016. Similar to our asset light strategy, Schlumberger recently announced their plans to exit the land and marine acquisition business. We actively manage the costs of developing our multi-client data library business by requiring our customers to partially pre-fund, or underwrite, the investment for any new project. Our target goal is to have a vast majority of the total cost of each new project’s data acquisition to be underwritten by our customers. We believe this conservative approach to data library investment is the most prudent way to reduce the impact of any sudden reduction in the demand for seismic data,

giving us the flexibility to aggressively reduce cash outflows as we have successfully implemented in the current industry downturn.

- Our global footprint and ability to work in harsh conditions allow us to offset regional downturns. Our focus on conducting business around the world, even in the harshest and most extreme environments, has been and will continue to be a key component of our strategy. This global focus and diversified portfolio approach has been helpful in minimizing the impact of any regional or country-specific slowdown for short or extended periods of time.

- We have a diversified and blue chip customer base. We provide services and products to a diverse, global customer base that includes many of the largest oil and gas and geophysical companies in the world, including NOCs and International Oil Companies ("IOCs"). Over the past decade, we have made significant progress in expanding our customer list and revenue sources. Whereas almost all of our revenues in the early 2000s were derived principally from seismic service providers, in 2017, E&P companies accounted for approximately 73% of our total revenues. Although we provide services and products to some of the largest E&P companies in the world, no single customer accounted for more than 10% of our total revenue in 2016 and 2015; in 2017, we had one multi-national oil customer that exceeded 10% of our total revenue.

Services and Products

E&P Technology & Services Segment

Our E&P Technology & Services segment includes the following:

Ventures — Our Ventures group provides complete seismic data services, from survey planning and design through data acquisition to final subsurface imaging and reservoir characterization. We work backwards through the seismic workflow, with the final image in mind, to select the optimal survey design, acquisition technology, and processing techniques.

We offer our services to customers on both a proprietary and multi-client (non-exclusive) basis. In both cases, the customers generally pre-fund a majority of the survey costs. The period during which our multi-client surveys are being designed, acquired or processed is referred to as the "New Venture" phase. For proprietary services, the customer has exclusive ownership of the data. For multi-client surveys, we generally retain ownership of or long-term exclusive marketing rights to the data and receive ongoing revenue from subsequent data license sales.

Since 2002, we have acquired and processed a growing multi-client data library consisting of non-exclusive marine and ocean bottom data from around the world. The majority of the data licensed by ION consists of ultra-deep 2-D seismic data that E&P companies use to evaluate petroleum systems at the basin level, including insights into the character of source rocks and sediments, migration pathways, and reservoir trapping mechanisms. In some cases, we extend beyond seismic data to include magnetic, gravity, well log, and electromagnetic information, to provide a more comprehensive picture of the subsurface. Known as "BasinSPAN" programs, these geophysical surveys cover most major offshore basins worldwide and we continue to build on them. In addition to our 2-D multi-client programs, in 2013, we acquired our first 3-D marine proprietary program, then in 2014, in collaboration with Polarcus Limited, a marine geophysical company, we jointly acquired and processed our first 3-D survey offshore Ireland.

In 2016, in collaboration with Schlumberger we began a 3-D multi-client broadband reimaging program offshore Mexico, leveraging Mexico's National Hydrocarbons Commission (CNH) data library. The successful Campeche program has since expanded due to customer demand and now consists of approximately 94,000 km^2 offshore southern Mexico. Since 2016, we have added an additional 70,000 km^2 of 3-D data offshore Mexico (in continued collaboration with Schlumberger) and in Brazil. These programs make up a significant portion of our backlog at December 31, 2017.

We also have a library of 3-D onshore reservoir imaging and characterization programs that provide E&P companies with the ability to better understand unconventional reservoirs to maximize production. Known as "ResSCAN™" programs, these 3-D multicomponent seismic data programs were designed, acquired and depth-imaged using advanced geophysical technology and proprietary processing techniques, resulting in high-definition images of the subsurface.

Imaging Services — Our Imaging Services group provides advanced marine and land seismic data processing and imaging. In addition to applying processing and imaging technologies to data we own or data licensed by our customers, we also provide our customers with seismic data acquisition support services, such as data pre-conditioning for imaging and quality control of seismic data acquisition.

We utilize a globally distributed network of Linux-cluster processing centers in combination with our major hubs in Houston and London to process seismic data using advanced, proprietary algorithms and workflows.

Our Imaging Services team has pioneered several differentiated processing and imaging solutions for both offshore and onshore environments including: Reverse Time Migration (RTM), Surface Related Multiple Elimination (SRME), and WiBand broadband deghosting. In 2013, we commercially released our Full Waveform Inversion and

non-parametric picking tomography techniques to improve subsurface image resolution in areas with complex geologies. The advantages of these techniques are that they allow for the resolution of complex, small-scale velocity variations. In 2014, we introduced PrecisION™, an innovative compressed seismic inversion technique that is designed to build Earth reconstructions with improved accuracy and aid geoscientists in better quantifying exploration and development risk and uncertainty. In 2015, we released our next generation data processing system, Perseus, which removes our dependence on third party software and yielded turnaround improvements of over four times on our key processes. In addition to processing our own 2-D and 3-D

multi-client programs, our proprietary processing and imaging business has been focused on key customers with complex 3-D imaging challenges predominantly in the marine environment for both towed streamer and seabed.
At December 31, 2017, our E&P Technology & Services segment backlog, which consists of commitments for (i) data processing work and (ii) both multi-client New Venture and proprietary projects that have been underwritten, has increased to $39.2 million compared with $33.9 million at December 31, 2016. The majority of the increase in backlog is attributable to our 3-D imaging programs. Our E&P Technology & Services segment's fiscal-year-end backlog includes signed contracts that we can usually fulfill within approximately six months. Investments in our multi-client data library are dependent upon the timing of our New Venture projects and the availability of underwriting by our customers. Our asset light strategy enables us to scale our business to avoid significant fixed costs and to remain financially flexible as we manage the timing and levels of our capital expenditures.
E&P Advisors — Our E&P Advisors group partners with E&P operators, energy industry regulators and capital institutions to capture and monetize E&P opportunities worldwide. This group provides technical, commercial and strategic advice across the exploration and production value chain, working at basin, prospect and field scales. E&P Advisors couple ION's proven technical capabilities with the industry's best commercial and strategic minds to deliver fit-for-purpose solutions, employing a variety of commercial models specific to our clients' needs.
E&P Operations Optimization Segment
Our E&P Operations Optimization segment combines our Optimization Software & Services and Devices offerings. Through this segment, we supply command and control software systems and related services for marine towed streamer and ocean bottom seismic operations. Software developed by our Optimizations Software & Services group is installed on marine towed streamer vessels and used by many ocean bottom survey crews. In addition we, recently began selling existing technology to new customers in scientific, military and academic industries. An advantage of our underlying software platform is that it provides common components from which to build other applications. This enables the acceleration of development and commercialization of new products as market opportunities are identified. Marlin, our newest software solution for optimizing offshore operations is an example where we leveraged the underlying software platform to quickly develop a new offering.
Products and services for our Optimizations Software & Services group include the following:
Towed Streamer Command & Control System - Our command and control software for towed streamer acquisition, Orca, integrates acquisition, planning, positioning, source and quality control systems into a seamless operation.
Ocean Bottom Command & Control System - Gator is our integrated navigation and data management system for multi-vessel OBS, electromagnetic and transition zone operations.
Survey Planning and Optimization - We offer consulting services for planning and supervising complex surveys, including for 4-D (time lapse) and wide-azimuth survey operations. Our acquisition expertise and in-field software platforms are designed to allow clients, including both oil companies and seismic data acquisition contractors, to optimize these complex surveys, improving efficiencies, data quality and reducing costs. Our Orca and Gator systems are designed to integrate with our post-survey tools for processing, analysis and data quality control. Orca and Gator both have modules that enable in-field survey optimization. These modules are designed to enable improved, safer acquisition through analysis and prediction of sea currents and integration of the information into the acquisition plan.
Products of our Devices group include the following:
Marine Positioning Systems — Our marine towed streamer positioning system includes streamer cable depth control devices, lateral control devices, compasses, acoustic positioning systems and other auxiliary sensors. This equipment is designed to control the vertical and horizontal positioning of the streamer cables and provides acoustic, compass and depth measurements to allow processors to tie navigation and location data to geophysical data to determine the location of potential hydrocarbon reserves. DigiBIRD II™ is designed to maintain streamers at pre-defined target depths more safely, efficiently, and cost effectively than ever before by eliminating workboat operations for battery changes on the majority of seismic surveys. DIGIFIN® is an advanced lateral streamer control system that we commercialized in 2008. DIGIFIN® is designed to maintain tighter, more uniform marine streamer separation along the entire length of the streamer cable, which allows for better sampling of seismic data and improved subsurface images. We believe DIGIFIN® also enables faster line changes and minimizes the requirements for in-fill seismic work. In addition to manufacturing new marine positioning system devices, the Devices group also repairs its positioning equipment

previously sold to its customers.

Analog Geophones — Analog geophones are sensors that measure acoustic energy reflected from rock layers in the Earth's subsurface using a mechanical, coil-spring element. We manufacture and market a full suite of geophones and geophone test equipment that operate in most environments, including land surface, transition zone and downhole. Our geophones are used in other industries as well.

Ocean Bottom Seismic Services Segment

ION offers a fully-integrated OBS solution that includes expert survey design, planning and optimization, to maximize seismic image quality; safe, efficient data acquisition by the experienced team at OceanGeo; superior imaging via OceanGeo's exclusive use of our acquisition systems; and data processing, interpretation and reservoir services through ION.

We believe the market for ocean bottom seismic imaging is growing. OBS provides more detailed reservoir imaging typically used for development rather than exploration objectives, leading E&P companies to prioritize in ocean bottom seismic activities, consistent with their desire for higher-quality seismic imaging for complex geological formations and more detailed reservoir characteristics. Since introducing our first ocean bottom acquisition system, VSO, in 2004, we have continued to develop advanced ocean bottom systems.

INOVA Geophysical Products

INOVA manufactures land acquisition systems, including the G3i® HD, ARIES® and Hawk® recording platforms, land source products, including the AHV-IV series, UNIVIB®, and UNIVIB 2 vibroseis vehicles, and source controllers and multicomponent sensors, including the ground-breaking VectorSeis® digital 3C receivers.

Product Research and Development

Our ability to compete effectively in the seismic market depends principally upon continued innovation in our underlying technologies. As such, the overall focus of our research and development efforts has remained on improving both the quality of the subsurface images we generate and the economics, efficiency and quality of the seismic data. In particular, we have concentrated on enhancing the nature and quality of the information that can be extracted from the subsurface images.

Research and development efforts in 2017 targeted the consolidation of key technologies across ION, together with the expansion of our portfolio of product offerings. A range of new technologies have been developed, with an over-arching focus on Ocean Bottom Seismic Services, including new and flexible seismic acquisition optimization and processing tools, as well as in-water control devices which improve the operational efficiency of marine sources.

The Optimization Software & Services group continued development of survey optimization and integration capabilities across the software portfolio as well as with products from the Devices group. Investment continued in the Marlin simultaneous operations tool including the aim of addressing alternative market opportunities.

Development within the Devices group was focused on the new in-water control device, SailWing™, including sea trials and integration with the Orca and Gator software products, as well as further development of the successful Digi family of products, including the automatic Streamer Recovery Device and rechargeable battery option. We continue to invest in the development of new sensors with applicability both within and outside the seismic business.

The seismic data processing group continued to invest in production efficiencies, leading-edge technologies and OBS capabilities. Research continued into advanced imaging techniques such as the extension of Full Waveform Imaging to allow the use of reflection data as well as high-frequency FWI.

As many of these new services and products are under development and, as the development cycles from initial conception through to commercial introduction can extend over a number of years, their commercial feasibility or degree of commercial acceptance may not yet be established. No assurance can be given concerning the successful development of any new service or product, any enhancements to them, the specific timing of their release or their level of acceptance in the marketplace.

Markets and Customers

Our primary customers are E&P companies to whom we market and offer services, primarily multi-client seismic data programs from our Ventures group, imaging-related processing services from our Imaging Services group, and OBS data acquisition services through OceanGeo, as well as consulting services from our E&P Advisors and Optimization Software & Services group. Secondarily, seismic contractors purchase our towed streamer data acquisition systems and related equipment and software to collect data in accordance with their E&P company customers' specifications or for their own seismic data libraries.

A significant portion of our marketing effort is focused on areas outside of the United States. Foreign sales are subject to special risks inherent in doing business outside of the United States, including the risk of political instability, armed conflict, civil disturbances, currency fluctuations, embargo and governmental activities, customer credit risks and risk

of non-compliance with U.S. and foreign laws, including tariff regulations and import/export restrictions.

We sell our services and products through a direct sales force consisting of employees and international third-party sales representatives responsible for key geographic areas. The majority of our foreign sales are denominated in U.S. dollars. During 2017, 2016 and 2015, sales to destinations outside of North America accounted for approximately 76%, 78%