风云三号（03 批）气象卫星地面应用系统工程

G 星全球导航卫星掩星探测仪–II 型

L1 数据产品特性卡
（GNSS 反射）

（V1.0）

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文档修改记录

版本号	日期	修改者	修 改 描 述
V0.1	2022-06-09	黄飞雄	在 FY-3E 格式的基础上，新增了 4 个用于土壤湿度反演的变量 Ddm_peak_power_ratio、Ddm_skewness、Ddm_kurtosis、Ddm_sp_reflectivity；将原 SDS73 移至 SDS70；更换 SDS14 和 SDS15 的顺序。
	2022-06-23	黄飞雄	修改部分英文拼写，属性中 nadir 变量描述中 SNR 大写
	2022-07-08	黄飞雄	SDS73Ddm_quality_flag 增加 bit19
	2023-07-06	黄飞雄	增加变量 Sp_distance_to_coastline 和 Sp_land_sea_mask，更新变量 Sp_surface_type 和 Ddm_quality_flag 的定义

1 FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）

1.1 数据概况

表1．FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）概况表

产品名称	FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）
	L1 data of GNOS GNSS Reflectometry
物理意义（中英文）	GNOS GNSS 反射 L1 数据提供了利用时延-多普勒相关功率波形计算得到的镜面反射点处归一化双基雷达散射截面及相关辅助信息。产品主要内容包括 GNSS 反射事件发生时间及位置、反射 GNSS 卫星号、反射 GNSS 卫星位置和速度、FY-3G 卫星位置和速度、镜面反射点处归一化双基雷达散射截面及 LES 等。
	GNSS Reflectometry (GNSS-R) L1 data of FY-3 E GNOS provides the Normalized Bistatic Radar Cross sections (NBRCS) and the related auxiliary data for each GNSS-R Specular. The products include the occurrence time and position of GNSS reflection, the PRN number of the reflection GNSS satellite with its position and velocity, the position and velocity of FY-3G satellite, the NBRCS of each Specular.
用途（中英文）	用于计算海面风速等二级产品。
	Calculations of the L2 sea surface wind speed product and so on.
用户（中英文）	数值天气预报及研究人员
	Numerical weather forecaster and researcher
备注（中英文）	

1.2 数据基本信息

表2．FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据(GNSS 反射）基本信息表

产品名称：FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）
文件名约定： FY3G_GNOSR_ORBT_L1_YYYYMMDD_HHmm_RFL*#_Vn.HDF

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其中，*表示发生反射的导航星座名称，*取值为 G 时表示为 GPS 星座，*取值为 C 时表示为北斗星座，*取值为 E 时表示为 Galileo 星座；#为通道号。

栏目	值	备注
卫星名	FY3G	
仪器名称	GNOS	
数据区域类型	ORBT	
数据级别	L1	
分辨率	--	
数据格式名称	HDF	
更新频率	~224	
更新频率单位	个/天	
分块方式	1/2圈	
单个文件数据量	~250	
数据量单位	MB	

2 L1 数据规格

2.1 HDF 数据格式结构

表3．FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）HDF 结构

全局文件属性				
私有文件属性				
科学数据集				
分组名称	科学数据集名		科学数据集英文描述	科学数据集中文描述
Time	SDS1	Sample_num	Sample number of DDM	DDM 采集序号，序号起始值为 0
	SDS2	Ddm_track_id	DDM track number	将同一 GNSS 卫星的连续不中断的 DDM 波形数据，称为一个轨迹，按一个轨迹内起始 DDM 波形数据的起始时间大小对不同的轨迹进行编号，起始轨迹编号为 0
	SDS3	Ddm_time_utc	DDM sample time - UTC	DDM 采集中间时刻对应的 UTC 时间
	SDS4	Ddm_gps_week	DDM sample time - GPS week	DDM 采集中间时刻对应的 GPS 周
	SDS5	Ddm_gps_second	DDM sample time - GPS seconds	DDM 采集中间时刻对应的 GPS 秒
Receiver	SDS6	Rx_clk_bias	Receiver clock bias	DDM 采集中间时刻对应

				的接收机的钟差
	SDS7	Rx_clk_bias_rate	Receiver clock bias rate	DDM 采集中间时刻对应的接收机的钟漂
	SDS8	Rx_pos_x	Spacecraft position X at DDM sample time	DDM 采集中间时刻对应的低轨卫星位置 X 分量
	SDS9	Rx_pos_y	Spacecraft position Y at DDM sample time	DDM 采集中间时刻对应的低轨卫星位置 Y 分量
	SDS10	Rx_pos_z	Spacecraft position Z at DDM sample time	DDM 采集中间时刻对应的低轨卫星位置 Z 分量
	SDS11	Rx_vel_x	Spacecraft velocity X at DDM sample time	DDM 采集中间时刻对应的低轨卫星速度 X 分量
	SDS12	Rx_vel_y	Spacecraft velocity Y at DDM sample time	DDM 采集中间时刻对应的低轨卫星速度 Y 分量
	SDS13	Rx_vel_z	Spacecraft velocity Z at DDM sample time	DDM 采集中间时刻对应的低轨卫星速度 Z 分量
	SDS14	Rx_lat	Sub-satellite point latitude	DDM 采集中间时刻对应的低轨卫星的纬度
	SDS15	Rx_lon	Sub-satellite point longitude	DDM 采集中间时刻对应的低轨卫星的经度
	SDS16	Rx_alt	Spacecraft altitude	DDM 采集中间时刻对应的低轨卫星的高度
	SDS17	Rx_attitude_status	Spacecraft attitude_status	DDM 采集中间时刻对应的低轨卫星姿态状态
	SDS18	Rx_fly_direction	Spacecraft fly direction	DDM 采集中间时刻对应的低轨卫星飞行方向
	SDS19	Rx_pitch	Spacecraft attitude pitch angle at DDM sample time	DDM 采集中间时刻对应的低轨卫星俯仰角
	SDS20	Rx_yaw	Spacecraft attitude yaw angle at DDM sample time	DDM 采集中间时刻对应的低轨卫星偏航角
	SDS21	Rx_roll	Spacecraft attitude roll angle at DDM sample time	DDM 采集中间时刻对应的低轨卫星翻滚角
Transmitter	SDS22	Gnss_prn_code	GNSS PRN code	用于生成 DDM 波形的 GNSS 卫星 PRN 码
	SDS23	Gnss_svn_num	GNSS space vehicle number	用于生成 DDM 波形的 GNSS 卫星 SV 码
	SDS24	Gnss_block_flag	GNSS block code	用于生成 DDM 波形的 GNSS 卫星批次代码
	SDS25	Tx_pos_x	GNSS Tx position X	DDM 采集中间时刻对应的信号发射时刻的 GNSS 卫星位置 X 分量
	SDS26	Tx_pos_y	GNSS Tx position Y	DDM 采集中间时刻对应的信号发射时刻的 GNSS 卫星位置 Y 分量
	SDS27	Tx_pos_z	GNSS Tx position Z	DDM 采集中间时刻对应的信号发射时刻的 GNSS

	SDS编号	名称	英文名称	说明
				卫星位置 Z 分量
	SDS28	Tx_vel_x	GNSS Tx velocity X	DDM 采集中间时刻对应的信号发射时刻的 GNSS 卫星速度 X 分量
	SDS29	Tx_vel_y	GNSS Tx velocity Y	DDM 采集中间时刻对应的信号发射时刻的 GNSS 卫星速度 Y 分量
	SDS30	Tx_vel_z	GNSS Tx velocity Z	DDM 采集中间时刻对应的信号发射时刻的 GNSS 卫星速度 Z 分量
Specular	SDS31	Sp_lat	Specular point latitude	镜面反射点的纬度
	SDS32	Sp_lon	Specular point longitude	镜面反射点的经度
	SDS33	Sp_alt	Specular point altitude	镜面反射点的高度
	SDS34	Sp_pos_x	Specular point position X	镜面反射点位置的 X 分量
	SDS35	Sp_pos_y	Specular point position Y	镜面反射点位置的 Y 分量
	SDS36	Sp_pos_z	Specular point position Z	镜面反射点位置的 Z 分量
	SDS37	Sp_vel_x	Specular point velocity X	镜面反射点速度的 X 分量
	SDS38	Sp_vel_y	Specular point velocity Y	镜面反射点速度的 Y 分量
	SDS39	Sp_vel_z	Specular point velocity Z	镜面反射点速度的 Z 分量
	SDS40	Sp_inc_angle	Specular point incidence angle	镜面反射点处 GNSS 信号入射角
	SDS41	Sp_theta_orbit	Specular point orbit frame theta angle	镜面反射点在轨道坐标系中的高度角
	SDS42	Sp_az_orbit	Specular point orbit frame azimuth angle	镜面反射点在轨道坐标系中的方位角
	SDS43	Sp_theta_body	Specular point body frame theta angle	镜面反射点在卫星本体坐标系中高度角
	SDS44	Sp_az_body	Specular point body frame azimuth angle	镜面反射点在卫星本体坐标系方位角
	SDS45	Sp_theta_antenna	Specular point antenna frame theta angle	镜面反射点在天线坐标系中的高度角
	SDS46	Sp_az_antenna	Specular point antenna frame azimuth angle	镜面反射点在天线坐标系中的方位角
	SDS47	Sp_theta_pattern	Specular point antenna pattern frame elevation angle	镜面反射点在方向图坐标系中的高度角
	SDS48	Sp_az_pattern	pecular point antenna pattern frame azimuth angle	镜面反射点在方向图坐标系中的方位角
	SDS49	Sp_antenna_gain	Specular point reflection antenna gain	镜面反射点接收机天线增益
	SDS50	Sp_surface_type	Specular point surface type	镜面反射点处地物类型
	SDS51	Sp_fresnel_coeff_square	Square of Fresnel power reflection coefficient at specular point	镜面反射点处菲涅尔反射系数模的平方
	SDS52	Sp_dist_to_coastline	Distance from specular point to coastline	镜面反射点到海岸线的距离

	SDS53	Sp_land_sea_mask	Specular point land-sea mask	镜面反射点海陆掩码
Channel	SDS54	Sp_tcg	Total corrected gain at specular point	镜面反射点处的全修正增益
	SDS55	Direct_antenna_id	Direct antenna id	直射通道天线标识
	SDS56	Direct_signal_noise	Direct signal noise	直射通道信号噪底
	SDS57	Direct_signal_snr	Direct signal to noise ratio	直射通道信号的信噪比
	SDS58	Rx_channel_status	Rx channel status	反射通道占用状态
DDM	SDS59	Ddm_range_refer	Ddm range reference	DDM 伪距参考值
	SDS60	Ddm_doppler_refer	Ddm doppler reference	DDM 多普勒参考值
	SDS61	Ddm_raw_data	DDM bin raw counts	DDM 波形数据
	SDS62	Ddm_noise_source	DDM noise sourse	DDM 噪底数据源
	SDS63	Ddm_noise_raw	DDM noise raw	DDM 噪底原始采样值
	SDS64	Ddm_noise_m	DDM noise m	DDM 噪底 M 值
	SDS65	Ddm_peak_raw	DDM peak raw	DDM 峰值原始采样值
	SDS66	Ddm_sp_raw	DDM specular point raw	DDM 镜面反射点原始采样值
	SDS67	Ddm_peak_snr	DDM peak snr	DDM 峰值信噪比
	SDS68	Ddm_sp_snr	DDM specular point snr	DDM 镜面反射点信噪比
	SDS69	Ddm_effective_area	DDM effective scattering area	DDM 有效散射面积
	SDS70	Ddm_sp_nbrcs	DDM specular point NBRCS	DDM 镜面反射点归一化双基雷达散射截面
	SDS71	Ddm_sp_les	DDM specular point LES	DDM 波形前沿斜率
	SDS72	Ddm_sp_dles	DDM specular point DLES	DDM 波形前沿二阶导数
	SDS73	Ddm_quality_flag	DDM quality flag	DDM 质量标识符
	SDS74	Ddm_sp_row	DDM specular point row	DDM 镜面反射点的行位置
	SDS75	Ddm_sp_column	DDM specular point column	DDM 镜面反射点的列位置
	SDS76	Ddm_sp_delay	DDM delay at specular point	DDM 镜面反射点的时延
	SDS77	Ddm_sp_doppler	DDM doppler at specular point	DDM 镜面反射点的多普勒
	SDS78	Ddm_peak_row	DDM peak bin row	DDM 峰值点的行位置
	SDS79	Ddm_peak_column	DDM peak bin column	DDM 峰值点的列位置
	SDS80	Ddm_peak_delay	DDM peak bin delay	DDM 峰值点的时延
	SDS81	Ddm_peak_doppler	DDM peak bin doppler	DDM 峰值点的多普勒
	SDS82	Sp_delay_doppler_flag	Specular point delay doppler flag	DDM 波形镜面反射点判断可靠性的标识符

SDS83	Ddm_power_factor	Factor used to compute DDM power	DDM 功率计算系数
SDS84	Ddm_brcs_factor	Factor used to compute DDM BRCS	DDM 双基雷达散射截面计算系数
SDS85	Ddm_sp_normalized_snr	Normalized SNR at DDM specular point	归一化镜像点信噪比
SDS86	Ddm_peak_power_ratio	Power ratio of DDM peak	DDM 峰值占比
SDS87	Ddm_skewness	DDM skewness	DDM 的偏度
SDS88	Ddm_kurtosis	DDM kurtosis	DDM 的峰度
SDS89	Ddm_sp_reflectivity	Reflectivity at specular point	镜面反射点处反射率

2.2 全局文件属性

表4．FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）全局文件属性定义

描述	属性名称	数据类型	数量	值
卫星名称	Satellite Name	8-bit signed char	不定长	FY-3G
仪器名称	Sensor Name	8-bit signed char	不定长	GNOS
传感器代码	Sensor Identification Code	8-bit signed char	不定长	GNOS II
数据集名称	Dataset Name	8-bit signed char	不定长	GNOS L1 GNSSR Data
文件名称	File Name	8-bit signed char	不定长	
文件别名	File Alias Name	8-bit signed char	不定长	GNOS_L1
产品生成地	Responser	8-bit signed char	不定长	NSMC
处理软件版本号	Version Of Software	8-bit signed char	不定长	V1.0.0
处理软件更新日期	Software Revision Date	8-bit signed char	不定长	YYYY-MM-DD
定标参数版本号	Version Of Calibration Parameter	8-bit signed char	不定长	
定标参数更新日期	Calibration Parameter Revision Date	8-bit signed char	不定长	YYYY-MM-DD
数据观测开始日期(包括年月日)	Observing Beginning Date	8-bit signed char	不定长	YYYY-MM-DD
数据观测开始时间（包括时分秒毫秒）	Observing Beginning Time	8-bit signed char	不定长	Hh:mm:ss.sss
数据观测结束日期(包括年月日)	Observing Ending Date	8-bit signed char	不定长	YYYY-MM-DD
数据观测结束时间（包括时分秒毫秒）	Observing Ending Time	8-bit signed char	不定长	Hh:mm:ss.sss
数据创建日期(包括年月日)	Data Creating Date	8-bit signed char	不定长	YYYY-MM-DD
数据创建时间（包括时分秒毫秒）	Data Creating Time	8-bit signed char	不定长	Hh:mm:ss.sss
白天夜间标志	Day Or Night Flag	8-bit signed char	不定长	D:Day　N:Night　M:Mixed
轨道号	Orbit Number	32-bit unsigned Integer	1	
轨道周期(分钟)	Orbit Period(min.)	16-bit unsigned Integer	1	102
轨道方向	Orbit Direction	8-bit signed char	1	A:Ascend　D:Descend　M:Mixed

描述	属性名称	数据类型	数量	值
数据完整性(0-5级)	Data Integrity	8-bit unsigned Integer	1	0为最好，5为最差（具体定义参见注1）
总扫描线数	Number Of Scans	32-bit signed Integer	1	
白天模式扫描线数	Number Of Day mode scans	32-bit signed Integer	1	注2
晚上模式扫描线数	Number of Night mode scans	32-bit signed Integer	1	注3
处理成功的扫描线数	Successfully pre-pressed Scans	32-bit signed Integer	1	注4
地球椭球参考坐标系ID	Reference Ellipsoid Model ID	8-bit signed char	定长	WGS84
日地距离比	EarthSun Distance Ratio	64-bit floating point	1	
平近地点角	MeanAnomaly	64-bit floating point	1	
平均运动	MeanMotion	64-bit floating point	1	
偏心率	Eccentricity	64-bit floating point	1	
近地点俯角	PerigeeArgument	64-bit floating point	1	
升交点赤经	AscendingNodeLongitude	64-bit floating point	1	
轨道倾角	OrbitalInclination	64-bit floating point	1	
历元时间	EpochTime	64-bit floating point	1	
轨道4个角点纬度	Orbit Point Latitude	32-bit floating point	4	NW,NE,SW,SE
轨道4个角点经度	Orbit Point Longitude	32-bit floating point	4	NW,NE,SW,SE
文件的附加说明(可以对文件的使用、创建人等说明)	AdditionalAnnotation	8-bit signed char	不定长	Yang Guanglin,010-68406934,yglyang@cma.gov.cn

2.3私有文件属性

表5．FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）私有文件属性定义

描述	属性名称	数据类型	数量	值
UTC 秒计时起始时间	Utc_Second_Start_Time	8-bit signed char	不定长	1980-01-06T00:00:00.00
时间分辨率	Time_Resolution	32-bit floating point	1	1
年积日	Data_Doy	32-bit signed Integer	1	
数据持续时间	Data_Duration	32-bit floating point	1	
GNSS 系统	Gnss_System	8-bit signed char	不定长	GPS/ BDS /GAL
GNSS 信号频率	Gnss_Frequency	32-bit floating point	1	Unit:Hz
GNSS 信号波长	Gnss_Wavelength	32-bit floating point	1	Unit:m
反射通道 ID	Reflection_Channel_ID	8-bit unsigned Integer	1	0-7
接收机工作模式	Receiver_Mode	8-bit unsigned Integer	1	0：work without blackbody, 1: work with blackbody
AGC 工作模式	Agc_Mode	8-bit unsigned Integer	1	0：Automatic Gain Control (AGM), 1:Programme gain mode (PGM)

是否因原始采样中断	Raw_Mode_Flag	8-bit unsigned Integer	1	0: No data is suspended by raw data sampling, 1: Part data is suspended by raw data sampling
中频采样率	Raw_Sampling	32-bit floating point	1	unit：MHz
DDM 计时点	Ddm_Time_Point	8-bit unsigned Integer	1	0:DDM begin time, 1:DDM middle time, 2:DDM end time, 3:PVT time
DDM 数据源	Ddm_Source	8-bit unsigned Integer	1	0:FY-3G GNOS in orbit data, 1:GREEPS simulation data, 2:GNSS simulator ground data, 3:other
DDM 时延分辨率	Delay_Res	32-bit floating point	1	unit:chips
DDM 多普勒分辨率	Doppler_Res	8-bit unsigned Integer	1	unit:Hz
DDM 时延类型	Delay_Type	8-bit unsigned Integer	1	0:non-uniform_DDM, 1:uniform_DDM
DDM 时延非均匀范围	Nonuniform_Delay_Range	32-bit floating point	1	unit:chips
时延采样点数	Delay_Pixels	8-bit unsigned Integer	1	122
多普勒频点数	Doppler_Pixels	8-bit unsigned Integer	1	20
DDM 跟踪时延采样点	Track_Delay_Pixel	8-bit unsigned Integer	1	62
DDM 跟踪多普勒采样点	Track_Doppler_Pixel	8-bit unsigned Integer	1	11
非相干积分次数	Incoherent_Times	32-bit unsigned Integer	1	1000
相干积分时间	Coherent_Time	8-bit unsigned Integer	1	unit:ms
镜面反射点最小纬度	Min_Sp_Lat	32-bit floating point	1	unit:degree
镜面反射点最大纬度	Max_Sp_Lat	32-bit floating point	1	unit:degree
镜面反射点最小经度	Min_Sp_Lon	32-bit floating point	1	unit:degree
镜面反射点最大经度	Max_Sp_Lon	32-bit floating point	1	unit:degree
接收机地面定标数据版本	Calibration_Version	8-bit unsigned char	不定长	v1.0
GNSS EIRP 数据版本	Eirp_Version	8-bit unsigned char	不定长	v1.0
估计海面温度的数据集版本	Sss_Version	8-bit unsigned char	不定长	v1.0
估计海面盐度的数据集版本	Sst_Version	8-bit unsigned char	不定长	v1.0
估计大气吸收的数据集版本	Atm_Attenu_Version	8-bit unsigned char	不定长	v1.0
有效散射面积查找表版本	Effective_Area_Version	8-bit unsigned char	不定长	v1.0
反射面类型匹配版本	Land_Type_Version	8-bit unsigned char	不定长	v1.0
GNSS 反射天线方向图数据版本	Nadir_Antenna_Pattern_Version	8-bit unsigned char	不定长	v1.0
PRN 与 SV 对应数据集版本	Prn_Sv_Version	8-bit unsigned char	不定长	v1.0
海冰覆盖数据集版本	Sea_Ice_Cover_Version	8-bit unsigned char	不定长	v1.0

文件数据质量判断标识	Bad_File_Flag	8-bit unsigned Integer	1	0:The amounts of effective ddm is not zero, 1: The amounts of effective DDM is zero

2.4科学数据集

表6．FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）科学数据集（SDS）定义

SDS1.　SDS 名称	数据类型	维数	数据量(字节)
Sample_num 数据采集序号	Int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"Sample number"
units	String	1	"none"
valid_range	int32	2	0,86400
Description	String	1	"DDM sample sequence number"
SDS2.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_track_id DDM Track ID 号	Int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM track id"
units	String	1	"none"
valid_range	int32	2	0, 345600
Description	String	1	A track is a temporally contiguous series of DDMs that have the same prn_code. Each track in the file is assigned a unique track_id starting with zero. track_id ranges from 0 to N.
SDS3.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_time_utc DDM 采集时间(UTC)	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM sample time UTC"
units	String	1	"s"

valid_range	float64	2	0.0, 1.9e9
Description	String	1	"The generation time of the DDM onboard."

SDS4.　SDS 名称	数据类型	维数	数据量(字节)
Ddm_gps_week DDM 采集时间 GPS 周	Int32	[nscans]	nscans*4

SDS 属性名	数据类型	数量	值
FillValue	int32	1	-2147483648
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM sample time - GPS week"
units	String	1	"week"
valid_range	int32	2	0, 3129
Description	String	1	"The GPS week of GPS time"

SDS5.　SDS 名称	数据类型	维数	数据量(字节)
Ddm_gps_second DDM 采集时间 GPS 秒	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM sample time - GPS second"
units	String	1	"s"
valid_range	float64	2	0, 604800
Description	String	1	"The GPS second of GPS time"

SDS6.　SDS 名称	数据类型	维数	数据量(字节)
Rx_clk_bias 接收机的钟差	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Receiver clock bias"
units	string	1	"m"
valid_range	float64	2	0.0, 100.0
Description	String	1	"The receiver clock bias (in seconds) multiplied by the speed of light as reported by the receiver, interpolated to ddm_time_utc, in meters."

SDS7.　SDS 名称	数据类型	维数	数据量(字节)
Rx_clk_bias_rate 接收机的钟漂	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"

long_name	String	1	"Receiver clock bias rate"
units	String	1	"m/s"
valid_range	float64	2	-100.0, 100.0
Description	String	1	"The receiver clock bias rate (in seconds/second) multiplied by the speed of light as reported by the DDMI, interpolated to ddm_time_utc, in m/s."
SDS8.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_pos_x 低轨卫星位置 X 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft position X at DDM sample time"
units	String	1	"m"
valid_range	float64	2	-7500000.0,7500000.0
Description	String	1	"The X component of the spacecraft WGS84 reference frame ECEF position, in meters, at ddm_time_utc. "
SDS9.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_pos_y 低轨卫星位置 Y 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft position Y at DDM sample time"
units	String	1	"m"
valid_range	float64	2	-7500000.0,7500000.0
Description	String	1	"The Y component of the spacecraft WGS84 reference frame ECEF position, in meters, at ddm_time_utc."
SDS10.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_pos_z 低轨卫星位置 Z 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft position Z at DDM sample time"
units	String	1	"m"

valid_range	float64	2	-7500000.0,7500000.0
Description	String	1	"The Z component of the spacecraft WGS84 reference frame ECEF position, in meters, at ddm_time_utc."
SDS11.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_vel_x 低轨卫星速度 X 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft velocity X at DDM sample time"
units	String	1	"m/s"
valid_range	float64	2	-8000.0,8000.0
Description	String	1	"The X component of the spacecraft WGS84 reference frame ECEF velocity, in m/s, at ddm_time_utc"
SDS12.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_vel_y 低轨卫星速度 Y 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft velocity Y at DDM sample time"
units	String	1	"m/s"
valid_range	float64	2	-8000.0,8000.0
Description	String	1	"The Y component of the spacecraft WGS84 reference frame ECEF velocity, in m/s, at ddm_time_utc"
SDS13.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_vel_z 低轨卫星速度 Z 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft velocity Z at DDM sample time"
units	String	1	"m/s"
valid_range	float64	2	-8000.0,8000.0
Description	String	1	"The Z component of the spacecraft WGS84 reference frame ECEF velocity, in m/s, at ddm_time_utc"
SDS14.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**

Rx_lat 低轨卫星的纬度	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Sub-satellite point latitude"
units	String	1	"degree"
valid_range	float64	2	-90.0, 90.0
Description	String	1	"Subsatellite point latitude, in degrees North, at ddm_time_utc"
SDS15. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_lon 低轨卫星的经度	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Sub-satellite point longitude"
units	String	1	"degree"
valid_range	float64	2	0.0, 360.0
Description	String	1	"Subsatellite point longitude, in degrees East, at ddm_time_utc"
SDS16. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_alt 低轨卫星的高度	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft altitude"
units	String	1	"m"
valid_range	float64	2	0.0, 1000000.0
Description	String	1	"Spacecraft altitude above WGS-84 ellipsoid, in meters, at ddm_time_utc"
SDS17. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_attitude_status 低轨卫星姿态状态	Int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft attitude status"
units	String	1	"none"
valid_range	int32	2	0,100000
Description	String	1	"The spacecraft tracker attitude

			status. 0 by default. "
SDS18.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_fly_direction 低轨卫星飞行方向	Int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft fly direction"
units	String	1	"none"
valid_range	int32	2	0, 10000
Description	String	1	"Spacecraft fly direction.0: With the head forward;4369: With the head backward;8738:Unknow fly direction"
SDS19.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_pitch 低轨卫星俯仰角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft attitude pitch angle at DDM sample time"
units	String	1	"degree"
valid_range	float64	2	-360.0,360.0
Description	String	1	"Spacecraft pitch angle relative to the orbit frame, in radians at ddm_time_utc"
SDS20.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_yaw 低轨卫星偏航角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft attitude yaw angle at DDM sample time"
units	String	1	"degree"
valid_range	float64	2	-360.0,360.0
Description	String	1	"Spacecraft yaw angle relative to the orbit frame, in radians　at ddm_time_utc"
SDS21.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Rx_roll 低轨卫星翻滚角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9

Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Spacecraft attitude roll angle at DDM sample time"
units	String	1	"degree"
valid_range	float64	2	-360.0,360.0
Description	String	1	"Spacecraft roll angle relative to the orbit frame, in radians at ddm_time_utc"
SDS22. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Gnss_prn_code GNSS 卫星 PRN 码	int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS PRN code"
units	String	1	"none"
valid_range	int32	2	1, 1000
Description	String	1	"The PRN code of the GNSS signal associated with the DDM."
SDS23. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Gnss_svn_num GNSS 卫星 SV 码	int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS space vehicle number"
units	String	1	"none"
valid_range	int32	2	1, 1000
Description	String	1	"The GNSS unique space vehicle number that transmitted prn_code."
SDS24. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Gnss_block_flag GNSS 卫星批次代码	int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS block code"
units	String	1	"none"
valid_range	int32	2	1,1000
Description	String	1	"GNSS_block_flag is used to indicate the block or type for a certain GNSS satellite. For GPS satellite:

			22 = II-R 23 = IIR-M 24 = II-F 31 = III-A. For BDS satellite: the First number indicates the type of system: 1 = BD-3S 2 = BD-2 3 = BD-3 The second number indicates the type of orbit: 1 = GEO 2 = IGSO 3 = MEO. For GAL satellite: 10 = IOV (In-Orbit Validation) 20 = FOC (Full Operational Capability)"
SDS25. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Tx_pos_x GNSS 信号发射时刻的卫星位置 X 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS Tx position X"
units	String	1	"m"
valid_range	float64	2	-40000000.0,40000000.0
Description	String	1	"The X component of the GNSS spacecraft WGS84 reference frame ECEF position, in meters, at sending time."
SDS26. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Tx_pos_y GNSS 信号发射时刻的卫星位置 Y 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS Tx position Y"
units	String	1	"m"
valid_range	float64	2	-40000000.0,40000000.0
Description	String	1	"The Y component of the GNSS spacecraft WGS84 reference frame ECEF position, in meters, at sending time."
SDS27. SDS 名称	**数据类型**	**维数**	**数据量(字节)**

Tx_pos_z GNSS 信号发射时刻的卫星位置 Z 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS Tx position Z"
units	String	1	"m"
valid_range	float64	2	-40000000.0,40000000.0
Description	String	1	"The Z component of the GNSS spacecraft WGS84 reference frame ECEF position, in meters, at sending time."
SDS28.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Tx_vel_x GNSS 信号发射时刻的卫星速度 X 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS Tx velocity X"
units	String	1	"m/s"
valid_range	float64	2	-5000.0,5000.0
Description	String	1	"The X component of the GNSS spacecraft WGS84 reference frame ECEF velocity in meters, at sending time."
SDS29.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Tx_vel_y GNSS 信号发射时刻的卫星速度 Y 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS Tx velocity Y"
units	String	1	"m/s"
valid_range	float64	2	-5000.0,5000.0
Description	String	1	"The Y component of the GNSS spacecraft WGS84 reference frame ECEF velocity in meters, at sending time."
SDS30.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Tx_vel_z GNSS 信号发射时刻的卫星速度 Z 分量	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"GNSS Tx velocity Z"
units	String	1	"m/s"
valid_range	float64	2	-5000.0,5000.0
Description	String	1	"The Z component of the GNSS spacecraft WGS84 reference frame ECEF velocity in meters, at sending time."

SDS31. SDS 名称	数据类型	维数	数据量(字节)
Sp_lat 镜面反射点的纬度	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point latitude"
units	String	1	"degree"
valid_range	float64	2	-90.0,90.0
Description	String	1	"Specular point latitude, in degrees North corresponding to ddm_time_utc."

SDS32. SDS 名称	数据类型	维数	数据量(字节)
Sp_lon 镜面反射点的经度	Float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	"none"
Slope	float64	1	"none"
band_name	String	1	"none"
long_name	String	1	"Specular point longitude"
units	String	1	"degree"
valid_range	float64	2	0.0,360.0
Description	String	1	"Specular point longitude, in degrees North corresponding to ddm_time_utc."

SDS33. SDS 名称	数据类型	维数	数据量(字节)
Sp_alt 镜面反射点的高度	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point altitude"
units	String	1	"m"
valid_range	float64	2	-9000.0,9000.0

Description	String	1	"Altitude of the specular point relative to the WGS 84 datum in meters corresponding to ddm_time_utc, as calculated on the ground. Note that an approximated DTU10 mean sea surface height model is used to calculate the specular point altitude."
SDS34. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_pos_x 镜面反射点位置的 X 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	"none"
Slope	float64	1	"none"
band_name	String	1	"none"
long_name	String	1	"Specular point position X"
units	String	1	"m"
valid_range	float64	2	-7000000.0,7000000.0
Description	String	1	"The X component of the specular point position in the ECEF coordinate system, in meters corresponding to ddm_time_utc, as calculated on the ground."
SDS35. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_pos_y 镜面反射点位置的 Y 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point position Y"
units	String	1	"m"
valid_range	float64	2	-7000000.0,7000000.0
Description	String	1	"The Y component of the specular point position in the ECEF coordinate system, in meters corresponding to ddm_time_utc, as calculated on the ground."
SDS36. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_pos_z 镜面反射点位置的 Z 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point position Z"
units	String	1	"m"
valid_range	float64	2	-7000000.0,7000000.0
Description	String	1	"The Z component of the specular

			point position in the ECEF coordinate system, in meters corresponding to ddm_time_utc, as calculated on the ground."
SDS37.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_vel_x 镜面反射点速度的 X 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	"none"
Slope	float64	1	"none"
band_name	String	1	"none"
long_name	String	1	"Specular point velocity X"
units	String	1	"m/s"
valid_range	float64	2	-8000.0,8000.0
Description	String	1	"The X component of the specular point velocity in the ECEF coordinate system, in m/s corresponding to ddm_time_utc, as calculated on the ground."
SDS38.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_vel_y 镜面反射点速度的 Y 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point velocity Y"
units	String	1	"m/s"
valid_range	float64	2	-8000.0,8000.0
Description	String	1	"The Y component of the specular point velocity in the ECEF coordinate system, in m/s corresponding to ddm_time_utc, as calculated on the ground."
SDS39.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_vel_z 镜面反射点速度的 Z 分量	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point velocity Z"
units	String	1	"m/s"
valid_range	float64	2	-8000.0,8000.0
Description	String	1	"The Z component of the specular point velocity in the ECEF coordinate system, in m/s corresponding to ddm_time_utc, as calculated on the ground."

SDS40.　　SDS 名称	数据类型	维数	数据量(字节)
Sp_inc_angle 镜面反射点处 GNSS 信号入射角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point incidence angle"
units	String	1	"degree"
valid_range	float64	2	0.0,90.0
Description	String	1	"The specular point incidence angle, in degrees corresponding to ddm_time_utc. This is the angle between the line normal to the Earth's surface at the specular point and the line extending from the specular point to the spacecraft."
SDS41.　　SDS 名称	数据类型	维数	数据量(字节)
Sp_theta_orbit 镜面反射点轨道坐标系高度角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point orbit frame theta angle"
units	String	1	"degree"
valid_range	float64	2	0.0,90.0
Description	String	1	"The angle between the orbit frame +Z axis and the line extending from the spacecraft to the specular point, in degrees."
SDS42.　　SDS 名称	数据类型	维数	数据量(字节)
Sp_az_orbit 镜面反射点轨道坐标系方位角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point orbit frame azimuth angle"
units	String	1	"degree"
valid_range	float64	2	0.0, 360.0
Description	String	1	"Let line A be the line that extends from the spacecraft to the specular point. Let line B be the projection of line A onto the orbit frame XY

			plane. sp_az_orbit is the angle between the orbit frame +X axis (the velocity vector) and line B, in degrees."
SDS 43.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_theta_body 镜面反射点卫星坐标系中高度角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point body frame theta angle"
units	string	1	"degree"
valid_range	float64	2	0.0,90.0
Description	String	1	"The angle between the spacecraft body frame +Z axis and the line extending from the spacecraft to the specular point, in degrees."
SDS44.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_az_body 镜面反射点卫星坐标系方位角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point body frame azimuth angle"
units	String	1	"degree"
valid_range	float64	2	0.0,360.0
Description	String	1	"Let line A be the line that extends from the spacecraft to the specular point. Let line B be the projection of line A onto the spacecraft body frame XY plane. sp_az_body is the angle between the spacecraft body frame +X axis and line B, in degrees."
SDS45.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_theta_antenna 镜面反射点在天线坐标系中的高度角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point antenna frame theta

			angle"
units	String	1	"degree"
valid_range	float64	2	0.0,90.0
Description	String	1	"The angle between the spacecraft antenna frame +Z axis and the line extending from the spacecraft to the specular point, in degrees."
SDS46.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_az_antenna 镜面反射点在天线坐标系中的方位角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point antenna frame azimuth angle"
units	String	1	"degree"
valid_range	float64	2	0.0,360.0
Description	String	1	"Let line A be the line that extends from the spacecraft to the specular point. Let line B be the projection of line A onto the spacecraft antenna frame XY plane. sp_az_antenna is the angle between the spacecraft antenna frame +X axis and line B, in degrees."
SDS47.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_theta_pattern 镜面反射点在方向图坐标系中的高度角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point antenna pattern frame theta angle"
units	String	1	"degree"
valid_range	float64	2	0.0,90.0
Description	String	1	"The angle between the spacecraft antenna pattern frame +Z axis and the line extending from the spacecraft to the specular point, in degrees."
SDS48.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_az_pattern 镜面反射点在方向图坐标系中的方位角	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**

FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point antenna pattern frame azimuth angle"
units	String	1	"degree"
valid_range	float64	2	0.0,360.0
Description	String	1	"Let line A be the line that extends from the spacecraft to the specular point. Let line B be the projection of line A onto the spacecraft antenna pattern frame XY plane. sp_az_pattern is the angle between the spacecraft antenna pattern frame +X axis and line B, in degrees."

SDS49.　SDS 名称	数据类型	维数	数据量(字节)
Sp_antenna_gain 镜面反射点接收机天线增益	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point Rx antenna gain"
units	String	1	"dB"
valid_range	float64	2	-200.0,20.0
Description	String	1	"The receive antenna gain in the direction of the specular point, in dBi."

SDS50.　SDS 名称	数据类型	维数	数据量(字节)
Sp_surface_type 镜面反射点处地物类型	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point surface type"
units	String	1	"none"
valid_range	float64	2	0.0,2.0
Description	String	1	"Specular point surface type: 0 = Open ocean; 0.5 = Coastal ocean within 25 km from land; 1 = land; 2 = Sea ice; "

SDS51.　SDS 名称	数据类型	维数	数据量(字节)
Sp_fresnel_coeff_square 镜面反射点处菲涅尔反射系数模的平方	float64	[nscans]	nscans*8

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SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	"none"
Slope	float64	1	"none"
band_name	String	1	"none"
long_name	String	1	"Square of Fresnel power reflection coefficient at specular point"
units	String	1	"none"
valid_range	float64	2	0.0,1.0
Description	String	1	"The square of the left hand circularly polarized Fresnel electromagnetic voltage reflection coefficient for a smooth ocean surface at the specular point location and incidence angle."

SDS52.　　SDS 名称	数据类型	维数	数据量(字节)
Sp_dist_to_coastline 镜面反射点到海岸线的距离	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Distance from specular point to coastline"
units	String	1	"km"
valid_range	float64	2	-10000.0,10000.0
Description	String	1	"Distance of specular point to coastline from a 3-km high resolution map."

SDS53.　　SDS 名称	数据类型	维数	数据量(字节)
Sp_land_sea_mask 镜面反射点海陆掩码	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point land-sea mask "
units	String	1	"none"
valid_range	float64	2	0.0,1.0
Description	String	1	"Coarse specular point land-sea mask from a 0.25 degree map. 0 for ocean or waterbody, 1 for land, 0-1 for mixing of land and sea."

SDS54.　　SDS 名称	数据类型	维数	数据量(字节)
Sp_tcg 镜面反射点处的全修正增益	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0

Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Total corrected gain at specular point"
units	String	1	"none"
valid_range	float64	2	0.0,1.0
Description	String	1	"Sp_tcg is equal to the effective scattering area times brcs_factor and power_factor and divided by the noise floor at the specular point
SDS55. SDS 名称	数据类型	维数	数据量(字节)
Direct_antenna_id 直射天线标识	Int32	[nscans]	nscans*4
SDS 属性名	数据类型	数量	值
FillValue	int32	1	-2147483648
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Direct antenna id"
units	String	1	"none"
valid_range	int32	2	0, 5
Description	String	1	"The flag of the direct signal antenna. 0:foward antenna,5:backward antenna."
SDS56. SDS 名称	数据类型	维数	数据量(字节)
Direct_signal_noise 直射信号噪底	float64	[nscans]	nscans*8
SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Direct signal noise"
units	String	1	"none"
valid_range	float64	2	10000.0,10000000.0
Description	String	1	"The noise floor of direct signal channel with coherent time 1ms."
SDS57. SDS 名称	数据类型	维数	数据量(字节)
Direct_signal_snr 直射信号的信噪比	float64	[nscans]	nscans*8
SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Direct signal to noise ratio"
units	String	1	"dB"
valid_range	float64	2	-100.0,100.0
Description	String	1	"10lg(zenith signal power/zenith signal noise) at ddm_time_utc."
SDS58. SDS 名称	数据类型	维数	数据量(字节)

Rx_channel_status 反射通道占用状态	Int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"Rx channel status"
units	String	1	"none"
valid_range	int32	2	0, 2
Description	String	1	"The current work status of the reflection channel.0:empty;1:setting;2:tracking the reflection signal"
SDS59. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_range_refer DDM 伪距参考值	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM range reference"
units	String	1	"m"
valid_range	float64	2	0.0,50000000.0
Description	String	1	"The initial range (at row 0) of the DDM."
SDS60. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_doppler_refer DDM 多普勒参考值	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM doppler reference"
units	String	1	"Hz"
valid_range	float64	2	-500000.0,500000.0
Description	String	1	"The central doppler (at column 10) of the DDM"
SDS61. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_raw_data DDM 波形数据	float64	[122*20*nscans]	122*20*nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-99999999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM bin raw counts"
units	String	1	"none"
valid_range	float64	2	0.0,4000000000.0

Description	String	1	"122x20 array of DDM bin raw counts. These are the uncalibrated power values produced by the receiver."
SDS62.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_noise_source DDM 噪底数据源	Int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM noise sourse"
units	String	1	"none"
valid_range	int32	2	0, 5
Description	String	1	"DDM noise floor source to calculate the mean noise. Source 1: the average of noise_odd and noise_even calculated by the receiver. Source 2: average of counts at delays before -2 chips. Bit 0: the average of source 1 and source 2. Bit 1: source 1 because the relative difference between source 1 and source 2 is too large. Bit 2: source 1 because the number of counts in source 2 is less than 600. Bit 3: source 1 because the number of rows in source 2 is less than 1."
SDS63.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_noise_raw DDM 噪底原始采样值	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM noise raw"
units	String	1	"none"
valid_range	float64	2	0.0,4000000000.0
Description	String	1	"The mean noise floor of the raw DDM."
SDS64.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_noise_m DDM 噪底 M 值	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0

band_name	String	1	"none"
long_name	String	1	"DDM noise m"
units	String	1	"none"
valid_range	float64	2	0.0,2000.0
Description	String	1	"The ratio of the square of the mean of the noise floor and the variance of the noise floor."
SDS65. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_peak_raw DDM 峰值原始采样值	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM peak raw"
units	String	1	"none"
valid_range	float64	2	0.0,4000000000.0
Description	String	1	"Peak value in DDM raw counts."
SDS66. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_raw DDM 镜面反射点原始采样值	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM specular point raw"
units	String	1	"none"
valid_range	float64	2	0.0,4000000000.0
Description	String	1	"Value of the specular point in the DDM raw counts."
SDS67. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_peak_snr DDM 峰值信噪比	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM peak SNR"
units	String	1	"dB"
valid_range	float64	2	-200.0,50.0
Description	String	1	"10lg(S_max/N_avg-1), where Smax is the maximum value (in raw counts) in a single DDM bin and Navg is the the average per-bin raw noise counts, at ddm_timestamp_utc."
SDS68. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_snr	float64	[nscans]	nscans*8

DDM 镜面反射点信噪比

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM specular point SNR"
units	String	1	"dB"
valid_range	float64	2	-200.0,50.0
Description	String	1	"10lg(S_sp/N_avg-1), where S_sp is the value of specular point (in raw counts) in a single DDM bin and Navg is the the average per-bin raw noise counts, at ddm_timestamp_utc."

SDS69. SDS 名称	数据类型	维数	数据量(字节)
Ddm_effective_area DDM 有效散射面积	float64	[9*20*nscans]	9*20*nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM effective scattering area"
units	String	1	"dBm^2"
valid_range	float64	2	0.0,100.0
Description	String	1	"The effective scattering area of the 9x20 region of the DDM used to calculate DDM_NBRCS."

SDS70. SDS 名称	数据类型	维数	数据量(字节)
Ddm_sp_nbrcs 镜面反射点归一化双基雷达散射截面	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM specular point NBRCS"
units	String	1	"dB"
valid_range	float64	2	-200.0, 200.0
Description	String	1	"Normalized BRCS of a 3 delay x 5 Doppler bin box centered at the specular point bin."

SDS71. SDS 名称	数据类型	维数	数据量(字节)
Ddm_sp_les DDM 波形前沿斜率	float64	[nscans]	nscans*8

SDS 属性名	数据类型	数量	值
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0

band_name	String	1	"none"
long_name	String	1	"DDM specular point LES"
units	String	1	"dB"
valid_range	float64	2	-200.0,200.0
Description	String	1	"Leading edge slope of a 3 delay x 5 Doppler bin box centered at the specular point bin."
SDS72.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_dles DDM 波形前沿二阶导数	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM specular point DLES"
units	String	1	"dB"
valid_range	float64	2	-200.0,200.0
Description	String	1	"The slope of the second derivative of the DDM's leading edge slope."
SDS 73.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_quality_flag DDM 质量标识符	int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float64	1	"none"
Slope	float64	1	"none"
band_name	String	1	"none"
long_name	String	1	"DDM quality flag"
units	String	1	"none"
valid_range	int32	2	0, 2147483647
Description	String	1	The L1 DDM quality flag of processing: Bit 0: Set to 1 if overall quality is poor. Bit 1: Set to 1 if any absolute value of the spacecraft roll/pitch/yaw is greater than the threshold. Bit 2: Set to 1 if the absolute value of LNA temperature's change rate is greater than the threshold. Bit 3: Set to 1 if the difference between this DDM noise floor and the previous DDM noise floor is greater than the threshold. Bit 4: Set to 1 if the AGC status between this DDM and the previous DDM is different. Bit 5: Set to 1 if the difference of the DDM noise floor calculated by two different methods is greater than the threshold.

			Bit 6: Not used. Bit 7: Not used. Bit 8: Set to 1 if direct_signal_exists in the DDM: The absolute value of the difference between the direct signal code phase and the DDM signal code phase is less than 12.5 chips. Bit 9: Set to 1 if RFI is detected. Bit 10: Set to 1 if the estimated specular point delay has a high uncertainty. Bit 11: Set to 1 if the estimated specular point Doppler has a high uncertainty. Bit 12: Set to 1 if the spacecraft's altitude is out of nominal altitude range. Bit 13: Set to 1 if DDM power calibration conditions' temperature is out of normal range. Bit 14: Set to 1 if DDM power calibration conditions' AGC value is out of normal range. Bit 15: Set to 1 if the EIRP information of the GNSS satellite is unknown. Bit 16: Set to 1 if negative value exists in the BRCS matrix used to calculate NBRCS. Bit 17: Not used. Bit 18: Set to 1 if the effective area is invalid. Bit 19: Set to 1 if the change of spacecraft roll/pitch/yaw is greater than the threshold.
SDS74.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_row DDM 镜面反射点的行位置	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM specular point row"
units	String	1	"none"
valid_range	float64	2	0.0,121.0
Description	String	1	"The zero-based delay row of the specular point delay in the DDM based on the specular point calculated on the ground."
SDS75.　　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_column	float64	[nscans]	nscans*8

DDM 镜面反射点的列位置			
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM specular point column"
units	String	1	"none"
valid_range	float64	2	0.0,19.0
Description	String	1	"The zero-based Doppler column of the specular point doppler in the DDM based on the specular point calculated on the ground."
SDS76.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_delay DDM 镜面反射点的时延	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	"none"
Slope	float64	1	"none"
band_name	String	1	"none"
long_name	String	1	"DDM specular point delay"
units	String	1	"chips"
valid_range	float64	2	-15.25,15
Description	String	1	"Specular point delay in the DDM."
SDS77.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_doppler DDM 镜面反射点的多普勒	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM specular point doppler"
units	String	1	"Hz"
valid_range	float64	2	-5000,4500
Description	String	1	"Specular point Doppler in the DDM."
SDS78.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_peak_row DDM 峰值点的行位置	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	"none"
Slope	float64	1	"none"
band_name	String	1	"none"
long_name	String	1	"DDM peak bin row"
units	String	1	"none"
valid_range	float64	2	0.0,121.0
Description	String	1	"The zero-based delay row of the peak value in the DDM."

SDS79. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_peak_column DDM 峰值点的列位置	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM peak bin column"
units	String	1	"none"
valid_range	float64	2	0.0,19.0
Description	String	1	"The zero-based Doppler column of the peak value in the DDM."
SDS80. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_peak_delay DDM 峰值点的时延	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM peak bin delay"
units	String	1	"chips"
valid_range	float64	2	-15.25,15.0
Description	String	1	"Delay of the DDM peak bin, in corresponding GNSS system chip."
SDS81. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_peak_doppler DDM 峰值点的多普勒	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM peak bin doppler"
units	String	1	"Hz"
valid_range	float64	2	-5000,4500
Description	String	1	"Doppler of the DDM peak bin."
SDS82. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Sp_delay_doppler_flag DDM 波形镜反点判断可靠性的标识符	int32	[nscans]	nscans*4
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	int32	1	-2147483648
Intercept	float32	1	0.0
Slope	float32	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point delay doppler flag"
units	String	1	"none"
valid_range	int32	2	0,100
Description	String	1	"The method and quality flag to

			find specular position in DDM: 0: Interpolation and derivative method are used. The delay, doppler values corresponding to the specular point are not out of the normal range. 1: Interpolation and SSH modified method are used because the derivative method has a high uncertainty. 2: The specular point is over non-sea surface. After interpolation, the specular position is set to be the peak position. 3: Only SSH modified method is used because the SNR is low. 4: The specular point is over non-sea surface and the SNR is low. The specular position is set to be the peak position without interpolation."
SDS83. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_power_factor DDM 功率计算系数	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Factor used to compute DDM power"
units	String	1	"dBW^{-1}"
valid_range	float64	2	150.0,300.0
Description	String	1	"Factor used to compute DDM power (dBW) from DDM counts (counts/power)."
SDS84. SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_brcs_factor DDM 双基雷达散射截面计算系数	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Factor used to compute DDM BRCS (power/BRCS)"
units	String	1	"dBW/dBm^2"
valid_range	float64	2	-350.0,-200.0
Description	String	1	"Factor used to compute DDM BRCS (dBm^2) from DDM power (dBW)."

SDS85.　SDS 名称	数据类型	维数	数据量(字节)
Ddm_sp_normalized_snr 归一化镜像点信噪比	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Normalized SNR at specular point"
units	String	1	"dBW^{-1}"
valid_range	float64	2	0.0,300.0
Description	String	1	"SNR at specular point normalized by bistatic radar equation."
SDS86.　SDS 名称	数据类型	维数	数据量(字节)
Ddm_peak_power_ratio DDM 峰值占比	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM peak power ratio"
units	String	1	"none"
valid_range	float64	2	0.0,1.0
Description	String	1	"Sum of centered 5x3 DDM power bin values around the specular point divided by the sum of the all DDM power bin values."
SDS87.　SDS 名称	数据类型	维数	数据量(字节)
Ddm_skewness DDM 偏度	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM skewness"
units	String	1	"none"
valid_range	float64	2	0.0,50.0
Description	String	1	"Skewness of raw counts in the whole DDM."
SDS88.　SDS 名称	数据类型	维数	数据量(字节)
Ddm_kurtosis DDM 峰度	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"DDM kurtosis"

units	String	1	"none"
valid_range	float64	2	0.0,1000.0
Description	String	1	"Kurtosis of raw counts in the whole DDM."
SDS89.　SDS 名称	**数据类型**	**维数**	**数据量(字节)**
Ddm_sp_reflectivity 反射率	float64	[nscans]	nscans*8
SDS 属性名	**数据类型**	**数量**	**值**
FillValue	float64	1	-9999.9
Intercept	float64	1	0.0
Slope	float64	1	1.0
band_name	String	1	"none"
long_name	String	1	"Specular point reflectivity"
units	String	1	"none"
valid_range	float64	2	0.0,1.0
Description	String	1	"Signal reflectivity at the specular point assuming coherent scattering."

2.5 数据填充值

表7．FY-3G 全球导航卫星掩星探测仪-II 型 L1 数据（GNSS 反射）填充值说明

序号	数据类型	填充值	说明
1.	Int32	-2147483648	
2.	Float64	-9999.9 或-9999999.9 或-99999999.9	如有覆盖正常值，可做适当调整