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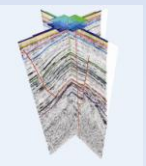
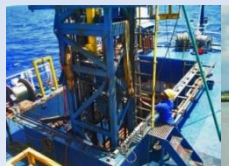
Nortek instruments-

The first choice for real time current measurements





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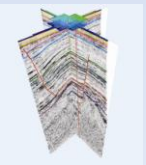







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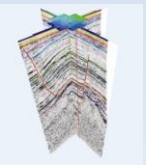
AWAC with NIP









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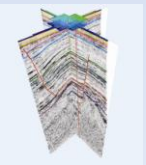
Siemens TC65 Modem









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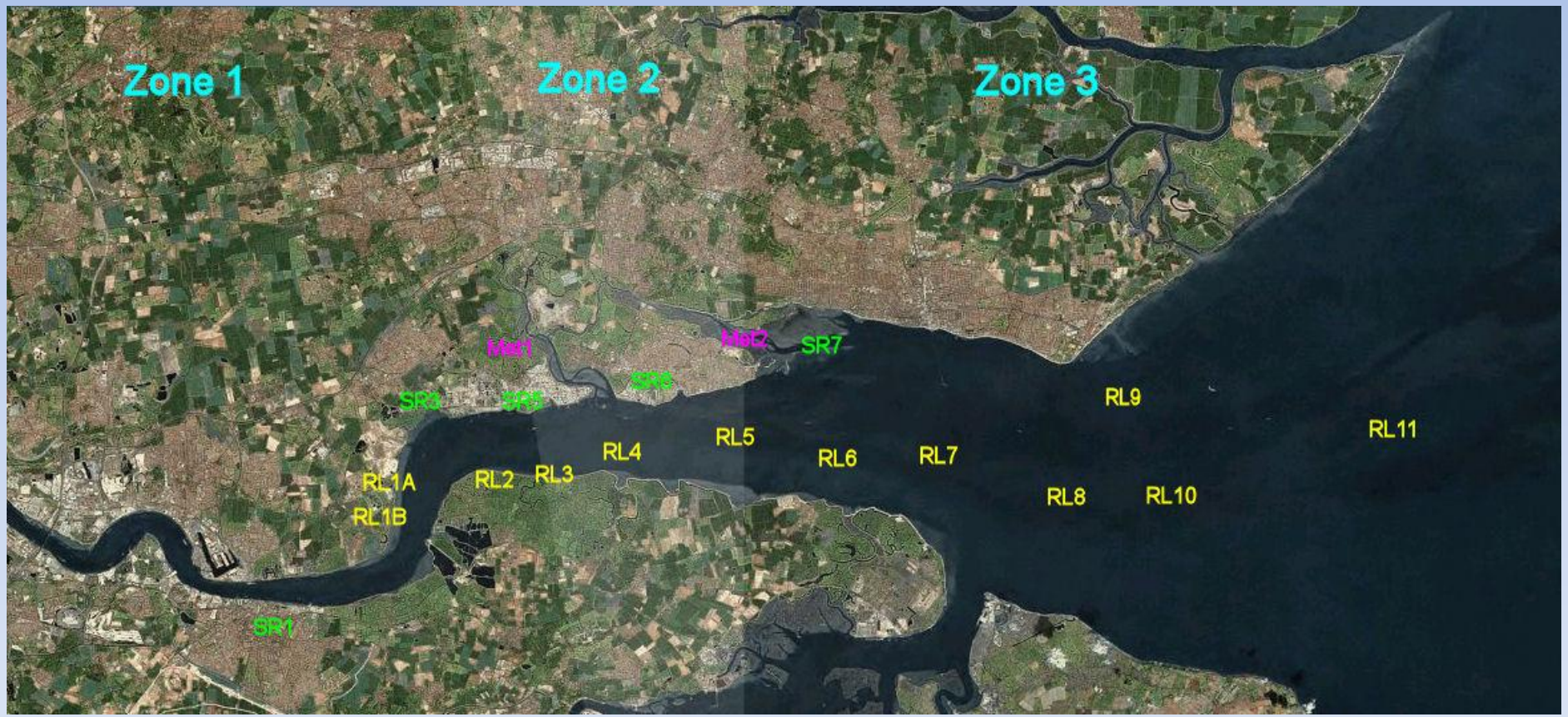

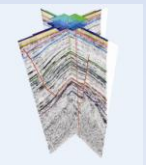







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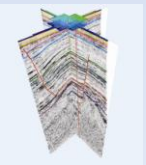
What does real time mean?

Measurements available for use as soon as they are made

Measurements available at a remote location









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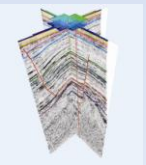
What do we need?

Instrument

Transport system

Receiver and display









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Instruments used on LGW project

20 x YSI Water quality sondes

2 x Weather stations

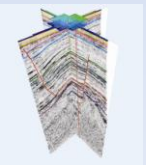
3 x Argus ASM

2 x Nortek AWAC

3 x Nortek Vector

2 x Nortek Aquadopp

1 x RDI ADCP









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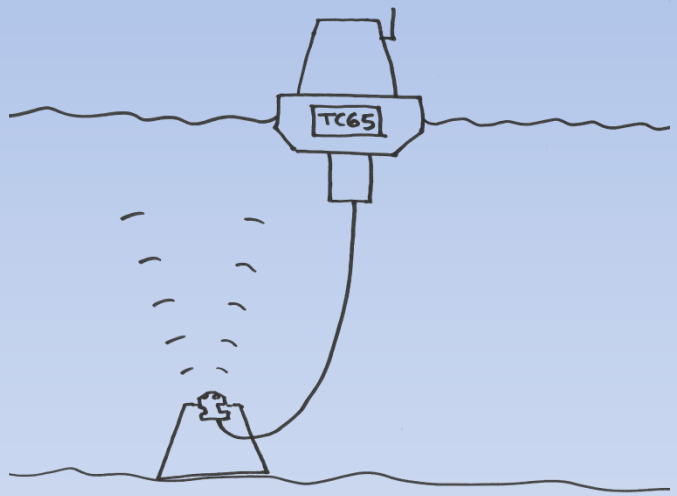
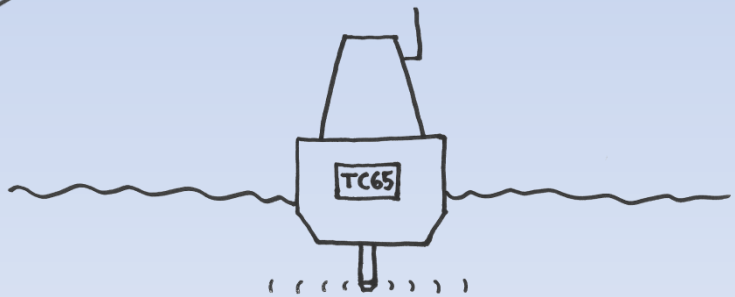
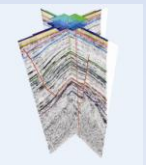
Deployments used













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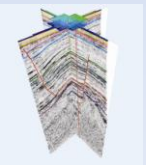
Transport System

SMS text messaging

GPRS

Iridium (under development)









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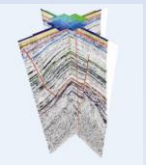
Receiver and Display

Manufacturer's own programs

ARTEMeS from Alphecca Systems









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RL1b | RL1a | RL2 | RL3 | RL4 | RL5 | Met1

RL6 | RL7 | RL8 | RL9 | RL10 | RL11 | Met2

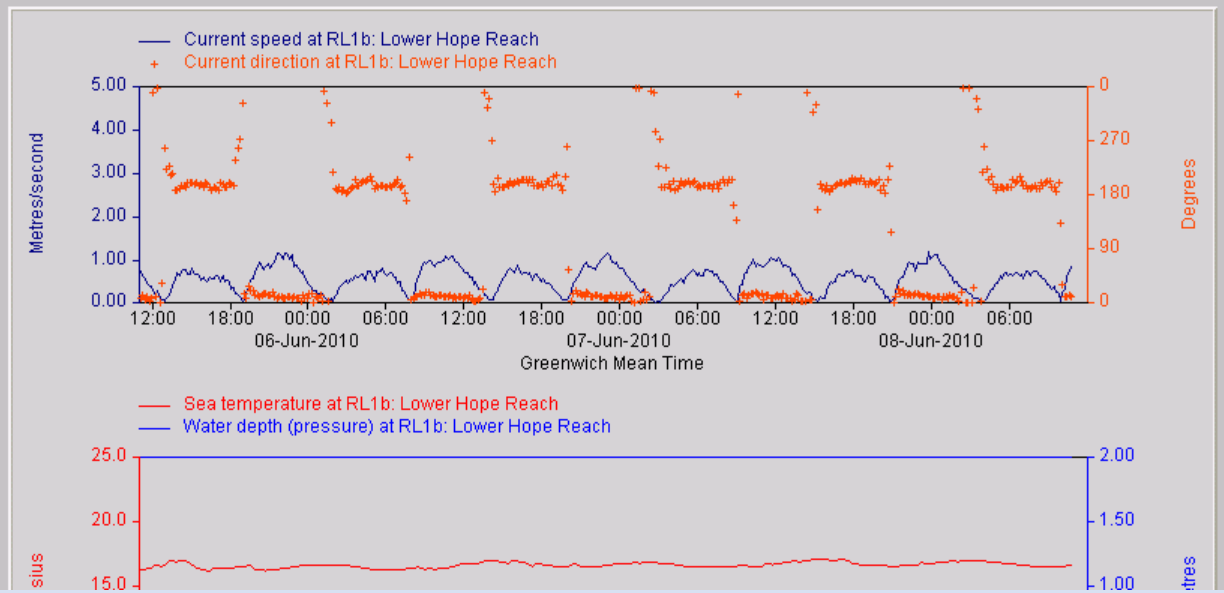
Data from RL1b

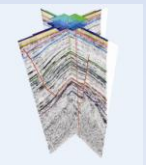
Turbidity

Current

Predicted Tides

RL1b Currents











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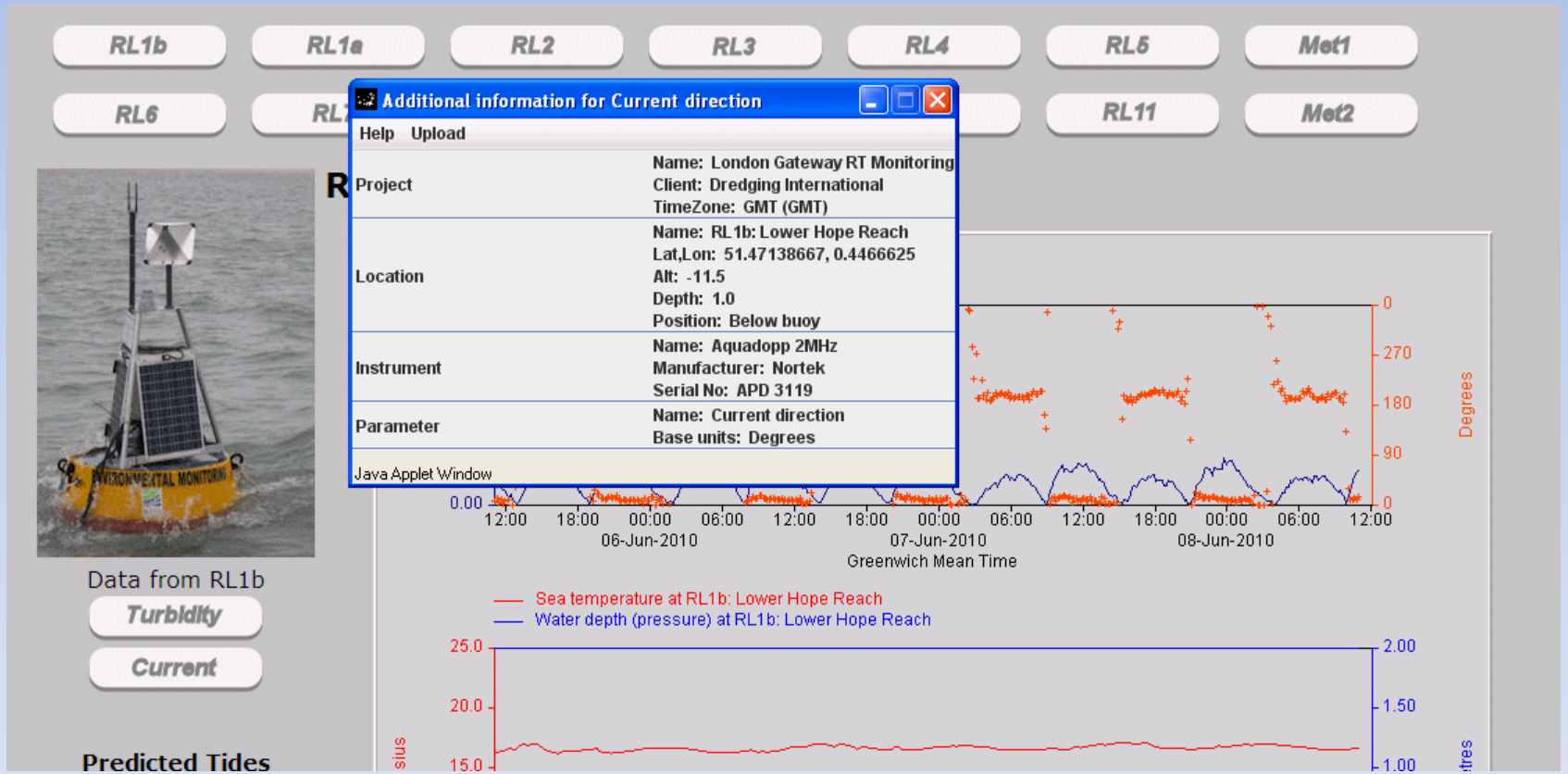

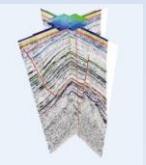






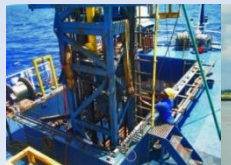


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RL1b | RL1a | RL2 | RL3 | RL4 | RL5 | Met1

RL6 | RL7 | RL8 | RL9 | RL10 | RL11 | Met2

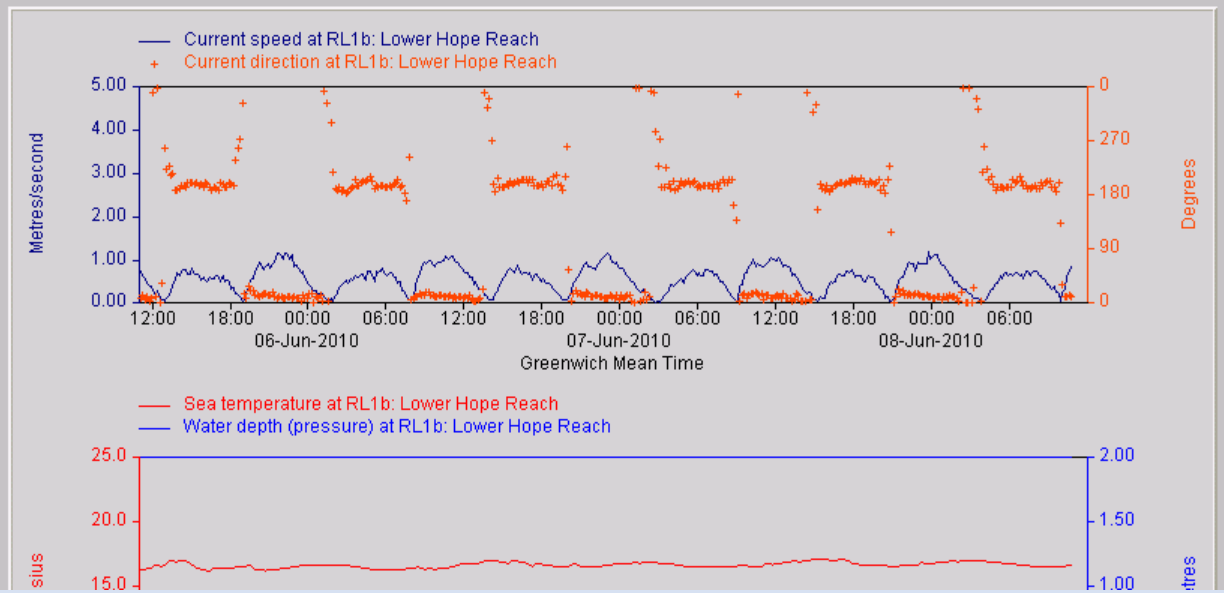
Data from RL1b

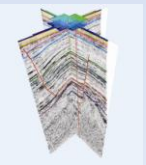
Turbidity

Current

Predicted Tides

RL1b Currents











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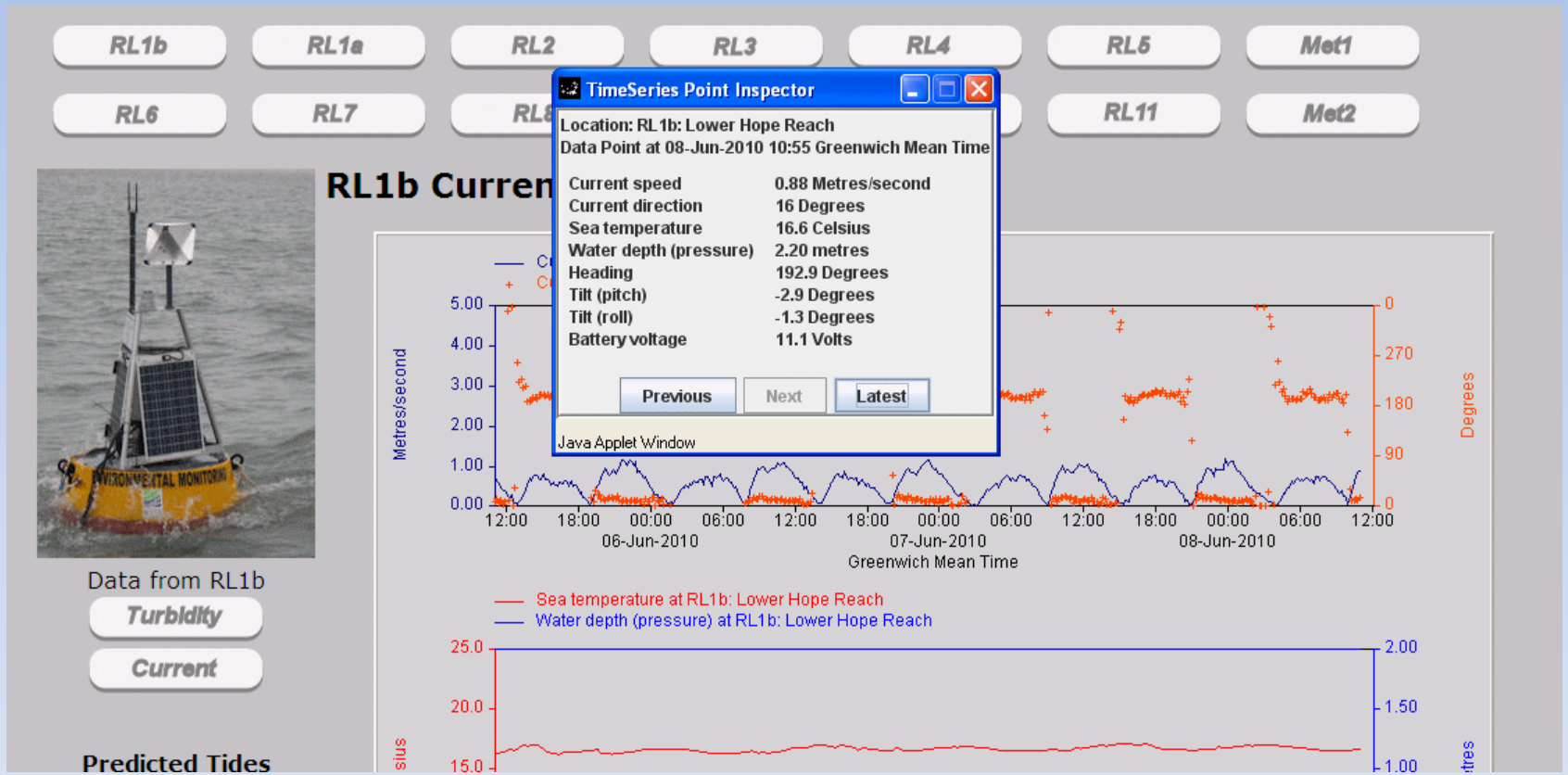

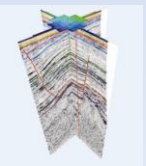







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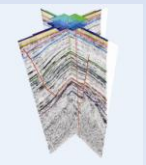
Data output from an instrument









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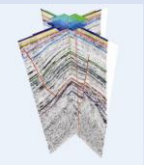
Data output from an instrument

ASCII









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Data output from an instrument

ASCII

```
"==========","========","=====","======","======","=======","======","======="
"      Date","    Time","  Temp","SpCond","   Sal","  Depth","Turbid","Battery"
"     d/m/y","hh:mm:ss","     C","  mS/cm","   ppt","  meters","   NTU","  volts"
"----------","--------","-----","------","------","-------","------","-------"
07/08/2006,14:45:16,20.36,0.016,0.01,0.271,3799.9,6.1
07/08/2006,14:52:46,20.62,0.015,0.01,0.271,20.9,6.1
07/08/2006,15:00:16,20.83,0.016,0.01,0.269,16.3,6.2
07/08/2006,15:07:46,20.58,0.014,0.01,0.267,16.9,6.2
07/08/2006,15:15:16,20.42,0.004,0.00,0.266,15.1,6.1
07/08/2006,15:22:46,20.73,0.004,0.00,0.264,11.9,6.2
07/08/2006,15:30:27,20.52,0.001,0.00,0.263,11.3,6.2
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```

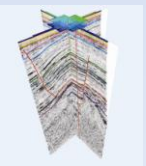






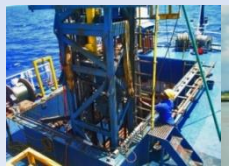


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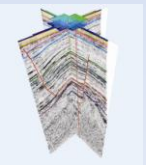
Data output from an instrument

ASCII

Binary









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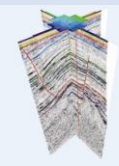
Data output from an instrument

ASCII

Binary

```
¥?WPR 0401  ???? ?ÿÿ
??? ??!Cÿÿÿÿÿÿÿÿÿÿ1.15#]¥p??è?WAV
5248?????????=`ó`ó??$êÜâââZ¥
õ0?v£?üq0Ù?????????????????????????ÿÿ??????ÿÿ?????????ÿÿ?
?????„ÃVG.yIKÎhAŠæù,0~?€y
       ó1»ÿÿ□þ&þv}4?Álax%?1?óÿ??????????????
'd?????????????????????-!¥??.?6??ÿ ??,???????????„?? ?□
„P10F1L????%???A????????œ1^Ê<æ<==9=S=n=^=¢=»=Ô=í=>>6>N>e>
}>"">ª>À>Ö>ì>??,?A?U?i?}?'?¤?¸?Ê?Ý?ð?@@&@7@I@Z@k@|@Œ@œ@¬@¼
@Ì@Û@ê@ù@AA%A3ABAOA]AjAxA…A'AžA«A·AÃAÏAÛAçAòAýABB
```









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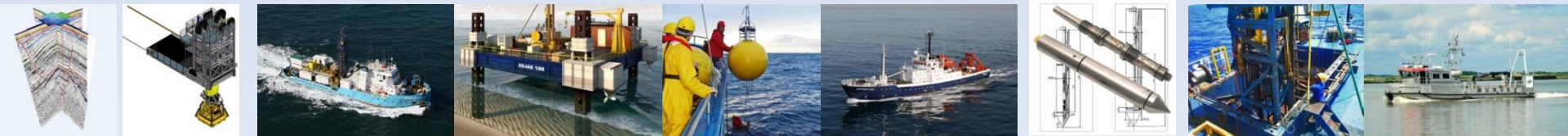
Data output from an instrument

ASCII

Binary

```
00000000 A5 05 18 00 57 50 52 20 30 34 30 31 20 20 00 00 ....WPR 0401  ..
00000010 00 00 07 00 FF FF 0D 00 00 00 20 05 00 00 21 43 .......... ...!C
00000020 FF FF FF FF FF FF FF FF FF FF 31 2E 31 35 23 5D ..........1.15#]
00000030 A5 04 70 00 17 00 E8 03 03 00 57 41 56 20 35 32 ..p.......WAV 52
00000040 34 38 00 00 00 00 19 00 19 00 19 00 00 00 3D 19 48.............=.
00000050 60 F3 60 F3 00 00 24 EA DC 15 E2 05 E2 05 E2 05 `.`...$.........
00000060 5A A5 09 07 F5 30 3F 01 76 A3 00 FC 71 30 D9 00 Z....0?.v...q0..
00000070 00 00 01 00 00 00 00 00 00 00 01 00 00 00 00 00 ................
00000080 00 00 01 00 01 00 00 00 00 00 00 00 FF FF 00 00 ................
00000090 00 00 00 00 FF FF 00 00 01 00 01 00 00 00 00 00 ................
000000A0 01 00 FF FF 00 00 00 00 00 00 84 1E C3 56 47 2E .............VG.
000000B0 79 49 11 4B CE 68 41 8A E6 F9 82 30 7E 00 01 80 yI.K.hA....0~...
000000C0 79 09 F3 31 BB FF FF 7F 03 FE 26 01 03 FE 76 7D y..1......&...v}
000000D0 34 00 C1 04 6C 01 61 78 25 00 31 00 F3 FF 00 00 4...l.ax%.1.....
000000E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 1C 07 ................
000000F0 10 0E 10 0E 10 27 64 00 00 00 00 00 00 00 00 00 .....'d.........
00000100 00 00 00 00 00 00 00 00 00 00 00 00 03 00 96 21 ...............!
```



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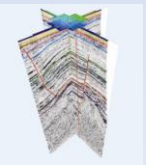
A single data block...

```
00000000 A5 01 15 00 50 25 07 14 08 11 00 00 00 00 8C 00 ....P%..........
00000010 29 3A 13 07 1C 01 B9 FF 00 F1 CE 00 12 09 E7 05 ):..............
00000020 56 FC 7C FE 22 1C 19 00 16 5C                   V.|."....\
```









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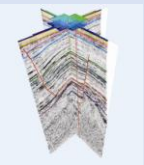
A single data block...

```
00000000 A5 01 15 00 50 25 07 14 08 11 00 00 00 00 8C 00 ....P%..........
00000010 29 3A 13 07 1C 01 B9 FF 00 F1 CE 00 12 09 E7 05 ):..............
00000020 56 FC 7C FE 22 1C 19 00 16 5C                   V.|."....\
```









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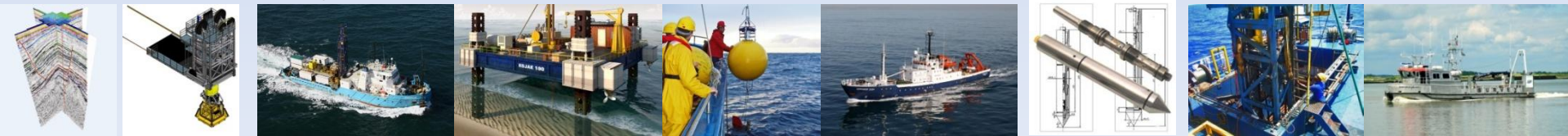
A single data block...

```
00000000 A5 01 15 00 50 25 07 14 08 11 00 00 00 00 8C 00 ....P%..........
00000010 29 3A 13 07 1C 01 B9 FF 00 F1 CE 00 12 09 E7 05 ):..............
00000020 56 FC 7C FE 22 1C 19 00 16 5C                   V.|."....\
```

Splits into four sections...

Identifier	A501
Size	1500
Data	5025 0714 0811 0000 0000 8C00 293A 1307 1C01
..	B9FF 00F1 CE00 1209 E705 56FC 7CFE 221C 1900
Checksum	165C



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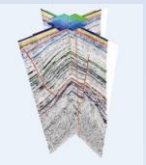
Checksum calculation...

```
B58C  + 01A5 + 0015 + 2550 + 1407 + 0811
      + 0000 + 0000 + 008C + 3A29 + 0713
      + 011C + FFB9 + F100 + 00CE + 0912
      + 05E7 + FC56 + FE7C + 1C22 + 0019
```

= 5C16









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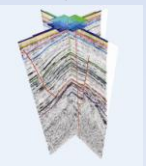
Checksum calculation...

```
B58C  + 01A5 + 0015 + 2550 + 1407 + 0811
      + 0000 + 0000 + 008C + 3A29 + 0713
      + 011C + FFB9 + F100 + 00CE + 0912
      + 05E7 + FC56 + FE7C + 1C22 + 0019
```

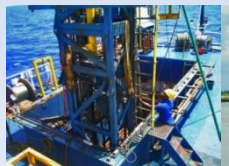
= 5C16

Easy!





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Identify the data block

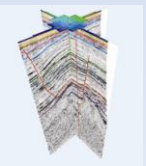
Read the expected size

Check if data are available

Calculate the checksum

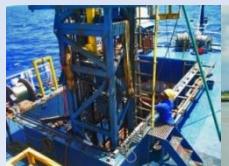
Compare with published checksum

Decode if good








GEMS Group

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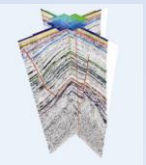
Why are Nortek my first choice for real time current measurements?

Reliability

Setup software is excellent

Raw binary data decodes easily

Real time wave calculation with AWAC









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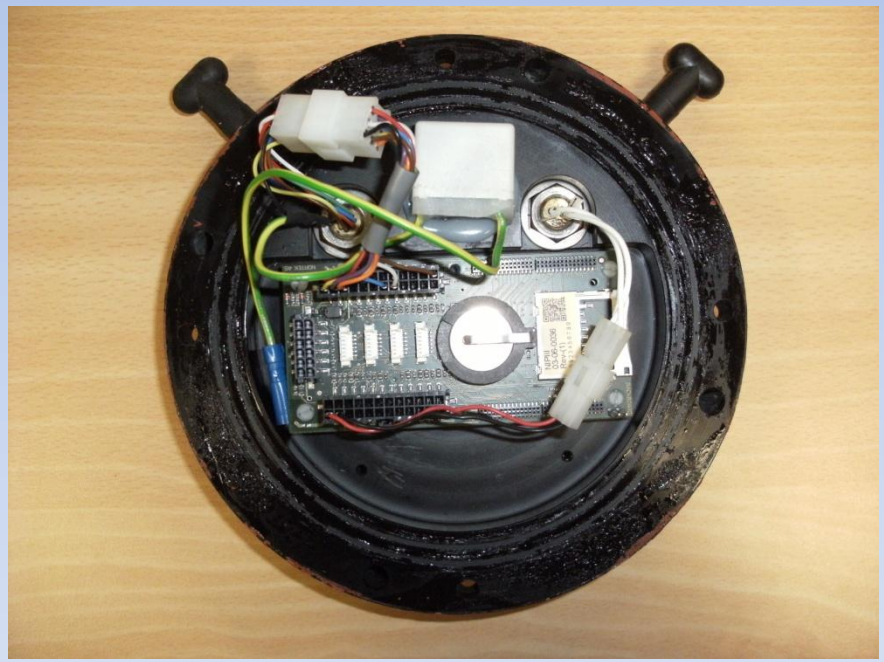
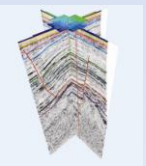
On-board wave calculations

NIP, 2008

Used in Yemen

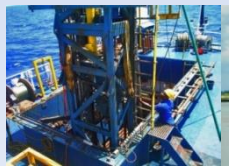
Some intermittent problems







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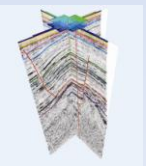
On-board wave calculations

Prolog, 2010

Trialled on London Gateway

- Easy to install
- Easy to setup
- Doesn’t interfere with AWAC operation
- Preserves raw AWAC data
- Uses standard Nortek data structures
- Completely reliable









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Data from RL7

Turbidity

Background susp. solids

Current

Profile

Wave

Predicted Tides
(Coryton)
Last Tide

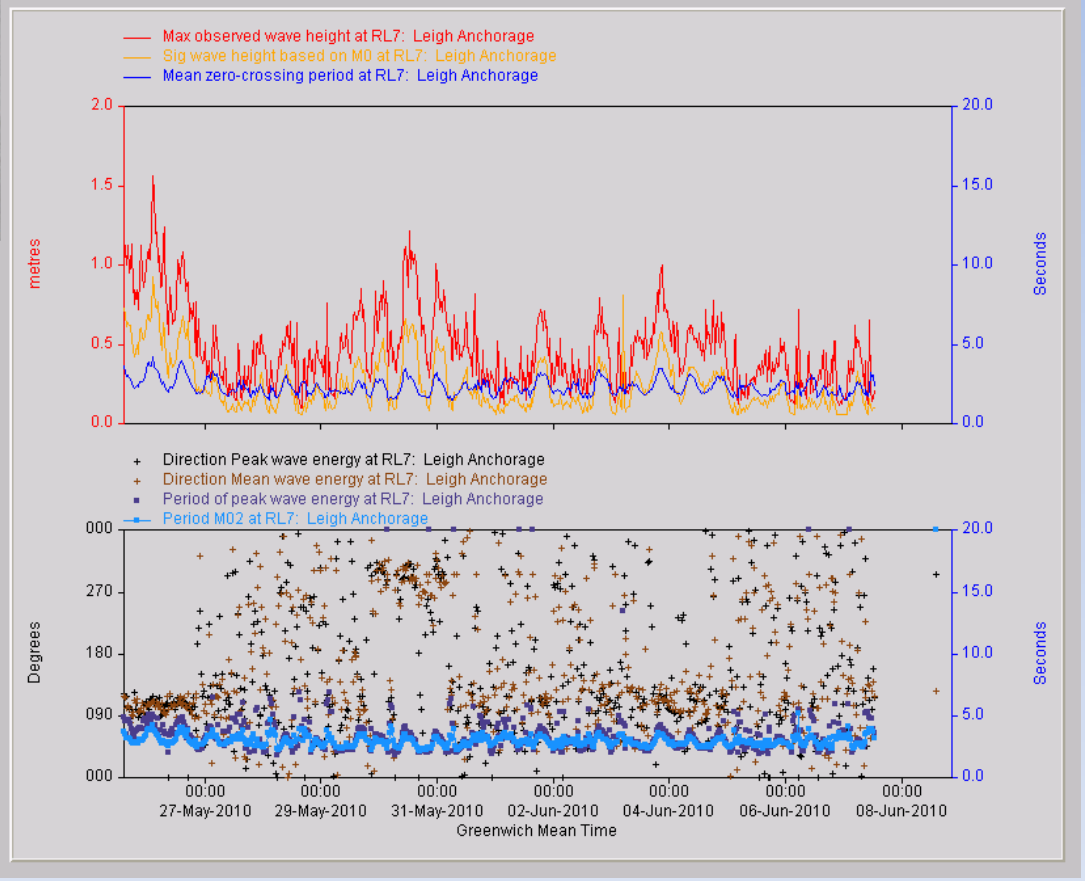
Predicted Tides, HW & LW

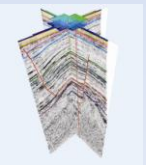
5.20
m

Next Tide

Predicted Tides, HW & LW

1.50











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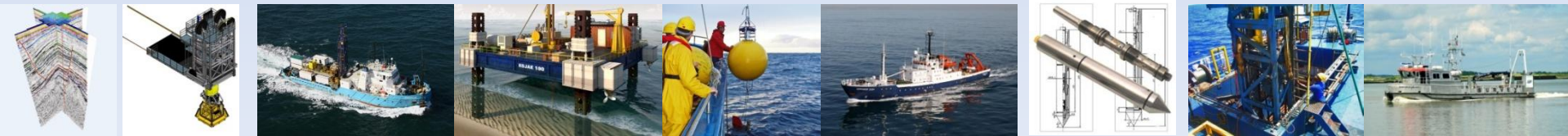
Future developments

Iridium Short Burst Data

Nortek Z-Cell



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Questions?