In fact, we checked the Singapore Maritime Dataset (SMD) and Buoy Dataset. According to the record of webpage, all test videos and ground truth are created in 2016. We found that there are three kinds of problems:

1) The number of ground truth is not totally equal to the number of frames.

We downloaded the whole dataset from the webpage and found that the file can be classified into two classes: test videos and manual annotations. Manual annotation is regarded as the ground truth which is used to check exactness of horizon detection for each method. We divided test videos into frames. The difference of frames and ground truths is demonstrated on Table 1 and Table 2.

Table 1 The number of frames and ground truths for VIS_Onboard.

Name of test sequences	The number of ground truth	The number of frames
MVI_0788_VIS_OB_HorizonGT	**600**	**299**
MVI_0789_VIS_OB_HorizonGT	279	279
MVI_0790_VIS_OB_HorizonGT	**299**	**600**
MVI_0792_VIS_OB_HorizonGT	299	299
MVI_0794_VIS_OB_HorizonGT	**299**	**288**
MVI_0795_VIS_OB_HorizonGT	**299**	**255**
MVI_0796_VIS_OB_HorizonGT	299	299
MVI_0797_VIS_OB_HorizonGT	**299**	**600**
MVI_0799_VIS_OB_HorizonGT	**299**	**600**
MVI_0801_VIS_OB_HorizonGT	**299**	**600**
MVI_0804_VIS_OB_HorizonGT	299	299
The total number of frames	3570	4418

Table 2 The number of frames and ground truths for VIS_Onshore.

Name of test sequences	The number of ground truth	The number of frames
MVI_1469_VIS_HorizonGT	600	600
MVI_1470_VIS_HorizonGT	**299**	**266**
MVI_1471_VIS_HorizonGT	299	299
MVI_1474_VIS_HorizonGT	445	445
MVI_1478_VIS_HorizonGT	477	477
MVI_1479_VIS_HorizonGT	206	206
MVI_1481_VIS_HorizonGT	409	409
MVI_1482_VIS_HorizonGT	454	454
MVI_1483_VIS_HorizonGT	299	299
MVI_1484_VIS_HorizonGT	687	687
MVI_1485_VIS_HorizonGT	104	104
MVI_1486_VIS_HorizonGT	299	629
MVI_1578_VIS_HorizonGT	505	505
MVI_1582_VIS_HorizonGT	540	540
MVI_1583_VIS_HorizonGT	251	251
MVI_1584_VIS_HorizonGT	539	539
MVI_1587_VIS_HorizonGT	600	600
MVI_1592_VIS_HorizonGT	491	491
MVI_1609_VIS_HorizonGT	505	505
MVI_1610_VIS_HorizonGT	543	543
MVI_1612_VIS_HorizonGT	261	261
MVI_1613_VIS_HorizonGT	626	626

MVI_1614_VIS_HorizonGT	582	582
MVI_1615_VIS_HorizonGT	566	566
MVI_1617_VIS_HorizonGT	600	600
MVI_1619_VIS_HorizonGT	473	473
MVI_1620_VIS_HorizonGT	502	502
MVI_1622_VIS_HorizonGT	309	309
MVI_1623_VIS_HorizonGT	522	522
MVI_1624_VIS_HorizonGT	494	494
MVI_1625_VIS_HorizonGT	995	995
MVI_1626_VIS_HorizonGT	556	556
MVI_1627_VIS_HorizonGT	600	600
MVI_1640_VIS_HorizonGT	310	310
MVI_1644_VIS_HorizonGT	252	252
MVI_1645_VIS_HorizonGT	535	535
MVI_1646_VIS_HorizonGT	520	520
The total number of frames	17255	17552

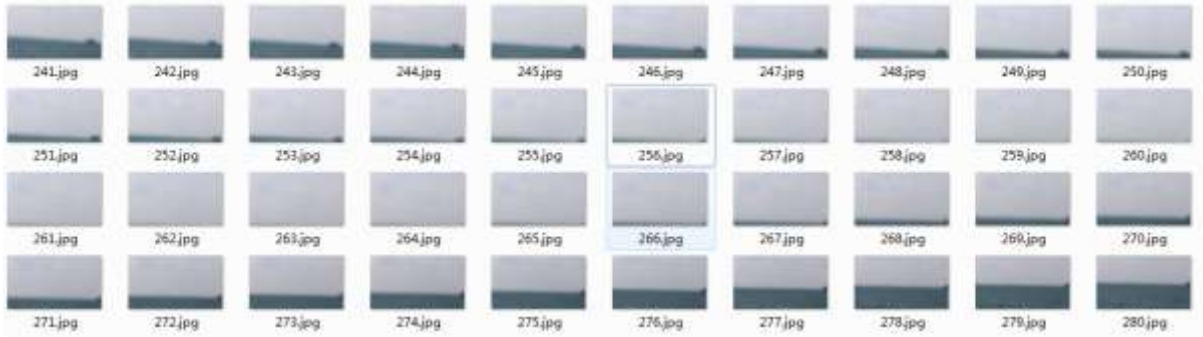
All different values are remarked by red color.

2) The total number of frames and test videos are not same as [30] and [32] referred.

We notice that no matter for frames or ground truth, the total number is larger than the [30] and [32] mentioned: 15376. The number of test videos also exist difference. For test videos in VIS_Onshore, the actual amount is 37 not 28 in [30] and [32].

3) Some "ground truth" is error.

We check test videos frame by frame and make the comparison with manual annotation. In the test sequence named "MVI_0799_VIS_OB_HorizonGT", some manual annotations are not correct. For example, in 255th frame the manual annotation for parameter Y is 1042. But for the next frame 256th, the manual annotation of Y is 546.6547. In fact the location of Y in 255th frame is similar to 256th, which is illustrated in Fig. 10.



(a) The frames of video named MVI_0799_VIS_OB.avi

(b) The 255th frame

(c) The 256th frame

	X	Y	Nx	Ny
253	961	1.0015e+03	-0.0349	0.9994
254	961	1.0213e+03	-0.0140	0.9999
255	961	1042	5.0532e-16	1
256	961	546.6547	-0.4420	0.8970
257	961	714.6848	-0.6361	0.7716
258	961	991.2513	0.0175	0.9998
259	961	432.1565	0.1994	0.9799
260	961	507.1679	0.4226	0.9063
261	961	651.8538	-0.0411	0.9992
262	961	676.6539	0.2630	0.9648
263	961	518.0832	0.2672	0.9636
264	961	386.8327	-0.1533	0.9882
265	961	353.1898	-0.1564	0.9877
266	961	1.0273e+03	2.8328e-16	1

(d) The manual annotation in file MVI_0799_VIS_OB_HorizonGT.mat

Fig. 10 The frames and corresponding manual annotation.

For test video named MVI_1485_VIS.avi and MVI_1486_VIS.avi, there is proper occlusion on horizon caused by vessels as Fig. 10 shows.

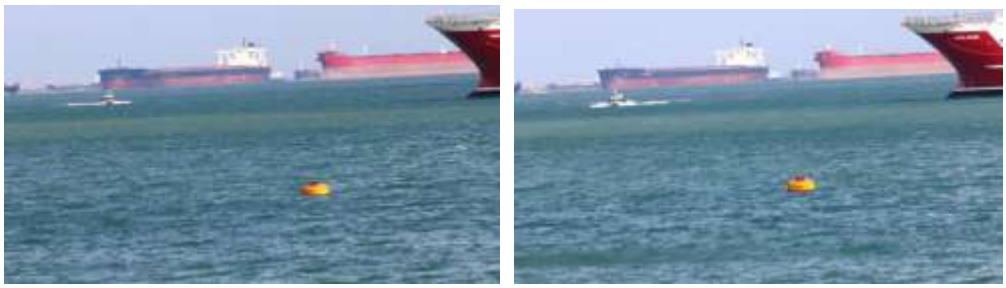


Fig. 10 The frames of MVI_1485_VIS.avi (left) and MVI_1486_VIS.avi (right)

In our experiments, three videos are discarded: MVI_0799_VIS_OB.avi, MVI_1485_VIS.avi and MVI_1486_VIS.avi. We correct remind videos and their corresponding manual annotation, which is demonstrated in Table 3 and Table 4.

Table 3 The number of frames and ground truths for VIS_Onboard.

Name of test sequences	The number of ground truth/frames
MVI_0788_VIS_OB_HorizonGT	299
MVI_0789_VIS_OB_HorizonGT	279
MVI_0790_VIS_OB_HorizonGT	299
MVI_0792_VIS_OB_HorizonGT	299
MVI_0794_VIS_OB_HorizonGT	288
MVI_0795_VIS_OB_HorizonGT	255
MVI_0796_VIS_OB_HorizonGT	299
MVI_0797_VIS_OB_HorizonGT	299
MVI_0801_VIS_OB_HorizonGT	299
MVI_0804_VIS_OB_HorizonGT	299
The total number of frames	2915

Table 4 The number of frames and ground truths for VIS_Onshore.

Name of test sequences	The number of ground truth
MVI_1469_VIS_HorizonGT	600
MVI_1470_VIS_HorizonGT	266
MVI_1471_VIS_HorizonGT	299
MVI_1474_VIS_HorizonGT	445
MVI_1478_VIS_HorizonGT	477
MVI_1479_VIS_HorizonGT	206
MVI_1481_VIS_HorizonGT	409
MVI_1482_VIS_HorizonGT	454
MVI_1483_VIS_HorizonGT	299
MVI_1484_VIS_HorizonGT	687
MVI_1578_VIS_HorizonGT	505
MVI_1582_VIS_HorizonGT	540
MVI_1583_VIS_HorizonGT	251
MVI_1584_VIS_HorizonGT	539
MVI_1587_VIS_HorizonGT	600
MVI_1592_VIS_HorizonGT	491
MVI_1609_VIS_HorizonGT	505
MVI_1610_VIS_HorizonGT	543
MVI_1612_VIS_HorizonGT	261
MVI_1613_VIS_HorizonGT	626
MVI_1614_VIS_HorizonGT	582
MVI_1615_VIS_HorizonGT	566
MVI_1617_VIS_HorizonGT	600
MVI_1619_VIS_HorizonGT	473
MVI_1620_VIS_HorizonGT	502
MVI_1622_VIS_HorizonGT	309
MVI_1623_VIS_HorizonGT	522
MVI_1624_VIS_HorizonGT	494
MVI_1625_VIS_HorizonGT	995
MVI_1626_VIS_HorizonGT	556
MVI_1627_VIS_HorizonGT	600
MVI_1640_VIS_HorizonGT	310
MVI_1644_VIS_HorizonGT	252
MVI_1645_VIS_HorizonGT	535
MVI_1646_VIS_HorizonGT	520
The total number of frames	16819

We also check Buoy Dataset and the whole illustration of Singapore Maritime Dataset (SMD), Buoy Dataset and our proposed dataset is shown in Table 5.

Table 5 Details of datasets: SMD, Buoy Dataset and our proposed dataset.

Dataset	Buoy	Proposed	Singapore Maritime	
			Onboard	Onshore
No. of videos	10	10	10	35
No. of frames	996	1576	2915	16819
Min(Y-mean(Y))	-261.4424	-94.7219	-364.9797	-197.7587
Max(Y-mean(Y))	339.1325	223.6456	535.0281	395.6408

Standard deviation of Y	108.6655	55.8093	162.4086	103.7937
Min(Y-mean(α))	-15.9123	-4.3847	-3.8498	-1.6998
Max(Y-mean(α))	20.5301	3.0219	4.1307	3.969
Standard deviation of α	4.4371	1.0318	1.8976	1.1653

Our experiment is executed on these corrected datasets and the performance of methods is described in our paper.