## From Alice Orlich (IARC)

Please see reports from Kristina Brown and Kazu Tataeyama for more details on their sampling.

## Ice Stations

Transects of ice thickness, snow depth and ice cores can provide additional information about ice conditions that is not possible to gauge with shipboard methods. Ice cores were taken to provide temperature and salinity profiles through the ice, and chemistry sample. We had four objectives for ice station work:

(1) to determine the mean level ice thickness and variability at point locations during the cruise;

(2) to collect ice cores for physical characterization of ice at Kristina Brown’s chemistry core sites;

(3) to collect stable isotopes of dissolved inorganic carbon, Oxygen-18 and particulate organic carbon and bacteria samples; and

(4) to characterize the snow pack.

Table 1: Measurements and samples at each ice stations.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ice Station** | **Date** | **Latitude** | **Longitude** | **# Cores** | **# thickness** | **Thickness transects** | **Snow**  **Pits** | **Other Samples** |
| 1 | 3-Oct | 80 19.4N | 151 45.7W | 2 | 0 | 0 | No | Snow transect |
| 2 | 6-Oct | 77 59.7N | 149 14.5W | 1 | 0 | 0 | Yes |  |
| 3 | 7-Oct | 77 04.476N | 135 25.785W | 6 | 7 | 2 | Yes | EM-31 |
| 4 | 10-Oct | 74 35.0N | 134 45.5W | 2 | 0 | 0 | No |  |

**Participants**

**EM-31 & snow pits:** Kazutaka Tateyama

**Ice Coring:** Kristina Brown (Chemistry) and Alice Orlich (Physical)

**Drill and snow transects:** Alice Orlich and Jenny Hutchings

Many thanks to Dan Carlson, Glenn, Lori and Misun for assistance on the ice.

**Chemistry Cores Summary**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Station** | **Type of Sample** | **Depth of Sample** | | **Bag #** | **13C-POC** | **DIC/TALK** | **13C-DIC** | **13C-TOC** | **18O** | **Bacteria** | **salinity** |
| 03/10/2009 | ITP8 | **Core 2: Section 1** | 5-25cm | | 10 |  | 1 | 2 | 1 | 1 | 1 | 1 |
| 03/10/2009 | ITP8 | **Core 2: Section 2** | 40-60cm | | 13 |  | 1 | 2 |  | 1 |  |  |
| 03/10/2009 | ITP8 | **Core 2: Section 3** | 70-90cm | | 12 |  | 1 | 2 |  | 1 | 1 | 1 |
| 03/10/2009 | ITP8 | **Core 2: Section 4** | 116-126cm | | 9 |  | 1 | 2 | 1 | 1 | 1 | 1 |
| 03/10/2009 | ITP8 | **Core 2: Section 5** | bottom 20 | | 3 |  | 1 | 2 | 1 | 1 | 1 | 1 |
| 06/10/2009 | ITP33 | **PUMP 1** | 110cm | | 1 | 2 | 1 | 2 |  | 2 |  | 1 |
| 06/10/2009 | ITP33 | **PUMP 2** | 110cm | | 2 | 1 | 1 | 2 |  | 2 |  | 1 |
| 07/10/2009 | ITP35 | **Core 2: Section 1** | 28 - 54cm | | 10 |  | 1 | 2 |  |  |  |  |
| 07/10/2009 | ITP35 | **Core 2: Section 2** | 98-118cm | | 1 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 2: Section 3** | 157-177cm | | 20 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 2: Section 4** | 186-206cm | | 7 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 2: Section 5** | 226-251cm | | 5 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 2: Section 6** | 302-322cm | | 6 |  | 1 | 2 |  | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 2: Section 7** | bottom chunks | | 2 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **SNOW** | upper snow layer (loose) |  |  |  |  |  |  | 2 | 1 |  |
| 07/10/2009 | ITP35 | **SNOW** | lower hard pack snow |  |  |  |  |  |  | 2 | 1 |  |
| 07/10/2009 | ITP35 | **SNOW** | Kazu's snow pits 18O |  |  |  |  |  |  | 17 |  |  |
| 07/10/2009 | ITP35 | **Core 4: Section 1** | 0-21cm | | 21 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 4: Section 2** | 21-46cm | | 22 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 4: Section 3** | 46-79cm | | 23 |  | 1 | 2 | 2 | 1 | 1 | 1 |
| 07/10/2009 | ITP35 | **Core 5: Section 1** | 0-88cm | | 1 | 2 |  |  |  |  |  |  |
| 07/10/2009 | ITP35 | **Core 6: Section 1** | 0-80cm | | 2 | 2 |  |  |  |  |  | 1 |
| 08/10/2009 | Zodiac SITE 1 | **POC-1** | 7cm | | 1 | 1 |  |  |  |  |  |  |
| 08/10/2009 | Zodiac SITE 1 | **POC-2** | 6.5cm | | 2 | 1 |  |  |  |  |  |  |
| 08/10/2009 | Zodiac SITE 1 | **DIC-1** | 6.5cm | | L3 |  | 4 | 2 | 2 | 1 | 1 | 1 |
| 08/10/2009 | Zodiac SITE 1 | **DIC-2** | 7cm | | L1 |  | 4 | 2 | 2 | 1 | 1 | 1 |
| 08/10/2009 | Zodiac SITE 1 | **Core 1** | 6cm | | S17 |  |  | 2 |  |  |  | 1 |
| 08/10/2009 | Zodiac SITE 1 | **Core 2 + 3** | 4 + 4cm | | S14 |  |  |  |  |  |  |  |
| 08/10/2009 | Zodiac SITE 2 | **Core 4 + 6** | 6.5cm + 7 cm | | S15 |  | 1 | 2 |  | 1 | 1 | 1 |
| 08/10/2009 | Zodiac SITE 2 | **DIC-3** | 7cm + 8cm | | L5 |  | 7 | 2 | 2 | 1 | 1 | 1 |
| 08/10/2009 | Zodiac SITE 2 | **POC-3** | 8cm | | 3 | 2 |  |  |  |  |  |  |
| 10/10/2009 | ITP34 | **T&S Core** | 295cm | |  |  |  |  |  | 30 |  |  |
| 10/10/2009 | ITP34 | **CORE 2: Section 1** | 113 | | 1 | 2 |  |  |  |  |  |  |
| 10/10/2009 | ITP34 | **CORE 2: Section 2** | 104 | | 2 | 2 |  |  |  |  |  |  |
| 10/10/2009 | ITP34 | **CORE 2: Section 3** | 77.3 | | 3 | 2 |  |  |  |  |  |  |
| 10/10/2009 | ITP34 | **PUMP 1** | 110 cm | | 2 | 1 | 1 | 2 |  | 1 |  | 1 |
| 10/10/2009 | ITP34 | **PUMP 2** | 110 cm | | 1 | 1 | 1 | 2 |  | 1 |  | 1 |
| **TOTAL** | | | | | | **19** | **35** | **48** | **25** | **75** | **19** | **23** |

**Physical Cores**

**Ice Station 1 Core A:** 3 October 2009;80° 18' 42.7" N 151 58’39.07”W; ITP8 recovery site. Core was taken for T/S.

**Ice Station 2 Core A:** 6October 2009; 77° 59' 42" N 149° 14' 30" W; ITP33 recovery site. Core was taken for T/S.

**Ice Station 3 Core A:** 7 October 2009; 77° 4' 4.56" N 135° 25' 47.1" W; ITP35 recovery site. Core was taken for T/S in thick ice.

**Ice Station 3 Core C:** 7 October 2009; 77° 4' 4.56" N 135° 25' 47.1" W; ITP35 recovery site. Core was taken for T/S in thin ice.

**Ice Station 4 Core A:** 10 October 2009; 74° 35' N 134° 45' 30" W; ITP34 recovery site. Core was taken for T/S in thin ice.



**Detail of Density and Salinity of JOIS 2009 Ice Core Results**



**Transects**

**October 3rd**

Snow pack was wind packed drifted snow. Snow drifted in front of ridges, bare ice in places. Paced out transect. Estimated distance between paces is 70cm. Snow Depth (cm): 5,7,7,5,6,18,27,36.5,33,38,18,11,8,7,6,3,5,4,5,7,6.5,7,3,1,6,7,9,3,4.5,3,0,5,6,0,10,17,12,1,12,6,16,27,38,5

**October 7th**

Line A, on MY ice floe across ridge. 100m long

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hole #:** | **Dist (m)** | **Snow depth (cm)** | **Freeboard (cm)** | **Ice thickness (cm)** |
| **1** | 8 | 7.5 |  | >800 |
| **2** | 64 | 6 |  | >500 |
| **3** | 80 | 9 | 41 | 445 |
| **4** | 92 | 6.5 | 39 | >500 |
| **5** | 98 | 20 |  | 32 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Distance (m)** | **Snow Depth (cm)** | **Distance (m)** | **Snow Depth (cm)** | **Distance (m)** | **Snow Depth (cm)** | **Distance (m)** | **Snow Depth (cm)** | **Distance (m)** | **Snow Depth (cm)** |
| **1** | 6 | **21** | 10 | **41** | 12 | **61** | 9 | **81** | 12 |
| **2** | 6 | **22** | 13 | **42** | 5 | **62** | 11 | **82** | 10.5 |
| **3** | 6.5 | **23** | 17.5 | **43** | 19 | **63** | 11 | **83** | 9 |
| **4** | 7 | **24** | 18 | **44** | 11 | **64** | 9 | **84** | 8 |
| **5** | 9 | **25** | 25 | **45** | 31 | **65** | 9 | **85** | 9 |
| **6** | 9.5 | **26** | 28 | **46** | 29 | **66** | 9 | **86** | 8 |
| **7** | 7 | **27** | 35 | **47** | 27 | **67** | 11 | **87** | 7 |
| **8** | 7.5 | **28** | 43 | **48** | 5 | **68** | 8 | **88** | 7 |
| **9** | 10 | **29** | 50 | **49** | 5 | **69** | 7 | **89** | 9 |
| **10** | 7 | **30** | 76 | **50** | 11 | **70** | 32 | **90** | 8.5 |
| **11** | 7 | **31** | 58 | **51** | 5 | **71** | 34 | **91** | 8 |
| **12** | 9.5 | **32** | 61 | **52** | 8 | **72** | 51 | **92** | 6.5 |
| **13** | 9.5 | **33** | 62 | **53** | 7 | **73** | 37 | **93** | 4 |
| **14** | 10 | **34** | 63 | **54** | 5 | **74** | 31 | **94** | 7.5 |
| **15** | 7 | **35** | 63 | **55** | 40 | **75** | 22 | **95** | 8.5 |
| **16** | 8 | **36** | 53 | **56** | 7 | **76** | 8 | **96** | 21 |
| **17** | 9 | **37** | 42 | **57** | 12 | **77** | 25 | **97** | 20 |
| **18** | 9 | **38** | 6 | **58** | 26 | **78** | 29 | **98** | 20 |
| **19** | 8.5 | **39** | 1 | **59** | 21 | **79** | 7 | **99** | 11 |
| **20** | 9 | **40** | 0 | **60** | 8.5 | **80** | 9 | **100** | 6 |

Line B, on first year ice. 30m long.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Hole #:** | **Dist (m)** | **Snow depth (cm)** | **Freeboard (cm)** | **Ice thickness (cm)** | **Comments** |
| **1** | 6 | 36 | 2 | 93 |  |
| **2** | 18 | 23 | -2 | 45 | negative freeboard |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Distance (m)** | **Snow depth (cm)** | **Distance (m)** | **Snow depth (cm)** | **Distance (m)** | **Snow depth (cm)** |
| **1** | 54 | **11** | 2 | **21** | 33 |
| **2** | 36 | **12** | 14 | **22** | 30 |
| **3** | 35 | **13** | 17 | **23** | 18 |
| **4** | 34 | **14** | 15.5 | **24** | 15 |
| **5** | 35 | **15** | 12.5 | **25** | 14 |
| **6** | 36 | **16** | 7 | **26** | 13 |
| **7** | 28 | **17** |  | **27** | 14 |
| **8** | 32 | **18** | 18 | **28** | 14 |
| **9** | 35.5 | **19** | 18 | **29** | 14 |
| **10** | 11 | **20** | 24 | **30** | 17 |

**Appendices**

**Appendix A: Ice Core Chemistry**

**Appendix B: EM & Snow**

**Hourly ice observations located in file ICEOBS09.xls**