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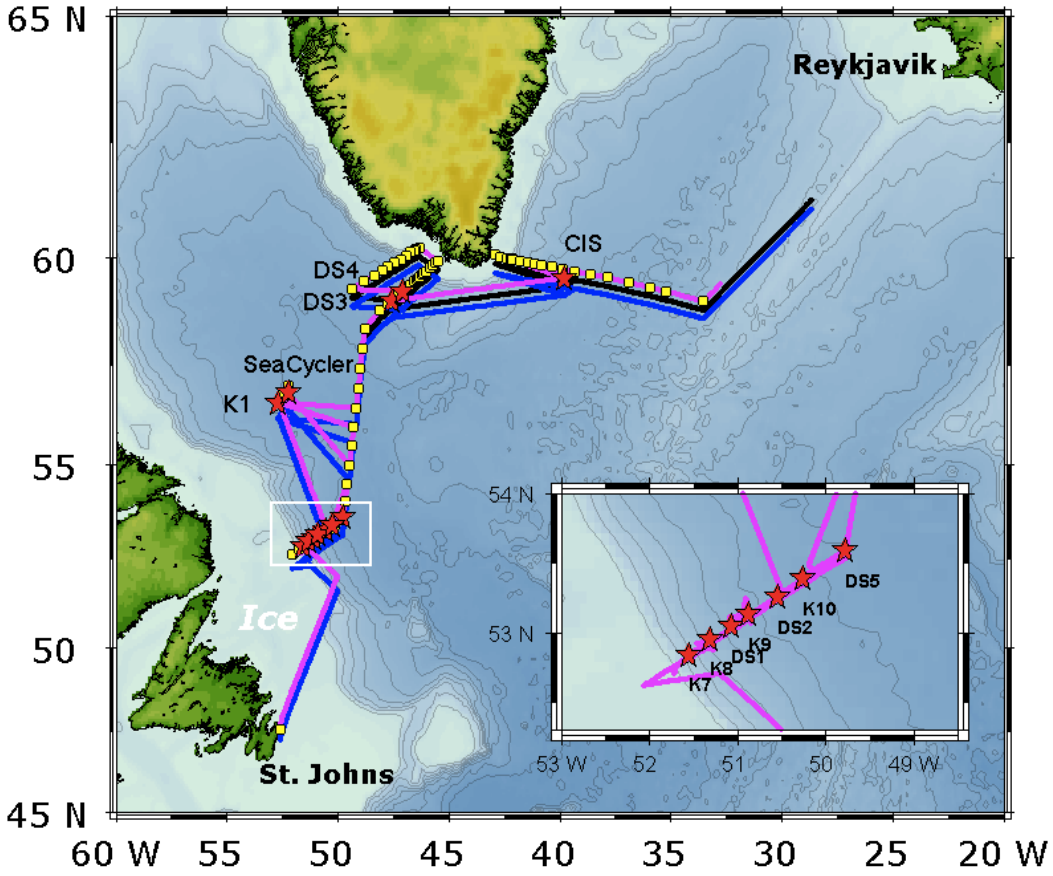
Short Cruise Report
RV Maria S Merian MSM54

St. Johns, Canada – Reykjavik, Iceland
12. May – 04. June 2016
Chief scientist: Johannes Karstensen
Captain: Ralf Schmidt



RV Maria S. Merian MSM54 cruise track from St. Johns to Reykjavik. Yellow dots indicate CTD/lADCP casts, red stars indicate mooring operations (mooring names), 75kHz ADCP (blue), 38kHz ADCP (magenta) and underway data (black) tracks are shown with latitude offset.

Objectives

The core program of the expedition MSM54 was dedicated to the re-deployment of moored instrumentation as well to vertical surveys of the water column. Moored instrumentation, programed for high temporal resolution sampling (<1 hour) and installed at distinct locations in the Labrador and Irminger Seas, record the local evolution of physical properties (temperature, salinity, density, currents). Continuous installation of such system over many years, and even up to decades at some locations, provide the observational base for the analysis of systematic changes of the interior ocean. In a global context only a few of such long lasting ocean-reference-stations exists. Along selected sections the hydrographic (temperature, salinity, density), oxygen, and currents structure was recorded using CTD/ (l)ADCP systems. These systems operate over the full water depth, from the surface to the ocean bottom. Moreover, quasi-continuous underway data collection was performed using the Thermosalinograph (Temperature, Salinity), and surface meteorological observations but also ship mounted ADCP systems (currents in upper 500 to 1000m).

Narrative

The cruise Maria S Merian started on the 12th May 2016 when the ship left the Pier 16 St. Johns at 08:00 for bunkering. At 09:00 a safety briefing was done followed by a introduction to the ship. A safety drill was done at 15:00 in the harbour basin and at 16:00 LT we left St. Johns heading towards “Station 27”, one of the longest existing marine time series stations in the world. At “Station 27” we had our first CTD cast as a contribution to the time series. The CTD station went well - all systems CTD, lADCP, a variety of optical sensors, and the rosette sampler functioned as they should have. Unfortunately the Underwater Vision Profiler that we planned for using on this cruise had a small crack on one of the light bulbs and could not be used during this cruise.

From “Station 27” we headed towards the “53°N-Array”, an array of 7 moorings at the southern side of the Labrador Sea. However, ice-maps showed quite a bit of coverage in the area of the array and in addition it was relative rough seas. We had a strong head wind and low visibility, which made navigation difficult and the ship had to slow down. We steamed the whole of the 13th May – while on board further preparations for the upcoming work were done. Upon arrival at the southern most mooring site “K7” the weather/sea state conditions did not allow to recover the mooring and a CTD section was started first. The section followed the OSNAP West grid set by the JC32 mission in 2014. The first station was done on the shelf in 350m deep waters and with some ice around the ship. During the 2nd station further away from the shelf at 500m the CTD had a malfunction, possibly due to a shortage on one of the connectors. It turned out that the CTD device had a problem and the complete system needed to be changed (profile #4 was the first with the new CTD system).

Unfortunately different swell and wind directions made it difficult to find a heading that prevent strong rolling and thus tension on the CTD wire. As a consequence the CTD is operated relative slow (sometimes with 0.3m/s only) and casts take long.

The start with the mooring recovery was changed from K7 to K9. With the wind getting calmer the visibility was getting worst. The K9 recovery went well but it took a while before we found the mooring drifting at the surface. The Argos transmitter did not work on the top element of the mooring and we navigated under low visibility conditions (fog) to the mooring via the two acoustic releases (ranging only). The CCGS Hudson was emailing us that they will operate on the shelf side of the 53°N-Array tomorrow.

At night a number of CTD cast were performed having now a complete section of the 53°N array in lADCP and CTD. At 09:00 on 16th May the second mooring was recovered (DSOW5), the most northerly one of the 53°N-Array. At this time the visibility was even less than the day before but the Argos transmitter worked and supported by ranging via the acoustic releases. Then we headed for DSOW2, a mooring equipped with a McLane profiler and an ADCP, and that was recovered without problems. Next followed the DSOW1, a short mooring recovered in short time. Over night some more CTD stations along the 53°N section were done, centred between stations of the 1st occupation. The deployment of DSOW1 and K9 on the 17th May went well and without major problems – also weather and sea state were supportive. During the night of the 17th to 18th we were in close proximity of the southeastern part of the line (K7) and thus close to where the Canadians shelf array C begins. At about 1:00 am a call was received from CCGS Hudson and information exchanged about the programs and some general issues. It snowed about 15cm. Making best use of the calm weather we were able to recovery and deploy K7 and K8 on one single day. A 2000 m CTD calibration cast and release test (Seacycler and BIO instruments) was done in the night and we steamed 60 nm to the K10 site. In the morning at 7:00am we started to communicate with K10 but we get no response. After about 1.5 hours of attempts the release command was sent and shortly after the first element was spotted at the surface. The recovery went well and we steamed to the DSOW5 position to re-install this mooring in the afternoon. In between a release-test shallow CTD was done at the start position for the deployment.

After finishing the work in the 53°N-Array area we headed towards the K1 area to the northwest. Upon arrival on May 21th, the K1 mooring was recovered. This mooring carried originally a surface telemetry buoy but that stopped data transmission in March 2015 and was detached at some stage and later recovered by a Canadian coast guard ship. The recovered end of the mooring wire further supported the assumption that a ship propeller detached the wire.

We did three CTD stations over the night and on the 22th May the deployment of the SeaCycler started. The SeaCycler, an underwater winch system, was deployed in 2015 from Maria S Merian but shorter after deployment failed because of a broken wire. The deployment preparations during our cruise started at 07:00. The first piece that went into the water was the Mechanism float at 08:30 shortly after the communication float and the instrument float followed. The operations all went well and weather/sea state were very fortunate. The rest of the mooring (>3500m) where deployed as a normal mooring. The anchor was launch at 11:50 and we observed the slow falling (3 parachutes were attached) until the communication float submerged at 12:30. The first profile was received, as expected, at 18:00 and the system is running as expected.

Later the day we deployed K1. The mooring had again a surface telemetry buoy installed (NACLIM project) but with a new design for air-pressure observations (using a Keller pressure sensor that can withstand up to 60 dbar pressure). During the operations the hydraulic hose on the port side of the A-Frame broke. Moreover, it turned out after inspection that the bearing of one of the arms of the A-frame was corrupt and need replacement. The replacement will take about 1 weeks of time in the harbour. In an agreement between ship, Leitstelle, and chiefscientists MSM54 & MSM55 the two cruises will be shortened and the ship will target arrival in Reykjavik already on the 4. June. This assumes that the core scientific program of MSM54 is all successfully completed. The chances are good as the weather was very fortunately for most of the 23 mooring operations – which cannot be expected to be a “normal” situation.

We left the K1 area after a final CTD at the SeaCycler location (with carbon system parameter sampling) and continued with the OSNAP West CTD section. On the 23rd May the telemetry messages from the newly installed K1 telemetry buoy stopped and we decided to return back to

the mooring site to exchange the telemetry system on the 24th May. It turned out that one compartment of the surface buoy was not properly sealed and water flooded some electronics. The exchange buoy works now well but has no surface pressure sensor. Returning back to the OSNAP west section and continued CTD program heading northward, towards the Greenland coast.

As the weather was getting very windy we could not recover DSOW3 and DSOW4 mooring off the Westgreenland Coast but we did a second CTD section instead. On the 27th May, we were heading from the northern part of the OSNAP West section the parallel section, we came across the largest Viking ship build in modern times, the “Draken Harald Hårfagre”. These brave seamen are repeating the voyage of the Vikings sailing from Norway to America – it was a 8 to 9 Bft wind and quite some waves but the Viking ship was doing a good job in the rough seas. The parallel section connected to the AR7W occupied a few weeks ago by CCGS Hudson. The forecast suggested for tomorrow (29th May) a weather window to recover the two DSOW moorings.

After the recovery, that went well and quick, we headed towards the Irminger Sea and recovered and deployed on the 30th May the CIS mooring. It was suspected that the mooring was deployed in too shallow waters and, following the surface buoy, this turned out to be true. Different strategies were discussed on what to do: (1) Recovery of mooring and redeployment – very time consuming and risk of wire entangling. (2) Lifting the complete mooring from the ground and exchanging one wire with a shorter one – risk that the mooring wire will break, in particular if the anchor is immersed into ground. Given the much shorter time that is potentially required for option (2) we tried that first and if it fails we recover (1). At night CTD were done and on the 31st of May the recovery of top 100 m (below top subsurface buoy) of CIS were began. The whole operation took about 1.5 hours. Then we departed westward to start the OSNAP East section off Greenland in the early evening. The CTD program continued until 2nd June afternoon and a nearly complete section through the Irminger Sea could be acquired. We had about 36 h of steaming to Reykjavik ahead of us. Science meetings on cruise observations (also in preparation for the cruise report) were done and the normal packing procedures. The weather was foggy, windy and it was wavy. On the 4th June at 09:00 the Merian was moored at Reykjavik port in sunny and calm weather. Cleaning of labs, custom clearance businesses followed. While the cruise is over and the repair of the A-Frame started, most science crew will stay on board until 8. June.

Acknowledgement

We thank Captain Ralf Schmidt, his officers and the crew of RV Maria S. Merian for their support of our observational program and the hospitality on board. It became apparent during the cruise that having a research vessel that is capable in operating in region with partial ice cover is enormous important for our work and we are particularly thankful for having access to the Merian. The ship time was provided by the Deutsche Forschungsgemeinschaft within the METEOR/MERIAN core program. Financial support for the different work carried out during the expedition was provided by the EU-project NACLIM, The German Ministry of Education and Research through “RACE II”, and the EU H2020 Project AtlantOS. We also benefited from financial contributions by the research institutions involved.

Cruise participants science:

Name	Task	Institute
1. Johannes Karstensen	Chiefscientist	GEOMAR
2. Christian Begler	Mooring, telemetry	GEOMAR
3. Wiebke Martens	Instruments	GEOMAR
4. Uwe Papenburg	Mooring, Logistics	GEOMAR
5. Gerd Niehus	Mooring, Logistics	GEOMAR
6. Amelie Klein	Blog Coordination, CTD watch	CAU Kiel
7. Marilena Oltmanns	Mooring data, **CTD watch lead**	GEOMAR
8. Henrike Schmidt	ADCP processing, **CTD watch lead**	CAU Kiel
9. Nora Fried	CTD processing, **CTD watch lead**	CAU Kiel
10. Patricia Handmann	lADCP processing, CTD watch	CAU Kiel
11. Arne Bendinger	Underway data, Helper mooring, CTD watch	CAU Kiel
12. Jonathan Wiskamp	Helper mooring, CTD watch	CAU Kiel
13. Mareike Körner	Salinometer, CTD watch	CAU Kiel
14. Christina Schmidt	Helper mooring + protocol, CTD watch	CAU Kiel
15. Sijia Zou	Salinometer, RT data, CTD watch	Duke University
16. Greg Siddall	Mooring Seacycler	Dalhousie
17. Jeremy Lai	Mooring Seacycler	Dalhousie
18. Mike Vining	Mooring Seacycler	Dalhousie
19. Dariia Atamanchuk	Bio-Optics, Chemistry	Dalhousie
20. Katerina Fupsova	Carbon/Nutrients, Chemist	Dalhousie

GEOMAR:	Helmholtz-Zentrum für Meeresforschung Kiel, Kiel, Germany
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Science crew participants Maria S Merian MSM54 expedition

Station list Maria S Merian MSM54

Gear coding
CTD/RO: CTD/lowered Acoustic Doppler Current Profiler/and rosette sampler
MOOR: Mooring operation
moor code: Re – Recovery; De - deployment

Ship Station #	CTD # /moor code	Gear code	Date Yyyy/mm/dd	Time	Latitude [N]	Longitude [W]	Depth [m]
AL54/0301-1	1	CTD/RO	2016/05/12	19:24	47° 32.78’	52° 35.2067’	177,2
AL54/0302-1	2	CTD/RO	2016/05/14	12:55	47° 32.78’	52° 35.2067’	300,1
AL54/0303-1	3	CTD/RO	2016/05/14	16:05	48° 48.87’	52° 27.2775’	514
AL54/0303-2	4	CTD/RO	2016/05/14	20:51	52° 39.9233’	51° 56.49’	509,4
AL54/0304-1	5	CTD/RO	2016/05/14	22:05	47° 32.78’	52° 35.2067’	1011
AL54/0305-1	6	CTD/RO	2016/05/14	23:40	47° 32.78’	52° 35.2067’	1453,5
AL54/0306-1	7	CTD/RO	2016/05/15	01:37	47° 32.78’	52° 35.2067’	1968,5
AL54/0307-1	8	CTD/RO	2016/05/15	05:55	49° 34.524’	52° 22.522’	2411,2
AL54/0308-1	9	CTD/RO	2016/05/15	11:10	50° 27.8929’	52° 14.0829’	2893,8
AL54/0309-1	Re K9	MOOR	2016/05/15	14:28	52° 17.441’	51° 36.7679’	2914,6
AL54/0310-1	10	CTD/RO	2016/05/15	21:00	50° 27.8929’	52° 14.0829’	3138,3
AL54/0311-1	11	CTD/RO	2016/05/16	00:47	47° 32.78’	52° 35.2067’	3301,1
AL54/0312-1	12	CTD/RO	2016/05/16	04:34	47° 32.78’	52° 35.2067’	3472,5
AL54/0313-1	13	CTD/RO	2016/05/16	08:37	47° 32.78’	52° 35.2067’	3588,3
AL54/0314-1	Re DSOW5	MOOR	2016/05/16	11:13	51° 17.9036’	52° 2.5564’	nan
AL54/0315-1	Re DSOW2	MOOR	2016/05/16	15:47	51° 49.4624’	51° 53.6506’	3155,7
AL54/0316-1	Re DSOW1	MOOR	2016/05/16	20:27	51° 9.145’	52° 4.558’	2566
AL54/0317-1	14	CTD/RO	2016/05/16	22:26	47° 32.78’	52° 35.2067’	2710,5
AL54/0318-1	15	CTD/RO	2016/05/17	01:32	47° 32.78’	52° 35.2067’	3014
AL54/0319-1	16	CTD/RO	2016/05/17	04:34	47° 32.78’	52° 35.2067’	3190,9
AL54/0320-1	De DSOW1	MOOR	2016/05/17	11:07	51° 17.9036’	52° 2.5564’	2713,6
AL54/0321-1	De K9	MOOR	2016/05/17	15:27	52° 3.6077’	51° 47.2545’	2940,1
AL54/0322-1	17	CTD/RO	2016/05/17	21:11	47° 32.78’	52° 35.2067’	2315,4
AL54/0323-1	18	CTD/RO	2016/05/18	00:12	47° 32.78’	52° 35.2067’	1973,7
AL54/0324-1	19	CTD/RO	2016/05/18	02:13	47° 32.78’	52° 35.2067’	1454,8
AL54/0325-1	20	CTD/RO	2016/05/18	03:47	47° 32.78’	52° 35.2067’	1010,2
AL54/0326-1	21	CTD/RO	2016/05/18	05:15	47° 32.78’	52° 35.2067’	509,3
AL54/0327-1	Re K7	MOOR	2016/05/18	08:47	51° 36.8121’	51° 57.8264’	1672,2
AL54/0328-1	Re K8	MOOR	2016/05/18	11:50	51° 36.8121’	51° 57.8264’	nan
AL54/0329-1	De K8	MOOR	2016/05/18	16:34	51° 52.8378’	51° 52.3006’	2089,8
AL54/0330-1	De K7	MOOR	2016/05/18	20:49	51° 55.8463’	51° 51.0805’	1372
AL54/0331-1	22	CTD/RO	2016/05/18	23:29	49° 34.524’	52° 22.522’	1971,8
AL54/0332-1	Re K10	MOOR	2016/05/19	09:06	52° 8.2467’	51° 44.0033’	3389,6
AL54/0333-1	23	CTD/RO	2016/05/19	15:36	49° 34.524’	52° 22.522’	3608,8
AL54/0334-1	De DSOW5	MOOR	2016/05/19	17:07	50° 45.0825’	52° 10.1162’	3604,8
AL54/0335-1	24	CTD/RO	2016/05/19	20:36	47° 32.78’	52° 35.2067’	3646,6
AL54/0336-1	25	CTD/RO	2016/05/20	02:03	47° 32.78’	52° 35.2067’	3617,7
AL54/0337-1	De K10	MOOR	2016/05/20	10:48	52° 10.286’	51° 42.5744’	3508,5
AL54/0338-1	De DSOW2	MOOR	2016/05/20	17	51° 36.8121’	51° 57.8264’	3276,4

AL54/0339-1	26	CTD/RO	2016/05/20	20:35	47° 32.78’	52° 35.2067’	3235,7
AL54/0340-1	Re K1	MOOR	2016/05/21	15:54	52° 1.2867’	51° 48.4248’	3495,2
AL54/0341-1	27	CTD/RO	2016/05/21	19:56	47° 32.78’	52° 35.2067’	3495,5
AL54/0342-1	28	CTD/RO	2016/05/21	23:57	47° 32.78’	52° 35.2067’	3514,7
AL54/0343-1	29	CTD/RO	2016/05/22	03:39	47° 32.78’	52° 35.2067’	3514,1
AL54/0344-1	De SeaCycler	MOOR	2016/05/22	09:40	52° 15.7364’	51° 38.3604’	3533
AL54/0345-1	De K1	MOOR	2016/05/22	17:13	52° 17.441’	51° 36.7679’	3519,3
AL54/0346-1	30	CTD/RO	2016/05/23	01:25	47° 32.78’	52° 35.2067’	3527,3
AL54/0347-1	31	CTD/RO	2016/05/23	15:32	47° 32.78’	52° 35.2067’	3644,4
AL54/0348-1	32	CTD/RO	2016/05/23	20:23	47° 32.78’	52° 35.2067’	3670,4
AL54/0349-1	33	CTD/RO	2016/05/24	01:13	47° 32.78’	52° 35.2067’	3762,4
AL54/0350-1	exchange head buoy	MOOR	2016/05/24	14:16	48° 48.87’	52° 27.2775’	3494,1
AL54/0351-1	34	CTD/RO	2016/05/25	00:22	47° 32.78’	52° 35.2067’	3678,5
AL54/0352-1	35	CTD/RO	2016/05/25	05:17	47° 32.78’	52° 35.2067’	3619,8
AL54/0353-1	36	CTD/RO	2016/05/25	10:13	47° 32.78’	52° 35.2067’	3557,9
AL54/0354-1	37	CTD/RO	2016/05/25	15:24	47° 32.78’	52° 35.2067’	3484,9
AL54/0355-1	38	CTD/RO	2016/05/25	20:14	47° 32.78’	52° 35.2067’	3485,6
AL54/0356-1	39	CTD/RO	2016/05/26	02:07	47° 32.78’	52° 35.2067’	3308,9
AL54/0357-1	40	CTD/RO	2016/05/26	05:47	47° 32.78’	52° 35.2067’	2887,6
AL54/0358-1	41	CTD/RO	2016/05/26	09:07	47° 32.78’	52° 35.2067’	2935
AL54/0359-1	42	CTD/RO	2016/05/26	12:03	47° 32.78’	52° 35.2067’	2938,1
AL54/0360-1	43	CTD/RO	2016/05/26	15:01	47° 32.78’	52° 35.2067’	2463,5
AL54/0361-1	44	CTD/RO	2016/05/26	17:22	47° 32.78’	52° 35.2067’	2142,2
AL54/0362-1	45	CTD/RO	2016/05/26	19:35	47° 32.78’	52° 35.2067’	2022,2
AL54/0363-1	46	CTD/RO	2016/05/26	21:48	47° 32.78’	52° 35.2067’	2252,1
AL54/0364-1	47	CTD/RO	2016/05/27	00:11	47° 32.78’	52° 35.2067’	1796,7
AL54/0365-1	48	CTD/RO	2016/05/27	02:10	47° 32.78’	52° 35.2067’	1290,6
AL54/0366-1	49	CTD/RO	2016/05/27	03:47	47° 32.78’	52° 35.2067’	0
AL54/0367-1	50	CTD/RO	2016/05/27	05:05	47° 32.78’	52° 35.2067’	594,6
AL54/0368-1	51	CTD/RO	2016/05/27	06:33	47° 32.78’	52° 35.2067’	197,4
AL54/0369-1	52	CTD/RO	2016/05/27	07:44	47° 32.78’	52° 35.2067’	160,9
AL54/0370-1	53	CTD/RO	2016/05/27	08:47	47° 32.78’	52° 35.2067’	142,5
AL54/0371-1	54	CTD/RO	2016/05/27	09:47	47° 32.78’	52° 35.2067’	94,4
AL54/0372-1	55	CTD/RO	2016/05/27	10:40	47° 32.78’	52° 35.2067’	144,3
AL54/0373-1	56	CTD/RO	2016/05/27	14:23	47° 32.78’	52° 35.2067’	115,5
AL54/0374-1	57	CTD/RO	2016/05/27	15:26	47° 32.78’	52° 35.2067’	119,9
AL54/0375-1	58	CTD/RO	2016/05/27	16:09	47° 32.78’	52° 35.2067’	838,2
AL54/0376-1	59	CTD/RO	2016/05/27	17:28	47° 32.78’	52° 35.2067’	1263,1
AL54/0377-1	60	CTD/RO	2016/05/27	19:20	47° 32.78’	52° 35.2067’	1954,8
AL54/0378-1	61	CTD/RO	2016/05/27	21:52	47° 32.78’	52° 35.2067’	2600,2
AL54/0379-1	62	CTD/RO	2016/05/28	00:28	47° 32.78’	52° 35.2067’	2832,7
AL54/0380-1	63	CTD/RO	2016/05/28	03:28	47° 32.78’	52° 35.2067’	2821,6
AL54/0381-1	64	CTD/RO	2016/05/28	06:22	47° 32.78’	52° 35.2067’	3036,7
AL54/0382-1	65	CTD/RO	2016/05/28	09:38	47° 32.78’	52° 35.2067’	3195,4
AL54/0383-1	66	CTD/RO	2016/05/28	13:12	47° 32.78’	52° 35.2067’	3301,1
AL54/0384-1	67	CTD/RO	2016/05/28	17:04	47° 32.78’	52° 35.2067’	3402,4

AL54/0385-1	Re DSOW4	MOOR	2016/05/29	09:46	50° 58.4522’	52° 7.0311’	2938,5
AL54/0386-1	De DSOW4	MOOR	2016/05/29	11:45	50° 45.0825’	52° 10.1162’	2904,5
AL54/0387-1	Re DSOW3	MOOR	2016/05/29	14:23	50° 58.4522’	52° 7.0311’	3105,5
AL54/0388-1	De DSOW3	MOOR	2016/05/29	15:57	50° 45.0825’	52° 10.1162’	3127,5
AL54/0389-1	Re CIS13	MOOR	2016/05/30	11	52° 15.7364’	51° 38.3604’	0
AL54/0390-1	68	CTD/RO	2016/05/30	14:29	49° 34.524’	52° 22.522’	2932,5
AL54/0391-1	De CIS 14	MOOR	2016/05/30	18:14	52° 10.286’	51° 42.5744’	2905,8
AL54/0392-1	69	CTD/RO	2016/05/31	00:28	47° 32.78’	52° 35.2067’	2850
AL54/0393-1	70	CTD/RO	2016/05/31	03:48	47° 32.78’	52° 35.2067’	2743,6
AL54/0394-1	71	CTD/RO	2016/05/31	06:57	47° 32.78’	52° 35.2067’	2574,2
AL54/0395-1	shortening CIS 14 top rope	MOOR	2016/05/31	10:42	51° 55.8463’	51° 51.0805’	2915,9
AL54/0396-1	72	CTD/RO	2016/05/31	20:58	47° 32.78’	52° 35.2067’	175,9
AL54/0397-1	73	CTD/RO	2016/05/31	22:09	47° 32.78’	52° 35.2067’	193
AL54/0398-1	74	CTD/RO	2016/05/31	23:28	47° 32.78’	52° 35.2067’	207,9
AL54/0399-1	75	CTD/RO	2016/06/01	00:28	47° 32.78’	52° 35.2067’	496,6
AL54/0400-1	76	CTD/RO	2016/06/01	01:13	47° 32.78’	52° 35.2067’	827,2
AL54/0401-1	77	CTD/RO	2016/06/01	02:19	47° 32.78’	52° 35.2067’	1492,2
AL54/0402-1	78	CTD/RO	2016/06/01	04:23	47° 32.78’	52° 35.2067’	1814
AL54/0403-1	79	CTD/RO	2016/06/01	06:35	47° 32.78’	52° 35.2067’	1904
AL54/0404-1	80	CTD/RO	2016/06/01	08:50	47° 32.78’	52° 35.2067’	2090,3
AL54/0405-1	81	CTD/RO	2016/06/01	11:13	47° 32.78’	52° 35.2067’	2564,3
AL54/0406-1	82	CTD/RO	2016/06/01	18:48	47° 32.78’	52° 35.2067’	2989,6
AL54/0407-1	83	CTD/RO	2016/06/01	23:23	47° 32.78’	52° 35.2067’	3128,6
AL54/0408-1	84	CTD/RO	2016/06/02	04:02	47° 32.78’	52° 35.2067’	3105,6
AL54/0409-1	85	CTD/RO	2016/06/02	08:40	47° 32.78’	52° 35.2067’	3097,9
AL54/0410-1	86	CTD/RO	2016/06/02	12:50	47° 32.78’	52° 35.2067’	2994
AL54/0411-1	87	CTD/RO	2016/06/02	19:36	47° 32.78’	52° 35.2067’	2523