<table>
<thead>
<tr>
<th>Eventlabel</th>
<th>CAR2013_sel_a_m_08</th>
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<tbody>
<tr>
<td>Campaign</td>
<td>King George Island 2013</td>
</tr>
<tr>
<td>Species</td>
<td>Southern elephant seal (Mirounga leonina)</td>
</tr>
<tr>
<td>Age</td>
<td>Adult; &gt;7 years</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td>Number</td>
<td></td>
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<tr>
<td>Length (total)</td>
<td>4670 mm</td>
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<tr>
<td>Length (standard)</td>
<td>4180 mm</td>
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<tr>
<td>Length (curvatur)</td>
<td>4750 mm</td>
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<tr>
<td>Girth (pectoral)</td>
<td>3830 mm</td>
</tr>
<tr>
<td>Weight [estimated]</td>
<td>&gt;3000</td>
</tr>
<tr>
<td>Weight [calculated]</td>
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</tr>
<tr>
<td>Weight [measured]</td>
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</tr>
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<td>ARGOS PTT ID</td>
<td>130073</td>
</tr>
<tr>
<td>Transmitter type</td>
<td>SMRU/Series 9000 SRDL/CTD</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>SMRU</td>
</tr>
<tr>
<td>PTT Serial Number</td>
<td>12799</td>
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<td>PTT Software</td>
<td>Software specification for CTD_GEN_13A deployment (Standard CTD) Valid for dates in years 2013 to 2016</td>
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<tr>
<td>Setting protocol</td>
<td>Software specification for CTD_GEN_13A deployment (Standard CTD) Valid for dates in years 2013 to 2016</td>
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<td>Transmitting via ARGOS</td>
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<tr>
<td></td>
<td>Argos page transmission sequences:</td>
</tr>
<tr>
<td></td>
<td>Until day 1464: 0 0 1 0 0 2 3 0 0 4 5</td>
</tr>
<tr>
<td></td>
<td>An additional diagnostics page (6) is sent every 60 transmissions</td>
</tr>
<tr>
<td></td>
<td>Argos airtest for first 7 hours:</td>
</tr>
<tr>
<td></td>
<td>Transmission interval is chosen randomly between 48 and 72 seconds</td>
</tr>
<tr>
<td></td>
<td>Satellite availability (UTC):</td>
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<tr>
<td></td>
<td>00: -- on --</td>
</tr>
<tr>
<td></td>
<td>01: -- on --</td>
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<tr>
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<td>02: -- on --</td>
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<td>04: -- on --</td>
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<tr>
<td></td>
<td>05: -- on --</td>
</tr>
<tr>
<td></td>
<td>06: -- on --</td>
</tr>
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</table>
07: -- on --
08: -- on --
09: -- on --
10: -- on --
11: -- on --
12: -- on --
13: -- on --
14: -- on --
15: -- on --
16: -- on --
17: -- on --
18: -- on --
19: -- on --
20: -- on --
21: -- on --
22: -- on --
23: -- on --

Transmission targets:

56000 transmissions after 365 days

Normal interval between Argos transmissions: 40 secs
In Haulouts: ON (one tx every 1 min 20 secs) for first 5 hours
then cycling OFF for 3 hours, ON for 2 hours

Check sensors every 4 secs
When near surface (shallower than 10m), check wet/dry every 1 sec
Consider wet/dry sensor failed if wet for 7 days or dry for 99 days
Dives start when wet and below 6m for 8 secs
and end when dry, or above 6m
Do not separate 'Deep' dives
A cruise begins if there has been no dive for 9 mins
A haulout begins when dry for 10 mins
and ends when wet for 40 secs

Dive shape (normal dives):
4 points per dive using broken-stick algorithm

Dive shape (deep dives):
none

CTD profiles: max 2000 dbar up to 4 dbar in 2 dbar bins.
Note: these values should now be given in cbar. They have been auto-converted from dbar because CTD_HI_RES_PRESSURE is not specified

Temperature: Collected, Stored. Valid range:
-2.5 to 30.2 degC
Conductivity: Collected, Not stored.
Salinity: Calculated, Stored. Valid range:
28.9 to 37.1
Fluorescence: Not collected.
Oxygen: Not collected.
Light level: Not collected.

Send the deepest upcast in each 6-hour period.
An upcast is collected if the depth exceeds:
- 1000m in hour 1
- 400m in hour 2
- 200m in hour 3
- 100m in hour 4
- 50m in hour 5
- 30m in hour 6

In addition, a replacement upcast is collected if the depth exceeds the depth of the current upcast by 20%.

During profile, sample CTD sensor every 2 seconds when deeper than 500 m, every 1 seconds when shallower than 500 m.
Each profile contains 16 cut points consisting of 8 fixed points, maximum depth, minimum depth, 6 broken-stick points. A set of fixed point is selected according to depth:

- 10,12,14,16,18,20,24,30
- 10,14,20,26,30,36,40,50
- 10,20,30,40,50,60,70,75
- 10,20,30,40,50,60,75,100
- 10,20,30,50,75,100,125,150
- 10,20,30,50,75,100,150,200
- 10,20,30,50,100,150,200,300
- 10,20,50,100,150,200,300,400
- 10,20,50,100,200,300,400,500
- 10,20,50,100,200,300,500,700
- 20,50,100,200,300,500,700,1000
- 50,100,200,300,500,700,1000,1500

No GPS data

TRANSMISSION BUFFERS (in RAM):
Dives in groups of 3 (10.4167 days @ 10mins/dive): 500 = 2000 bytes
No 'deep' dives
Haulouts: 50 = 200 bytes
6-hour Summaries in groups of 3 (7.5 days): 10 = 40 bytes
No Timelines
Cruises: 50 = 200 bytes
No Diving periods
No Spot depths
No Emergence records
No Dive duration histograms
No Max depth histograms
No Depth & Temperature histograms
CTD casts (7.5 days): 30 = 120 bytes
No GPS fixes
No Spot CTD's
No Vemco VMT's

TOTAL 2560 bytes (of about 21000 available)
MAIN BUFFERS (in 8 or 24 Mb Flash):
Dive in groups of 3 (10.4167 days @ 10mins/dive):
500 x 104 bytes = 52000 bytes
No 'deep' dives
Haulout: 50 x 32 bytes = 1600 bytes
6-hour summaries in groups of 3 (7.5 days): 10 x 88 bytes = 880 bytes
No Depth & Temperature histograms
No timelines
Cruise: 50 x 32 bytes = 1600 bytes
No diving periods
No spot depths
No emergence records
No Max depth histograms
CTD casts (7.5 days): 30 x 160 bytes = 4800 bytes
No GPS fixes
No spot CTD's
No Vemco VMT's

TOTAL 59 kb (from 8192 kb available)

PAGE CONTENTS:

PAGE 0 (Argos, 247 bits):
PTT NUMBER OVERHEAD (28-bit code)
-------------[8 bits: 0 - 7]

PAGE NUMBER
-------------[3 bits: 8 - 10]

DIAGNOSTICS in format 0:

Max depth ever: Lookup with 128 bins:
2050, 2050-2100, 2100-2150, >2150 in units of 0.1 m
(range: 0 to 2150 m)

--------- [7 bits: 11 - 17]

DIVE group in format 0:
Normal dives transmitted in groups of 3
Time of start of last dive: max 5 days 12 hours @ 30 secs = 15840
(tx as raw 14 bits in units of 1
(range: 0 to 16383 ) OK
(recommended sell-by 5 days 11 hours,
actual: 5 days is OK)
Number of records: raw 2 bits in units of 1
(range: 0 to 3 )
Reason for end: -- not transmitted --
Group number: -- not transmitted --
Max depth: -- not transmitted --
Dive duration: odlog 2/5 in units of 16 s
(range: 0 to 7608 s)
Mean speed: -- not transmitted --
Profile data (4 depths/times, 0 speeds):
Profile times: raw 6 bits in units of 15.873 permille (range: 0 to 1000 permille)
Speed profile: -- not transmitted --
Residual: -- not transmitted --
Calculation time: -- not transmitted --
Surface duration: odlog 2/4 in units of 2.5 s (range: 0 to 588.75 s)
cf. cruise starts after 9 mins (540 secs)
Dive area: raw 6 bits in units of 15.873 permille (range: 0 to 1000 permille)
--------- [229 bits: 18 - 246]

Available bits used exactly
PAGE 1 (Argos, 247 bits):

PTT NUMBER OVERHEAD (28-bit code)
-----------[8 bits: 0 - 7]

PAGE NUMBER
-----------[3 bits: 8 - 10]

DIAGNOSTICS in format 1:

TX number: wraparounds 11 bits in units of 32 (range: 0 to 65504)
-----------[11 bits: 11 - 21]

CRUISE group in format 0:

Number of records: raw 1 bits in units of 1 (range: 0 to 1)
Cruise number: wraparound 4 bits in units of 1 (range: 0 to 15)
Start time: -- not transmitted --
End time: max 5 days 12 hours @ 2 mins = 3960 tx as raw 12 bits in units of 1 (range: 0 to 4095) OK (recommended sell-by 5 days 11 hours, actual: 5 days 4 hours is OK)
Duration: raw 9 bits in units of 120 s (range: 0 to 61320 s)
cf. Max duration is 16 hours
Speed: -- not transmitted --
Reason for end: -- not transmitted --
-----------[26 bits: 22 - 47]

HAULOUT in format 0:

Number of records: raw 1 bits in units of 1 (range: 0 to 1)
Haulout number: wraparound 3 bits in units of 1 (range: 0 to 7)
Start time: -- not transmitted --
End time: max 5 days 12 hours @ 2 mins = 3960 tx as raw 12 bits in units of 1 (range: 0 to 4095) OK (recommended sell-by 5 days 11 hours, actual: 5 days 4 hours is OK)
Duration: raw 9 bits in units of 120 s (range: 0 to 61320 s)
cf. Max duration is 16 hours
Reason for end: -- not transmitted --
Contiguous: -- not transmitted --
-----------[25 bits: 48 - 72]

SUMMARY group in format 0:

Transmitted in groups of 3
Record could be in buffer for 7 days 12 hours
End time: max 7 days 12 hours @ 6 hours = 30 tx as raw 5 bits in units of 1 (range: 0 to 31) OK (recommended sell-by 7 days 11 hours,
**Actual:** 7 days is OK

- **Number of records:** raw 1 bits in units of 1 (range: 0 to 1)
- **Cruising time:** -- not transmitted --
- **Haulout time:** raw 6 bits in units of 15.873 permille (range: 0 to 1000 permille)
- **Dive time:** raw 6 bits in units of 15.873 permille (range: 0 to 1000 permille)
- **Deep Dive time:** -- not transmitted --

**Normal dives:**


- **SD max dive depth:** odlog 2/4 in units of 5 m (range: 0 to 1177.5 m)


- **Avg dive duration:** odlog 2/5 in
units of 16 s (range: 0 to 7608 s)  
SD dive duration:  odlog 1/4 in
units of 60 s (range: 0 to 2790 s)  
Max dive duration:  odlog 2/5 in
units of 16 s (range: 0 to 7608 s)  
Avg surface duration: -- not
transmitted --  
SD surface duration: -- not
transmitted --  
Max surface duration: -- not
transmitted --  
Avg speed in dive: -- not
transmitted --  
Number of dives:  odlog 1/4 in units of 2 (range: 0 to 93 )
Deep dives:
transmitted --  
Avg max dive depth: -- not
transmitted --  
SD max dive depth: -- not
transmitted --  
Max max dive depth: -- not
transmitted --  
Avg dive duration: -- not
transmitted --  
SD dive duration: -- not
transmitted --  
Max dive duration: -- not
transmitted --  
Avg surface duration: -- not
transmitted --  
SD surface duration: -- not
transmitted --  
Max surface duration: -- not
transmitted --  
Avg speed in dive: -- not
transmitted --  
Number of dives: -- not transmitted
--  
Avg SST: -- not transmitted --  
----------------[174 bits: 73 - 246]

Available bits used exactly

--- End of page 1 ---

PAGE 2 (Argos, 247 bits):
PTT NUMBER OVERHEAD (28-bit code)  
----------------[8 bits: 0 - 7]

PAGE NUMBER  
----------------[3 bits: 8 - 10]

CTD PROFILE in format 0:

End time:  max 7 days @ 10 mins= 1008 tx as raw 10 bits in units of 1
(range: 0 to 1023 ) OK  
(recommended sell-by 6 days 23 hours, actual: 6 days 18 hours is OK)
CTD cast number: -- not transmitted --
Note: these old-style dbar pressures are internally
Min pressure: -- not transmitted --
Max pressure: raw 10 bits in units of 2 dbar (range: 4 to 2050 dbar)
Min temperature: raw 15 bits in units of 0.001 (range: 2.5 to 35.267 = -2.5 to 30.267 °C in steps of 0.001 °C)
Max temperature: raw 15 bits in units of 0.001 (range: 2.5 to 35.267 = -2.5 to 30.267 °C in steps of 0.001 °C)
cf. Valid temperatures: -2.5 to 30.2 degC
Min salinity: raw 13 bits in units of 1 mPSU (range: 28900 to 37091 mPSU)
Max salinity: raw 13 bits in units of 1 mPSU (range: 28900 to 37091 mPSU)
cf. Valid salinity: 28.9 to 37.1
Number of samples: -- not transmitted --
8 profile points 0 to 7 (from total of 16 cut points):
  Temperature:
    Points 0 to 7 are at fixed pressure
    8 x Temperature: raw 10 bits in units of 0.977517 permille (range: 0 to 1000 permille)
    Temperature residual: -- not transmitted --
  Salinity:
    Points 0 to 7 are at fixed pressure
    8 x Salinity: raw 10 bits in units of 0.977517 permille (range: 0 to 1000 permille)
    Salinity residual: -- not transmitted --
Temperature bounds: -- not transmitted --
Conductivity bounds: -- not transmitted --
Salinity bounds: -- not transmitted --
Min fluoro: -- not transmitted --
Max fluoro: -- not transmitted --
Min DOxy: -- not transmitted --
Max DOxy: -- not transmitted --
Min Light: -- not transmitted --
Max Light: -- not transmitted --
----------[236 bits: 11 - 246]

Available bits used exactly

--- End of page 2 ---

PAGE 3 (Argos, 247 bits):
PTT NUMBER OVERHEAD (28-bit code)
----------[8 bits: 0 - 7]

PAGE NUMBER
----------[3 bits: 8 - 10]

DIAGNOSTICS in format 2:
Number of resets: wraparound 2 bits in
units of 1  (range: 0 to 3 )
----------[2 bits: 11 - 12]

CTD PROFILE in format 1:

End time:  max 7 days @ 10 mins= 1008
         tx as raw 10 bits in units of 1
         (range: 0 to 1023 ) OK
         (recommended sell-by 6 days 23 hours,
         actual: 6 days 18 hours is OK)
CTD cast number:  -- not transmitted --
Note: these old-style dbar pressures are internally
       converted to cbar
Min pressure:  -- not transmitted --
Max pressure:  -- not transmitted --
Min temperature:  -- not transmitted --
Max temperature:  -- not transmitted --
Min salinity:  -- not transmitted --
Max salinity:  -- not transmitted --
Number of samples:  -- not transmitted --
8 profile points 8 to 15 (from total of 16
cut points):
   Temperature: Min pressure is sent
   separately
   Max pressure is sent separately
   6 broken stick pressure bins:
   raw 10 bits in units of 1 bin (range: 0 to 1023 bin)
   8 x Temperature:  raw 10 bits
   in units of 0.977517 permille (range: 0 to 1000
   permille)
   Temperature residual:  -- not transmitted --
Salinity:
   Pressure already transmitted
   8 x Salinity:  raw 10 bits in
   units of 0.977517 permille (range: 0 to 1000
   permille)
   Salinity residual:  -- not transmitted --
Temperature bounds :  raw 2 bits in units of
1 lo/hi (range: 0 to 3 lo/hi)
Conductivity bounds :  -- not transmitted --
Salinity bounds :  raw 2 bits in units of 1
lo/hi (range: 0 to 3 lo/hi)
   Min fluoro:  -- not transmitted --
   Max fluoro:  -- not transmitted --
   Min DOxy:  -- not transmitted --
   Max DOxy:  -- not transmitted --
   Min Light:  -- not transmitted --
   Max Light:  -- not transmitted --
----------[234 bits: 13 - 246]

Available bits used exactly

== End of page 3 ==

PAGE 4 (Argos, 247 bits):
PTT NUMBER OVERHEAD (28-bit code)
----------[8 bits: 0 - 7]
CTD PROFILE in format 2:

End time:  max 3 days 6 hours @ 10 mins = 468
          tx as raw 9 bits in units of 1
          (range: 0 to 511 ) OK
          (recommended sell-by 3 days 5 hours,
          actual:  3 days is OK)
CTD cast number:  -- not transmitted --

Note: these old-style dbar pressures are internally converted to cbar

Min pressure:  -- not transmitted --
Max pressure:  raw 10 bits in units of 2
dbar (range: 4 to 2050 dbar)

Max temperature:  raw 15 bits in units of
0.001 (range: 2.5 to 35.267 = -2.5 to 30.267 °C in
steps of 0.001 °C)

Min temperature:  raw 15 bits in units of
0.001 (range: 2.5 to 35.267 = -2.5 to 30.267 °C in
steps of 0.001 °C)

cf. Valid temperatures: -2.5 to 30.2 degC

Min salinity:  raw 13 bits in units of 1
Max salinity:  raw 13 bits in units of 1

mPSU (range: 28900 to 37091 mPSU)
cf. Valid salinity: 28.9 to 37.1

Number of samples:  -- not transmitted --
8 profile points 0 to 7 (from total of 16 cut points):

Temperature:
Points 0 to 7 are at fixed pressure
8 x Temperature:  raw 10 bits in units of 0.977517 permille (range: 0 to 1000 permille)

Temperature residual:  -- not transmitted --

Salinity:
Points 0 to 7 are at fixed pressure
8 x Salinity:  raw 10 bits in units of 0.977517 permille (range: 0 to 1000 permille)

Salinity residual:  -- not transmitted --

Temperature bounds :  -- not transmitted --
Conductivity bounds :  -- not transmitted --
Salinity bounds :  -- not transmitted --
Min fluoro:  -- not transmitted --
Max fluoro:  -- not transmitted --
Min DOxy:  -- not transmitted --
Max DOxy:  -- not transmitted --
Min Light:  -- not transmitted --
Max Light:  -- not transmitted --

----------[235 bits: 11 - 245]
PAGE 5 (Argos, 247 bits):
PTT NUMBER OVERHEAD (28-bit code)
---------[8 bits: 0 - 7]

PAGE NUMBER
---------[3 bits: 8 - 10]

DIAGNOSTICS in format 2:

Number of resets: wraparound 2 bits in units of 1 (range: 0 to 3 )
---------[2 bits: 11 - 12]

CTD PROFILE in format 3:

End time: max 3 days 6 hours 0 10 mins= 468 tx as raw 9 bits in units of 1
(range: 0 to 511 ) OK
(recommended sell-by 3 days 5 hours, actual: 3 days is OK)
CTD cast number: -- not transmitted --
Note: these old-style dbar pressures are internally converted to cbar
Min pressure: -- not transmitted --
Max pressure: -- not transmitted --
Min temperature: -- not transmitted --
Max temperature: -- not transmitted --
Min salinity: -- not transmitted --
Max salinity: -- not transmitted --
Number of samples: -- not transmitted --
8 profile points 8 to 15 (from total of 16 cut points):

Temperature:
Min pressure is sent separately
Max pressure is sent separately
6 broken stick pressure bins:
raw 10 bits in units of 1 bin (range: 0 to 1023 bin)
8 x Temperature: raw 10 bits in units of 0.977517 permille (range: 0 to 1000 permille)
Temperature residual: -- not transmitted --

Salinity:
Pressure already transmitted
8 x Salinity: raw 10 bits in units of 0.977517 permille (range: 0 to 1000 permille)
Salinity residual: -- not transmitted --

Temperature bounds : raw 2 bits in units of 1 lo/hi (range: 0 to 3 lo/hi)
Conductivity bounds : -- not transmitted --
Salinity bounds : raw 2 bits in units of 1 lo/hi (range: 0 to 3 lo/hi)
Min fluoro: -- not transmitted --
Max fluoro: -- not transmitted --
Min DOxy: -- not transmitted --
Max DOxy: -- not transmitted --
Min Light: -- not transmitted --
Max Light: -- not transmitted --
------------[233 bits: 13 - 245]

UNUSED
------------[1 bits: 246 - 246]

--- End of page 5 ---

PAGE 6 (special diagnostics page sent every 60 transmissions)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Range</th>
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<tbody>
<tr>
<td>PTT NUMBER OVERHEAD</td>
<td>28-bit code</td>
<td>0 to 7</td>
</tr>
<tr>
<td>PAGE NUMBER</td>
<td></td>
<td>8 to 10</td>
</tr>
</tbody>
</table>

TX number: wraparound 18 bits in units of 1 (range: 0 to 262143)
Current state: raw 3 bits in units of 1 (range: 0 to 7)
Tag time (mm:ss): raw 12 bits in units of 1 secs (range: 0 to 4095 secs)
ADC offset: raw 12 bits in units of 1 A/D units (range: 0 to 4095 A/D units)
Tag hours: wraparound 16 bits in units of 1 hours (range: 0 to 65535 hours)
Aborted tx: wraparound 18 bits in units of 1 (range: 0 to 262143)
Wet/dry status: raw 2 bits in units of 1 (range: 0 to 3)
Wet/dry fail count: wraparound 8 bits in units of 1 (range: 0 to 255)
Body number: raw 16 bits in units of 1 (range: 0 to 65535)
Max depth ever: raw 15 bits in units of 0.1 m (range: 0 to 3276.7 m)
Latest reset hour: raw 16 bits in units of 1 hours (range: 0 to 65535 hours)
Number of resets: wraparound 8 bits in units of 1 (range: 0 to 255)
Wettest (min wet/dry): raw 8 bits in units of 1 (range: 0 to 255)
Driest (max wet/dry): raw 8 bits in units of 1 (range: 0 to 255)
Number of depth spikes: wraparound 16 bits in units of 1 (range: 0 to 65535)
Number of CTD samples: wraparound 22 bits in units of 1 (range: 0 to 4.1943e+06)

------------[198 bits: 11 - 208]

UNUSED
------------[38 bits: 209 - 246]
<table>
<thead>
<tr>
<th>Deployment</th>
<th><img src="image.jpg" alt="Image" /></th>
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</table>
| **Comment** | Seal tag: ST 73 ST; C024 C025  
Deployment site: P5 - Refugio Elephante  
Prev. Deployment: none |
| **Tag retrieved** | -- // |
| **First transmission** | 2013-11-09T23:11:12 -62.256 -58.636 |
| **Last transmission** | 2014-05-10T18:07:35 --62.261 -58.647 |

[http://doi.pangaea.de/10.1594/PANGAEA.833216]