

Cruise report



PRT13

R/V Pelagia cruise 64PE380

06 – 13 December 2013 St Maarten – St Maarten

R/V Pelagia cruise 64PE396

07 – 17 February 2015 Barbados – Barbados

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In December 2013 the R/V Pelagia sailed to Puerto Rico Trench. Main purpose of the cruise was to deploy a long-term deep mooring (diagram in Appendix A), to study (the unknown) internal wave motions and turbulent exchange in a deep-ocean trench, i.e. the deepest point in the Atlantic Ocean. The cruise was quite successful. Deployment in the intended location went smoothly. Sea floor mapping was very limited because of a software block in the ship's multibeam system. As a result, only the 12 kHz EA600 echosounder could be used for depth determination.

In February 2015 the R/V Pelagia sailed again to Puerto Rico Trench to recover the mooring. Despite the fact that 6 glass spheres were imploded because of the 600 Bar ambient pressure, the mooring was successfully recovered. Limited Multibeam mapping was performed in the vicinity of the mooring (see Appendix B for activities list).

Two SeaBird 911 CTD (conductivity-temperature-depth) profiles were made in the vicinity of the mooring. Deepest point was 7100 m, due to sensor and cable restrictions (thus not reaching the sea floor).

The long-term mooring (Appendix A; originally planned for recovery in September 2014) consisted of two 200 m long thermistor strings and a single current meter. It was deployed at 19° 44' N, 67° 11' W in 8370 m water depth (EA600, 12 kHz, CTD-calibrated data) on 11 December 2013. Figure 1 shows the mooring location, in the middle of the (very) flat-bottom Milwaukee deep. Several cross-sections with the ship's echo-sounder confirmed the flatness of the bottom-deep. The deep's width was about 10 km. The top of the mooring is about 5960 m below the sea surface.



The thermistor strings consisted of about 100 high-resolution, high-precision NIOZ thermistors, sampling at a rate of 1 Hz. One set of sensors was prepared for great depths and is located just above the anchor. Its purpose was to study wave-turbulence in the near-bottom deep, away from sloping topography above the flat bottom. The second set of thermistors was about 500 m below the surrounding ocean floor, so near the top of the trench. It is where the CTD profile showed a transition from near-homogeneous to very weakly stratified waters above. The top of the mooring was about 5960 m below the sea surface.

The data return was reasonable. The current meter worked well for the planned 11 months of operation. The upper set of temperature sensors returned 90% of good data. The deep lower set of temperature sensors were more problematic due to pressure and battery problems, returning only about 40% of good data.

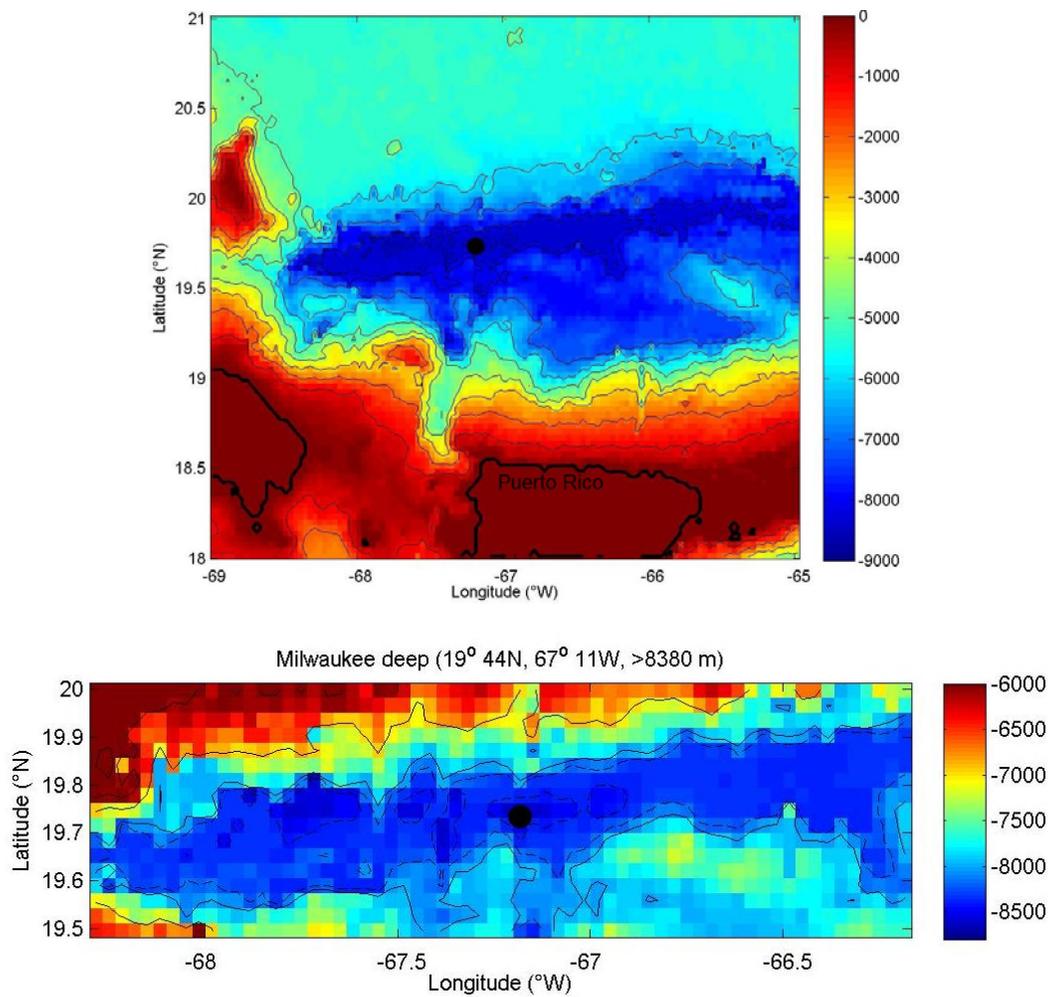
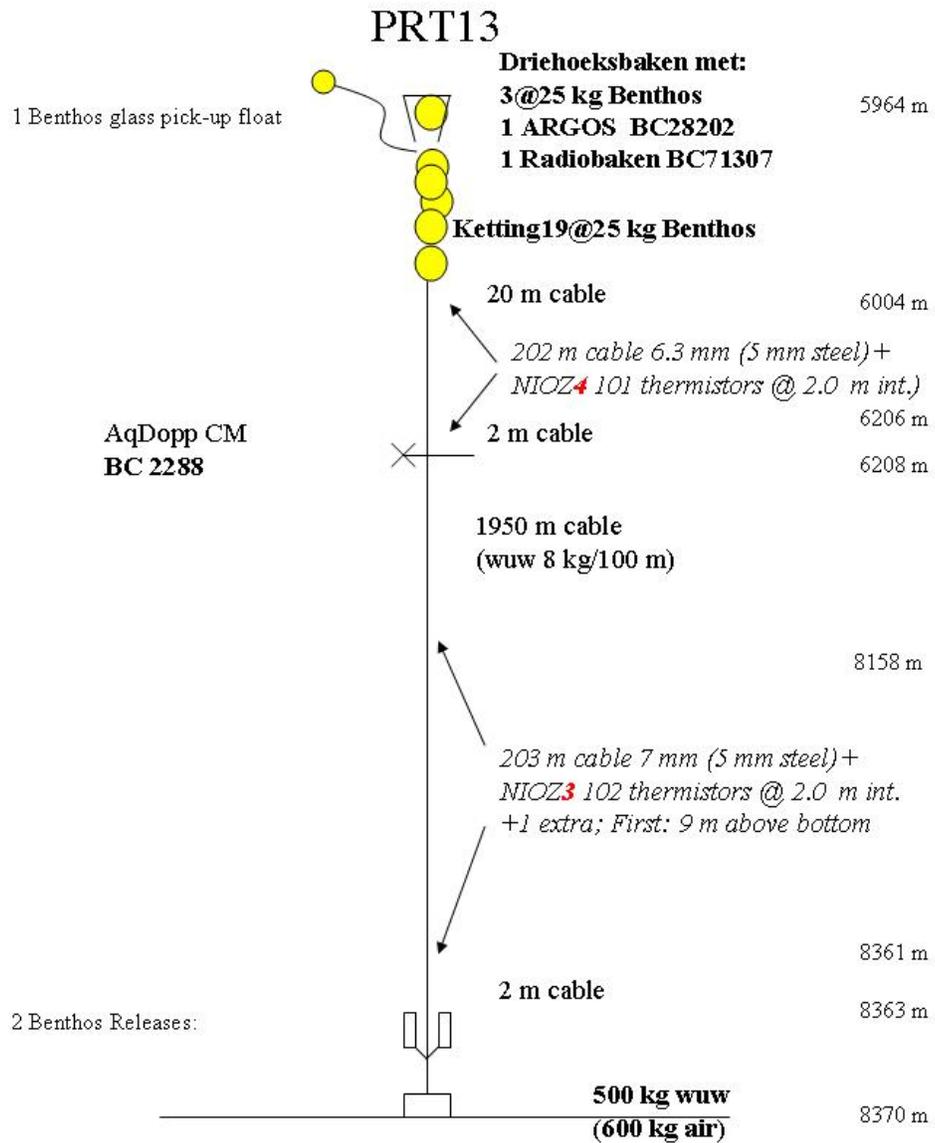


Fig. 1. Map of the Puerto Rico Trench, with mooring location indicated in the Milwaukee Deep.

Appendix A Mooring PRT13



Appendix B Summary of activities 64PE396

Date	Heure	Latitude(deg. min.milli) N 19°	Longitude(deg. min.milli) W 67°	Device name	Device code	Action name	Station number
10/02/2015	11:01:16	43.94478'	11.58642'	Mooring	MOOR	Recovery	1_1
10/02/2015	15:33:03	44.00454'	W 67° 11.2917'	CTD	CTD	Begin	1_2
10/02/2015	17:33:46	N 19° 43.9785'	11.23962'	CTD	CTD	Bottom	1_2
10/02/2015	19:30:29	N 19° 44.0634'	11.25024'	CTD	CTD	End	1_2
10/02/2015	20:13:35	42.19752'	W 67° 11.2686'	Multibeam	EM302	Begin	1_3
11/02/2015	12:27:05	43.99578'	11.25972'	Multibeam	EM302	End	1_3
11/02/2015	12:30:21	43.97304'	W 67° 11.2653'	CTD	CTD	Begin	1_4
11/02/2015	14:29:46	N 19° 43.8768'	11.27772'	CTD	CTD	Bottom	1_4
11/02/2015	14:30:22	43.87476'	11.28006'	CTD	CTD	End	1_4
11/02/2015	16:26:51	43.98006'	11.26662'	CTD	CTD	End	1_3
11/02/2015	16:45:20	N 19° 43.4127'	W 67° 10.4298'	Multibeam	EM302	Begin	1_5
12/02/2015	07:30:04	40.11708'	W 67° 8.13018'	Multibeam	EM302	End	1_5