

# 海上目标特性数据共享计划（MTDSP）——海上目标多源观测数据集

## 使用说明

**数据主编：**刘宁波、王国庆、董云龙、关键、李佳、张子豪（海军航空大学，烟台 264001）

**下载说明：**海上目标特性数据共享计划（MTDSP）——海上目标多源观测数据集所有版权归海军航空大学所有，《雷达学报》编辑部具有编辑出版权等。读者可免费使用该数据进行教学、科研等，但需在论文、报告等成果中引用或致谢。该数据禁止私自用于商业目的，如有商业需求，请与《雷达学报》编辑部联系。首次数据下载，请关注微信公众号后注册、并通过邮箱验证：以后数据下载，在开始时微信扫码即可。英文网站数据下载和注册，可直接通过邮箱验证进行。如有更多需求，欢迎联系刘宁波（lnb198300@163.com）、王国庆（gqwang80@126.com）。

### 本数据集参考文献与引用格式：

- [1] 刘宁波, 李佳, 王国庆, 等. 雷达对海探测试验与目标特性数据获取——海上目标多源观测数据集 [J]. 雷达学报(中英文), 待出版. doi: 10.12000/JR25001.  
LIU Ningbo, LI Jia, WANG Guoqing, et al. Sea-detecting Radar Experiment and Target Feature Data Acquisition for Multi-source Observation Data Set of Marine Targets [J]. Journal of Radars, in press. DOI: 10.12000/JR25001.
- [2] 关键, 刘宁波, 王国庆, 等. 雷达对海探测试验与目标特性数据获取——海上目标双极化多海况散射特性数据集[J]. 雷达学报, 2023, 12(2): 456 - 469. doi: 10.12000/JR23029  
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- [3] 刘宁波, 丁昊, 黄勇, 等. X 波段雷达对海探测试验与数据获取年度进展[J]. 雷达学报, 2021, 10(1), doi: 10.12000/JR21011  
LIU Ningbo, DING Hao, HUANG Yong, et al. Annual Progress of Sea-detecting X-band Radar and Data Acquisition Program[J]. Journal of Radars, 2021, 10(1), doi: 10.12000/JR21011
- [4] 刘宁波, 董云龙, 王国庆, 等. X 波段雷达对海探测试验与数据获取[J]. 雷达学报, 2019, 8(5): 656 - 667. doi: 10.12000/JR19089  
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**数据集简介：**海上目标特性数据共享计划（MTDSP）——海上目标多源观测数据集本次共享数据涵盖 7 类典型海上目标，包括干货船、液货船、集装箱船、客轮、渔船、工程船及搜救船，每类 4 组，共计 28 组数据（ZIP 文件），总数据量约 42GB，具体对应信息如下表所

示：

船只类型	数据名称	
干货船	20250107155816_2002_AT_412331720_1	20250107155816_2003_AT_412331720_1
	20250117101739_2002_AT_352003977_1	20250117101738_2003_AT_352003977_1
液货船	20250305103638_2002_AT_413203610_1	20250305103638_2003_AT_413203610_1
	20250312101233_2002_AT_413203610_1	20250312101233_2003_AT_413203610_1
集装箱船	20250106103943_2002_AT_413212990_1	20250106103942_2003_AT_413212990_1
	20250117103454_2002_AT_413697880_1	20250117103453_2003_AT_413697880_1
客船	20250106102221_2002_AT_412450000_1	20250106102222_2003_AT_412450000_1
	20250117110751_2002_AT_414211000_1	20250117110753_2003_AT_414211000_1
工程船	20250117093108_2002_AT_413324410_1	20250117093107_2003_AT_413324410_1
	20250117103141_2002_AT_413020540_1	20250117103143_2003_AT_413020540_1
搜救船	20250124112948_2002_ST_413021330_1	20250124112948_2003_ST_413021330_1
	20250124121318_2002_AT_414150000_1	20250124121319_2003_AT_414150000_1
渔船	20250114144131_2002_AT_200000000_1	20250114144129_2003_AT_200000000_1
	20250314154739_2002_AT_200000000_1	20250314154740_2003_AT_200000000_1

数据内容包括了多源观测信息，包括雷达 HH/VV 极化中频/视频回波、可见光与红外图像、目标航迹（雷达与 AIS）以及气象水文参数（风速、风向、浪高、浪向），覆盖不同海况、天气条件及目标运动状态，具备较高的时空分辨率和数据完整性，为海上目标检测、识别与运动分析研究提供了高质量的数据支撑。

数据采集设备布设于烟台第一海水浴场，雷达采用圆扫模式进行长时序连续观测，并基于目标实时位置信息动态截取局部区域数据，以优化存储和解析效率，减少冗余数据负担。光电设备处于从动模式，实时接收雷达提供的目标距离、方位及俯仰信息，并自动调整自身参数，确保多源数据的精准对齐。

该数据集适用于海上目标特性分析、智能识别及目标跟踪等研究方向。数据上传后，将配套海上目标多源观测数据复盘解析软件（V1.0），支持高效的数据解析与复盘，为相关学术研究及工程应用提供重要支撑。

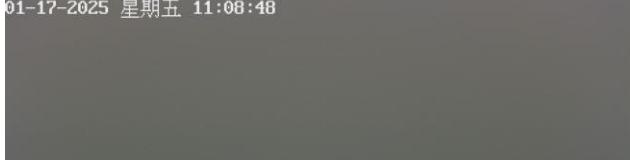
海上目标多源观测试验数据(.zip)其目录结构如下：

- 1) 雷达中频/视频回波切片数据：分别保存为二进制文件（后缀为.dat），雷达中频与视频切片数据需要配合使用“雷达数据复盘解析软件”，将其读取并保存为 MAT 格式数据，MAT 数据协议（前 26 位）则与“雷达对海探测数据集”中已共享的数据协议一致，只在最后补充了三位，即切片的起始距离采样点数、起始距离和切片距离维采样点个数，示例如下：

变量 - amplitude_data																	
amplitude_data																	
208751x800 complex_double																	
1	-1.0631e+02	9.3888e+01j	60.5137	... .33.0883	+ 1.4818e+0	2.2346e+0	2.0638e+0	.98.4917	+ .41.8155	+ .1.4237e+0	.-1.6682e+0	.-1.3006e+0	.-75.1118	+ .38.2185	+ .-29.5466	+ .-35.1152	+ .-3.0813e+0
2	9.0508e+01	+ 1.0348e+02j	1.1285e+0	.1.5249e+0	1.8157e+0	1.8231e+0	1.6051e+0	.1.3299e+0	+ 1.0611e+0	.72.1666	+ .26.4546	+ .-17.8722	+ .-36.0384	+ .-13.2501	+ .9.5690e+0	+ .9.0951e+0	+ .1.0927e+0
3	15.6071	+ 56.9739j	30.6758	.48.1504	+ .22.7116	- .33.0382	+ .84.5235	+ .1.0149e+0	.82.1086	+ .49.3757	+ .23.6951	+ .1.6190	+ .-36.4745	+ .-99.4598	+ .-1.6911e+0	+ .-2.1142e+0	+ .-2.0391e+0
4	-1.1251e+02	+ 2.1795e+01j	-1.0815e+	.90.6326	+ .80.4607	+ .88.1245	+ .1.0911e+	.-1.3192e+	+ .1.4940e+	+ .1.6381e+	+ .1.8309e+	+ .-2.1203e+	+ .-2.4563e+	+ .-2.7349e+	+ .-2.5311e+	+ .-2.1958e+	+ .-1.6695e+0
5	-1.0450e+02	+ 8.7217e+01j	-1.5922e+	.-2.0363e+	+ .-2.2452e+	+ .-2.1287e+	+ .-1.7038e+	+ .-1.1401e+	+ .-68.5813	+ .-5.0288e+	+ .-5.6368e+	+ .-7.0457e+	+ .-7.6112e+	+ .-6.4896e+	+ .-36.1401	+ .-4.2217	+ .-1.4961e+0
6	9.4567e+01	+ 1.5624e+02j	1.1652e+0	.1.2906e+0	+ .1.3738e+0	+ .1.3937e+0	+ .1.2231e+0	+ .8.0093e+0	+ .2.8570e+0	+ .-4.6229e+	+ .-6.3146e+	+ .-1.1490e+0	+ .-2.9044e+0	+ .-42.0949	+ .-63.2112	+ .-1.0196e+0	+ .-1.4871e+0
7	83.7478	+ 22.0967j	1.5333e+0	.1.7236e+0	+ .1.3048e+0	+ .4.6289e+0	+ .-3.9473e+	+ .-8.7320e+	+ .-8.0060e+	+ .-2.5710e+	+ .5.8363e+0	+ .1.3247e+0	+ .1.8827e+0	+ .2.0904e+0	+ .1.7788e+0	+ .1.5180e+0	+ .1.1327e+0
8	-1.3808e+02	+ 4.8315e+01j	-1.0388e+	.59.3203	+ .-37.5867	+ .-64.1304	+ .-1.3137e+	+ .-2.0320e+	+ .-2.4495e+	+ .-2.4660e+	+ .-2.2040e+	+ .-1.8298e+	+ .-1.4235e+	+ .-97.6765	+ .-47.031	+ .-4.7658	+ .-3.45.3254
9	-6.9927e+01	+ 1.0735e+02j	94.8190	+ .63.2085	+ .3.4101	- .6	+ .68.0763	+ .1.0814e+0	+ .1.2671e+0	+ .1.3959e+0	+ .1.5373e+0	+ .1.5749e+0	+ .1.3097e+0	+ .6.7818e+0	+ .-1.1781e+	+ .-72.2101	+ .-89.2729
10	-9.7832e+01	+ 1.2157e+02j	-8.3724e+	+ .-6.6984e+	+ .-5.1986e+	+ .-1.9717e+	+ .-1.04239	+ .-14.8098	+ .-3.1878e+0	+ .-3.7446e+0	+ .-2.1889e+0	+ .-1.4871e+0	+ .-1.7871e+0	+ .-1.7004e+0	+ .-1.64451	+ .-6.70964	+ .-1.0004e+0
11	14.4475	+ 73.7653j	1.2414e+0	.5.2108e+0	+ .8.3497e+0	+ .9.2981e+0	+ .73.1100	+ .4.28583	+ .2.4402e+0	+ .1.7830e+0	+ .4.6112e+0	+ .-26.0973	+ .-60.6175	+ .-72.1734	+ .-46.8138	+ .3.3474	+ .5.502788
12	-1.3555e+02	+ 5.9498e+01j	-1.5398e+	.-1.2084e+	+ .-56.3976	+ .-0.0594	+ .-2.16.8412	+ .-6.9808	+ .-2.42.0123	+ .-5.3494e+	+ .-2.9528e+	+ .-1.6644e+	+ .-3.9320e+	+ .-3.3402e+	+ .-7.0674e+	+ .-7.0907e+	+ .-1.4163e+
13	4.5735e+01	+ 1.3374e+02j	69.7416	+ .79.0152	+ .67.3539	+ .33.3380	+ .-21.0963	+ .-81.2923	+ .-1.1512e+	+ .-84.8236	+ .-23.6591	+ .-1.7847e+0	+ .3.1267e+0	+ .3.6947e+0	+ .3.4433e+0	+ .2.8485e+0	+ .2.4375e+0
14	-35.6529	+ 11.8952j	-60.7322	+ .65.3478	+ .81.8359	+ .1.2271e+	+ .-1.6595e+	+ .-1.7983e+	+ .-1.5656e+	+ .-1.1697e+	+ .-85.8771	+ .-67.6092	+ .-68.9852	+ .-74.1006	+ .-78.2691	+ .-71.0215	+ .-45.2257
15	-79.4864	+ 46.6876j	-43.5914	+ .10.5379	+ .1.9215	+ .-4	+ .-6.1364	+ .-2.17.1827	+ .-14.8216	+ .-0.9282	+ .-9.2319	+ .-3.8271	+ .-1.8031	+ .-25.0115	+ .-58.9541	+ .-91.0305	+ .-1.0595e+0
16	76.0350	+ 97.1277j	14.9621	+ .38.3498	+ .-53.2919	+ .-28.1547	+ .-9.0378	+ .7	+ .2.3875e+0	+ .4.8395e+0	+ .-2.7511e+	+ .-40.7284	+ .-20.2618	+ .-20.5445	+ .-5.7394e+0	+ .-76.9250	+ .-80.4310
17	-32.4368	+ 51.1866j	45.6802	+ .25.4185	+ .14.5793	+ .51.2770	+ .-70.9120	+ .-73.7514	+ .-73.9682	+ .-81.9308	+ .-9.2277e+0	+ .-8.9590e+0	+ .-6.9318e+0	+ .-49.9268	+ .-56.9493	+ .-92.0210	+ .-1.2302e+0
18	-2.4873	+ 74.2382j	-2.4699e+	+ .-1.8584e+	+ .-2.3563e+	+ .-1.8585e+	+ .-1.8583e+	+ .-1.2115e+	+ .-1.0997e+	+ .-54.5347	+ .-13.7209	+ .-64.4371	+ .-81.5732	+ .-66.7822	+ .-34.4011	+ .-5.5370	+ .-9.5977
19	-1.1384e+02	+ 1.3803e+01j	-1.0596e+	.-7.6129e+	+ .-49.6709	+ .-41.8506	+ .-1.2114e+	+ .-1.1442e	+ .-6.9865	+ .-31.2369	+ .-22.7735	+ .-13.8156	+ .-4.3402e+0	+ .-3.3402e+0	+ .-7.0674e+0	+ .-7.0907e+0	+ .-1.4163e+0
20	-35.7931	+ 75.0879j	-8.9004e+	-1.6497e+	+ .-2.4162e+	+ .-3.0450e+	+ .-3.4579e+	+ .-3.5778e+	+ .-3.3705e+	+ .-2.9428e+	+ .-2.5059e+	+ .-2.1932e+	+ .-1.9571e+	+ .-1.6872e+	+ .-1.3774e+	+ .-1.1075e+	+ .-56.5868
21	-63.6160	+ 82.1955j	58.2005	+ .56.9437	+ .-5.5530e+	+ .-4.5567e+	+ .-3.0569e+	+ .-2.5534e+	+ .-36.2904	+ .-45.2605	+ .-27.3430	+ .-18.0538	+ .-5.7872e+	+ .-54.4191	+ .-2.5113	+ .-65.6000	+ .-1.0936e+
22	1.3388e+02	+ 1.4989e+01j	1.04790e	+ .70.1581	+ .47.6542	+ .35.2376	+ .-26.9731	+ .-16.5532	+ .-4.2369	+ .-2.120917	+ .-4.2443e+	+ .-9.7387e+	+ .-2.4892e+	+ .-2.9239e+	+ .-2.8544e+	+ .-2.3157e+	+ .-1.4977e+
23	-9.0503e+00	+ 1.1248e+02j	71.5821	+ .-1.0271e+	+ .-1.1885e+	+ .-1.4360e+	+ .-1.8235e+	+ .-2.0276e+	+ .-2.4115e+	+ .-2.3440e+	+ .-2.3440e+	+ .-1.4915e+	+ .-1.0266e+	+ .-8.6617e+	+ .-1.3063e+	+ .-1.2231e+	+ .-7.2969e+
24	-1.1880e+02	+ 1.8767e+02j	-5.3805e+	+ .1.8585e+	+ .1.4045e+	+ .-3.6289e+	+ .-65.6161	+ .-90.7880	+ .-1.0852e+	+ .-1.1315e+	+ .-88.4580	+ .-36.1594	+ .-31.8983	+ .-90.9753	+ .-1.2539e+	+ .-1.4007e+	+ .-1.4854e+
25	-1.3385e+02	+ 1.3072e+02j	-1.8790e+	+ .-2.0041e+	+ .-1.8780e+	+ .-1.5219e+	+ .-1.40008e+	+ .-1.3950e+	+ .-1.3964e+	+ .-1.3573e+	+ .-1.2464e+	+ .-95.0885	+ .-34.2122	+ .-52.8482	+ .-1.3587e+	+ .-1.7762e+	+ .-1.6137e+
26	63.7113	+ 14.4767j	11.8533	+ .78.3981	+ .1.2422e	+ .1.4677e+	+ .-1.3987e+	+ .-9.9807e+	+ .-4.2832e+	+ .-3.9956e+	+ .-9.0518e+	+ .-5.4376e+	+ .-1.0543e+	+ .-5.3759e+	+ .-1.5219e+	+ .-1.6626e+	+ .-1.3399e+
27	-43.3602	+ 33.3427j	-1.3060e+	+ .-2.1927e	+ .-2.7813e	+ .-2.5648e+	+ .-2.8111e	+ .-2.4337e+	+ .-1.9325e	+ .-1.4258e	+ .-1.0416e	+ .-8.3036e	+ .-7.1705e	+ .-5.8472e+	+ .-39.7182	+ .-20.8392	+ .-3.7833
28	1.8192e+02	+ 2.47151e+00j	2.8972e+0	+ .3.1919e+0	+ .2.6599e+0	+ .6.0494e+0	+ .-1.6424e+0	+ .-1.6424e+0	+ .-4.2626e+0	+ .-1.0268e+0	+ .-1.4253e+0	+ .-1.4162e+0	+ .-9.6556e+0	+ .-2.0205e+0	+ .-5.3141e+0	+ .-95.2534	+ .-83.3784
29	7.8878e+01	+ 1.42090e+02j	1.1419e+0	.1.2039e+0	+ .1.0540e+0	+ .9.4030e+0	+ .6.6163e+0	+ .1.7807e+0	+ .-3.3724e+	+ .-6.0372e+	+ .-47.8839	+ .-9.7931	+ .-22.9537	+ .-26.1652	+ .-2.5016	+ .-47.3847	+ .-89.1865
30	20.3234	+ 71.5095j	2.0403	+ .-9	+ .-3.4460e+	+ .-5.3009e+	+ .-46.3280	+ .-28.7099	+ .-29.1604	+ .-64.5142	+ .-1.2120e	+ .-1.6319e	+ .-1.5863e	+ .-1.0356e	+ .-24.6794	+ .-36.3556	+ .-50.0363
31	-61.5762	+ 81.1179j	-11.2141	+ .58.5059	+ .1.2040e+	+ .1.3807e+	+ .94.3843	+ .16.8755	+ .-16.5157e	+ .-23.7465	+ .-13.5602	+ .-54.0564	+ .-1.1074e	+ .-1.7938e	+ .-2.3265e	+ .-2.1058e	+ .-1.5424e
32	81.6030	+ 49.0478j	1.4951e+0	.1.5754e+0	+ .1.3549e+0	+ .1.1064e+0	+ .1.0155e+0	+ .98.8610	+ .-87.2784	+ .-74.4156	+ .-82.2295	+ .-1.1581e	+ .-1.4827e	+ .-1.4586e	+ .-1.0704e	+ .-70.0769	+ .-78.5126
33	-20.2662	+ 20.4221j	11.6023	+ .60.4862	+ .1.2661	+ .1.1099	+ .87.6577	+ .1.7220	+ .-26.4010	+ .-22.5563	+ .-22.2242	+ .-11.466	+ .-30.0704	+ .-2.3205e	+ .-4.0002	+ .-2.6251	+ .-1.6776

(20250117110753\_2003\_AT\_414211000\_1 中 IQ\_2003\_AT\_414211000.dat 解析后的 MAT 文件)

2) 可见光与红外图像数据: 无符号整数型 (uint8) 图像数据, 以.jpg 文件形式保存, 示例如下:



(Photo\_ScreenShot\_TV\_2002\_AIS\_0\_414211000\_10.50\_-0.200\_12.40\_20250117110848\_2.jpg)

3) AIS 静态与动态报文数据: 通过 AIS 设备可获取船只的静态和动态报文数据, 以.csv 文件形式保存, 示例如下:

A	B	C	D	E	F	G	H	I
1	时间	MMSI	船名	国籍	类型	船长(m)	船宽(m)	定位装置
2	2025/1/17 10:15	414211000	BO HAI MA ZHU	中国	客船	179	28	目的地

(AIS\_ShipInformation\_414211000.csv)

A	B	C	D	E	F	G	H	I	J	K	L	M	
1	MMSI	经度(°)	纬度(°)	时间	速度(kn)	船艏向(°)	对地航向(°)	航行状态	相对视角(°)	姿态信息	浪高(m)	方位角(°)	距离(m)
2	414211000	121.428	37.5782	2025/1/17 11:07	14.6	260	234.9	在航	1000	0	0	8.6087	5092.85
3	414211000	121.429	37.5783	2025/1/17 11:07	14.6	260	234.9	在航	1000	0	0	8.9057	5105.9
4	414211000	121.428	37.5782	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	8.5593	5090.07
5	414211000	121.429	37.5783	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	9.122	5114.09
6	414211000	121.428	37.5781	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	8.2727	5077.19
7	414211000	121.429	37.5784	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	9.4229	5126.85
8	414211000	121.43	37.5785	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	9.7168	5139.71
9	414211000	121.431	37.5788	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	10.7958	5189.87
10	414211000	121.432	37.579	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	11.8159	5240.19
11	414211000	121.433	37.5793	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	12.7706	5289.37
12	414211000	121.434	37.5795	2025/1/17 11:08	14.7	0	55.7	在航	1000	0	0	13.4613	5326.62
13	414211000	121.431	37.5788	2025/1/17 11:08	14.8	228	0	在航	1000	0	0.2	10.7126	5181.79
14	414211000	121.43	37.5785	2025/1/17 11:08	14.8	228	0	在航	1000	0	0	9.8836	5143.06
15	414211000	121.432	37.579	2025/1/17 11:08	14.8	228	0	在航	1000	0	0	11.8393	5238.9
16	414211000	121.431	37.5789	2025/1/17 11:08	14.8	292	158.2	在航	1000	0	0.2	11.0935	5198.81
17	414211000	121.432	37.5791	2025/1/17 11:08	14.8	292	158.2	在航	1000	0	0	12.1062	5252.43
18	414211000	121.43	37.5784	2025/1/17 11:08	14.8	292	158.2	在航	1000	0	0	9.6693	5130.4
19	414211000	121.432	37.579	2025/1/17 11:08	14.8	292	107	在航	1000	0	0.2	11.6209	5223.16
20	414211000	121.433	37.5791	2025/1/17 11:08	14.8	292	107	在航	1000	0	0	12.4262	5265.61
21	414211000	121.43	37.5786	2025/1/17 11:08	14.8	292	107	在航	1000	0	0	10.4747	5168.25
22	414211000	121.432	37.5791	2025/1/17 11:08	14.8	324	311.8	在航	1000	0	0.2	11.9953	5240.9
23	414211000	121.433	37.5792	2025/1/17 11:08	14.8	324	311.8	在航	1000	0	0	12.7746	5281.01
24	414211000	121.432	37.5789	2025/1/17 11:08	14.8	324	311.8	在航	1000	0	0	11.668	5226.03
25	414211000	121.433	37.5791	2025/1/17 11:08	14.8	324	311.8	在航	1000	0	0	12.4715	5265.23
26	414211000	121.433	37.5791	2025/1/17 11:08	14.9	0	337.4	在航	1000	0	0	12.2193	5251.85
27	414211000	121.433	37.5792	2025/1/17 11:08	14.9	0	337.4	在航	1000	0	0	12.7493	5277.94
28	414211000	121.432	37.579	2025/1/17 11:08	14.9	0	337.4	在航	1000	0	0	11.9557	5238.67
29	414211000	121.434	37.5793	2025/1/17 11:08	14.9	0	337.4	在航	1000	0	0	13.1001	5295.43
30	414211000	121.434	37.5793	2025/1/17 11:08	14.9	0	337.4	在航	1000	0	0	13.3236	5306.75
31	414211000	121.434	37.5794	2025/1/17 11:09	14.9	0	337.4	在航	1000	0	0	13.5525	5318.66

(AIS\_Trajectory\_414211000.csv)

- 4) 气象水文数据：同步获取目标所处海域（指定经纬度处）的气象水文数据，以.txt 文件形式保存，示例如下：

20250117110753\_2003\_AT\_414211000

文件 编辑 查看

Snip(Passenger)(U.88)

有效波高 (米) : 0.20

浪向 (°) : 86.00

浪周期 (s) : 0.00

海况等级: 2

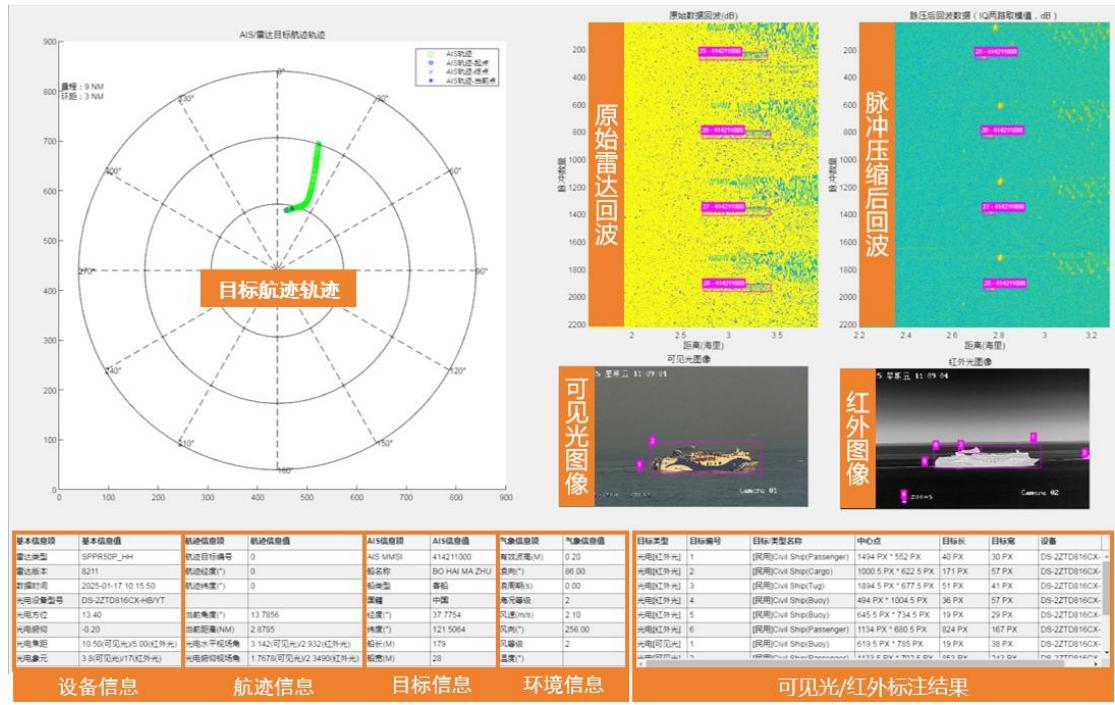
风速 (米/秒) : 2.10

风向 (°) : 256.00

风力等级: 2

(20250117110753\_2003\_AT\_414211000\_1.txt)

通过海上目标多源观测数据复盘解析软件（V1.0）解析该.zip 文件后得到的直观展示结果如下图所示：



(20250117110753\_2003\_AT\_414211000\_1.zip)