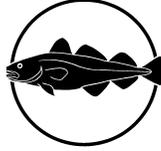


The Faroese Fisheries Laboratory

Fiskirannsóknarstovan



Shallow-water ADCP calibrations 1997 - 98

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In the shallow-water ADCP deployments 1994-98, the ADCP's are surrounded by large steel frames, which affect the ADCP compass so much, that the measurements of heading are heavily biased. Attempts to perform on-shore calibration failed to give reliable results and instead, a special calibration rig has been deployed at each of the two sites NWSA and NWSA for a few hours immediately after deployment, in the middle of the deployment and prior to recovery of the ADCP's. Unfortunately the ADCP at NWSA9706 has not yet been recovered, so in this document only the NWSA9706 calibration is calculated.

The calibration rig includes two Aanderaa RCM7 current meters with serial numbers 9494 and 10309 which are 58 and 69 meters above bottom respectively (Fig. 1). Table 1 lists locations and measuring periods for the two first calibration rig deployments at NWSA as well as the associated ADCP deployment. The last calibration rig was wasted because the ADCP had stopped to collect data (probably because the battery was flat) before the deployment of the calibration rig. The two Aanderaa current meters were set to 5 minute intervals while the ADCP logged at 20 minute intervals.

To evaluate the compass heading bias, ADCP current directions from bin 5 and bin 6 (centered at 56 and 66 m above bottom) were compared to the compass readings from RCM 9494 and RCM 10309 respectively for each reading during the calibration periods. The result is discussed below.

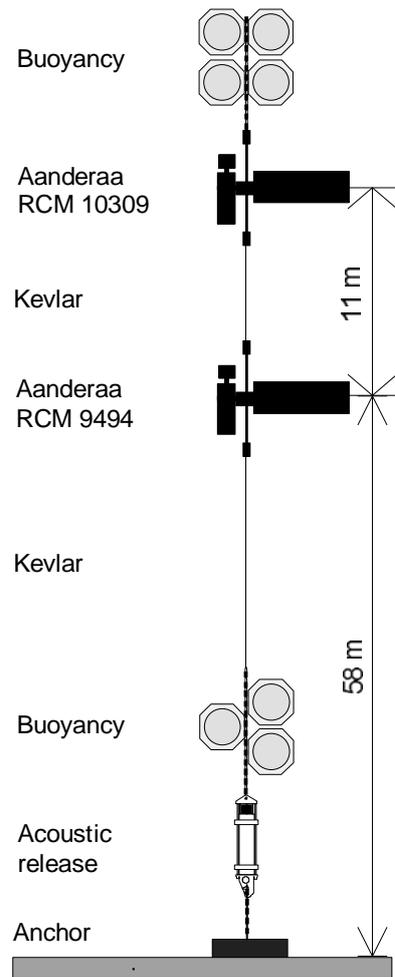


Figure 1. Calibration rig. Vertical distances not to scale.

Table 1. Positions, bottom depths, measuring period and intervals for the 1997 - 98 NWSA ADCP and two of the associated Aanderaa calibration deployments.

Instrum.	Latitude	Longitude	Bott. depth	Measuring period	Interval
ADCP	62° 42.315'N	06° 05.170'W	300 m	97/06/14 12:40 - 98/06/09 03:20	20 min.
Calibration rig	62° 42.241'N	06° 04.685'W	303 m	97/06/14 13:00 - 97/06/14 18:00	05 min.
Calibration rig	62° 42.410'N	06° 05.858'W	302 m	98/02/12 05:20 - 98/02/12 11:40	05 min.

NWSA current direction calibration

For NWSA the instrument heading (and pitch and roll) measured by the ADCP exhibited no sudden jumps but drifted about $242^\circ \pm 2^\circ$.

Table 2 and 3 list the results of the calibration experiments which indicate that the ADCP current directions should be “corrected” by adding -174° which implies that the heading of the ADCP was 68° instead of the measured 242° .

Table 2. Comparison of current direction measured by the NWNA ADCP and the two Aanderaa current meters during the first calibration experiment in June 1997. For the Aanderaa current meters, the speed and direction shown are the averages of the two instruments (direction corrected for magnetic deviation by adding -12°), while shear is the difference in direction between them. The direction shown for the ADCP is the direction of the vectorially averaged current vectors of bin 5 and bin 6.

Time (GMT)	Measured by Aanderaa current meters			Measured by ADCP Direction	Aanderaa - ADCP Direction
	Speed (cm/s)	Direction	Shear		
14 June 1997 13:20	13.6	8°	-17°	182°	-175°
14 June 1997 13:40	12.9	28°	-25°	179°	-152°
14 June 1997 14:00	11.7	34°	-22°	205°	-171°
14 June 1997 14:20	12.6	37°	-22°	223°	-186°
14 June 1997 14:40	13.6	47°	-25°	218°	-172°
14 June 1997 15:00	13.9	50°	-22°	228°	-178°
14 June 1997 15:20	12.4	63°	-21°	226°	-164°
14 June 1997 15:40	12.3	69°	-24°	240°	-171°
14 June 1997 16:00	13.0	78°	-23°	245°	-168°
14 June 1997 16:20	12.9	86°	-22°	248°	-162°
14 June 1997 16:40	12.4	92°	-19°	261°	-170°
14 June 1997 17:00	12.5	97°	-22°	293°	-196°
14 June 1997 17:20	12.6	108°	-18°	288°	-180°
14 June 1997 17:40	12.2	114°	-17°	270°	-157°
14 June 1997 18:00	12.6	113°	-19°	282°	-170°

Average for the NWNA calibration period:

$-171^\circ \pm 3^\circ$

Table 3. Comparison of current direction measured by the NWNA ADCP and the two Aanderaa current meters during the second calibration experiment in February 1998. For the Aanderaa current meters, the speed and direction shown are the averages of the two instruments (direction corrected for magnetic deviation by adding -12°), while shear is the difference in direction between them. The direction shown for the ADCP is the direction of the vectorially averaged current vectors of bin 5 and bin 6.

Time (GMT)	Measured by Aanderaa current meters			Measured by ADCP Direction	Aanderaa - ADCP Direction
	Speed (cm/s)	Direction	Shear		
12 February 1998 05:40	18.2	263°	6°	120°	-217°
12 February 1998 06:00	19.3	258°	6°	104°	-206°
12 February 1998 06:20	18.7	262°	4°	117°	-215°
12 February 1998 06:40	16.7	266°	7°	114°	-209°
12 February 1998 07:00	13.6	279°	4°	105°	-186°
12 February 1998 07:20	18.1	313°	-1°	132°	-180°
12 February 1998 07:40	17.1	316°	-9°	156°	-201°
12 February 1998 08:00	15.5	320°	0°	137°	-177°
12 February 1998 08:20	10.7	343°	-7°	165°	-183°
12 February 1998 08:40	9.2	347°	1°	175°	-189°
12 February 1998 09:00	4.9	6°	-14°	187°	-181°
12 February 1998 09:20	5.7	53°	-2°	211°	-158°
12 February 1998 09:40	8.4	78°	-5°	211°	-134°
12 February 1998 10:00	11.2	92°	3°	210°	-119°
12 February 1998 10:20	15.4	111°	-3°	231°	-121°
12 February 1998 10:40	18.0	117°	0°	268°	-151°
12 February 1998 11:00	22.8	117°	-3°	290°	-174°
12 February 1998 11:20	28.3	122°	1°	313°	-192°

Average for the NWNA calibration period:

$-177^\circ \pm 7^\circ$

Based on this, the current direction measurements in file Nwana9706.DIR have been corrected in the following way (which includes correction for magnetic deviation):

Calibration for Nwana: Corrected current direction = Measured current direction + (68° - Measured heading)

Tórshavn 29 January 1999