

GEOFORCE DTS®

DEEP-TOW HIGH-RESOLUTION SUB-BOTTOM PROFILING SYSTEM

The development of the **Geoforce DTS®** sub-bottom profiler over more than four decades is an important case study in successful Canadian Government/Private Sector collaboration. It demonstrates how a survey tool can retain its competitiveness in global seafloor mapping through continuous improvements building upon the solid **Huntec Deep-Tow System** core technology.

GEOFORCE DTS® TODAY

The Geoforce DTS® - a deep-tow, high-resolution sub-bottom profiler. **It is the only system to have two acoustic sources (boomer and sparker) integrated into a single tow body.**

The system has been designed for use in the world's toughest offshore environments, where reliability, ease of operation, accuracy and optimal data resolution are essential to survey success.

Geoforce Group Limited has implemented fully digital communications between the towed equipment and topside equipment, resulting in lossless hydrophone and sensor data. The selection of the acoustic source can be controlled by the **Geoforce Cerebella** surface interface.



FEATURES AND CAPABILITIES

Dynamic depth and body motion control system ensures consistent quality of subsurface data acquisition in high sea states.

Tow-body compensated return with full-waveform signal and amplitude preservation, regardless of acoustic output

Boomer Mode Penetration of up to 100m in soft sediments and >10m in sands

Sarker Mode Penetration of >30m in sands

Remote toggle selection between boomer and sparker while tow body is deployed

Real-time selection of optimal sound source and power output in varying seabed conditions

Two channel selection—one channel (internal hydrophone) dedicated to resolution data; the other (streamer) for penetration data

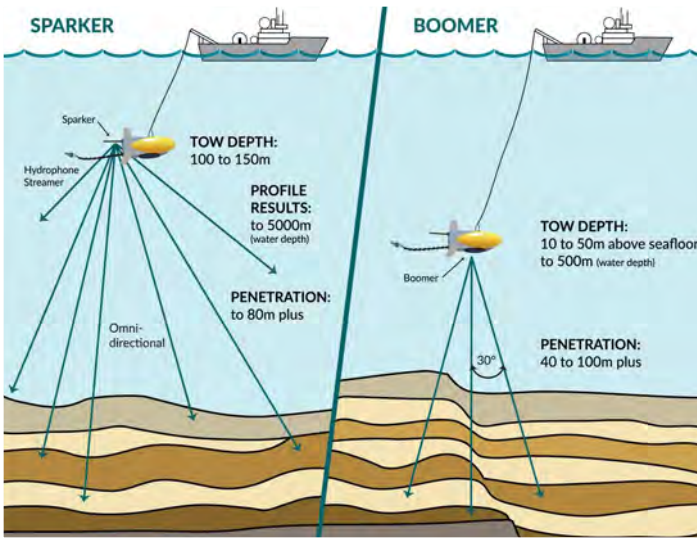
Automatic depth compensation resulting in repeatable boomer pulse shape with differing power output

Unique Body Motion Compensator allows operation in up to Beaufort Sea State 7

Topside Control Unit has positive or negative power supply depending on application

Energy Storage Unit utilizes either a 30 µf or 60 µf capacitor

Adjustable firing rates and source energy to meet a wide range of survey requirements and geological situations



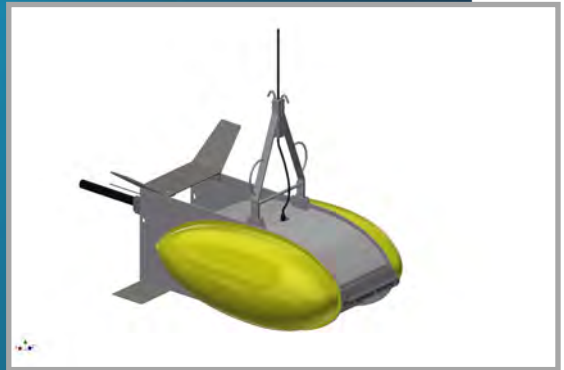
The Geoforce DTS® is a switchable, dual source, normal incidence reflection profiler. The sound source and receiving hydrophones are deployed in an underwater Tow Body fitted with motion and depth sensors.

The data are corrected on line for variations in depth of the Tow Body by a Body Motion Compensator (BMC) algorithm, resulting in a recording of the true shape of the sea floor. Layer resolutions at the seabed approach the theoretical acoustic resolution and penetrations in most sediments is in the order of 100 meters.

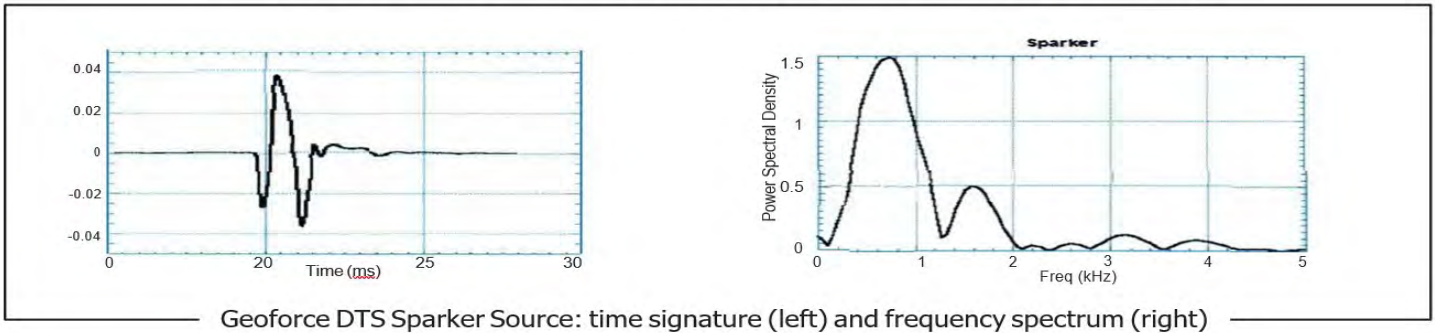
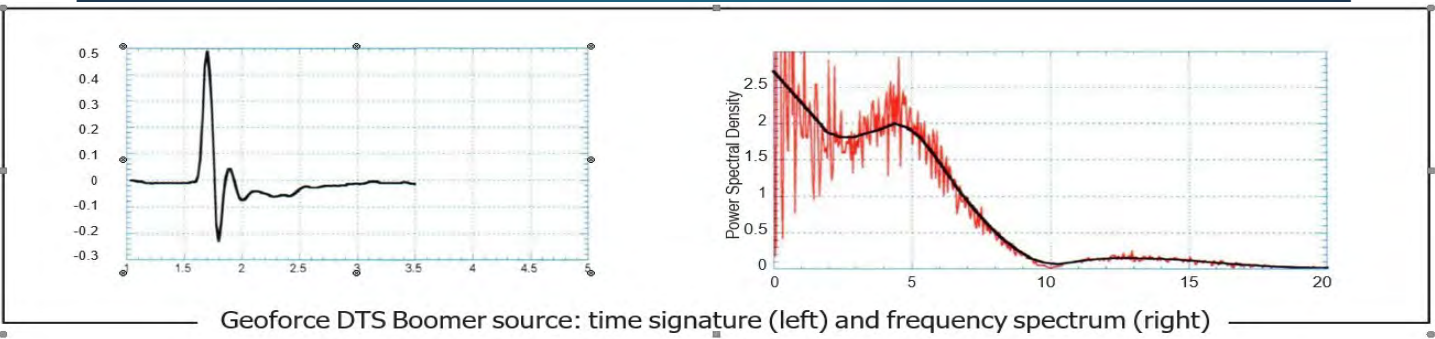
Above: Boomer vs. Sparker Mode:

activated through a remote selector switch. Upon release of the electrical energy stored in the Energy Storage Unit capacitor, the **Boomer** produces a high intensity, positive/negative acoustic pressure pulse of short time-duration (wide frequency bandwidth) and high energy content. The quality of the Boomer pressure pulse has an important bearing on the procedures used for signal processing and interpretation. These qualities include:

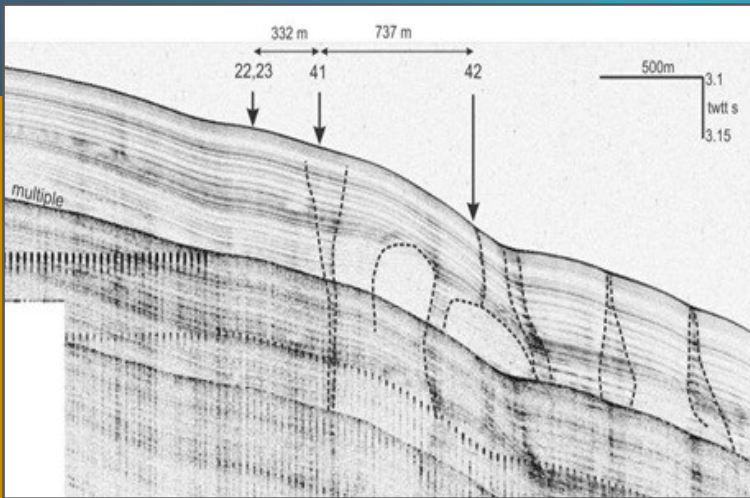
- ⇒ Reproducibility of this pressure pulse from shot to shot
- ⇒ Consistency with depth
- ⇒ Stability of the pulse shape over long periods of time



The **Sparker** operates by creating an explosive spark between electrodes that vaporizes the water. The resulting vapour bubble then collapses under ambient pressure, and the result is a low frequency pulse (5-00-2000 Hz). The Sparker peak amplitude and pulse width are depth dependent. It attaches to the bottom fin of the Tow Body in between the tail fins.

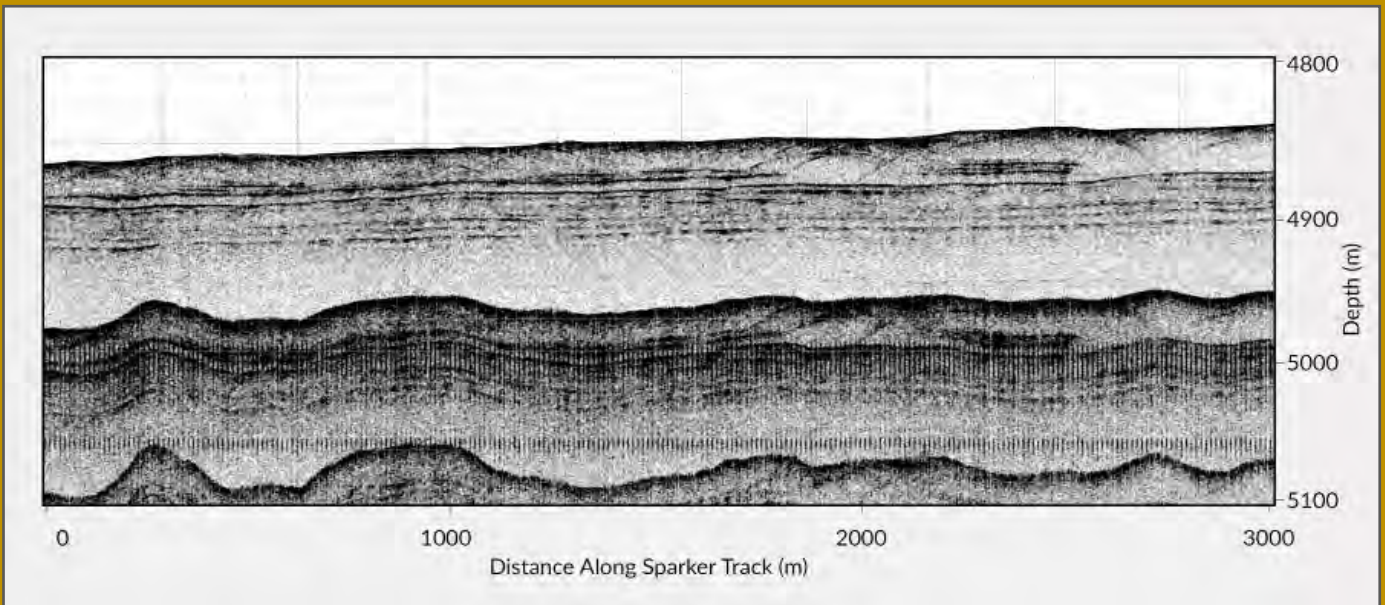
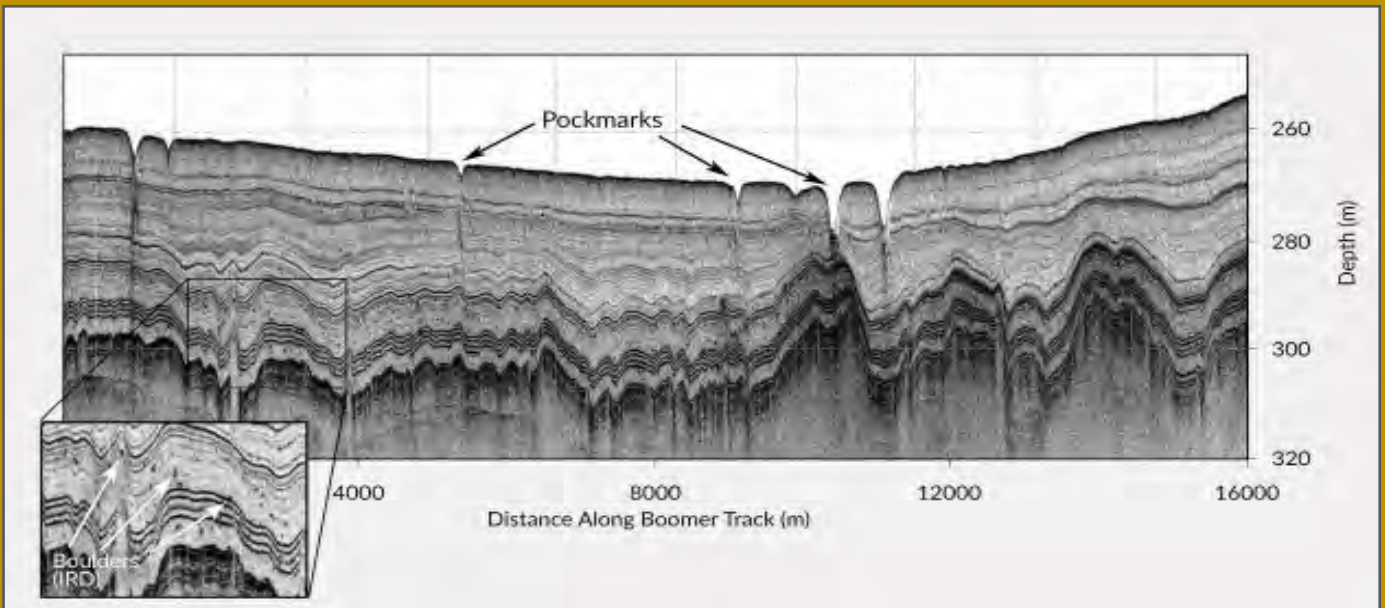


GEOFORCE DTS® DATA SETS



Left: Sparker Profile: 2000m
Shows core targeted for sub-vertical reflections and "wipeouts" interpreted as fluid conduits or chimneys

Below: Boomer Profile: Shelf Depth - 260m



Geoforce DTS® data collected in 5000 meters water depth. Note the motion of the towed body in the multiple. The seafloor topography is motion corrected to show true seafloor representation.

GEOFORCE DTS® SPECIFICATIONS

FUNCTIONAL

SURVEY TOW SPEED	3.5 to 6.0 kn
MAXIMUM TOW DEPTH	500 m
SURVEY WATER DEPTH	10 m to 5000 m
SEDIMENT LAYER RESOLUTION	6 cm to 20 cm , depending on substrate
SPECTRUM SOURCE INPUT	500 Hz to 10 kHz
ENERGY SOURCE	60J to 540J or 120J to 1080J at 0.11 ms duration
BOOMER CHARACTERISTICS	110 µs duration, 217 dB/1µPa at 1 m, 79 dB/1µPa at 10m
SOURCE FIRING RATE	300 ms TO 3000 ms
BODY MOTION COMPENSATION	Removes effective heave motion

OPTIONAL

OCEANANIC WINCH	300 m 600 m, 900 m, or 1200 m cable
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POWER REQUIREMENTS

GEOFORCE CEREBELLA	115V/230V AC 100w 50/60Hz single phase
TOPSIDE CONTROL UNIT	220-240V AC, 3kVA 50/60Hz single phase

MECHANICAL

TOW BODY ASSEMBLY

DIMENSIONS	164cm x 107cm x 68cm (l x w x h)
WEIGHT	400 kg

TOPSIDE CONTROL UNIT (TCU)

DIMENSIONS	56cm x 37cm x 83cm
WEIGHT	45 KG

CABLE

14-CONDUCTOR CABLE DIAMETER	1.64 cm (0.645 in)
TOW CABLE WEIGHT IN AIR	83.33kg/100m (560 lb./1,000ft)
MINIMUM RECOMMENDED BLOCK DIAMETER	56cm (22 in.)

TYPICAL PENETRATION (IN METERS)

SEDIMENT	BOOMER	SPARKER
SAND/PEBBLES/BOULDERS	5 TO 10	20
TERTIARY BEDROCK	20	40
CLAY/TILL	50 TO 60	80
SILT	80 TO 90	-
SOFT SEDIMENT/ SILT	100	100
SILT WITH GAS	-	80 TO 90
BEDROCK	-	10