

GeoExp

Geophysical/Geological investigation

Where?

- Land
- Inshore

What?

- Seismic (surface/borehole)
- ERT
- GPR
- Magnetic/Gravity
- Topography
- Bathymetry/Side scan sonar
- SBP (chirp – boomer)

Why?

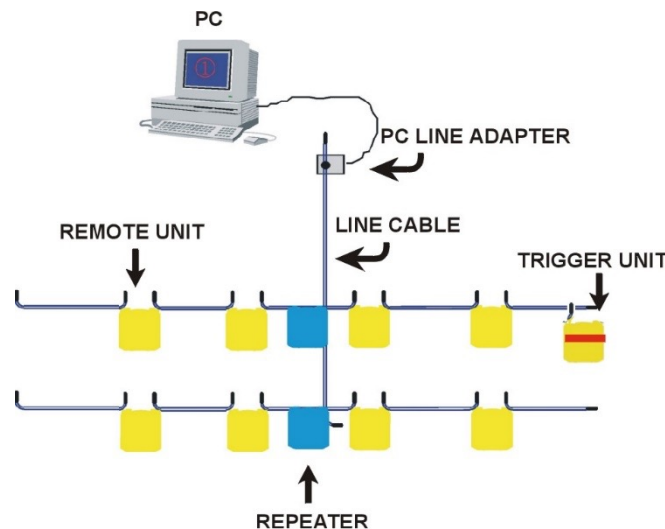
- Academic research
- Applied research
- Service

Data recording (1)

DMT Summit II and II plus – multichannel telemetric data recorder (400 channels)

Applications:

- Reflection seismic
- Refraction seismic



■ Technical Specifications

Sampling Rate

0.03125, 0.0625, 0.125, 0.25, 0.5, 1.0, 2.0, 4.0, 8.0 ms

Record Length

0.5, 1, 1.5, ...,
 ..., 48 K in dynamite mode
 ..., 24 K in dynamite mode incl. stacking
 ..., 16 K in vibro mode incl. stacking

Preamplification

0 dB or 18 dB

A/D Converter

24 bit Delta Sigma Technology

Instantaneous Dynamic Range

120 dB @ 2 ms sampling rate

Equivalent Input Noise

less than 0.3 μ V RMS @ 2 ms

Maximum Input Signal

2.0 Volt RMS

Gain Accuracy

better than 1% (between all RUs)

Crosstalk

better than 114 dB (between channels)

Distortion (THD)

better than 0.0008%

Input Impedance

20 kOhm

Analog Anti-Alias Filter

7,2 kHz 6 dB/Octave

Analog Low-Cut Filter

1 Hz 6 dB/Octave

Data recording (2)

Daq Link III – 24 channels
seismograph (4 units)



Applications

- Refraction seismic
- Borehole seismic
- Stand-alone monitoring

ACQUISITION

| | |
|-----------------------------|---|
| Dynamic range | >118 dB (at 2 msec sampling) |
| Bandwidth | DC to 15 kHz |
| Weight | 3.4 kg (7.5 lbs) |
| Sample rates (milliseconds) | 0.0208, 0.0625, 0.125, 0.250, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0 |
| Pre-trigger window | 10 second |
| Trigger accuracy | ±1 microsecond |

GENERAL

| | |
|-----------------------------|---|
| Number of channels per unit | 1 to 24 (factory set) |
| A/D resolution | 24-bit |
| Record length | Up to 4 billion samples |
| Continuous recording | Available |
| GPS synchronization | Int. Clock set to GPS time, Time & position saved |
| Internal storage | Compact Flash media (FAT16/FAT32) |
| Built-in Ethernet speed | 100 Mbit (8 Mbyte download) |

Seismic source (1)

Vibroseis Prakla VVCA/E



Manufacturer: Prakla Geomechanik

Model: VVCA/E

Peak Force: 125000 N

Piston Area 59.55 cm²

Mass Weight: 4300 lbs

Driven Weight 135000 N

Usable Stroke: ±35 mm

Frequency Limit 6 to 250Hz

Length: 7.350m

Width: 2.500 m

Height: 3.250 m

Wheelbase: 4.100 m

Turning Radius: 6.75 m

Speed: Up to 40 Km /h

Slope Capacity: 60%

Weights: 16000 Kg

Hold – Down: 28000 lbs

Base Plate: 3500 lbs

Shape: 4x4 Crab Tractor

Area: All terrain

Typical applications

- Reflection seismic (P)
- Borehole seismic (P)

Target depth: 300 – 2500 m

Seismic source (2)

IVI MiniVib T-2500



P- and S-waves

Typical applications

- Reflection seismic (P and S)
- Borehole seismic (P and S)

Target depth: 50 – 1000 m

Manufacturer: IVI

Model: T - 2500

Peak Force: 11120 N

Piston Area 9.7 cm²

Mass Weight: 141 kgf

Frequency Limit 10 to 550Hz

Length: 5.400 m

Width: 2.500 m

Height: 2.800 m

Speed: Up to 90 Km /h

Slope Capacity: 60%

Weights: 7000 Kg

Hold –Down: 1134 kgf

Base Plate: 168 kgf

Shape: 4x4 Unimog

Area: All terrain

P-wave seismic source (3)

Accelerated weight drop

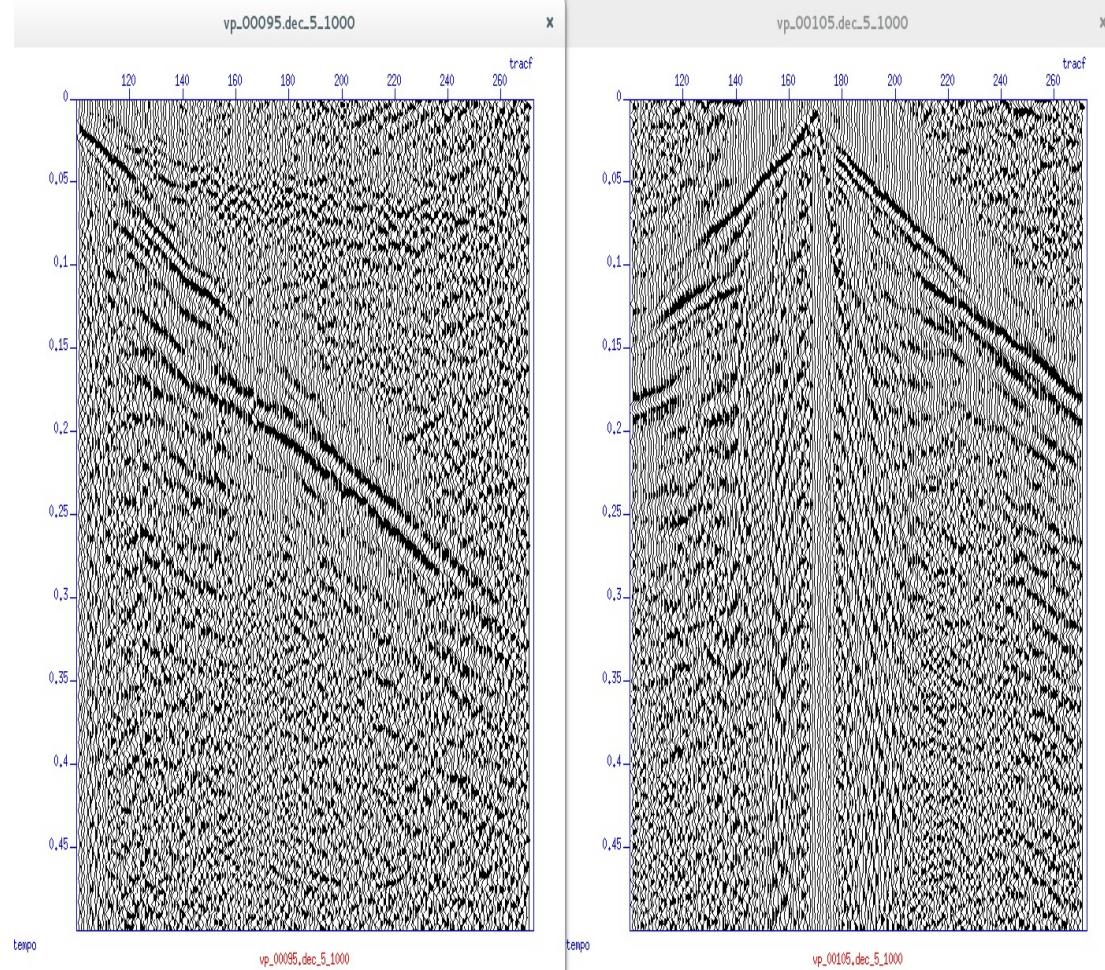


Seismic gun Isotta (2)



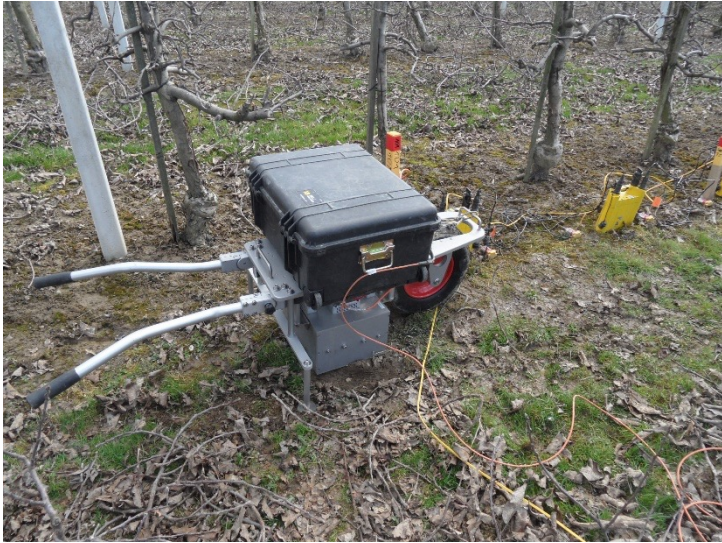
S-wave seismic source (4)

OGS-Raptor



S-wave seismic source (5)

Minivibrois Elvis III



Manufacturer: Geosym GmbH

Model: Elvis III S8

Power supply: 12 V DC

Drive system: Cascade linear motor

Peak force: approx. 450 N

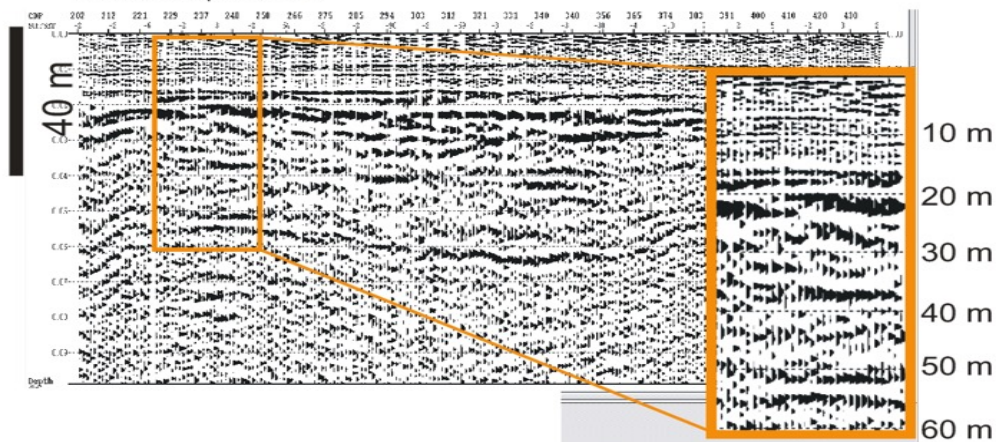
Frequency range (SH): 20 – 320 Hz

Investigation depth (SH): up to 100 – 150 m
(depending on geology)

Source weight: 35 kg

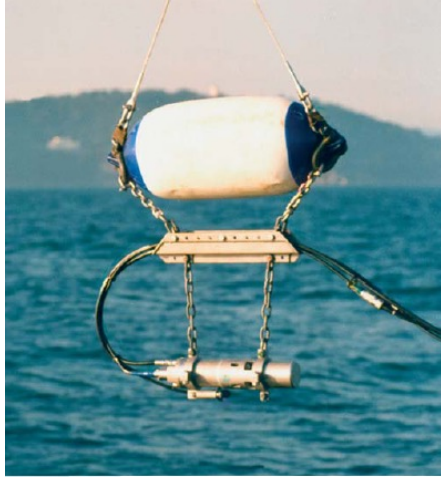
Total weight: 130 kg

Istituto Nazionale di Oceanografia e
di Geofisica Sperimentale



Marine/borehole seismic source

Air-gun



Water-gun



Mud-gun



Typical applications

- Inshore reflection seismic (P)
- Inshore refraction seismic (P)
- Borehole seismic (P)

Target depth: 0 – 1000 m

Land sensors

- 10 Hz geophone (V), single: 300
- 10 Hz geophone (V), string of 6: 400
- 10 Hz geophone 3C: 100
- 4.5 Hz geophone (V): 50
- 4.5 Hz geophone (H): 150
- 100 Hz geophone (V): 300
- 40 Hz geophone (V): 350
- 14 Hz geophone (H): 400
- 48 ch landstreamer

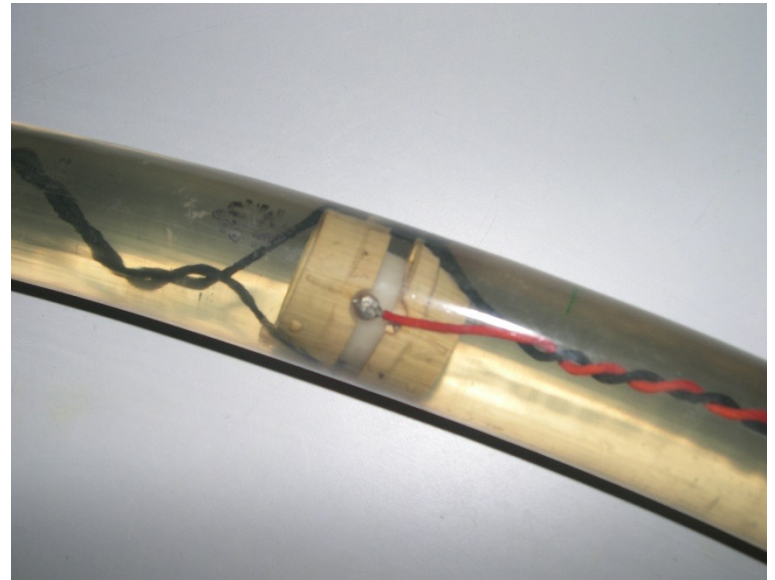


Marine/borehole sensors

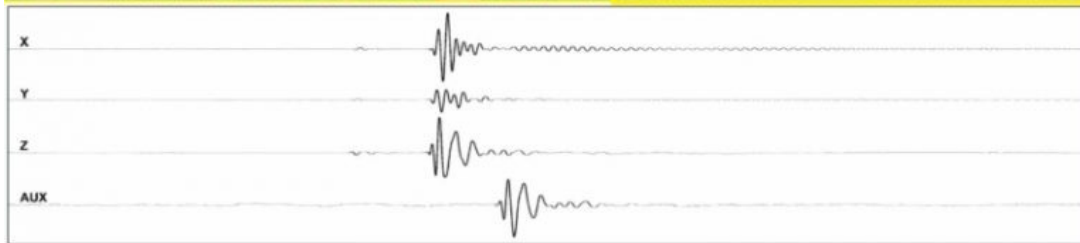
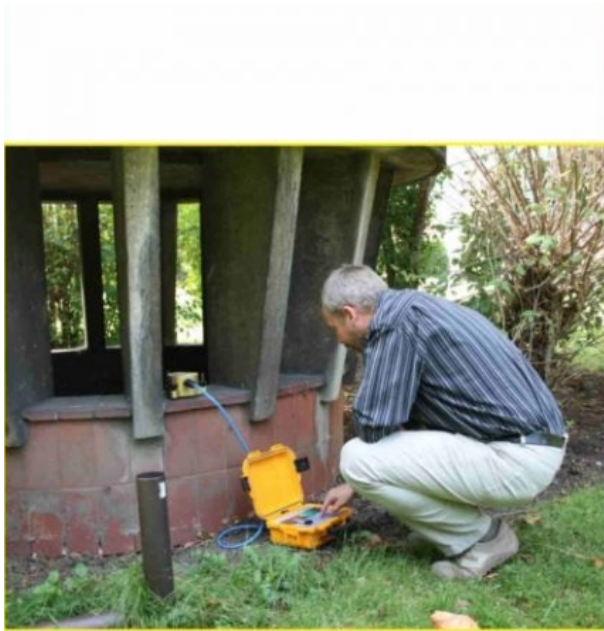
Hydrophone streamer 24 ch, 120 m (5 m)

Bay cable 24 ch 120 m (5 m) + 180 m layout: 2 units

Hydrophone streamer 6 ch (2 m), 50 m



Vibration monitoring – Summit M Vipa



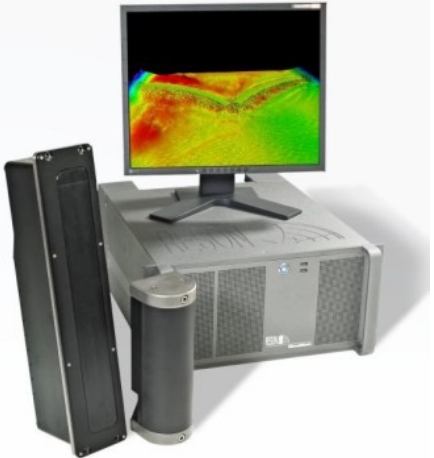
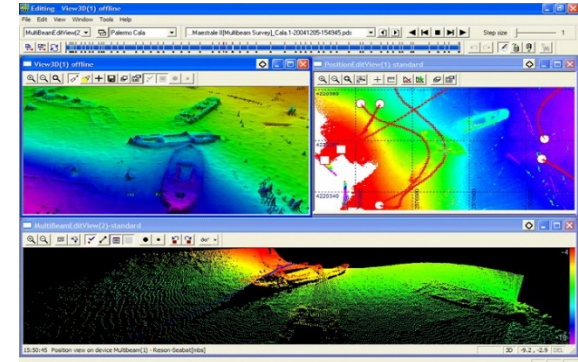
| Technical Specifications | |
|-----------------------------|---|
| Channels | 3 channels (X-, Y-, Z- vibration) 1 aux-channel (acoustic) |
| Sample Interval | 1 kHz, 2 kHz, 5 kHz, 10 kHz |
| Frequency Range | DC - 5 kHz |
| Recording Mode | Continuous or event based |
| Trigger Mode | Amplitude threshold for each channel, Trigger also on KB and vector sum |
| Record length | 1 sec to 60 sec per file |
| Pre-trigger length | 0 sec to record length-1 |
| A/D Converter | 24 bit |
| Signal Input Range | ± 5 V differential input |
| Measurement range | 175 mm /s with standard sensor DMT-3D/DIN, larger ranges on request |
| Time synchronisation | Internal GPS module (ext. Antenna), absolute time accuracy : < 10 µs |
| Data Storage | Internal 4GB or external USB-mass-storage device |
| Instantaneous Dynamic Range | ≥ 113 dB @ 1000 Hz sample rate |
| Crosstalk rejection | ≥ 110 dB (between all channels) |
| Total Harmonic Distortion | ≤ -100 dB |
| Common Mode Rejection | ≥ 105 dB |
| Gain Accuracy | < 1 % between channels |
| Data Communication | 100base-TX Ethernet, internal HSPA/EDGE/GSM Modem |
| Internal Battery | Li-Ion, typical life time >60 hours |
| External Power Supply | 9-18 V DC, max 15 W during battery charge |
| Display | Colour Graphical LCD with 320 x 240 resolution |
| Dimensions | 30 x 25 x 12 cm |
| Weight | 3.6 kg |

SINGLE AND MULTIBEAM ECHOSOUNDING



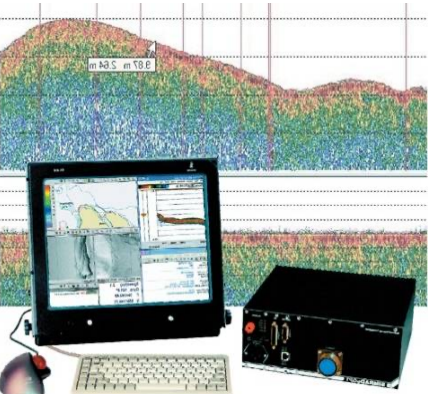
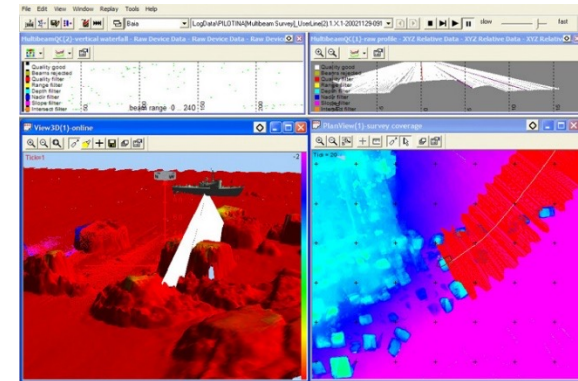
MB RESON SEABAT 8125

| | |
|---------------------|-----------|
| Operating frequency | 455 kHz |
| Number of beams | 240 |
| Max swath | 120° |
| Resolution | 6 mm |
| Depth range | 0 - 100 m |



MB RESON SEABAT 7125

| | |
|---------------------|---------------|
| Operating frequency | 200 - 400 kHz |
| Number of beams | 512 |
| Max swath | 140° |
| Resolution | 6 mm |
| Depth range | 0- 400 m |



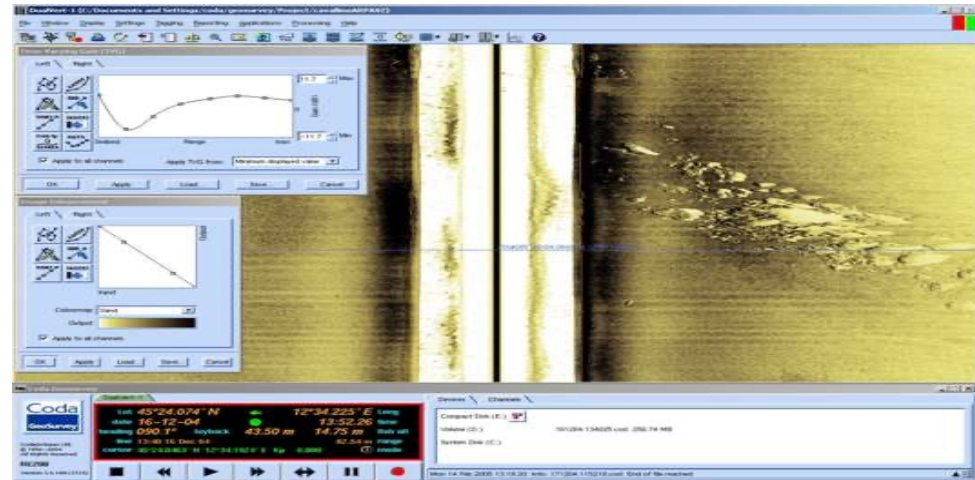
SB KONGSBERG EA400

| | |
|------------------------|--------------|
| Operating frequency | 50 - 200 kHz |
| Beam width alongtrack | 7° |
| Beam width acrosstrack | 10°-16° |
| Accuracy | 1 / 5 cm |

Acquisition soft. PDS2000

Processing soft. PDS2000

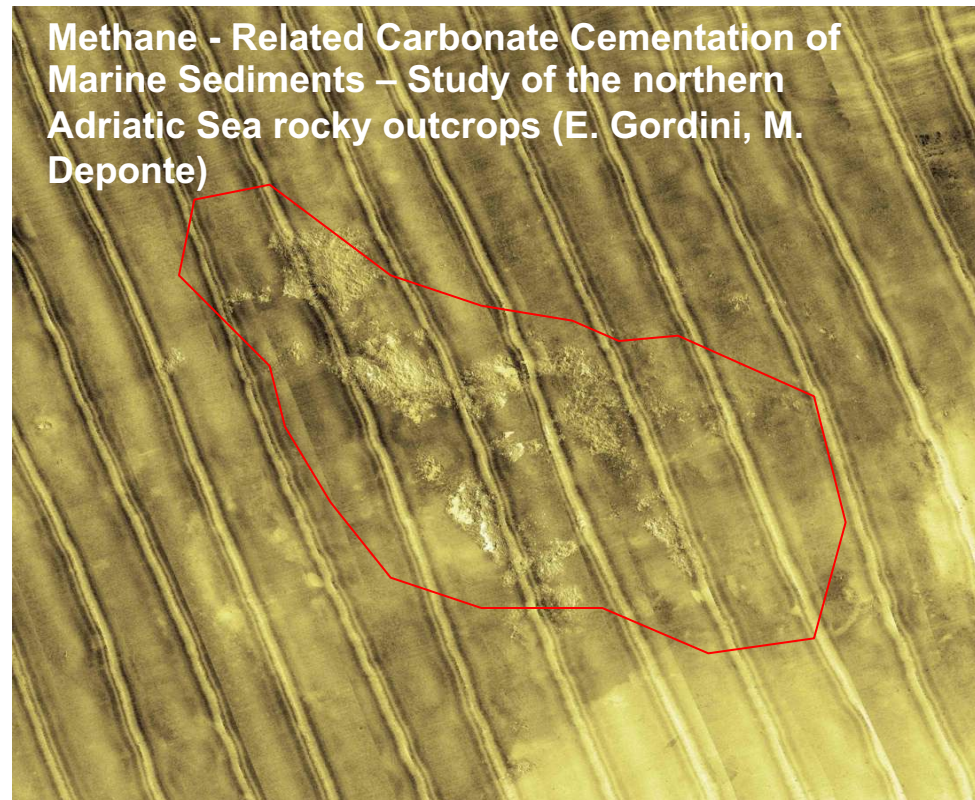
SIDE SCAN SONAR



EDGETECH DF 1000

| | |
|-----------------------|-------------------|
| Operating frequency | 100 kHz – 400 kHz |
| Pulse length | 0.1 - 0.01 ms |
| Horizontal beam width | 1.2°- 0.5° |
| A/D Resolution | 12 bits / sample |
| Sampling rate | 24 kHz / channel |
| Operating depth | 1000 m |

Caorle (northern Adriatic Sea) SSS mosaic. local high backscatter features indicating the occurrence of rock outcrops in a dominant sandy environment.



Methane - Related Carbonate Cementation of Marine Sediments – Study of the northern Adriatic Sea rocky outcrops (E. Gordini, M. Deponte)

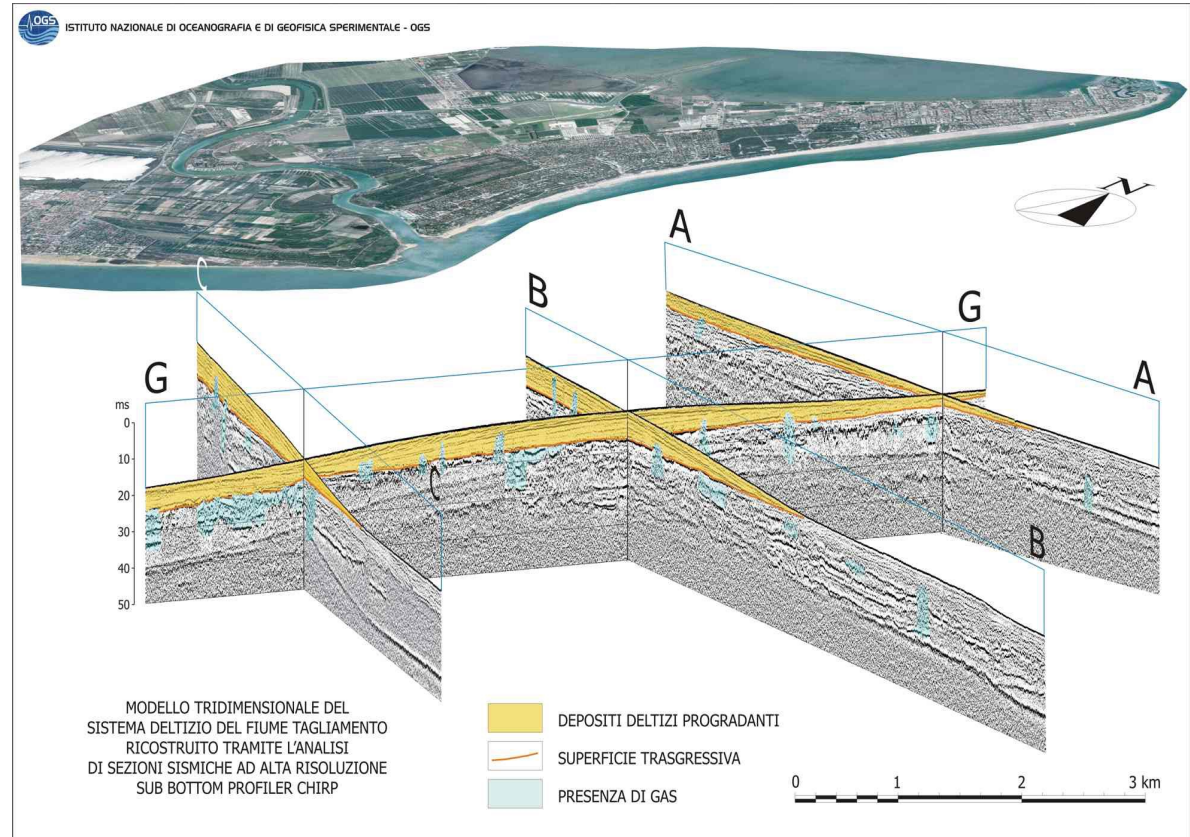
SUB BOTTOM PROFILING



EDGETECH 3200 XS

| | |
|---------------------|------------|
| Frequency range | 2 ÷ 12 kHz |
| Pulse type | FM |
| Pulse length | 20 ÷ 40 ms |
| Beam width | 16° ÷ 32° |
| Vertical resolution | 8 ÷ 20 cm |
| Penetration | 20 ÷ 200 m |
| Max depth | 300 m |

Sub-bottom profiler CHIRP investigations of Tagliamento River delta (northern Adriatic Sea).



Tridimensional model of the Tagliamento River delta system from sub bottom chirp analyses. Courtesy of E. Gordini

VERY HIGH RESOLUTION SEISMIC

| Seismic source | Bandwidth (Hz) | Indicative Max penetration (m) |
|----------------|------------------------------|--------------------------------|
| | Vertical resolution (m) [*] | |
| Sparker | 100 – 4000 approx 0.30 m | approx 50 – 200 |
| Boomer | 200 – 10000 approx 0.15 m | approx 10 – 100 |

[*] Computed with $V=1750$ m/s and $\lambda/4$ criterion

Power unit AAE CSP-Nv



CSP-Nv TECHNICAL SPECIFICATIONS

| | |
|----------------|--|
| Manufacturer | Applied Acoustic Engineering |
| Model | 2400 |
| Main input | 240 V 45-65 Hz 5kVA |
| Voltage output | 2500 to 3950 V |
| Energy output | 50,100,150,200,250,300 (boomer), 300 to 2400 J (sparker) |
| Size | 50x58x74 cm, 63.5 kg |
| Capacitance | 304microF, 108 shot life |
| Trigger | External and Internal |

Notes: Main microprocessor control circuits with fail-safe layer of logic circuitry; Specially designed HV connector with interlock; Trigger monitoring with time out and over clock shutdown.

Boomer source



Sparker source (300 J)

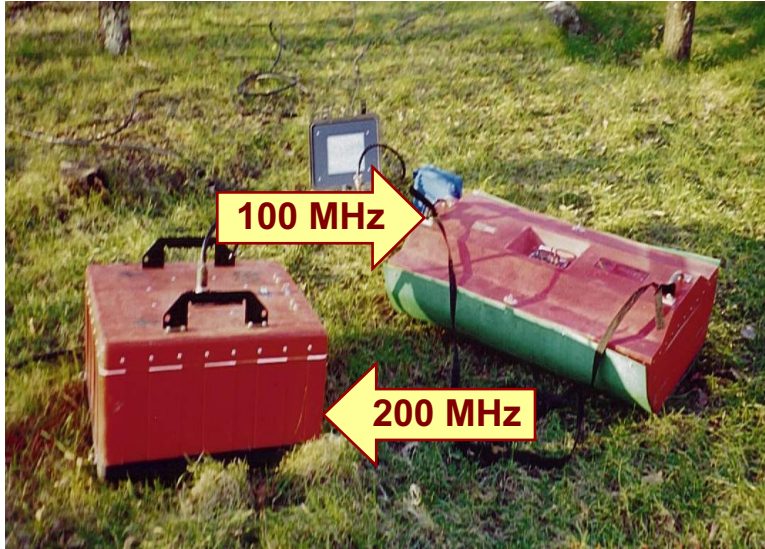


Hydrophone streamer (single-channel)

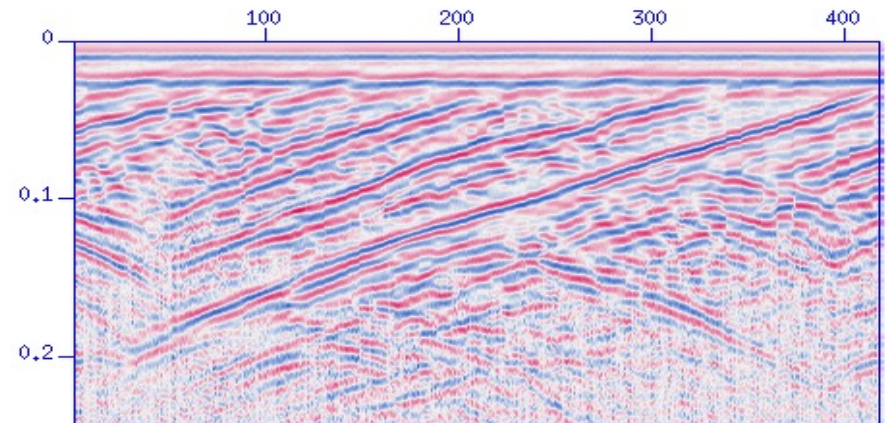
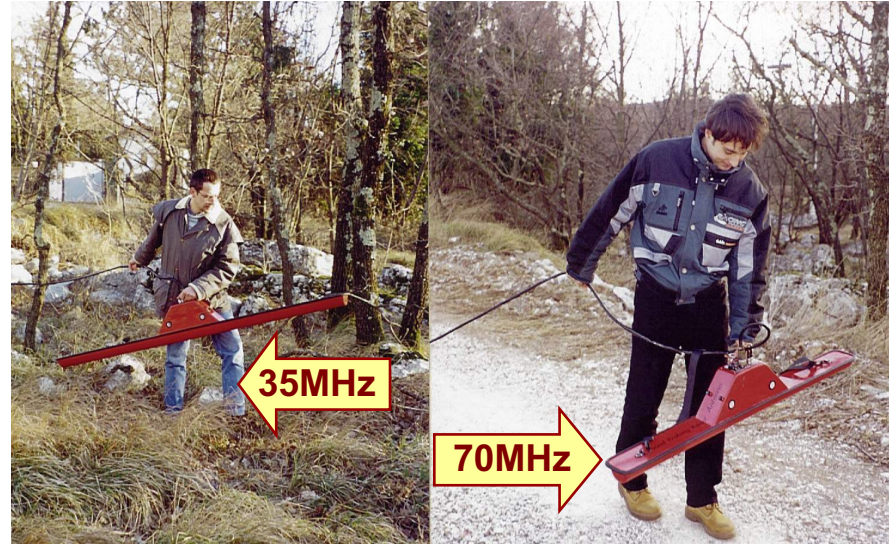


GROUND PENETRATING RADAR

GSSI HIGH FREQUENCY



GSSI LOW FREQUENCY



EARTH RESISTIVITY TOMOGRAPHY



4point light hp - Lippman

| | |
|----------------|---------|
| Channel number | 60 |
| Software | Geotest |

