

VERY HIGH RESOLUTION SEISMIC TOOLS: A NEW LOOK ON SEDIMENTARY BODIES EMPLACED IN SHALLOW WATER

E. CHAUMILLON*, J.-F. BREILH*, S. GIVRAN*, H. RICETTI*, J.-F. MARY*, H. FALCHETTO**, P.-G. SAURIAU* and O. LEMOINE**

* UMR CNRS 6250 LIENSs, Université de La Rochelle, 2 Rue Olympe de Gouges, 17000 La Rochelle, France (eric.chaumillon@univ-lr.fr)
** IFREMER, LER/PC, BP 133, Ronce-les-Bains, 17390 La Tremblade, France.

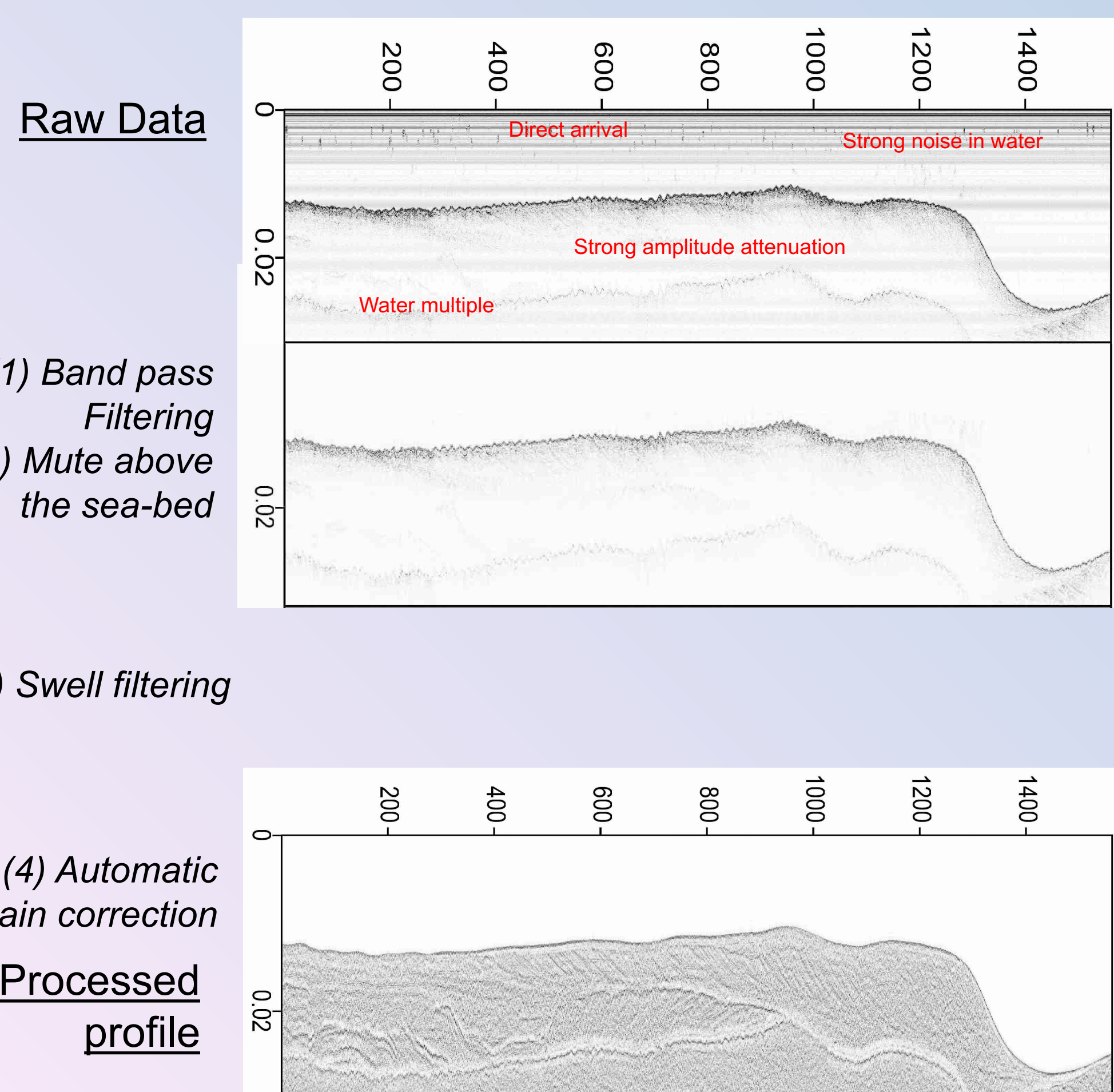


Ifremer

(1) Comparison of seismic tools (transducers and boomer) and their results

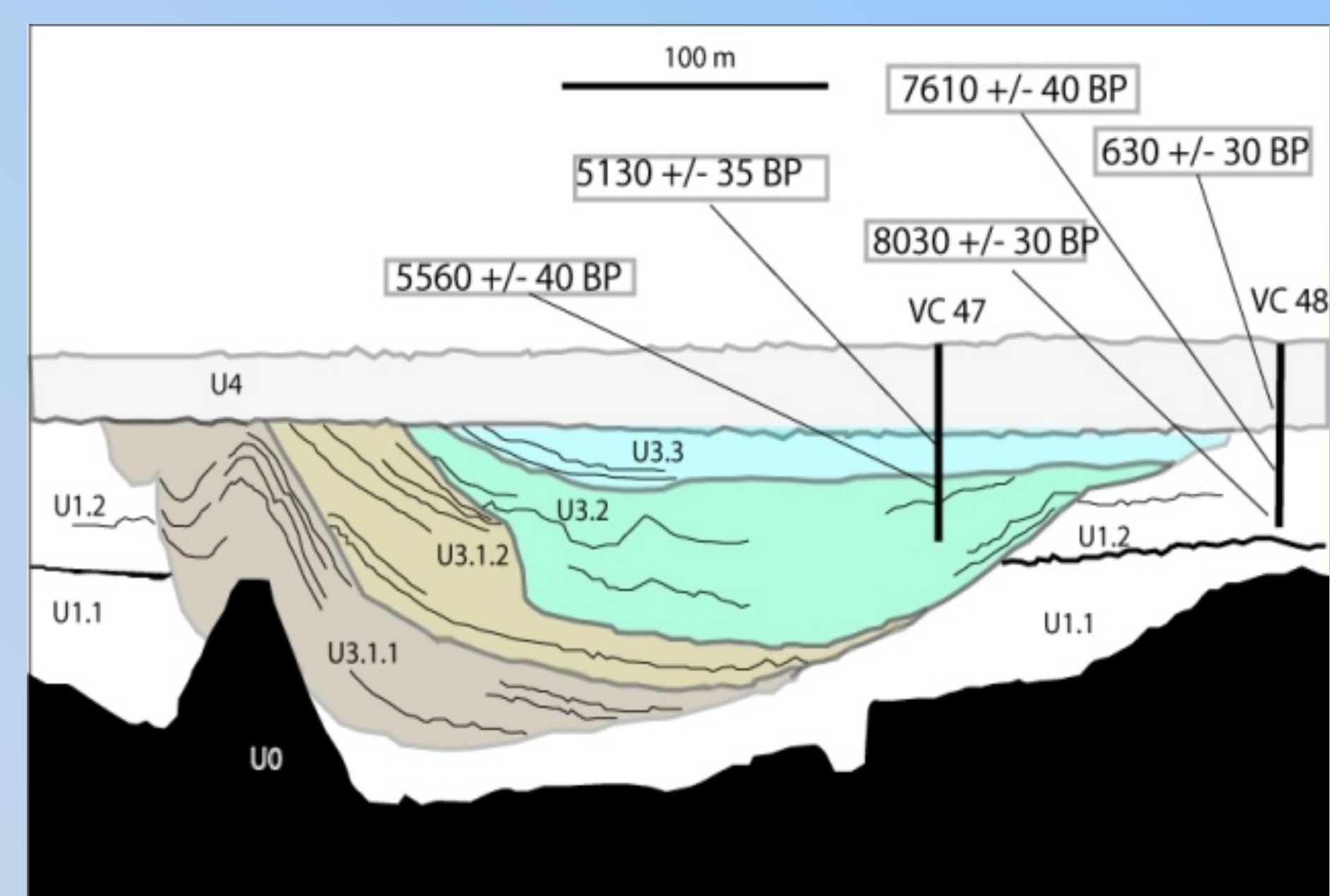
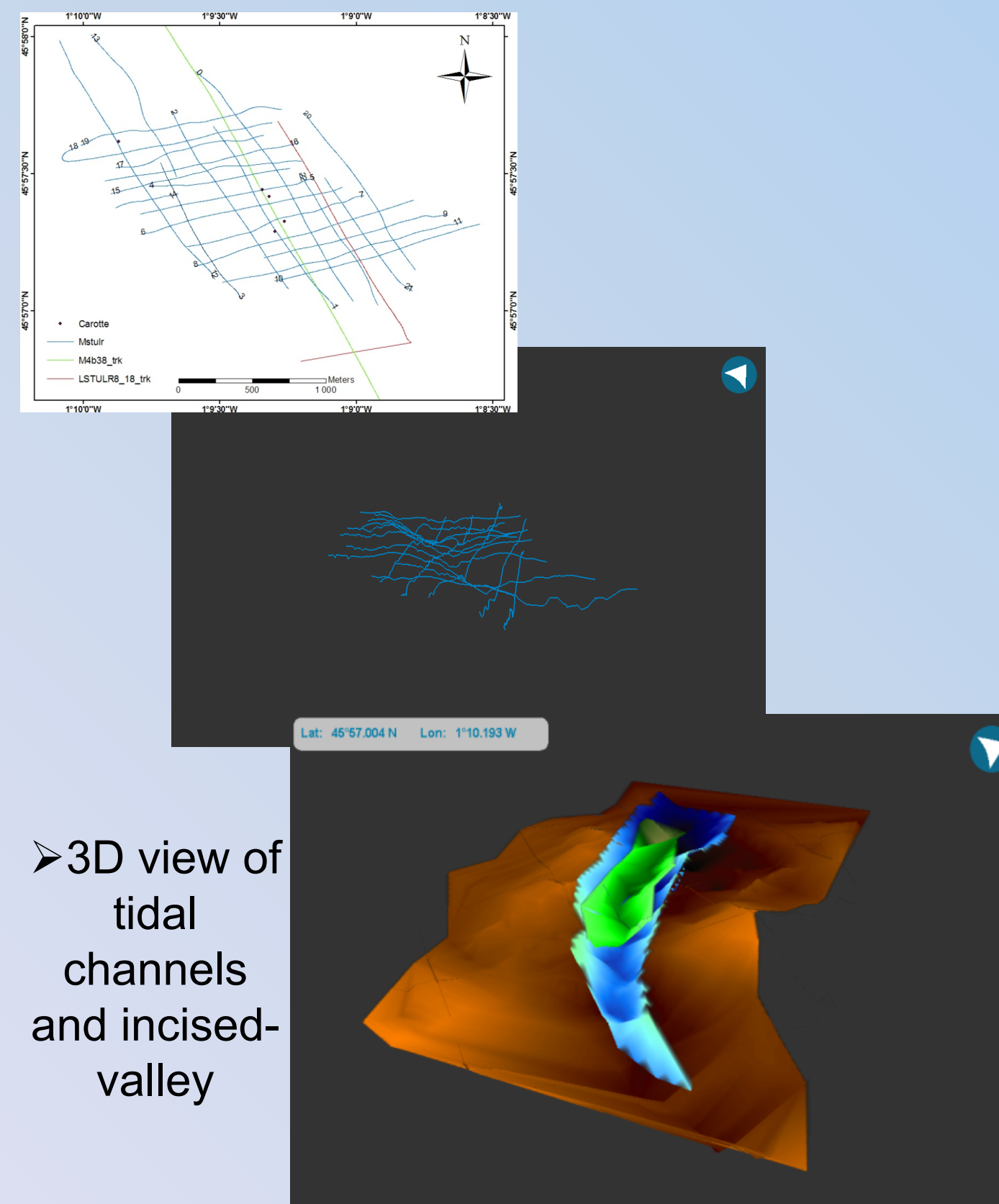
<p>N/O Côte d'Aquitaine (CNRS) Full equipment including IKB Boomer Seistec</p> <p>IKB Boomer Seistec & GPS antenna</p> <p>Power supply & digital recording</p>	<h3>IKB Boomer Seistec™</h3> <table border="1"> <tr> <th>Acquisition Parameters :</th> <th>Processing Parameters :</th> </tr> <tr> <td> <ul style="list-style-type: none"> Ship : N/O Côte d'Aquitaine (INSU-CNRS) Source : Boomer plate receiver : 7 hydrophones - Line in cone Sampling Frequency : 32000Hz Shot interval : 500 ms bandwidth of pulse : 1-10 kHz Data format : .TRA .PAR </td> <td> <ul style="list-style-type: none"> Software : Seismic Unix Swell filter : developed at LR University (J.-F. Mary) frequency band pass filtering Gain : AGC exponential </td> </tr> </table>	Acquisition Parameters :	Processing Parameters :	<ul style="list-style-type: none"> Ship : N/O Côte d'Aquitaine (INSU-CNRS) Source : Boomer plate receiver : 7 hydrophones - Line in cone Sampling Frequency : 32000Hz Shot interval : 500 ms bandwidth of pulse : 1-10 kHz Data format : .TRA .PAR 	<ul style="list-style-type: none"> Software : Seismic Unix Swell filter : developed at LR University (J.-F. Mary) frequency band pass filtering Gain : AGC exponential 	<p>M4b38</p> <p>200 m</p> <p>TWTT (ms)</p>	<p>France</p> <p>Atlantic Ocean</p>
Acquisition Parameters :	Processing Parameters :						
<ul style="list-style-type: none"> Ship : N/O Côte d'Aquitaine (INSU-CNRS) Source : Boomer plate receiver : 7 hydrophones - Line in cone Sampling Frequency : 32000Hz Shot interval : 500 ms bandwidth of pulse : 1-10 kHz Data format : .TRA .PAR 	<ul style="list-style-type: none"> Software : Seismic Unix Swell filter : developed at LR University (J.-F. Mary) frequency band pass filtering Gain : AGC exponential 						
<p>N/O Haliotis (IFREMER)</p> <p>Chirp data are recorded simultaneously with multibeam (Geoacoustics Geoswath-250 kHz) and single beam (Simrad ER60-120kHz/RoxAnn) echosounder data</p> <p>4 hydrophones</p> <p>Transducer</p>	<h3>CHIRP sonar IXSEA 3500</h3> <table border="1"> <tr> <th>Acquisition Parameters :</th> <th>Processing Parameters :</th> </tr> <tr> <td> <ul style="list-style-type: none"> Ship : N/O Haliotis (GENAVIR) Source : Echoes 3500 IXSEA (transducer Tonpilz) Receiver : 4 hydrophones (IXSEA 7001000) Chirp frequency : 1,7 - 5,5 KHz bandwidth of pulse : 50 ms Data format : SEG Y (.SEG) </td> <td> <ul style="list-style-type: none"> Preprocessing : <ul style="list-style-type: none"> - correlation with emit signal (1,7-5,5 KHz) - spherical divergence correction - data envelop - Surface Gyrocompass and motion sensor correction Software : Delph Seismic V2.6 Filter : HP= 1,88 KHz ; LP= 9,6KHz Gain : AGC Decremental (window=0,1ms) Stack : 2 </td> </tr> </table>	Acquisition Parameters :	Processing Parameters :	<ul style="list-style-type: none"> Ship : N/O Haliotis (GENAVIR) Source : Echoes 3500 IXSEA (transducer Tonpilz) Receiver : 4 hydrophones (IXSEA 7001000) Chirp frequency : 1,7 - 5,5 KHz bandwidth of pulse : 50 ms Data format : SEG Y (.SEG) 	<ul style="list-style-type: none"> Preprocessing : <ul style="list-style-type: none"> - correlation with emit signal (1,7-5,5 KHz) - spherical divergence correction - data envelop - Surface Gyrocompass and motion sensor correction Software : Delph Seismic V2.6 Filter : HP= 1,88 KHz ; LP= 9,6KHz Gain : AGC Decremental (window=0,1ms) Stack : 2 	<p>HAO192</p> <p>200 m</p> <p>TWTT (ms)</p>	
Acquisition Parameters :	Processing Parameters :						
<ul style="list-style-type: none"> Ship : N/O Haliotis (GENAVIR) Source : Echoes 3500 IXSEA (transducer Tonpilz) Receiver : 4 hydrophones (IXSEA 7001000) Chirp frequency : 1,7 - 5,5 KHz bandwidth of pulse : 50 ms Data format : SEG Y (.SEG) 	<ul style="list-style-type: none"> Preprocessing : <ul style="list-style-type: none"> - correlation with emit signal (1,7-5,5 KHz) - spherical divergence correction - data envelop - Surface Gyrocompass and motion sensor correction Software : Delph Seismic V2.6 Filter : HP= 1,88 KHz ; LP= 9,6KHz Gain : AGC Decremental (window=0,1ms) Stack : 2 						
<p>N/O L'Estran (La Rochelle University)</p> <p>Chirp Source & 3 element receiver</p> <p>Chirp Power supply & digital recording</p>	<h3>CHIRP sonar IXSEA 10000</h3> <table border="1"> <tr> <th>Acquisition Parameters :</th> <th>Processing Parameters :</th> </tr> <tr> <td> <ul style="list-style-type: none"> Ship : N/O L'Estran (LULR) Source : Chirp IXSEA AUV 5 - 15 KHz (Janus-Helmholtz transducer) Receiver : 3 element reception Antenna Pulse length : 10 ms bandwidth of pulse : 5-15 KHz Data format : .XTF </td> <td> <ul style="list-style-type: none"> Software : Delph Seismic V2.6 Chirp processing : envelopp Gain : AGC Decremental (window= 1 ms) Swell filter : Surface Gyrocompass and motion sensor correction Stack : 1 </td> </tr> </table>	Acquisition Parameters :	Processing Parameters :	<ul style="list-style-type: none"> Ship : N/O L'Estran (LULR) Source : Chirp IXSEA AUV 5 - 15 KHz (Janus-Helmholtz transducer) Receiver : 3 element reception Antenna Pulse length : 10 ms bandwidth of pulse : 5-15 KHz Data format : .XTF 	<ul style="list-style-type: none"> Software : Delph Seismic V2.6 Chirp processing : envelopp Gain : AGC Decremental (window= 1 ms) Swell filter : Surface Gyrocompass and motion sensor correction Stack : 1 	<p>ECHOES_03</p> <p>200 m</p> <p>TWTT (ms)</p>	
Acquisition Parameters :	Processing Parameters :						
<ul style="list-style-type: none"> Ship : N/O L'Estran (LULR) Source : Chirp IXSEA AUV 5 - 15 KHz (Janus-Helmholtz transducer) Receiver : 3 element reception Antenna Pulse length : 10 ms bandwidth of pulse : 5-15 KHz Data format : .XTF 	<ul style="list-style-type: none"> Software : Delph Seismic V2.6 Chirp processing : envelopp Gain : AGC Decremental (window= 1 ms) Swell filter : Surface Gyrocompass and motion sensor correction Stack : 1 						
<p>N/O Bathus (DDE17)</p> <p>Power supply & digital recording</p> <p>Transducer</p> <p>Parametric Sonar & GPS antenna</p>	<h3>Parametric sonar INNOMAR</h3> <table border="1"> <tr> <th>Acquisition Parameters :</th> <th>Processing Parameters :</th> </tr> <tr> <td> <ul style="list-style-type: none"> Ship : N/O Bathus (DDE17) Source & Receiver : Echo sounder INNOMAR™ SES-96 Sonar frequency : 8 kHz bandwidth of pulse : 0.07-1 ms Data format : internal </td> <td> <ul style="list-style-type: none"> Software : Gain : Stack : 5 (Shooting rate : 20 s⁻¹) </td> </tr> </table>	Acquisition Parameters :	Processing Parameters :	<ul style="list-style-type: none"> Ship : N/O Bathus (DDE17) Source & Receiver : Echo sounder INNOMAR™ SES-96 Sonar frequency : 8 kHz bandwidth of pulse : 0.07-1 ms Data format : internal 	<ul style="list-style-type: none"> Software : Gain : Stack : 5 (Shooting rate : 20 s⁻¹) 	<p>IKB Seistec NOMA16</p> <p>300 m</p> <p>2 m</p> <p>Parametric Sonar SES101035</p>	
Acquisition Parameters :	Processing Parameters :						
<ul style="list-style-type: none"> Ship : N/O Bathus (DDE17) Source & Receiver : Echo sounder INNOMAR™ SES-96 Sonar frequency : 8 kHz bandwidth of pulse : 0.07-1 ms Data format : internal 	<ul style="list-style-type: none"> Software : Gain : Stack : 5 (Shooting rate : 20 s⁻¹) 						

(2) Seismic Data Processing & Swell Filtering



(3) Interpretation : Detailed internal architecture of coastal sedimentary bodies

Processing VHR seismic results in a GIS environment (Delph Seismic SGIS and Arcview)



Groundtruthing with cores, shell content and radiocarbon dating

Sedimentary records of :

- Lower sea levels (U1.1 & U1.2)
- Coastline migration and related abandoned tidal drainage network (U3.1.1; U3.1.2; U3.2; U3.3)
- regional change in sedimentation related to climate changes and / or human activities (U4)

