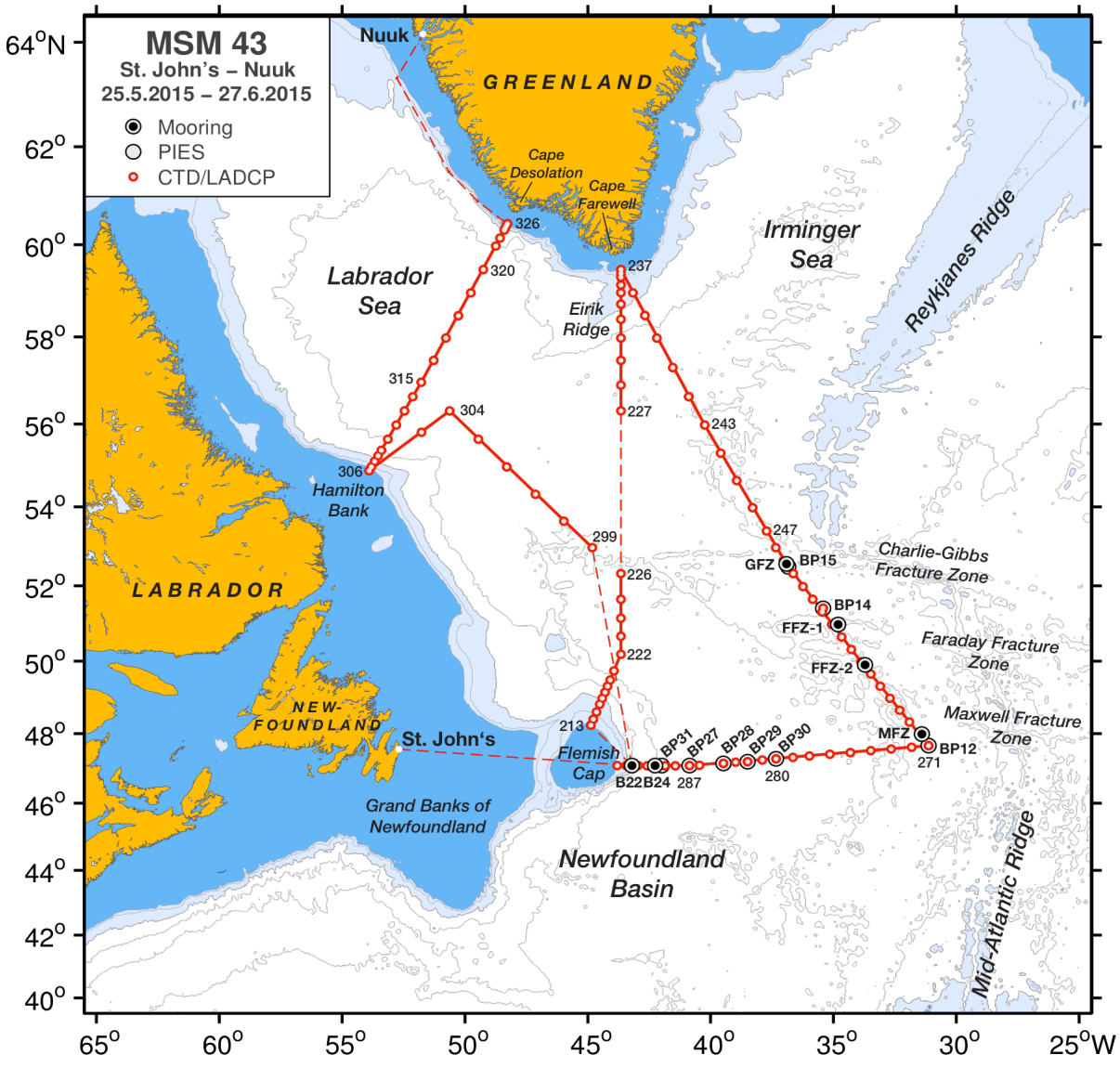
Dr. Christian Mertens
Institut für Umweltphysik
Universität Bremen
Otto-Hahn-Allee
D-28359 Bremen

Tel.: +49 421 218-62147
Fax: +49 421 218-62165
email: cmertens@uni-bremen.de

Short Cruise Report
MARIA S. MERIAN MSM 43

St. John's – Nuuk
25.05.2015 – 27.06.2015
Chief Scientist: Christian Mertens
Captain: Ralf Schmidt



Objectives

The subpolar North Atlantic reacts strongly to the atmospheric forcing and it is expected that global warming will cause significant changes in its large scale circulation and water mass properties. This will lead to changes in heat and freshwater fluxes, which could have consequences for the climate and sea level in western Europe. Studies of recent changes of circulation and water mass properties in the North Atlantic help to understand the processes involved and to separate changes caused by anthropogenic forcing from natural variability.

The cruise MSM 43 was dedicated to physical oceanographic observations in the western subpolar North Atlantic by the Institute of Environmental Physics (IUP) at the University of Bremen in collaboration with the Bundesamt für Seeschifffahrt und Hydrographie (BSH) in Hamburg. The work program is part of the joint project *RACE!* (Regional Atlantic Circulation and Global Change), to study the regional circulation of the Atlantic under global change. It had the following objectives:

1. Investigation of the long-term transport variability of the subpolar gyre and changes of water mass properties of the inflow into the eastern North Atlantic. The transport variability is measured by bottom-mounted inverted echo sounders deployed along a line west of the Mid-Atlantic Ridge. Moored current meters and temperature/salinity recorders along the same line measure the variability of the North Atlantic Current (NAC) and changes of the water mass properties.
2. Estimation of the Labrador Sea Water (LSW) formation rate between 2013 and 2015, and the LSW properties from large scale mapping of the distribution of anthropogenic tracers (SF6 and CFCs).
3. Measurements of the transport of the Deep Western Boundary Current (DWBC) off Newfoundland and Labrador, as well as the export of deep water to the subtropical North Atlantic. Synoptic surveys of current velocity using lowered acoustic Doppler current profilers (LADCP) were carried out along multiple transects across the boundary current. Deployment of two current meter moorings east of Flemish Cap that measure the long-term variability of transport and water mass properties.
4. The outflow of cold deep water in the boundary current is compensated by an inflow of warm water in the NAC. The variability of the NAC and its recirculation in the Newfoundland Basin is measured by inverted echo sounders, that are deployed along 47°N between Flemish Cap and the Mid-Atlantic Ridge.

Narrative

MARIA S. MERIAN left the port of St. John's, Canada on May 25 at 13:30 (local time) with 15 scientists from the Institute of Environmental Physics (IUP) at the University of Bremen, 2 scientists from the Bundesamt für Seeschifffahrt und Hydrographie (BSH) in Hamburg, and one guest scientist from the University of Alberta, Canada. Underway measurements (shipboard ADCPs, thermosalinograph, multibeam echo sounder) were started shortly after leaving the three-mile zone, at about 15:00 (local time). On May 26 a test of the CTD/rosette was made, by lowering the CTD to a depth of 100 m and closing all bottles. The first working area east of Flemish Cap was reached on May 27, where data recorded by a bottom-mounted inverted echo sounder (PIES) during the past year were retrieved acoustically using the ships hydrophone. Afterwards we proceeded to the current meter mooring B22 that was successfully released and completely recovered.

After a transit to the northern edge of Flemish Cap we started our first CTD/LADCP section (stations 213 to 237) toward Cape Farewell at the southern tip of Greenland. The first part of this section was in northwest direction (crossing the DWBC perpendicular to the slope), the later part followed straight north along 43° 40' W. On station 214 we experienced noisy

conductivity data below a depth of about 500 m. For the next station we switched to the second winch (EL1), but the problem remained and we switched back to winch EL2. The problem was difficult to locate, as it occurred only at a pressure above 500 dbar, we therefore used the ships CTD/rosette systems for stations 215 and 216 and returned to our own CTD on station 217, after having changed a number of cables and sensors. The CTD worked mostly flawless thereafter. On May 30 the station work had to be stopped after station 226, due to the weather conditions (wind about 20 m/s). The ship was rolling heavily and CTD work was no longer possible. For the next 18 hours we moved north along the track without CTD stations. The station work was resumed in the morning of May 31 (station 227), but was again interrupted in the morning of June 1 (after station 231), due to the weather now with wind of about 25 m/s. The CTD work was continued in the early morning of June 2 and the section completed in the afternoon of the same day (station 237).

At Cape Farewell we started the next CTD/LADCP section in southeastward direction across the Irminger Sea and then along the western flank of the Mid-Atlantic Ridge (stations 237 to 271). On June 5 we arrived at the northern end of our mooring array along the Mid-Atlantic Ridge, that consisted of four moorings with currents meters and temperature/conductivity recorders and three bottom-mounted PIES. Moorings and PIES are aligned the Charlie-Gibbs, Faraday, and Maxwell Fracture Zones to measure the variability of volume transport and water mass properties of the NAC as it crosses the Mid-Atlantic Ridge into the eastern basin of the North Atlantic. Servicing of the array was started by data retrieval at PIES BP15 by acoustic telemetry. Afterwards the mooring GFZ was released and all instruments recovered. We then proceeded southeastward along the array and arrived at PIES BP14 in the evening. The PIES data were retrieved acoustically and afterwards the instrument was released and then recovered. In the morning of June 6 the nearby mooring FFZ-1 was released and fully recovered. The instruments from the moorings GFZ and FFZ-1 were serviced on board, while CTD work was done along the section until we eventually returned to the GFZ position and re-deployed the mooring on June 8.

After a transit back southeastward we arrived at mooring FFZ-2 in the morning of June 9. Release and Pinger-On commands where send but no response from the acoustic releases was received. We tried two different deckunits and two different hydrophones, that all worked flawless during the previous mooring operations, without success. The procedure was repeated at four different positions around the expected mooring position but no response from the releases was received. After three hours, and an attempt to identify mooring elements using the water column mode of the multibeam echo sounder, we left the station and resumed the CTD work southeastward along the section. We then reached the fourth mooring of the array (MFZ) in the afternoon of June 10, but again had no success in recovering the mooring. This time response was received from both acoustic releases but they did not rise from the seafloor. Diagnostic commands where send to the releases and the response indicated that they where probably still vertical and not lying flat on the seafloor. As it was already in the afternoon we decided to wait for the next morning and then dredge for the mooring. During the night we moved to PIES BP12, retrieved the data acoustically and then released the instrument. After the recovery a serviced instrument (previously at position BP14) was deployed and surveyed. We returned to the position of mooring MFZ in the morning of June 11 and again tried to send commands to the releases. This time we no longer received any response. Therefore we had to assume that the releases had unhooked and that the mooring surfaced during the night. We started a four-hour search in eastward direction (downstream of the prevailing current), but despite the calm sea and excellent visibility no remnants of the mooring could be found.

Further no signals were received from the radio transmitter of the mooring. After noon we returned to the expected mooring position and started dredging which lasted until late in the evening but without any success. Again we have to assume that the mooring is lost. In addition to the CTD and mooring work, three ARGO floats were deployed along the Mid-Atlantic-Ridge, at the positions of moorings GFZ, FFZ-1, and MFZ.

In the morning of June 12 we started the CTD section along 47°N. On June 13 a float was deployed early in the morning (station 278) and in the afternoon we arrived at PIES BP30 to retrieved its data by acoustic telemetry. The data of next PIES (BP29) were retrieved in the morning of June 14. During that day the wind speed increased continuously to 17 – 20 m/s when we arrived at PIES BP28. Because the ships pump-jet was needed to hold the position, it was no longer possible to use the ships build-in hydrophone for telemetry. Instead an external hydrophone was mounted to a 350 kg dummy weight and then lowered over the side. After the data retrieval the station work had to be interrupted due to the weather conditions, except for a float deployment (station 285) in the afternoon of June 15. The CTD work was then resumed in the evening of the same day (station 286). The last PIES station (BP27) was reached in the morning of June 16 and the data were again retrieved using the hydrophone over the side. The CTD section was then continued toward the continental slope off Flemish Cap, where two current meter moorings were deployed on June 17, B24 in the morning and B22 in the afternoon. After the mooring deployments the CTD work along 47°N was completed early in the morning of June 18 (station 300).

A transit of 360 nautical miles brought us to the next CTD section that was started in the morning of June 20 in the southeastern Labrador Sea (station 299). The section headed in northwest direction toward the central Labrador Sea and was finished in the evening of June 21 (station 304). From there on we proceeded southwest to the continental slope on the Canadian side of the Labrador Sea where we started CTD stations along the so-called AR7W section on June 21. This former WOCE line crosses the central Labrador Sea from Hamilton Bank on the Canadian Shelf to Cape Desolation at the west coast of Greenland. The last station (326) on the Greenland shelf was reached in the evening of June 25. This was the last CTD cast of the cruise MSM 43, and also the recoding of bathymetry and shipboard ADCP data was stopped after that station. Other underway data were recorded until June 26, 16:00 local time. On June 27 MARIA S. MERIAN arrived in the port of Nuuk at 10:00 local time.

Acknowledgements
We thank Captain Ralf Schmidt and the entire crew of MARIA S. MERIAN for the friendly and cooperative atmosphere and their professional technical assistance. We are grateful to the Canadian and Danish authorities for the permission to conduct scientific research in the exclusive economic zones of Canada and Greenland. The Control Station German Research Vessels (Leitstelle Deutsche Forschungsschiffe), Klaus Bohn (LPL Projects + Logistics GmbH), and Barbara Kozak (University of Bremen) provided logistical and administrative support. Financial support came from the German Ministry of Education and Research (BMBF) as part of the joint project *RACE!* (Regional Atlantic Circulation and Global Change) and the Deutsche Forschungsgemeinschaft (DFG).

Scientific Personnel

1.	Mertens, Christian	Chief Scientist	IUPHB
2.	Böke, Wolfgang	Technician	IUPHB
3.	Köhler, Janna	lowered ADCP	IUPHB
4.	Roessler, Achim	PIES, shipboard ADCP	IUPHB
5.	Steinfeldt, Reiner	Hydrography	IUPHB
6.	Castro de la Guardia, Laura	Oxygen sampling	UALB
7.	Bulsiewicz, Klaus	Tracer	IUPHB
8.	Christodoulou, Aliki	Tracer	IUPHB
9.	Zeiss, Marie	Tracer	IUPHB
10.	Schneehorst, Anja	Moorings	BSH
11.	Uhde, Hans Hermann	Moorings	BSH
12.	Stake, Jürgen	Moorings	IUPHB
13.	Cordts, Robert	CTD	IUPHB
14.	Kappertz, Lars	CTD	IUPHB
15.	Nüß, Rasmus	CTD	IUPHB
16.	Sonntag, Isabelle	CTD	IUPHB
17.	Spanknebel, Martin	CTD	IUPHB
18.	Wegehaupt, Timm	CTD	IUPHB

IUPHB
Institut für Umweltphysik
Universität Bremen
Otto-Hahn-Allee
28359 Bremen / Germany
www.ocean.uni-bremen.de

BSH
Bundesamt für Seeschifffahrt und Hydrographie
Bernhard-Nocht-Str. 78
20359 Hamburg / Germany
www.bsh.de

UALB
University of Alberta
Department of Earth and Atmospheric Sciences
1-26 Earth Sciences Building
Edmonton, Alberta T6G 2E3 / Canada
www.ualberta.ca

List of PIES stations

Station	Site	PIES S/N	Date	Time (UTC)	Latitude	Longitude	Depth (m)	Action
MSM43/211-1	BP31	75	2015/05/27	03:16–06:02	47°05.84'N	41°59.94'W	4236	Telemetry
MSM43/249-1	BP15	235	2015/06/05	05:53–09:11	52°30.48'N	36°51.63'W	3386	Telemetry
MSM43/251-1	BP14	271	2015/06/05	23:19–02:51	51°25.76'N	35°26.11'W	3631	Telemetry
MSM43/251-2	BP14	271	2015/06/06	02:53–04:32	51°25.76'N	35°26.11'W	3631	Recovery
MSM43/271-1	BP12	201	2015/06/10	22:53–03:14	47°40.11'N	31°08.95'W	4091	Telemetry
MSM43/271-1	BP12	201	2015/06/11	03:18–04:40	47°40.11'N	31°08.95'W	4091	Recovery
MSM43/271-2	BP12	271	2015/06/11	05:00–07:38	47°39.91'N	31°08.88'W	4090	Deployment
MSM43/280-1	BP30	303	2015/06/13	16:12–19:22	47°17.52'N	37°21.47'W	4546	Telemetry
MSM43/282-2	BP29	302	2015/06/14	08:24–11:35	47°12.52'N	38°31.09'W	4607	Telemetry
MSM43/284-2	BP28	240	2015/06/15	01:12–04:22	47°09.68'N	39°30.06'W	4578	Telemetry
MSM43/287-2	BP27	272	2015/06/16	05:21–08:22	47°05.84'N	40°52.53'W	4486	Telemetry

List of mooring recoveries

Station	Site	Date	Time (UTC)	Latitude	Longitude	Depth (m)
MSM43/212-1	B22	2015/05/27	10:05–12:49	47°06.16'N	43°13.40'W	3000
MSM43/250-1	GFZ	2015/06/05	09:54–13:15	52°35.00'N	36°56.00'W	3610
MSM43/252-1	FFZ-1	2015/06/06	09:52–13:19	51°00.00'N	34°50.00'W	4310

List of mooring deployments

Station	Site	Date	Time (UTC)	Latitude	Longitude	Depth (m)
MSM43/262-1	GFZ	2015/06/08	14:05–17:25	52°35.00'N	36°56.00'W	3610
MSM43/293-1	B24	2015/06/17	11:04–12:43	47°06.20'N	42°16.50'W	4000
MSM43/294-1	B22	2015/06/17	17:26–19:58	47°06.20'N	43°13.30'W	3000

List of float deployments

Station	Float S/N	Date	Time (UTC)	Latitude	Longitude	WMO ID	Iridium ID
MSM43/250-3	240	2015/06/05	15:45	52°35.00'N	36°56.02'W	4901421	300234062958220
MSM43/252-3	241	2015/06/60	16:23	51°00.00'N	34°50.01'W	4901422	300234062954220
MSM43/269-2	242	2015/06/09	17:30	48°00.22'N	31°24.72'W	4901423	300234062958190
MSM43/278-2	243	2015/06/13	07:21	47°22.47'N	36°00.00'W	4901424	300234062953220
MSM43/285-1	244	2015/06/15	15:30	47°08.00'N	40°00.00'W	4901425	300234062957200

List of CTD/LADCP stations

Station	CTD Cast	Date	Time (UTC)	Latitude	Longitude	Depth (m)	SF6 & CFC	He	Comment
MSM43/213-1	1	2015/05/27	23:04	48°15.00'N	44°53.66'W	552	x	-	
MSM43/214-1	2	2015/05/28	01:15	48°25.00'N	44°47.33'W	763	x	-	bad data below 530 dbar
MSM43/215-1	3	2015/05/28	03:31	48°37.00'N	44°39.81'W	1184	-	-	cast aborted at 555 dbar
MSM43/215-1	4	2015/05/28	05:42	48°37.00'N	44°39.81'W	1227	-	-	bad data below 645 dbar
MSM43/215-2	5	2015/05/28	07:14	48°37.00'N	44°39.81'W	1227	-	-	no LADCP
MSM43/216-1	6	2015/05/28	10:02	48°50.02'N	44°31.61'W	1590	x	-	no LADCP
MSM43/217-1	7	2015/05/28	13:04	49°00.02'N	44°25.33'W	2169	x	-	
MSM43/218-1	8	2015/05/28	15:26	49°10.00'N	44°19.04'W	2807	x	-	
MSM43/219-1	9	2015/05/28	18:06	49°20.01'N	44°12.72'W	3377	x	-	
MSM43/220-1	10	2015/05/28	21:26	49°30.01'N	44°06.43'W	3892	x	-	
MSM43/221-1	11	2015/05/29	01:20	49°45.00'N	43°56.96'W	4088	-	-	
MSM43/222-1	12	2015/05/29	06:22	50°12.02'N	43°39.98'W	4368	x	-	
MSM43/223-1	13	2015/05/29	11:30	50°41.01'N	43°39.96'W	4230	x	-	bad data on upcast
MSM43/224-1	14	2015/05/29	16:37	51°10.00'N	43°40.04'W	4324	x	-	
MSM43/225-1	15	2015/05/29	23:07	51°39.95'N	43°40.00'W	4175	x	-	
MSM43/226-1	16	2015/05/30	06:06	52°20.00'N	43°39.96'W	4153	x	-	
MSM43/227-1	17	2015/05/31	09:57	56°20.00'N	43°40.00'W	3513	x	x	
MSM43/228-1	18	2015/05/31	15:40	56°55.99'N	43°39.97'W	3428	x	x	
MSM43/229-1	19	2015/05/31	21:04	57°29.97'N	43°40.02'W	3436	x	x	
MSM43/230-1	20	2015/06/01	02:09	58°00.00'N	43°40.01'W	3183	x	x	
MSM43/231-1	21	2015/06/01	06:36	58°24.97'N	43°40.01'W	2390	x	x	
MSM43/232-1	22	2015/06/02	04:03	58°45.01'N	43°39.96'W	1660	x	x	
MSM43/233-1	23	2015/06/02	08:03	59°00.00'N	43°40.00'W	1683	x	x	
MSM43/234-1	24	2015/06/02	10:37	59°10.00'N	43°39.96'W	1770	x	x	
MSM43/235-1	25	2015/06/02	13:01	59°20.00'N	43°39.97'W	1208	x	x	
MSM43/236-1	26	2015/06/02	14:39	59°24.99'N	43°40.02'W	311	x	x	
MSM43/237-1	27	2015/06/02	15:46	59°30.00'N	43°39.98'W	244	x	x	
MSM43/238-1	28	2015/06/02	19:02	58°59.95'N	43°10.82'W	1700	x	-	
MSM43/239-1	29	2015/06/02	23:02	58°29.99'N	42°41.63'W	2615	x	-	
MSM43/240-1	30	2015/06/03	03:34	57°59.96'N	42°12.35'W	3178	x	-	
MSM43/241-1	31	2015/06/03	09:18	57°20.02'N	41°33.44'W	3125	x	-	
MSM43/242-1	32	2015/06/03	14:46	56°39.98'N	40°54.49'W	3012	x	-	
MSM43/243-1	33	2015/06/03	20:15	55°59.98'N	40°15.54'W	3442	x	-	
MSM43/244-1	34	2015/06/04	01:59	55°20.00'N	39°36.62'W	3374	x	-	
MSM43/245-1	35	2015/06/04	07:45	54°40.01'N	38°57.71'W	2908	x	-	
MSM43/246-1	36	2015/06/04	13:18	53°59.98'N	38°18.72'W	2773	x	-	
MSM43/247-1	37	2015/06/04	18:15	53°24.99'N	37°44.71'W	3029	x	-	
MSM43/248-1	38	2015/06/04	22:34	52°59.99'N	37°22.03'W	3753	x	-	
MSM43/249-1	39	2015/06/05	03:49	52°30.47'N	36°51.58'W	3387	x	-	
MSM43/250-2	40	2015/06/05	13:46	52°35.00'N	36°56.01'W	3265	-	-	
MSM43/251-3	41	2015/06/06	04:40	51°25.94'N	35°26.48'W	3609	x	x	^{39}Ar & ^{3}H samples
MSM43/252-2	42	2015/06/06	13:43	51°00.01'N	34°50.03'W	4322	-	-	
MSM43/253-1	43	2015/06/06	18:08	50°40.00'N	34°41.18'W	3921	x	-	
MSM43/254-1	44	2015/06/06	22:38	50°20.00'N	34°17.65'W	3905	x	-	
MSM43/255-1	45	2015/06/07	03:09	50°00.01'N	33°54.04'W	4211	x	-	
MSM43/256-1	46	2015/06/07	12:24	51°00.01'N	35°04.83'W	4013	x	-	
MSM43/257-1	47	2015/06/07	16:59	51°20.01'N	35°28.47'W	3837	x	-	instrument calibration
MSM43/258-1	48	2015/06/07	21:56	51°40.02'N	35°52.06'W	3552	x	-	
MSM43/259-1	49	2015/06/08	02:06	52°00.02'N	36°15.66'W	3879	x	-	
MSM43/260-1	50	2015/06/08	06:30	52°20.02'N	36°39.25'W	3712	x	-	
MSM43/261-1	51	2015/06/08	10:50	52°40.04'N	37°02.88'W	3410	x	-	
MSM43/262-1	52	2015/06/09	15:41	49°40.03'N	33°30.34'W	3936	x	-	
MSM43/265-1	53	2015/06/09	20:15	49°19.99'N	33°06.80'W	4078	x	-	
MSM43/266-1	54	2015/06/10	00:50	49°00.04'N	32°43.15'W	4014	x	-	
MSM43/267-1	55	2015/06/10	05:18	48°40.02'N	32°19.52'W	3626	x	-	
MSM43/268-1	56	2015/06/10	09:31	48°20.02'N	31°55.95'W	3926	x	-	
MSM43/270-1	57	2015/06/10	18:07	48°00.00'N	31°32.33'W	3788	x	-	
MSM43/271-3	58	2015/06/11	05:03	47°40.06'N	31°08.97'W	4080	x	-	
MSM43/273-1	59	2015/06/12	03:05	47°37.50'N	31°50.02'W	3741	x	-	
MSM43/274-1	60	2015/06/12	07:54	47°34.46'N	32°40.01'W	3831	x	-	
MSM43/275-1	61	2015/06/12	12:56	47°31.48'N	33°30.01'W	4070	x	-	
MSM43/276-1	62	2015/06/12	18:00	47°28.47'N	34°20.00'W	4268	x	-	

MSM43/277-1	63	2015/06/12	23:22	47°25.49'N	35°09.98'W	4222	x	-	
MSM43/278-1	64	2015/06/13	04:40	47°22.47'N	36°00.00'W	4326	x	-	
MSM43/279-1	65	2015/06/13	10:03	47°20.01'N	36°39.98'W	4450	x	-	
MSM43/280-2	66	2015/06/13	16:03	47°17.50'N	37°21.52'W	4553	x	x	^{39}Ar & ^{3}H samples
MSM43/281-1	67	2015/06/13	22:23	47°15.51'N	37°54.94'W	4590	x	-	instrument calibration
MSM43/282-1	68	2015/06/14	05:11	47°12.50'N	38°30.97'W	4616	x	-	
MSM43/283-1	69	2015/06/14	14:11	47°11.61'N	38°59.97'W	4589	x	-	
MSM43/284-1	70	2015/06/14	21:30	47°09.76'N	39°29.84'W	4584	x	-	
MSM43/286-1	71	2015/06/15	20:29	47°06.44'N	40°27.94'W	4571	x	-	
MSM43/287-1	72	2015/06/16	02:06	47°05.82'N	40°52.50'W	4512	x	-	
MSM43/288-1	73	2015/06/16	11:37	47°05.77'N	41°27.00'W	4351	x	-	
MSM43/289-1	74	2015/06/16	16:17	47°05.78'N	41°52.10'W	4264	x	-	
MSM43/290-1	75	2015/06/16	20:52	47°05.78'N	42°16.00'W	3995	x	-	
MSM43/291-1	76	2015/06/17	00:46	47°05.79'N	42°36.01'W	3650	x	-	
MSM43/292-1	77	2015/06/17	04:39	47°05.82'N	42°58.12'W	3522	x	-	
MSM43/295-1	78	2015/06/17	20:40	47°05.80'N	43°09.01'W	3307	x	-	
MSM43/296-1	79	2015/06/17	23:33	47°05.82'N	43°19.98'W	1923	x	-	
MSM43/297-1	80	2015/06/18	01:33	47°05.85'N	43°27.00'W	1159	x	-	
MSM43/298-1	81	2015/06/18	04:10	47°05.81'N	43°49.00'W	558	x	-	
MSM43/299-1	82	2015/06/20	04:35	53°00.00'N	44°49.69'W	3973	x	-	
MSM43/300-1	83	2015/06/20	12:52	53°40.02'N	45°59.33'W	3764	x	-	
MSM43/301-1	84	2015/06/20	20:55	54°20.04'N	47°09.03'W	3637	x	-	
MSM43/302-1	85	2015/06/21	04:30	55°00.00'N	48°18.70'W	3761	x	-	
MSM43/303-1	86	2015/06/21	12:13	55°40.00'N	49°28.39'W	3686	x	-	
MSM43/304-1	87	2015/06/21	20:00	56°20.01'N	50°37.99'W	3638	x	x	^{39}Ar & ^{3}H samples
MSM43/305-1	88	2015/06/22	02:44	55°49.99'N	51°47.03'W	3461	x	-	
MSM43/306-1	89	2015/06/22	14:11	54°54.39'N	53°54.95'W	450	x	-	
MSM43/307-1	90	2015/06/22	15:33	55°00.02'N	53°49.28'W	887	x	-	
MSM43/308-1	91	2015/06/22	17:29	55°08.00'N	53°41.21'W	1775	x	-	
MSM43/309-1	92	2015/06/22	19:49	55°16.00'N	53°33.08'W	2454	x	-	
MSM43/310-1	93	2015/06/22	22:36	55°23.97'N	53°25.08'W	2971	x	-	
MSM43/311-1	94	2015/06/23	02:45	55°39.98'N	53°08.81'W	3043	x	-	
MSM43/312-1	95	2015/06/23	07:21	56°00.00'N	52°48.59'W	3322	x	-	
MSM43/313-1	96	2015/06/23	12:05	56°20.00'N	52°28.27'W	3550	x	-	
MSM43/314-1	97	2015/06/23	16:56	56°40.00'N	52°08.01'W	3541	x	-	
MSM43/315-1	98	2015/06/23	21:53	57°00.00'N	51°47.74'W	3540	x	x	
MSM43/316-1	99	2015/06/24	04:11	57°30.00'N	51°17.38'W	3518	x	x	
MSM43/317-1	100	2015/06/24	10:35	58°00.00'N	50°46.95'W	3574	x	x	
MSM43/318-1	101	2015/06/24	16:49	58°29.98'N	50°16.56'W	3527	x	x	^{3}H samples
MSM43/319-1	102	2015/06/24	22:51	58°59.98'N	49°46.19'W	3457	x	x	^{3}H samples
MSM43/320-1	103	2015/06/25	04:45	59°29.97'N	49°15.75'W	3370	x	x	
MSM43/321-1	104	2015/06/25	10:09	60°00.00'N	48°45.29'W	2959	x	x	
MSM43/322-1	105	2015/06/25	13:09	60°09.98'N	48°35.22'W	2819	x	x	CFC offline samples
MSM43/323-1	106	2015/06/25	16:04	60°20.06'N	48°25.05'W	1762	x	x	CFC offline samples
MSM43/324-1	107	2015/06/25	17:40	60°22.02'N	48°23.04'W	774	x	x	CFC offline samples
MSM43/325-1	108	2015/06/25	19:03	60°25.07'N	48°20.16'W	186	x	x	CFC offline samples
MSM43/326-1	109	2015/06/25	19:52	60°28.04'N	48°16.87'W	148	-	x	