



Title	2 THE "OSHORO MARU" CRUISE 267 TO NORTHWEST OF THE JAPAN SEA and TOYAMA BAY, and WAKASA BAY IN APRIL 2014
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**THE "OSHORO MARU" CRUISE 267  
TO NORTHWEST OF THE JAPAN SEA and TOYAMA BAY, and WAKASA BAY**

**IN APRIL 2014**

## 1. Cruise Itinerary

### Cruise 267

Departure from Hakodate	April	8	2014
Start hydrographic research (OS14049)		9	
Finish hydrographic research (OS14053)		10	
Arrive at Tsuruga		11	
Departure from Tsuruga and start hydrographic research (OS14054)		12	
Finish hydrographic research (OS14057) and return to Tsuruga		13	
Departure from Tsuruga		14	
Start hydrographic research (OS14058)		15	
Finish hydrographic research (OS14068)		16	
Return to Hakodate		17	
			Total coverage 1207.0 miles

## 2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi  
And 29 persons

### Research Staff: Leg1, Leg3

Professor (Laboratory of Marine Environmental Science,  
Hokkaido University) Kenshi Kuma  
Associate Professor (Laboratory of Marine Environmental Science,  
Hokkaido University) Yutaka Isoda  
Graduate Students: 5 persons  
Undergraduate Students: 1 person

### Leg1

Professor (Center for Global Environmental Research,  
National Institute for Environmental studies) Takafumi Aramaki  
Graduate Students: 1 person (Kanazawa University)

### Undergraduate instructor: Leg2

Professor (Department of Marine Bioscience, Fukui Prefectural University)  
Tatsuo Kato  
Professor (Department of Marine Bioscience, Fukui Prefectural University)  
Ryuji Kondo  
Associate Professor (Department of Marine Bioscience, Fukui Prefectural University)  
Masahito Matsukawa  
Associate Professor (Department of Marine Bioscience, Fukui Prefectural University)  
Atsushi Kaneda  
Associate Professor (Department of Marine Bioscience, Fukui Prefectural University)  
Yoshitake Takao

Teaching Assistant: 6 persons  
Undergraduate Students: 53 persons

Total 74 persons

### 3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

Table 1. Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14049	38 19.97 N	137 40.07 E	4/9	3:37	9	1998	-	-	9.8	b	9p-0769
OS14050	38 00.01 N	137 50.06 E	4/9	7:16	9	2015	-	-	10.1	b	9p-0769
OS14051	37 39.95 N	137 44.96 E	4/9	10:52	9	1637	-	-	11.4	b	9p-0769
OS14052	37 20.05 N	137 45.04 E	4/9	14:39	9	1205	-	-	11.1	b	9p-0769
OS14053	37 10.04 N	137 29.96 E	4/9	17:30	9	1205	-	-	11.7	b	9p-0769
OS14058	38 40.05 N	137 10.05 E	4/14	16:36	9	1510	-	-	11	bc	9p-0769
OS14059	38 39.90 N	137 25.09 E	4/14	19:06	9	1380	-	-	10.3	bc	9p-0769
OS14060	38 39.92 N	137 44.98 E	4/14	21:45	9	1857	-	-	10.5	b	9p-0769
OS14061	38 40.02 N	138 00.02 E	4/15	0:33	9	1860	-	-	10.4	b	9p-0769
OS14062	39 04.99 N	137 40.06 E	4/15	4:49	9	2326	-	-	10.5	b	9p-0769
OS14063	39 40.06 N	137 20.05 E	4/15	10:34	9	2569	-	-	10.0	b	9p-0769
OS14064	39 32.51 N	137 05.08 E	4/15	14:30	9	2545	-	-	10.3	b	9p-0769
OS14065	39 25.17 N	136 50.22 E	4/15	18:05	9	2580	-	-	10.8	b	9p-0769
OS14066	39 28.79 N	136 57.52 E	4/15	21:10	9	2580	-	-	10.8	b	9p-0769
OS14067	39 30.67 N	137 01.42 E	4/15	23:44	9	2574	-	-	11.0	b	9p-0769
OS14068	39 29.68 N	136 59.47 E	4/16	2:08	9	2570	-	-	11.1	b	9p-0769

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

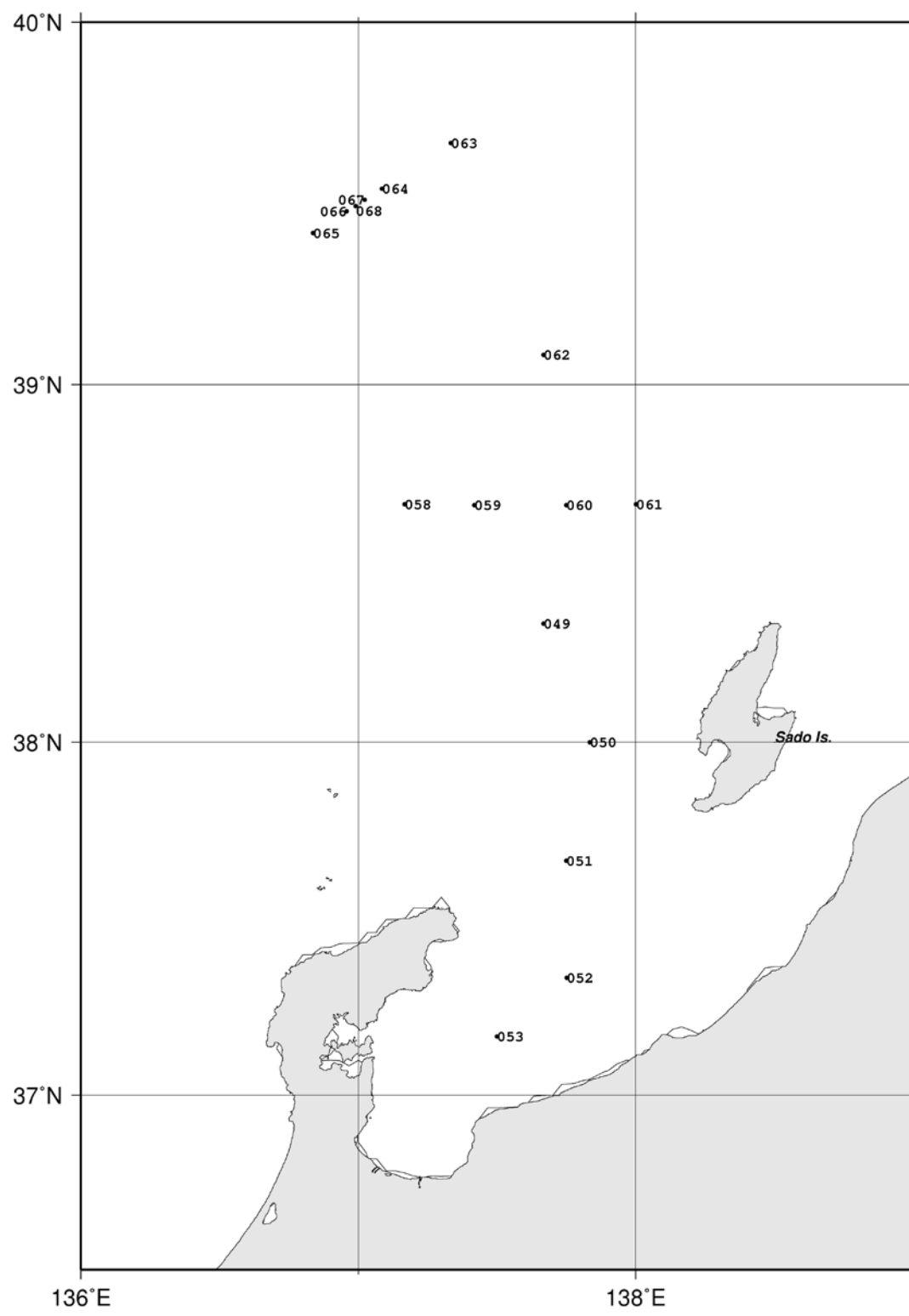


Fig.-1 Oceanographic stations

Table 2. Oceanographic data

Station OS14049				Station OS14050				Station OS14051			
Latitude 38-19.97N				Latitude 38-0.01N				Latitude 37-39.95N			
Longitude 137-40.07E				Longitude 137-50.06E				Longitude 137-44.96E			
Depth(m) 1998				Depth(m) 2015				Depth(m) 1637			
Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T
5	8.809	33.999	26.364	5	8.762	34.009	26.380	5	10.392	34.048	26.141
10	8.690	34.003	26.386	10	8.718	34.005	26.383	10	10.185	34.075	26.198
20	8.546	34.006	26.411	20	8.285	33.996	26.443	20	10.160	34.079	26.206
30	8.509	34.007	26.417	30	8.208	34.000	26.457	30	10.052	34.077	26.222
40	7.062	34.040	26.654	40	8.156	33.995	26.461	40	9.973	34.075	26.234
50	6.471	34.031	26.726	50	8.141	33.994	26.463	50	9.926	34.078	26.245
75	5.368	34.017	26.853	75	7.118	34.015	26.626	75	9.803	34.081	26.267
100	3.712	34.012	27.029	100	6.078	34.030	26.777	100	9.656	34.110	26.315
125	3.004	34.017	27.100	125	4.945	34.019	26.904	125	9.337	34.106	26.364
150	2.574	34.029	27.147	150	3.909	34.026	27.021	150	8.532	34.088	26.477
175	1.895	34.028	27.201	175	2.675	34.020	27.132	175	7.386	34.030	26.601
200	1.662	34.038	27.226	200	2.033	34.028	27.191	200	6.770	34.040	26.694
250	1.226	34.047	27.264	250	1.411	34.042	27.248	250	2.601	34.027	27.143
300	1.020	34.052	27.281	300	1.047	34.050	27.278	300	1.656	34.037	27.226
400	0.751	34.058	27.303	400	0.772	34.056	27.300	400	1.142	34.045	27.268
500	0.598	34.060	27.314	500	0.634	34.059	27.311	500	0.906	34.055	27.291
600	0.478	34.061	27.322	600	0.513	34.060	27.320	600	0.679	34.058	27.308
700	0.424	34.061	27.325	700	0.439	34.060	27.324	700	0.509	34.060	27.320
800	0.375	34.060	27.328	800	0.387	34.060	27.327	800	0.414	34.060	27.325
900	0.341	34.060	27.329	900	0.341	34.060	27.329	900	0.341	34.060	27.329
1000	0.311	34.060	27.331	1000	0.312	34.060	27.331	1000	0.322	34.060	27.330
1200	0.278	34.059	27.332	1200	0.273	34.059	27.332	1200	0.284	34.059	27.332
1500	0.241	34.059	27.334	1500	0.240	34.059	27.334	1500	0.239	34.058	27.334

Station OS14052				Station OS14053			
Latitude 37-20.05N				Latitude 37-10.04N			
Longitude 137-45.04E				Longitude 137-29.96E			
Depth(m) 1205				Depth(m) 1205			
Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T
5	9.974	33.279	25.612	5	10.503	33.852	25.969
10	9.857	33.430	25.750	10	10.448	33.891	26.009
20	9.612	33.742	26.034	20	10.286	33.896	26.041
30	9.521	33.796	26.092	30	10.152	33.972	26.123
40	9.333	33.800	26.125	40	9.578	33.904	26.167
50	9.363	33.849	26.159	50	9.336	33.882	26.189
75	9.308	33.927	26.229	75	9.534	33.984	26.236
100	9.581	34.036	26.269	100	9.182	33.960	26.275
125	9.487	34.091	26.328	125	9.033	33.993	26.325
150	9.226	34.090	26.369	150	8.750	34.014	26.386
175	8.727	34.114	26.467	175	7.969	34.026	26.513
200	7.925	34.085	26.566	200	6.661	34.039	26.708
250	3.971	34.006	26.999	250	3.267	34.031	27.087
300	2.181	34.030	27.180	300	1.728	34.039	27.222
400	0.875	34.052	27.291	400	1.068	34.050	27.277
500	0.577	34.057	27.314	500	0.798	34.055	27.298
600	0.467	34.059	27.321	600	0.651	34.058	27.310
700	0.409	34.059	27.325	700	0.551	34.059	27.316
800	0.359	34.060	27.328	800	0.440	34.060	27.323
900	0.329	34.060	27.330	900	0.379	34.060	27.327
1000	0.296	34.059	27.331	1000	0.336	34.060	27.329

Table 2. Oceanographic data

Station OS14058				Station OS14059				Station OS14060			
Latitude 38-40.05N				Latitude 38-39.9N				Latitude 38-39.92N			
Longitude 137-10.05E				Longitude 137-25.09E				Longitude 137-44.98E			
Depth(m) 1510				Depth(m) 1380				Depth(m) 1857			
Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T
5	9.281	34.020	26.306	5	9.296	34.011	26.296	5	9.413	34.013	26.279
10	9.192	34.023	26.323	10	9.048	33.997	26.325	10	9.023	34.000	26.332
20	9.030	34.085	26.397	20	8.693	33.996	26.380	20	8.702	34.003	26.384
30	8.782	34.063	26.419	30	8.421	33.990	26.417	30	8.580	34.000	26.400
40	8.310	34.043	26.475	40	8.303	33.993	26.438	40	8.147	33.992	26.460
50	7.953	34.025	26.515	50	7.866	33.998	26.507	50	7.097	34.011	26.627
75	6.627	34.031	26.706	75	6.110	34.035	26.776	75	5.456	34.013	26.840
100	5.489	34.021	26.842	100	4.912	34.012	26.902	100	4.075	34.023	27.002
125	4.289	34.018	26.975	125	3.757	34.020	27.031	125	2.866	34.022	27.116
150	3.280	34.020	27.077	150	2.854	34.011	27.109	150	2.245	34.030	27.175
175	2.344	34.018	27.158	175	1.882	34.024	27.199	175	1.777	34.038	27.218
200	1.866	34.025	27.201	200	1.487	34.034	27.236	200	1.446	34.043	27.246
250	1.277	34.042	27.257	250	1.092	34.047	27.273	250	1.103	34.050	27.275
300	1.020	34.049	27.279	300	0.879	34.052	27.291	300	0.935	34.053	27.288
400	0.708	34.056	27.305	400	0.710	34.056	27.305	400	0.689	34.056	27.306
500	0.588	34.058	27.314	500	0.600	34.058	27.312	500	0.553	34.058	27.316
600	0.467	34.059	27.321	600	0.529	34.059	27.317	600	0.462	34.059	27.321
700	0.393	34.059	27.325	700	0.452	34.059	27.322	700	0.392	34.059	27.325
800	0.367	34.059	27.327	800	0.406	34.059	27.325	800	0.338	34.059	27.328
900	0.354	34.059	27.328	900	0.363	34.058	27.327	900	0.304	34.058	27.330
1000	0.327	34.059	27.329	1000	0.326	34.058	27.329	1000	0.285	34.058	27.331
1200	0.276	34.058	27.331	1200	0.291	34.058	27.330	1200	0.252	34.058	27.332
								1500	0.225	34.057	27.333

Station OS14061				Station OS14062				Station OS14063			
Latitude 38-40.02N				Latitude 39-4.99N				Latitude 39-40.06N			
Longitude 138-0.02E				Longitude 137-40.06E				Longitude 137-20.05E			
Depth(m) 1860				Depth(m) 2326				Depth(m) 2569			
Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T
5	9.427	34.014	26.277	10	9.382	34.031	26.298	10	9.062	34.010	26.333
10	8.970	34.008	26.346	20	9.176	34.065	26.358	20	9.051	34.011	26.336
20	8.930	34.011	26.355	30	8.749	34.032	26.400	30	8.399	34.016	26.441
30	8.879	34.011	26.363	40	8.604	34.044	26.432	40	8.017	34.008	26.493
40	8.617	34.004	26.398	50	8.196	34.026	26.480	50	7.251	34.017	26.610
50	7.837	33.990	26.505	75	7.199	34.052	26.644	75	6.229	34.053	26.775
75	5.836	34.008	26.789	100	6.353	34.030	26.741	100	4.613	34.003	26.928
100	4.499	34.015	26.950	125	5.108	34.017	26.884	125	3.545	34.012	27.045
125	3.475	34.017	27.056	150	3.453	34.016	27.058	150	2.693	34.015	27.126
150	2.613	34.020	27.136	175	2.625	34.019	27.135	175	2.082	34.017	27.178
175	2.055	34.033	27.193	200	2.037	34.035	27.196	200	1.624	34.024	27.218
200	1.850	34.039	27.213	250	1.198	34.045	27.265	250	1.226	34.036	27.255
250	1.458	34.046	27.248	300	0.950	34.051	27.286	300	0.955	34.044	27.279
300	1.260	34.049	27.264	400	0.727	34.057	27.305	400	0.788	34.052	27.297
400	0.987	34.053	27.285	500	0.597	34.059	27.314	500	0.648	34.059	27.310
500	0.702	34.057	27.306	600	0.487	34.059	27.321	600	0.549	34.060	27.317
600	0.545	34.058	27.316	700	0.421	34.059	27.324	700	0.449	34.060	27.323
700	0.451	34.059	27.322	800	0.362	34.059	27.327	800	0.383	34.059	27.326
800	0.391	34.059	27.325	900	0.313	34.059	27.330	900	0.331	34.059	27.329
900	0.350	34.058	27.327	1000	0.285	34.058	27.331	1000	0.301	34.058	27.330
1000	0.313	34.058	27.329	1200	0.255	34.058	27.332	1200	0.263	34.058	27.332
1200	0.263	34.058	27.332	1500	0.224	34.057	27.333	1500	0.232	34.057	27.333
1500	0.234	34.057	27.333	2000	0.222	34.056	27.333	2000	0.221	34.056	27.333
								2500	0.241	34.056	27.331

Station OS14064  
 Latitude 39-32.51N  
 Longitude 137-5.08E  
 Depth(m) 2545

Press.	Temp.	Sal.	SIG-T
10	9.373	33.939	26.228
20	9.376	33.939	26.227
30	9.333	33.939	26.234
40	9.050	33.947	26.286
50	8.495	34.014	26.425
75	7.175	34.025	26.626
100	6.338	34.028	26.742
125	4.502	34.018	26.952
150	3.356	34.014	27.065
175	2.584	34.028	27.146
200	2.045	34.027	27.188
250	1.446	34.036	27.240
300	1.045	34.044	27.274
400	0.810	34.053	27.296
500	0.675	34.058	27.308
600	0.562	34.059	27.316
700	0.471	34.060	27.322
800	0.405	34.059	27.325
900	0.357	34.059	27.327
1000	0.315	34.058	27.329
1200	0.266	34.057	27.331
1500	0.234	34.057	27.333
2000	0.225	34.056	27.333
2500	0.242	34.056	27.331

Station OS14065  
 Latitude 39-25.17N  
 Longitude 136-50.22E  
 Depth(m) 2580

Press.	Temp.	Sal.	SIG-T
20	9.860	34.136	26.300
30	9.180	34.075	26.365
40	9.010	34.072	26.390
50	8.764	34.070	26.427
75	7.523	34.018	26.572
100	7.071	34.052	26.662
125	6.653	34.050	26.717
150	5.607	34.031	26.835
175	4.172	34.012	26.983
200	3.025	34.014	27.096
250	1.828	34.024	27.203
300	1.222	34.035	27.255
400	0.873	34.052	27.291
500	0.695	34.057	27.307
600	0.555	34.059	27.316
700	0.455	34.059	27.322
800	0.392	34.059	27.326
900	0.349	34.059	27.328
1000	0.314	34.058	27.329
1200	0.261	34.057	27.332
1500	0.233	34.057	27.333
2000	0.229	34.056	27.332
2500	0.256	34.056	27.331

Station OS14066  
 Latitude 39-28.79N  
 Longitude 136-57.52E  
 Depth(m) 2580

Press.	Temp.	Sal.	SIG-T
10	9.953	34.147	26.294
20	9.947	34.146	26.294
30	9.554	34.129	26.347
40	9.378	34.125	26.372
50	9.240	34.117	26.388
75	7.549	34.069	26.609
100	7.055	34.078	26.685
125	6.057	34.029	26.778
150	4.601	34.015	26.939
175	3.573	34.018	27.048
200	2.444	34.015	27.147
250	1.498	34.023	27.226
300	1.205	34.041	27.261
400	0.789	34.053	27.297
500	0.665	34.057	27.308
600	0.592	34.058	27.313
700	0.530	34.059	27.318
800	0.459	34.059	27.322
900	0.394	34.059	27.325
1000	0.347	34.058	27.327
1200	0.289	34.058	27.330
1500	0.243	34.057	27.332
2000	0.234	34.056	27.332
2500	0.255	34.056	27.330

Station OS14067  
 Latitude 39-30.67N  
 Longitude 137-1.42E  
 Depth(m) 2574

Press.	Temp.	Sal.	SIG-T
5	10.168	34.160	26.267
10	10.118	34.158	26.274
20	10.101	34.157	26.276
30	9.925	34.139	26.292
40	9.167	34.110	26.395
50	8.999	34.106	26.418
75	8.175	34.096	26.537
100	7.321	34.096	26.662
125	5.273	34.022	26.868
150	3.920	34.011	27.008
175	3.044	34.010	27.091
200	2.301	34.018	27.161
250	1.505	34.033	27.233
300	1.112	34.041	27.267
400	0.833	34.053	27.295
500	0.677	34.057	27.307
600	0.558	34.059	27.316
700	0.470	34.059	27.321
800	0.400	34.059	27.325
900	0.354	34.059	27.327
1000	0.326	34.058	27.329
1200	0.273	34.057	27.331
1500	0.234	34.057	27.332
2000	0.224	34.056	27.332
2500	0.242	34.056	27.331

Station OS14068  
 Latitude 39-29.68N  
 Longitude 136-59.47E  
 Depth(m) 2570

Press.	Temp.	Sal.	SIG-T
5	10.100	34.145	26.268
10	10.037	34.146	26.279
20	10.005	34.147	26.285
30	9.973	34.144	26.288
40	9.350	34.111	26.366
50	9.294	34.112	26.376
75	7.732	34.082	26.592
100	7.096	34.071	26.673
125	5.959	34.036	26.796
150	4.284	34.015	26.973
175	3.268	34.017	27.076
200	2.425	34.009	27.144
250	1.562	34.028	27.225
300	1.173	34.042	27.264
400	0.851	34.054	27.294
500	0.684	34.058	27.308
600	0.559	34.059	27.316
700	0.481	34.059	27.321
800	0.420	34.059	27.324
900	0.377	34.059	27.326
1000	0.340	34.058	27.328
1200	0.274	34.057	27.331
1500	0.236	34.057	27.332
2000	0.230	34.056	27.332
2500	0.257	34.056	27.330