APPENDIX A – TRANSMITTED VARIABLES

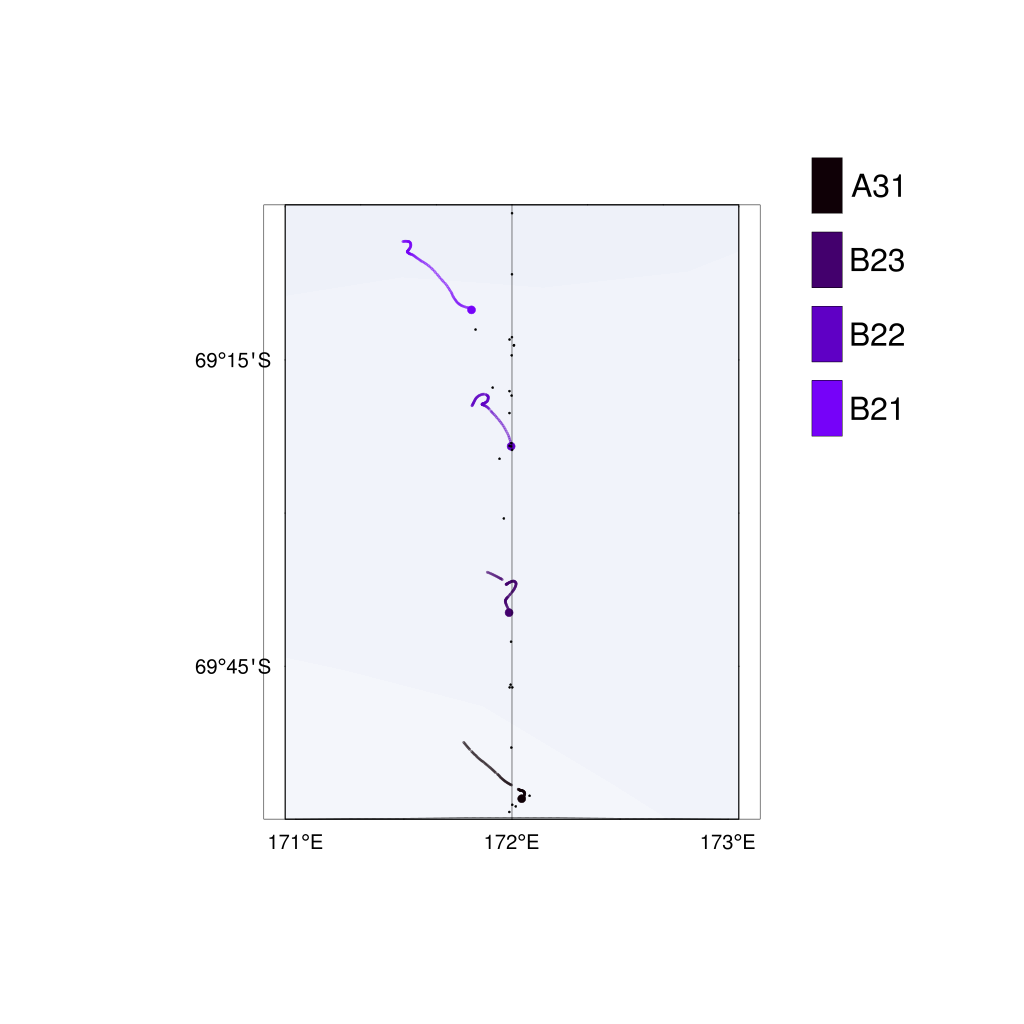
**Table 1.** A description of the relevant meta data transmitted for each capture

|  |  |  |  |
| --- | --- | --- | --- |
| **Row/s** | **Variable** | **Units** | **Description** |
| 1 | time | s | current time (UTC) |
| 3 | ID |  | buoy ID |
| 4 | mode\_default |  | default mode for capture rate |
| 5 | mode\_mode |  | current mode for capture rate |
| 6 | mode\_until | s | length of time in current mode |
| 17 | temperature | degrees | internal temperature of case |
| 20 | battery\_voltage | deci-volts | battery voltage |
| 21 | device\_uptime | s | uptime of board |
| 22 | device\_runtime | s | uptime of software |
| 23 | memory\_used | % | memory used |
| 26 | sd\_used | % | SD card space used |
| 27 | gps\_lat | decimal degrees | latitude at start of capture |
| 28 | gps\_lon | decimal degrees | longitude at start of capture |
| 29 | gps\_sats |  | number of satellites locked |
| 33 | iridim\_signal |  | quality of iridium signal (1 – 5) |

**Table 2.** A description of the relevant wave data transmitted for each capture

|  |  |  |  |
| --- | --- | --- | --- |
| **Row/s** | **Variable** | **Units** | **Description** |
| 1 – 4 | Hz\_max | m | maximum wave height (trough – crest) in a 256 each segment |
| 5 – 8 | Hcm\_max | m | maximum height of a crest above mean water level in each 256 s segment |
| 9 – 12 | Htm\_max | m | maximum depth of a trough below mean water level in each 256 s segment |
| 13 - 16 | Tz\_mean | s | mean wave period in each 256 s segment |
| 17 | Tp | s | peak period from full (non averaged) spectra |
| 18 | Hmo | m | significant wave height from deterministic analysis – 4 x standard deviation of elevation |
| 19 - 73 | psd | m2/Hz | the power spectral density for the 55 wave frequency bins |
| 74-80 | moments |  | spectral moments |
| 90 | qf\_mvar | m | quality flag: mean vertical acceleration removed |
| 91 | qf\_kist |  | quality flag: Kistler passed (0), Kistler failed (1) |
| 92 | qf\_imu |  | quality flag: IMU passed (0), IMU failed (1) |
| 93 | qf\_p\_kist |  | quality flag: percentage of flagged Kistler samples |
| 94 | qf\_p\_accel |  | quality flag: percentage of flagged acceleration samples (averaged across 3 axis) |
| 95 | qf\_p\_gyro |  | quality flag: percentage of flagged gyroscope samples (averaged across 3 axis) |
| 96 | qf\_p\_mag |  | quality flag: percentage of flagged magnetometer samples (averaged across 3 axis) |
| 98 | power\_diff |  | difference between power in the time and frequency domains |
| 101 | Hz\_mean | m | deterministic mean wave height |

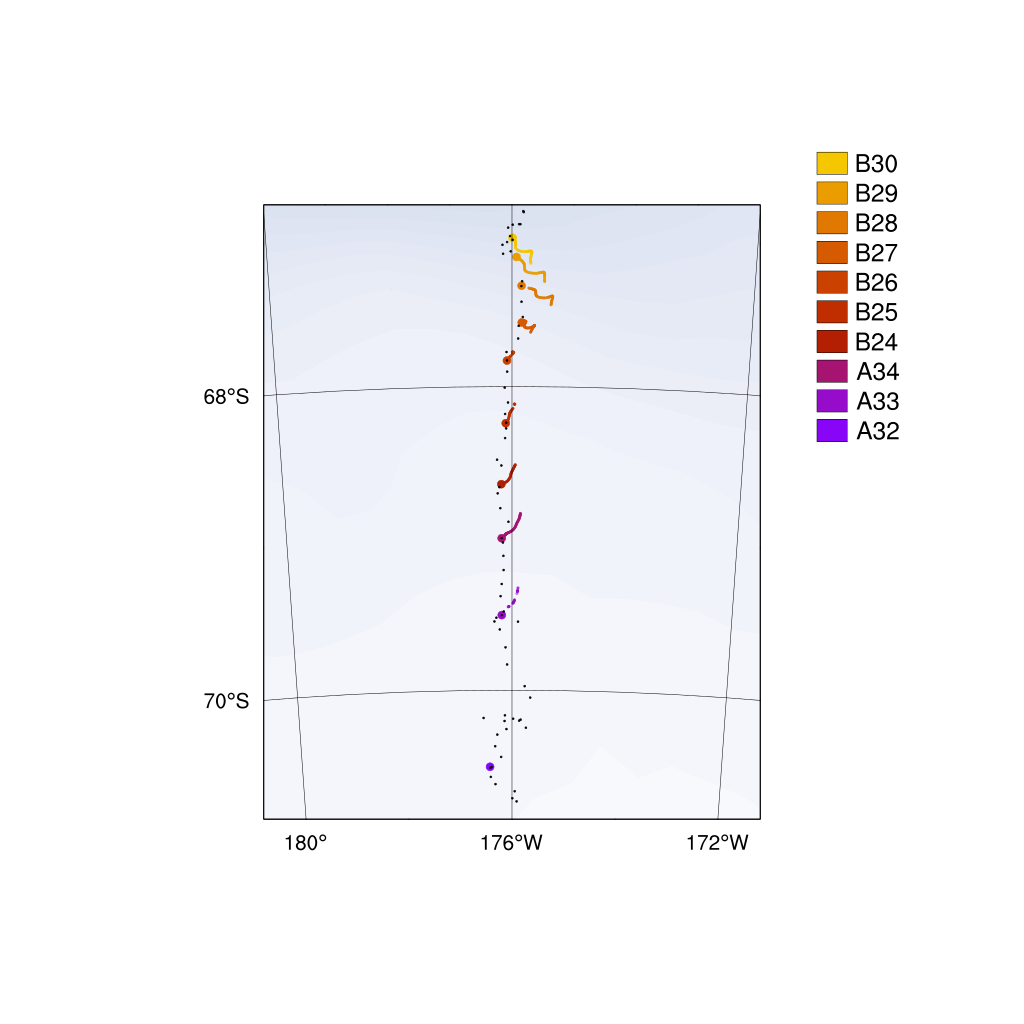
APPENDIX B – ASPECT OBSERVATIONS



**Fig. 18.** A map of the location of the ASPeCt observations (small black dots) relative to the inbound deployments (coloured large dots). The lines show the first 24 hrs of the buoy tracks.

**Table 3.** Details of each ASPeCt observation between buoys during the inbound deployments.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Buoy ID** | **Ice Thickness (m)** | **Floe size (m)** | **Ice Type (m)** | **Ice Concentration (%)** |
| **B21** |  |  |  |  |
|  | 0.5 | Pancakes | Pancakes | 100 |
|  | 0.3 | Pancakes | Pancakes | 100 |
|  | 0.3 | Pancakes | Pancakes | 100 |
|  | 0.3  0.3  0.3  0.5  0.3  0.25  0.3  0.5  0.15 | Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Small floes (20 – 100) | Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Pancakes  Young grey ice (0.1 – 0.15) | 100  100  100  100  100  100  100  80  80 |
| **B22** |  |  |  |  |
|  | 0.5 | Pancakes | Pancakes | 100 |
|  | 0.15 | Small floes (20 – 100) | Young grey ice (0.1 – 0.15) | 100 |
|  | 0.5 | Pancakes | Pancakes | 100 |
|  | 0.5 | Cake ice (< 20 m) | Pancakes | 100 |
| **B23** |  |  |  |  |
|  | 0.5 | Pancakes | Pancakes | 100 |
|  | 0.5 | Pancakes | Pancakes | 100 |
|  | 0.5 | Pancakes | Pancakes | 100 |
|  | 0.5 | Pancakes | Pancakes | 100 |
|  | 0.5 | Cake ice (< 20 m) | Pancakes | 90 |
|  | 0.4 | Large floes (500 - 2000) | Pancakes | 90 |
| **A31** |  |  |  |  |

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**Fig. 19.** A map of the location of the ASPeCt observations (small black dots) relative to the outbound deployments (coloured large dots). The lines show the first 24 hrs of the buoy tracks.

**Table 4.** Details of each ASPeCt observation between buoys during the outbound deployments.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Buoy ID** | **Ice Thickness (m)** | **Floe size (m)** | **Ice Type (m)** | **Ice Concentration (%)** |
| **A32** |  |  |  |  |
|  | 0.6 | Medium floes (100 - 500) | First year (0.3 – 0.7) | 80 |
|  | 0.4 | Medium floes (100 - 500) | First year (0.3 – 0.7) | 80 |
|  | 0.35 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 70 |
|  | 0.15 | Large floes (500 - 2000) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.4 | Vast floes (> 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.4 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.3 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.4 | Large floes (500 - 2000) | First year (0.3 – 0.7)) | 90 |
|  | 0.3 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.35 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.4 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.3 | Large floes (500 - 2000) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.3 | Medium floes (100 - 500) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.2 | Medium floes (100 - 500) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.3 | Large floes (500 - 2000) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.2 | Large floes (500 - 2000) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.3 | Medium floes (100 - 500) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.3 | Medium floes (100 - 500) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.4 | Medium floes (100 - 500) | First year (0.3 – 0.7) | 100 |
| **A33** |  |  |  |  |
|  | 0.6 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.25 | Large floes (500 - 2000) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.5 | Vast floes (> 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.25 | Large floes (500 - 2000) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.4 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.4 | Medium floes (100 - 500) | First year (0.3 – 0.7) | 90 |
|  | 0.5 | Medium floes (100 - 500) | First year (0.3 – 0.7) | 100 |
| **A34** |  |  |  |  |
|  | 0.5 | Medium floes (100 - 500) | First year (0.3 – 0.7) | 100 |
|  | 0.25 | Medium floes (100 - 500) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.4 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.6 | Large floes (500 - 2000) | First year (0.3 – 0.7) | 100 |
|  | 0.4 | Medium floes (100 - 500) | First year (0.3 – 0.7) | 100 |
| **B24** |  |  |  |  |
|  | 0.3 | Small floes (20 - 100) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.25 | Small floes (20 - 100) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.35 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.4 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
| **B25** |  |  |  |  |
|  | 0.75 | Small floes (20 - 100) | First year (0.7 – 1.2) | 100 |
|  | 0.15 | Small floes (20 - 100) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.15 | Large floes (500 - 2000) | Young grey-white ice (0.15 - 0.3) | 100 |
|  | 0.5 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.4 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
| **B26** |  |  |  |  |
|  | 0.3 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.3 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.3 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.3 | Small floes (20 - 100) | First year (0.3 – 0.7) | 50 |
| **B27** |  |  |  |  |
|  | 0.5 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.5 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
|  | 0.5 | Small floes (20 - 100) | First year (0.3 – 0.7) | 100 |
| **B28** |  |  |  |  |
|  | 0.5 | Cake ice (< 20) | First year (0.3 – 0.7) | 100 |
| **B29** |  |  |  |  |
|  | 0.3 | Cake ice (< 20) | First year (0.3 – 0.7) | 100 |
|  | 0.3  0.2  0.3  0.3 | Cake ice (< 20)  Pancakes  Cake ice (< 20)  Small floes (20 - 100) | First year (0.3 – 0.7)  Pancakes  First year (0.3 – 0.7)  First year (0.3 – 0.7) | 100  100  90  100 |
| **B30** |  |  |  |  |

APPENDIX C – WIIOS DEPLOYMENTS

bA picture containing water, outdoor

Description automatically generated

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**Fig. 20.** Images of inbound deployments. (a) WIIOS B21 at 03:50 on 21st April 2017 at 69.1715833 S and 171.8200167 E. (b) WIIOS B22 at 10:40 on 21st April 2017 at 69.394453 S and 171.996 E. (c) WIIOS B23 at 16:20 on 21st April 2017 at 69.666 S and 171.9866667 E. (d) WIIOS A31 at 01:20 on 22nd April 2017 at 69.96966667 S and 172.0448333 E. Photo credits: Lettie Roach.

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**Fig. 21.** Images of outbound deployments. (a) WIIOS A32 at 01:00 on 30th May 2017 at 70.5025 S and 176.4193833 W. (b) WIIOS A33 at 12:40 on 1st June 2017 at 69.5055 S and 176.1855833 W. (c) WIIOS A34 at 20:30 on 1st June 2017 at 68.9995 S and 176.1828333 W. (d) WIIOS B24 at 07:00 on 2nd June 2017 at 68.6434167 S and 176.186W. (e) WIIOS B25 at 15:00 on 2nd June 2017 at 68.24175 S and 176.10725 W. (f) WIIOS B26 at 21:00 on 2nd June 2017 at 67.8286833 S and 176.0849333 W. (g) WIIOS B27 at 03:30 on 3rd June 2017 at 67.5772333 S and 175.8371167 W. (h) WIIOS B28 at 08:30 on 3rd June 2017 at 67.33425 S and 175.8421667 W. (i) WIIOS B29 at 11:00 on 3rd June 2017 at 67.14455 S and 175.9256667 W. (j) WIIOS B30 at 12:30 on 3rd June 2017 at 67.0181167 S and 175.9898333 W. Photo credits: Lettie Roach.