



EO Formatting System

Instrument Data Product Format

SeaWiFS LAC 1B

Doc.Ref.: ESA-SWFS-L1B-1.2

Date : 9 June 1998

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Document No.: ESA-SWFS-L1B

Issue No.: 1.2

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Distribution:

Summary:

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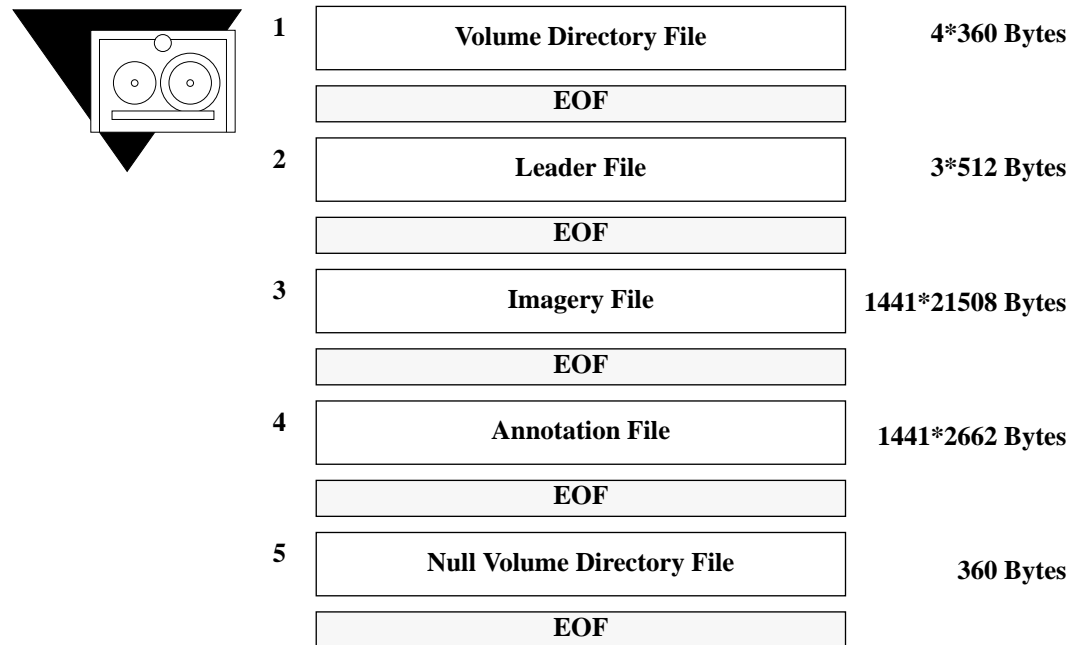
Change Log:

Changes in Version 1.1 from 1.0

1) Adding of the “Scaling_Factor” structure in the Leader File inside the Satellite Information structure, updating the Data Dictionary.

1.0 CEOS SeaWiFS Level 1B LAC Distribution Data Product Format

1.1 Product Organization on Sequential Media (Exabyte)



Each SeaWiFS LAC 1B data product consists of 5 data files:

- One Volume Directory File, which provides all product identification, documentation and processing information.
- One Leader File, which provides scene related information.
- One Imagery File, which contains sensor calibrated values for all 8 bands. The calibration has been performed on raw data counts and presents the top of the atmosphere radiances, the calibrated values are scaled in order to fit inside the unsigned 2 bytes integers.
- One Annotation File, which provides navigation information and coastlines/boundaries/grid.
- One Null Volume Directory File, which is necessary on tape media to indicate the end of the data product.

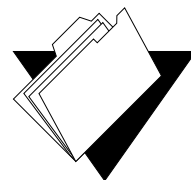
1.2 Files

Volume Directory File



| | | |
|---|--------------------------------|-----------|
| 1 | Volume Descriptor Record | 360 Bytes |
| 2 | Leader File Pointer Record | 360 Bytes |
| 3 | Imagery File Pointer Record | 360 Bytes |
| 4 | Annotation File Pointer Record | 360 Bytes |

Annotation File



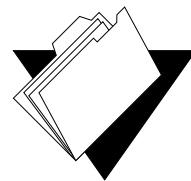
| | | |
|-----|--------------------------|------------|
| 1 | File Descriptor Record | 2662 Bytes |
| 2 | Annotation Data Record 1 | 2662 Bytes |
| N+1 | Annotation Data Record N | 2662 Bytes |

Leader File



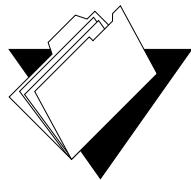
| | | |
|---|------------------------------|-----------|
| 1 | File Descriptor Record | 512 Bytes |
| 2 | Scene Header Record | 512 Bytes |
| 3 | Satellite Information Record | 512 Bytes |

Null Volume Directory File



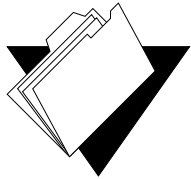
| | | |
|---|-------------------------------|-----------|
| 1 | Null Volume Descriptor Record | 360 Bytes |
|---|-------------------------------|-----------|

Imagery File



| | | |
|-----|------------------------|-------------|
| 1 | File Descriptor Record | 21508 Bytes |
| 2 | Image Data Record 1 | 21508 Bytes |
| N+1 | Image Data Record N | 21508 Bytes |

2.0 Volume Directory File



| | | |
|---|--------------------------------|-----------|
| 1 | Volume Descriptor Record | 360 Bytes |
| 2 | Leader File Pointer Record | 360 Bytes |
| 3 | Imagery File Pointer Record | 360 Bytes |
| 4 | Annotation File Pointer Record | 360 Bytes |

2.1 Volume Descriptor Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|----------------------------|--|--------------|-------------|----------------|--------|--------------|-------|
| 1 | CEOS_VDR_ID | CEOS Volume Descriptor Record Identification | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | Document_Name | Identification of the product description document | 17 | 28 | 12 | ASCII | 12 | 1 |
| 4 | Document_Version* | Version of product description document | 29 | 32 | 4 | ASCII | 4 | 1 |
| 5 | Software_ID | Software Release Number | 33 | 44 | 12 | ASCII | 12 | 1 |
| 6 | Media_ID | Source Product Identifier | 45 | 60 | 16 | ASCII | 16 | 1 |
| 7 | Product_ID | Product Identifier | 61 | 76 | 16 | ASCII | 16 | 1 |
| 8 | Product_Type | Product Type Identifier | 77 | 92 | 16 | ASCII | 16 | 1 |
| 9 | BLANKS | CEOS reserved (20 Blanks) | 93 | 112 | 20 | ASCII | 20 | 1 |
| 10 | Processing_Time | Time of Product generation | 113 | 120 | 16 | ASCII | 16 | 1 |
| 11 | Processing_Country | Product Generating Country | 129 | 140 | 12 | ASCII | 12 | 1 |
| 12 | Processing_Facilty | Product Processing Facility | 141 | 148 | 8 | ASCII | 8 | 1 |
| 13 | Acquisition_Facilty | Product Acquisition Facility | 149 | 160 | 12 | ASCII | 12 | 1 |
| 14 | Product_Files | Number of Files belonging to the product | 161 | 164 | 4 | ASCII | 4 | 1 |
| 15 | VDF_Records | Number of Records in Volume Directory File | 165 | 168 | 4 | ASCII | 4 | 1 |

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|---------------|-------------------|--------------|-------------|----------------|-------|--------------|-------|
| 16 | BLANKS | Blanks | 169 | 360 | 192 | ASCII | 1 | 1 |

2.2 Leader Pointer Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|-------------------------|--|--------------|-------------|----------------|--------|--------------|-------|
| 1 | CEOS_FPR_ID | CEOS File Pointer Record Identification Parameters | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | File_No_1 | File Sequence Number in Product | 17 | 20 | 4 | ASCII | 4 | 1 |
| 4 | File_Name_1 | File Name | 21 | 36 | 16 | ASCII | 16 | 1 |
| 5 | BLANKS | Blanks | 37 | 100 | 64 | ASCII | 1 | 64 |
| 6 | Records_1 | Number of Records in File | 101 | 108 | 8 | ASCII | 8 | 1 |
| 7 | FDR_Length_1 | File Descriptor Record Length | 109 | 116 | 8 | ASCII | 8 | 1 |
| 8 | Max_Rec_Length_1 | Maximum Record Length | 117 | 124 | 8 | ASCII | 8 | 1 |
| 9 | BLANKS | Blanks | 125 | 360 | 236 | ASCII | 1 | 236 |

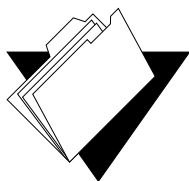
2.3 Imagery File Pointer Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|-------------------------|--|--------------|-------------|----------------|--------|--------------|-------|
| 1 | CEOS_FPR_ID | CEOS File Pointer Record Identification Parameters | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | File_No_2 | File Sequence Number in Product | 17 | 20 | 4 | ASCII | 4 | 1 |
| 4 | File_Name_2 | File Name | 21 | 36 | 16 | ASCII | 16 | 1 |
| 5 | BLANKS | Blanks | 37 | 100 | 64 | ASCII | 1 | 64 |
| 6 | Records_2 | Number of Records in File | 101 | 108 | 8 | ASCII | 8 | 1 |
| 7 | FDR_Length_2 | File Descriptor Record Length | 109 | 116 | 8 | ASCII | 8 | 1 |
| 8 | Max_Rec_Length_2 | Maximum Record Length | 117 | 124 | 8 | ASCII | 8 | 1 |
| 9 | BLANKS | Blanks | 125 | 360 | 236 | ASCII | 1 | 236 |

2.4 Annotation File Pointer Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|-------------------------|--|--------------|-------------|----------------|--------|--------------|-------|
| 1 | CEOS_FPR_ID | CEOS File Pointer Record Identification Parameters | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | File_No_3 | File Sequence Number in Product | 17 | 20 | 4 | ASCII | 4 | 1 |
| 4 | File_Name_3 | File Name | 21 | 36 | 16 | ASCII | 16 | 1 |
| 5 | BLANKS | Blanks | 37 | 100 | 64 | ASCII | 1 | 64 |
| 6 | Records_3 | Number of Records in File | 101 | 108 | 8 | ASCII | 8 | 1 |
| 7 | FDR_Length_3 | File Descriptor Record Length | 109 | 116 | 8 | ASCII | 8 | 1 |
| 8 | Max_Rec_Length_3 | Maximum Record Length | 117 | 124 | 8 | ASCII | 8 | 1 |
| 9 | BLANKS | Blanks | 125 | 360 | 236 | ASCII | 1 | 236 |

3.0 Leader File



| | | |
|---|-------------------------------------|-----------|
| 1 | File Descriptor Record | 512 Bytes |
| 2 | Scene Header Record | 512 Bytes |
| 3 | Satellite Information Record | 512 Bytes |

3.1 File Descriptor Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|-------------------------|--|--------------|-------------|----------------|--------|--------------|-------|
| 1 | CEOS_FDR_ID | CEOS File Descriptor Record Identification | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | Document_Name | Identification of the product description document | 17 | 28 | 12 | ASCII | 12 | 1 |
| 4 | Document_Version | Version of product description document | 29 | 32 | 4 | ASCII | 4 | 1 |
| 5 | Software_ID | Software Release Number | 33 | 44 | 12 | ASCII | 12 | 1 |
| 6 | File_No_1 | File Number | 45 | 48 | 4 | ASCII | 4 | 1 |
| 7 | File_Name_1 | File Name | 49 | 64 | 16 | ASCII | 16 | 1 |
| 8 | BLANKS | CEOS reserved, filled with blanks (48 Blanks) | 65 | 112 | 48 | ASCII | 1 | 48 |
| 9 | CEOS_Flags | CEOS reserved Flags | 113 | 116 | 4 | ASCII | 4 | 1 |
| 10 | BLANKS | Blanks for padding to equal record length | 117 | 512 | 396 | ASCII | 1 | 396 |

3.2 Scene Header Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|---------------------------|---|--------------|-------------|----------------|-----------------|--------------|-------|
| 1 | Centre_Coordinates | Scene centre coordinates | 1 | 32 | 32 | Structure 3.2.1 | 32 | 1 |
| 2 | Centre_Sun_Elev | Sun elevation angle at centre | 33 | 48 | 16 | ASCII (F16.8) | 16 | 1 |
| 3 | Centre_Line_No | Line number at scene centre | 49 | 56 | 8 | ASCII | 8 | 1 |
| 4 | Centre_Pixel_No | Pixel number at scene centre (Max. 1285 Pixels) | 57 | 64 | 8 | ASCII | 8 | 1 |
| 5 | Centre_Time | Scene centre date and time | 65 | 96 | 32 | ASCII | 32 | 1 |
| 6 | Scene_Start_Time | Data start date and time | 97 | 128 | 32 | ASCII | 32 | 1 |
| 7 | Scene_Stop_Time | Data stop date and time | 129 | 160 | 32 | ASCII | 32 | 1 |
| 8 | Scene_Coordinates | The 8 Scene Corner Coordinates | 161 | 288 | 128 | Structure 3.2.2 | 128 | 1 |
| 9 | Actual_Scene_Lines | Number of actual scene lines in the processed image | 289 | 296 | 8 | ASCII | 8 | 1 |
| 10 | BLANKS | Blanks for padding to equal record length | 297 | 512 | 216 | ASCII | 1 | 216 |

3.2.1 Centre_Coordinates Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|-------------------|------------------------|--------------|-------------|----------------|---------------|--------------|-------|
| 1 | Centre_Lat | Scene centre latitude | 1 | 16 | 16 | ASCII (F16.8) | 16 | 1 |
| 2 | Centre_Lon | Scene centre longitude | 17 | 32 | 16 | ASCII (F16.8) | 16 | 1 |

3.2.2 Scene_Coordinates Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|------------------------|------------------------------|--------------|-------------|----------------|---------------|--------------|-------|
| 1 | Upper_Left_Lat | Upper left corner latitude | 161 | 176 | 16 | ASCII (F16.8) | 16 | 1 |
| 2 | Upper_Left_Lon | Upper left corner longitude | 177 | 192 | 16 | ASCII (F16.8) | 16 | 1 |
| 3 | Upper_Right_Lat | Upper right corner latitude | 193 | 208 | 16 | ASCII (F16.8) | 16 | 1 |
| 4 | Upper_Right_Lon | Upper right corner longitude | 209 | 224 | 16 | ASCII (F16.8) | 16 | 1 |
| 5 | Lower_Left_Lat | Lower left corner latitude | 225 | 240 | 16 | ASCII (F16.8) | 16 | 1 |
| 6 | Lower_Left_Lon | Lower left corner longitude | 241 | 256 | 16 | ASCII (F16.8) | 16 | 1 |
| 7 | Lower_Right_Lat | Lower right corner latitude | 257 | 272 | 16 | ASCII (F16.8) | 16 | 1 |
| 8 | Lower_Right_Lon | Lower right corner longitude | 273 | 288 | 16 | ASCII (F16.8) | 16 | 1 |

3.3 Satellite Information

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|-----------------------------|---|--------------|-------------|----------------|-----------------|--------------|-------|
| 1 | MOE | Mean Brouwer Orbital Elements for the first scan line | 1 | 112 | 112 | Structure 3.3.1 | 112 | 1 |
| 2 | Acquisition_Time | Acquisition date and time | 113 | 144 | 32 | ASCII | 32 | 1 |
| 3 | Orbit_No | Orbit number of data acquisition | 145 | 152 | 8 | ASCII | 8 | 1 |
| 4 | Node_Crossing_Lon | Equator crossing node longitude | 153 | 168 | 16 | ASCII (F16.8) | 16 | 1 |
| 6 | Node_Crossing_Time | Equator crossing time | 169 | 200 | 32 | ASCII | 32 | 1 |
| 7 | Nominal_Altitude | Nominal altitude | 201 | 204 | 4 | ASCII | 4 | 1 |
| 8 | Nominal_G_Speed | Nominal ground speed | 205 | 220 | 16 | ASCII (F16.8) | 16 | 1 |
| 9 | Instrument_Info | Instrument Information | 221 | 392 | 172 | Structure 3.3.2 | 172 | 1 |
| 10 | Band_Scaling_Factors | Scaling Factor Value for each bands | 393 | 456 | 64 | Structure 3.3.3 | 64 | 1 |
| 11 | BLANKS | Blanks for padding to equal record length | 457 | 512 | 56 | ASCII | 1 | 120 |

3.3.1 MOE Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|------------------------|--|--------------|-------------|----------------|---------------|--------------|-------|
| 1 | Epoch_Date | Epoch Year and Day of Year | 1 | 8 | 8 | ASCII | 8 | 1 |
| 2 | Epoch_Time | Epoch Time in milliseconds of this day | 9 | 16 | 8 | ASCII | 8 | 1 |
| 3 | Semi_Major_Axis | Semi major axis | 17 | 32 | 16 | ASCII (F16.8) | 16 | 1 |
| 4 | Eccentricity | Eccentricity | 33 | 48 | 16 | ASCII (F16.8) | 16 | 1 |
| 5 | Inclination | Inclination | 49 | 64 | 16 | ASCII (F16.8) | 16 | 1 |
| 6 | Descending_Node | Descending node right ascension | 65 | 80 | 16 | ASCII (F16.8) | 16 | 1 |
| 7 | Perigree_Arg | Argument of perigree | 81 | 96 | 16 | ASCII (F16.8) | 16 | 1 |
| 8 | Mean_Anomaly | Mean Anomaly | 97 | 112 | 16 | ASCII (F16.8) | 16 | 1 |

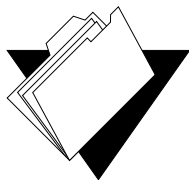
3.3.2 Instrument_Info Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|---------------------------|---|--------------|-------------|----------------|---------------|--------------|-------|
| 1 | Wavelengths | Upper and lower limits of wavelength range, 8 bytes per limit, 2 limits per band, 8 bands, starting with lower and upper limit band 1 | 221 | 348 | 128 | ASCII | 8 | 16 |
| 2 | Bands_No | Number of bands | 349 | 352 | 4 | ASCII | 4 | 1 |
| 3 | Active_Bands_No | Total number of active bands | 353 | 356 | 4 | ASCII | 4 | 1 |
| 4 | Active_Bands | Active bands (1 byte per band, is set to 1 if the band is active otherwise 0) | 357 | 364 | 8 | ASCII | 8 | 1 |
| 5 | Scan_Rate | Sensor scan rate | 365 | 368 | 4 | ASCII | 4 | 1 |
| 6 | Active_Sample_Rate | Sensor active sampling rate | 369 | 376 | 8 | ASCII (F16.8) | 8 | 1 |
| 7 | Tilt_Angle | Tilt angle | 377 | 392 | 16 | ASCII (F16.8) | 16 | 1 |

3.3.3 Band_Scaling_Factors Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|--------------------------|--|--------------|-------------|----------------|--------------|--------------|-------|
| 1 | B1_Scaling_Factor | Scaling Factor value for the calibrated band 1 | 393 | 400 | 8 | ASCII (F8.2) | 8 | 1 |
| 2 | B2_Scaling_Factor | Scaling Factor value for the calibrated band 2 | 401 | 408 | 8 | ASCII (F8.2) | 8 | 1 |
| 3 | B3_Scaling_Factor | Scaling Factor value for the calibrated band 3 | 409 | 416 | 8 | ASCII (F8.2) | 8 | 1 |
| 4 | B4_Scaling_Factor | Scaling Factor value for the calibrated band 4 | 417 | 424 | 8 | ASCII (F8.2) | 8 | 1 |
| 5 | B5_Scaling_Factor | Scaling Factor value for the calibrated band 5 | 425 | 432 | 8 | ASCII (F8.2) | 8 | 1 |
| 6 | B6_Scaling_Factor | Scaling Factor value for the calibrated band 6 | 433 | 440 | 8 | ASCII (F8.2) | 8 | 1 |
| 7 | B7_Scaling_Factor | Scaling Factor value for the calibrated band 7 | 441 | 448 | 8 | ASCII (F8.2) | 8 | 1 |
| 8 | B8_Scaling_Factor | Scaling Factor value for the calibrated band 8 | 449 | 456 | 8 | ASCII (F8.2) | 8 | 1 |

4.0 Imagery File



| | | |
|-----|-------------------------------|-------------|
| 1 | File Descriptor Record | 21508 Bytes |
| 2 | Image Data Record 1 | 21508 Bytes |
| N+1 | Image Data Record N | 21508 Bytes |

4.1 File Descriptor Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|-------------------------|--|--------------|-------------|----------------|--------|--------------|-------|
| 1 | CEOS_FDR_ID | CEOS File Descriptor Record Identification | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | Document_Name | Identification of the product description document | 17 | 28 | 12 | ASCII | 12 | 1 |
| 4 | Document_Version | Version of product description document | 29 | 32 | 4 | ASCII | 4 | 1 |
| 5 | Software_ID | Software Release Number | 33 | 44 | 12 | ASCII | 12 | 1 |
| 6 | File_No_2 | File Number | 45 | 48 | 4 | ASCII | 4 | 1 |
| 7 | File_Name_2 | File Name | 49 | 64 | 16 | ASCII | 16 | 1 |
| 8 | BLANKS | CEOS reserved, filled with blanks (48 Blanks) | 65 | 112 | 48 | ASCII | 1 | 48 |
| 9 | CEOS_Flags | CEOS reserved Flags | 113 | 116 | 4 | ASCII | 4 | 1 |
| 10 | BLANKS | Blanks for padding to equal record length | 117 | 21508 | 21392 | ASCII | 1 | 21392 |

4.2 Image Data Record

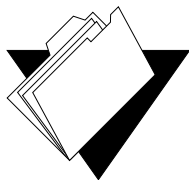
| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|-----------------------------|---|--------------|-------------|----------------|--------------------|--------------|-------|
| 1 | Scan_Line_Flag1 | Scan line flag | 1 | 2 | 2 | Unsigned Integer*2 | 2 | 1 |
| 2 | Scan_Line_Day | Scan line day (Julian) | 3 | 4 | 2 | Unsigned Integer*2 | 2 | 1 |
| 3 | Scan_Line_Time | Scan line time milliseconds of day | 5 | 8 | 4 | Unsigned Integer*4 | 4 | 1 |
| 4 | BLANKS | Empty byte to align the image on an even byte | 9 | 9 | 1 | ASCII | 1 | 1 |
| 5 | Spacecraft_ID | Spacecraft Identifier (2 times 16-bit words) | 10 | 13 | 4 | Unsigned Integer*2 | 2 | 2 |
| 6 | Spacecraft_Time_Tag | Spacecraft Time Tag (4 times 16-bit words) | 14 | 21 | 8 | Unsigned Integer*2 | 2 | 4 |
| 7 | Spacecraft_SOH | Spacecraft State of Health Telemetry (775 times 8-bit words) | 22 | 796 | 775 | Byte | 1 | 775 |
| 8 | Instrument_Telemetry | SeaWiFS Instrument and Ancillary Telemetry (44 times 16-bit words) | 797 | 884 | 88 | Unsigned Integer*2 | 2 | 44 |
| 9 | Gain_TDI | Gain and TDI for the 8 Bands | 885 | 900 | 16 | Unsigned Integer*2 | 2 | 8 |
| 10 | Start_Synch_Pixel | Start Synch Pixel for the 8 Bands | 901 | 916 | 16 | Unsigned Integer*2 | 2 | 8 |
| 11 | Dark_Restore_Pixel | Dark Restore Pixels for the 8 Bands | 917 | 932 | 16 | Unsigned Integer*2 | 2 | 8 |
| 12 | Image_Data | Pixel Interleaved SeaWiFS Data (1285 Pixels per Scan Line) | 933 | 21492 | 20560 | Structure 4.2.1 | 16 | 1285 |
| 13 | Stop_Synch_Pixel | Stop Synch Pixels for the 8 Bands | 21493 | 21508 | 16 | Unsigned Integer*2 | 2 | 8 |

4.2.1 Image_Data Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|---------------|--|--------------|-------------|----------------|--------------------|--------------|-------|
| 1 | Band_1 | Band 1 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|---------------|--|--------------|-------------|----------------|--------------------|--------------|-------|
| 2 | Band_2 | Band 2 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |
| 3 | Band_3 | Band 3 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |
| 4 | Band_4 | Band 4 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |
| 5 | Band_5 | Band 5 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |
| 6 | Band_6 | Band 6 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |
| 7 | Band_7 | Band 7 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |
| 8 | Band_8 | Band 8 TOA radiances of the SeaWiFS sensor | N/A | N/A | 2 | Unsigned Integer*2 | 2 | 1 |

5.0 Annotation File



| | | |
|-----|--------------------------|------------|
| 1 | File Descriptor Record | 2662 Bytes |
| 2 | Annotation Data Record 1 | 2662 Bytes |
| N+1 | Annotation Data Record N | 2662 Bytes |

5.1 File Descriptor Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|----|---------------------------|--|--------------|-------------|----------------|-----------------|--------------|-------|
| 1 | CEOS_FDR_ID | CEOS File Descriptor Record Identification | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | Document_Name | Identification of the product description document | 17 | 28 | 12 | ASCII | 12 | 1 |
| 4 | Document_Version | Version of product description document | 29 | 32 | 4 | ASCII | 4 | 1 |
| 5 | Software_ID | Software Release Number | 33 | 44 | 12 | ASCII | 12 | 1 |
| 6 | File_No_3 | File Number | 45 | 48 | 4 | ASCII | 4 | 1 |
| 7 | File_Name_3 | File Name | 49 | 64 | 16 | ASCII | 16 | 1 |
| 8 | BLANKS | CEOS reserved, filled with blanks (48 Blanks) | 65 | 112 | 48 | ASCII | 1 | 48 |
| 9 | CEOS_Flags | CEOS reserved Flags | 113 | 116 | 4 | ASCII | 4 | 1 |
| 10 | BLANKS | Blanks | 117 | 180 | 64 | ASCII | 1 | 64 |
| 11 | Tie_Point_Location | Ground control points location description | 181 | 522 | 342 | Structure 5.1.1 | 342 | 1 |
| 12 | BLANKS | Blanks for padding to equal record length | 523 | 2662 | 2140 | ASCII | 1 | 2140 |

5.1.1 Tie_Point_Location Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|----------------------------|--|--------------|-------------|----------------|-------|--------------|-------|
| 1 | Tie_Point_1_Line | first line with tie point | 181 | 184 | 4 | ASCII | 4 | 1 |
| 2 | Tie_Point_Increment | line increment between lines having tie point location | 185 | 188 | 4 | ASCII | 4 | 1 |
| 3 | Tie_Point_No | number of tie points per line | 189 | 192 | 4 | ASCII | 4 | 1 |
| 4 | Tie_Pixel_Positions | list of pixel positions used as tie points | 193 | 522 | 330 | ASCII | 6 | 55 |

5.2 Annotation Data Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|-------------------------|---|--------------|-------------|----------------|--------------------|--------------|-------|
| 1 | Scan_Line_Flag2 | Flag to determine if the state vector was interpolated | 1 | 2 | 2 | Unsigned Integer*2 | 2 | 1 |
| 2 | Scan_Line_Day | Scan line day (Julian) | 3 | 4 | 2 | Unsigned Integer*2 | 2 | 1 |
| 3 | Scan_Line_Time | Scan line time in milliseconds of day | 5 | 8 | 4 | Unsigned Integer*4 | 4 | 1 |
| 4 | State_Vector | State Vector (interpolated unless time tag corresponds to GPS time stamp) | 9 | 32 | 24 | Structure 5.2.1 | 24 | 1 |
| 5 | Attitude_Angles | Attitude Angles | 33 | 56 | 24 | Structure 5.2.2 | 24 | 1 |
| 6 | Navigation_Info | Navigation Information for the 55 tie points | 57 | 1376 | 1320 | Structure 5.2.3 | 24 | 55 |
| 7 | Annotation_Flags | Annotation Flags (1285 Pixels) 1 Bit: Coastlines Flag 2 Bit: Boundaries Flag 3 Bit: Grid Flag 4 Bit: Classification Flag . 8 Bit: Classification Flag | 1377 | 2661 | 1285 | Byte | 1 | 1285 |
| 8 | BLANKS | Blanks for padding to even record length | 2662 | 2662 | 1 | ASCII | 1 | 1 |

5.2.1 State_Vector Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|---------------------------|--------------------------|--------------|-------------|----------------|-----------|--------------|-------|
| 1 | State_Vector_X | State Vector: X | 9 | 12 | 4 | Integer*4 | 4 | 1 |
| 2 | State_Vector_Y | State Vector: Y | 13 | 16 | 4 | Integer*4 | 4 | 1 |
| 3 | State_Vector_Z | State Vector: Z | 17 | 20 | 4 | Integer*4 | 4 | 1 |
| 4 | State_Vector_X_Vel | State Vector: X velocity | 21 | 24 | 4 | Integer*4 | 4 | 1 |
| 5 | State_Vector_Y_Vel | State Vector: Y velocity | 25 | 28 | 4 | Integer*4 | 4 | 1 |
| 6 | State_Vector_Z_Vel | State Vector: Z velocity | 29 | 32 | 4 | Integer*4 | 4 | 1 |

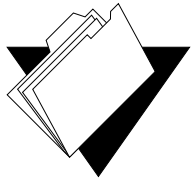
5.2.2 Attitude_Angles Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|---------------------|-----------------------------------|--------------|-------------|----------------|-----------|--------------|-------|
| 1 | Attitude_Angle_Φ | Attitude Angular Position Φ | 33 | 36 | 4 | Integer*4 | 4 | 1 |
| 2 | Attitude_Angle_Θ | Attitude Angular Position Θ | 37 | 40 | 4 | Integer*4 | 4 | 1 |
| 3 | Attitude_Angle_Ψ | Attitude Angular Position Ψ | 41 | 44 | 4 | Integer*4 | 4 | 1 |
| 4 | Attitude_Angle_ΦVel | Attitude Angular Rates Φ velocity | 45 | 48 | 4 | Integer*4 | 4 | 1 |
| 5 | Attitude_Angle_ΘVel | Attitude Angular Rates Θ velocity | 49 | 52 | 4 | Integer*4 | 4 | 1 |
| 6 | Attitude_Angle_ΨVel | Attitude Angular Rates Ψ velocity | 53 | 56 | 4 | Integer*4 | 4 | 1 |

5.2.3 Navigation_Info Structure

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|--------------------|--|--------------|-------------|----------------|-----------|--------------|-------|
| 1 | Tie_Point_Lat | Latitude for tie point | N/A | N/A | 4 | Integer*4 | 4 | 1 |
| 2 | Tie_Point_Lon | Longitude for tie point | N/A | N/A | 4 | Integer*4 | 4 | 1 |
| 3 | Tie_Point_Sun_Azi | Sun Angles azimuth for tie point | N/A | N/A | 4 | Integer*4 | 4 | 1 |
| 4 | Tie_Point_Sun_Elev | Sun Angles elevation for tie point | N/A | N/A | 4 | Integer*4 | 4 | 1 |
| 5 | Tie_Point_Sat_Azi | Satellite Angles azimuth for tie point | N/A | N/A | 4 | Integer*4 | 4 | 1 |
| 6 | Tie_Point_Sat_Elev | Satellite Angles elevation for tie point | N/A | N/A | 4 | Integer*4 | 4 | 1 |

6.0 Null Volume Directory File



1

Null Volume Descriptor Record

360 Bytes

6.1 Null Volume Descriptor Record

| # | Name | Short Description | Start (Byte) | Stop (Byte) | Length (Bytes) | Type | Size (Bytes) | Times |
|---|--------------------------|--|--------------|-------------|----------------|--------|--------------|-------|
| 1 | CEOS_NVDR_ID | CEOS Null Volume Descriptor Record Identification | 1 | 12 | 12 | Binary | 12 | 1 |
| 2 | BLANKS | Blanks | 13 | 16 | 4 | ASCII | 1 | 8 |
| 3 | Document_Name | Identification of the product description document | 17 | 28 | 12 | ASCII | 12 | 1 |
| 4 | Document_Version* | Version of product description document | 29 | 32 | 4 | ASCII | 4 | 1 |
| 5 | Software_ID | Software Release Number | 33 | 44 | 12 | ASCII | 12 | 1 |
| 6 | BLANKS | Blanks | 45 | 360 | 316 | ASCII | 1 | 316 |

7.0 Detailed Parameter Description

The following data description attributes are available to provide to the end user more detailed information about each data field/structure contained in the data product. In order to allow a systematic documentation those data description attributes follow a number of conventions, explained hereafter. Mandatory data description attributes need to be always documented. Optional data description attributes are only applicable to some data fields/data structures.

| | | |
|--------------------------|-------------|---|
| Meaning: | (mandatory) | Provides a detailed description of the meaning of the data field/data structure. |
| Type: | (mandatory) | Provides the data type of the data field/data structure, the length and if applicable also the encoding scheme. |
| Position: | (mandatory) | Provides the direct position of the data field/data structure within the data product, stating the File/the Record and the Start Position (in Bytes) |
| Permitted_Values: | (mandatory) | Provides all the permitted values of a data field. Multiple continuous ranges are documented using a comma as separator of several ranges, and a "-" between each minimum and maximum value, e.g. "00 - 99, 100 - 110". Discrete values are documented as follows: "150, 200". Combination of both are documented, as follows: "00 - 99, 100 - 110, 150, 200". If the value of a specific data field is constant only it's constant value is stated, e.g. "16.5". This data description attribute is only applicable for data fields, for data structures the string "N/A" (Not Applicable) should be used. |
| Special_Instance: | (optional) | Provides the possibility to document special values of a data field. In brackets "()" a text is provided which explains the significance of a specific value (constant, range). This data description attribute can be repeated as often as required. |
| Unit: | (optional) | Provides the possibility to document the unit if measurement of the data field (only applicable to numerical values) |
| Default: | (optional) | Provides the possibility to document the value used for the data field in case of it's unavailability. |
| Formation: | (optional) | Provides the possibility to document the formation of complex parameters, such as Character Strings or data structures. |
| Comment: | (optional) | Provides the possibility to comment or refer to additional references where information of the data field can be found. |

All data fields/structures contained in the data product are listed here in alphabetical order:

| Name | Data Description Attributes | |
|---------------------|-----------------------------|---|
| Active_Bands | Meaning: | This parameter contains information of a band's activity during the time of measurement For each band 1 byte is used. The first byte (left) states the activity of band 1, the right most byte (byte 8) the activity of band 8. If the value of a band is 1 this implies that the band is active. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 357 |
| | Permitted_Values: | 00000000 - 11111111 |
| | Special_Instance: | 00000000 (no band is active) |
| | Special_Instance: | 11111111 (all bands are active) |
| | Default: | \$\$\$\$\$\$\$ |

| Name | Data Description Attributes | |
|-----------------------------|--|--|
| Active_Bands_No | Meaning: Type: Position: Permitted_Values: Special_Instance: Special_Instance: Default: | This parameter contains the total number of active bands during the time of measurement. ASCII Character String (4 Bytes) Leader File, Satellite Information Record, Start Byte 353 \$\$\$0 - \$\$\$8 \$\$\$0 (no band is active) \$\$\$8 (all bands are active) \$\$\$8 |
| Active_Sample_Rate | Meaning: Type: Position: Permitted_Values: Unit: | The parameter states the active sample rate of the sensor (measured in pixels/second). ASCII Character String (8 Bytes) Leader File, Satellite Information Record, Start Byte 369 \$\$\$7710 1/s |
| Actual_Scene_Lines | Meaning: Type: Position: Permitted_Values: Default: | Number of lines in the scene. On average 1440 lines for a 4 minute scene are provided. ASCII Character String (4 Bytes) Leader File, Scene Header Record, Start Byte 289 \$\$\$0 - 9999 1440 |
| Acquisition_Facility | Meaning: Type: Position: Permitted_Values: | Identifier of the facility which performed the acquisition of the SeaWiFS data. ASCII Character String (12 Bytes) Volume Directory File, Volume Descriptor Record, Start Byte 149 "TMS\$NORWAY\$\$" (Tromsø, Norway), "DDE\$SCOTLAND" (Dundee, Scotland), "OPF\$GERMANY\$" (Oberpfaffenhofen, Germany), "SCZ\$ITALY\$\$\$" (Scanzano, Italy), "MPS\$SPAIN\$\$\$" (maspalomas, Spain), "RUN\$FRANCE\$\$" (La Reunion, France) "ESR\$ITALY" (ESRIN, Italy) |
| Acquisition_Time | Meaning: Type: Position: Formation: | The date and time of data acquisition. ASCII Character String (32 Bytes) Leader File. Scene Header Record, Start Byte {CCYYMMDDThhmmss,sss followed by blanks} where CC (century), YY (year), MM (month), DD (day), T (ISO standard date and time separator) hh (hour), mm (minutes), ss,sss (seconds, milliseconds (decimal fraction)) |

| Name | Data Description Attributes | |
|----------------------------|-----------------------------|--|
| Annotation_Flags | Meaning: | For each pixel (1285 pixels in one scan line) different annotation information is provided, currently the annotation information includes coastlines, boundaries, grid. For each different information one bit is reserved, the bit is set to 1 in the case that the information is existing. |
| | Type: | 1285 * {1 Byte} |
| | Position: | Annotation File, Annotation Data Record, Start Byte 1377 |
| | Formation: | A geographical information extracted from DCW (Digital Chart of the World) is associated with each SeaWiFS pixel. Each pixel is represented by a byte where the meaning of the bits are defined as follows: 1 Bit (LSB): Coastlines Flag (0 = not existing, 1 = is existing) 2 Bit: Boundaries Flag(0 = not existing, 1 = is existing) 3 Bit: Grid Flag (0 = not existing, 1 = is existing) 4 Bit: Land/Sea mask Flag (0=Sea, 1=Land) 5 Bit: Classification Flag (not yet used) . 8 Bit (MSB): Classification Flag (not yet used) |
| Attitude_Angles | Meaning: | Attitude Angles |
| | Type: | Structure (24 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 33 |
| Attitude_Angle_Φ | Meaning: | Attitude Angular Position Φ |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 33 |
| | Unit: | micro radiant |
| Attitude_Angle_Θ | Meaning: | Attitude Angular Position Θ |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 37 |
| | Unit: | micro radiant |
| Attitude_Angle_Ψ | Meaning: | Attitude Angular Position Ψ |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 41 |
| | Unit: | micro radiant |
| Attitude_Angle_ΦVel | Meaning: | Attitude Angular Rates Φ velocity |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 45 |
| | Unit: | micro radiant/s |

| Name | Data Description Attributes | |
|----------------------------|-----------------------------|---|
| Attitude_Angle_ΘVel | Meaning: | Attitude Angular Rates Θ velocity |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 49 |
| | Unit: | micro radiant/s |
| Attitude_Angle_ΨVel | Meaning: | Attitude Angular Rates Ψ velocity |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 53 |
| | Unit: | micro radiant/s |
| Band_1 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 1, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 933 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |
| Band_2 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 2, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 935 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |
| Band_3 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 3, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 937 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |
| Band_4 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 4, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 939 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |
| Band_5 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 5, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 941 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |
| Band_6 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 6, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 943 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |

| Name | Data Description Attributes | |
|--------------------------|-----------------------------|---|
| Band_7 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 7, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 945 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |
| Band_8 | Meaning: | Digital calibrated counts of SeaWiFS instrument's band 8, scaled to fit on 2 bytes integer. |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 947 (for the first pixel) |
| | Permitted_Values: | [0, 65535] |
| Bands_No | Meaning: | Number of nominal bands for SeaWiFS instrument (8 bands). |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 349 |
| | Permitted_Values: | \$\$\$8 (Constant) |
| B1_Scaling_Factor | Meaning: | Scaling Factor for band 1 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 393 |
| | Permitted_Values: | \$\$100.00 (example) |
| B2_Scaling_Factor | Meaning: | Scaling Factor for band 2 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 401 |
| | Permitted_Values: | \$\$100.00 (example) |
| B3_Scaling_Factor | Meaning: | Scaling Factor for band 3 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 409 |
| | Permitted_Values: | \$\$100.00 (example) |
| B4_Scaling_Factor | Meaning: | Scaling Factor for band 4 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 417 |
| | Permitted_Values: | \$\$100.00 (example) |
| B5_Scaling_Factor | Meaning: | Scaling Factor for band 5 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 425 |
| | Permitted_Values: | \$\$100.00 (example) |

| Name | Data Description Attributes | |
|--------------------------|-----------------------------|--|
| B6_Scaling_Factor | Meaning: | Scaling Factor for band 6 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 433 |
| | Permitted_Values: | \$\$100.00 (example) |
| B7_Scaling_Factor | Meaning: | Scaling Factor for band 7 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 441 |
| | Permitted_Values: | \$\$100.00 (example) |
| B8_Scaling_Factor | Meaning: | Scaling Factor for band 8 used to transform the real calibrated count values into unsigned 2 bytes integer. |
| | Type: | ASCII Character String F8.2 (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 449 |
| | Permitted_Values: | \$\$100.00 (example) |
| BLANKS | Meaning: | As a place holder blanks have been introduced in order to ensure consistency with the CEOS format family. The number of repetitions of the "\$" blank sign are provided in the table column "Times". |
| | Type: | ASCII character (1 Byte) |
| | Permitted_Values: | \$ |
| CEOS_Flags | Meaning: | In the SeaWiFS LAC 1B data product no use is made of the CEOS flagging system. The parameter is set to "NNNN" to keep consistency with formerly defined CEOS data products. |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Leader File, File Descriptor Record, Start Byte 113 |
| | Position: | Imagery File, File Descriptor Record, Start Byte 113 |
| | Position: | Annotation File, File Descriptor Record, Start Byte 113 |
| | Permitted_Values: | NNNN (Constant) |
| CEOS_FDR_ID | Meaning: | CEOS code to identify the File Descriptor Records. This structure is only used to identify the CEOS records used and to keep consistency to former CEOS data products. |
| | Type: | 12 Bytes |
| | Position: | Leader File, File Descriptor Record, Start Byte 1 |
| | Position: | Imagery File, File Descriptor Record, Start Byte 1 |
| | Position: | Annotation File, File Descriptor Record, Start Byte 1 |
| | Formation: | 1 - 4 Bytes: Record Sequence Number (1) 5 - 5 Bytes: Volume Descriptor Record Code 1 (63) 6 - 6 Bytes: Volume Descriptor Record Code 2 (192) 7 - 7 Bytes: Volume Descriptor Record Code 3 (18) 8 - 8 Bytes: Volume Descriptor Record Code 4 (18) |

| Name | Data Description Attributes | |
|---------------------------|-----------------------------|---|
| CEOS_FPR_ID | Meaning: | CEOS code to identify the File Pointer Records. This structure is only used to identify the CEOS records used and to keep consistency to former CEOS data products. |
| | Type: | 12 Bytes |
| | Position: | Volume Directory File, Leader Pointer Record, Start Byte 1 |
| | Position: | Volume Directory File, Imagery File Pointer Record, Start Byte 1 |
| | Position: | Volume Directory File, Annotation File Pointer Record, Start Byte 1 |
| | Formation: | 1 - 4 Bytes: Record Sequence Number (1) 5 - 5 Bytes: Volume Descriptor Record Code 1 (219) 6 - 6 Bytes: Volume Descriptor Record Code 2 (192) 7 - 7 Bytes: Volume Descriptor Record Code 3 (18) 8 - 8 Bytes: Volume Descriptor Record Code 4 (18) |
| CEOS_NVDR_ID | Meaning: | CEOS code to identify the Null Volume Descriptor Record. This structure is only used to identify the CEOS records used and to keep consistency to former CEOS data products. |
| | Type: | 12 Bytes |
| | Position: | Null Volume Directory File, Null Volume Descriptor Record, Start Byte 1 |
| | Formation: | 1 - 4 Bytes: Record Sequence Number (1) 5 - 5 Bytes: Volume Descriptor Record Code 1 (192) 6 - 6 Bytes: Volume Descriptor Record Code 2 (192) 7 - 7 Bytes: Volume Descriptor Record Code 3 (63) 8 - 8 Bytes: Volume Descriptor Record Code 4 (18) |
| CEOS_VDR_ID | Meaning: | CEOS code to identify the Volume Descriptor Record. This structure is only used to identify the CEOS records used and to keep consistency to former CEOS data products. |
| | Type: | 12 Bytes |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 1 |
| | Formation: | 1 - 4 Bytes: Record Sequence Number (1) 5 - 5 Bytes: Volume Descriptor Record Code 1 (192) 6 - 6 Bytes: Volume Descriptor Record Code 2 (192) 7 - 7 Bytes: Volume Descriptor Record Code 3 (18) 8 - 8 Bytes: Volume Descriptor Record Code 4 (18) |
| Centre_Coordinates | Meaning: | Latitude and Longitude at the central point of the scene. |
| | Type: | Structure (32 Bytes) |
| | Position: | Leader File, Scene Header Record, Start Byte 1 |
| | Formation: | {Centre_Lat, Centre_Lon} |

| Name | Data Description Attributes | |
|---------------------------|-----------------------------|--|
| Centre_Lat | Meaning: | Latitude at the central point of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File. Scene Header Record, Start Byte 1 |
| | Permitted_Values: | \$\$\$\$-90.00000000 - \$\$\$\$90.00000000 |
| | Unit: | Degree |
| Centre_Line_No | Meaning: | Line number of the scene centre. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Leader File. Scene Header Record, Start Byte 49 |
| | Permitted_Values: | \$\$\$\$\$\$1 - \$\$\$1440 |
| | Default: | \$\$\$\$\$720 (1440 scene lines for a 4 minute scene) |
| Centre_Lon | Meaning: | Longitude at the central point of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte 17 |
| | Permitted_Values: | \$\$\$-180.00000000 - \$\$\$180.00000000 |
| | Unit: | Degree |
| Centre_Pixel_No | Meaning: | Pixel number where Centre_Lat and Centre_Lon are calculated |
| | Type: | ASCII Character String (8 bytes) |
| | Position: | Leader File, Scene Header Record, Start Byte 57 |
| | Permitted_Values: | \$\$\$\$\$\$0 - \$\$\$1285 |
| | Default: | \$\$\$\$\$643 |
| Centre_Sun_Elev | Meaning: | Sun elevation angle value at the scene centre pixel |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte 33 |
| | Permitted_Values: | \$\$\$-180.00000000 - \$\$\$180.00000000 |
| | Unit: | Degree |
| Centre_Time | Meaning: | Date and Time value of the Centre_Line_No |
| | Type: | ASCII Character String (32 Bytes) |
| | Position: | Leader File, Scene Header Record, Start Byte 65 |
| | Formation: | {CCYYMMDDThhmmss,sss followed by Blanks} |
| Dark_Restore_Pixel | Meaning: | Dark restore pixel for the 8 SeaWiFS bands as provided in the HRPT frame |
| | Type: | 8 * {Unsigned Integer (2 Bytes)} |
| | Position: | Imagery File. Image Data Record, Start Byte 917 |
| | Permitted_Values: | 0 - 1023 |

| Name | Data Description Attributes | |
|-------------------------|-----------------------------|--|
| Descending_Node | Meaning: | Descending node right ascension |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte 65 |
| | Unit: | Degree |
| Document_Name | Meaning: | The name of the document describing this format. |
| | Type: | ASCII Character String (12 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 17 |
| | Position: | Leader File, File Descriptor Record, Start Byte 17 |
| | Position: | Imagery File, File Descriptor Record, Start Byte 17 |
| | Position: | Annotation File, File Descriptor Record, Start Byte 17 |
| | Position: | Null Volume Directory File, Null Volume Descriptor Record, Start Byte 17 |
| Document_Version | Meaning: | The version of the document describing this format. |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 17 |
| | Position: | Leader File, File Descriptor Record, Start Byte 17 |
| | Position: | Imagery File, File Descriptor Record, Start Byte 17 |
| | Position: | Annotation File, File Descriptor Record, Start Byte 17 |
| | Position: | Null Volume Directory File, Null Volume Descriptor Record, Start Byte 17 |
| Eccentricity | Meaning: | Eccentricity |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte 33 |
| Epoch_Date | Meaning: | Epoch year and days of the MOE |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 1 |
| | Formation: | {CCYYDDD followed by blanks } |
| Epoch_Time | Meaning: | Epoch time in milliseconds in the Epoch_Date |
| | Type: | ASCII Character String (8 bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 9 |
| | Permitted_Values: | \$\$\$\$\$\$0 - 86400000 |
| | Unit: | millisecond |

| Name | Data Description Attributes | |
|---------------------|-----------------------------|--|
| FDR_Length_1 | Meaning: | The length of the file descriptor record in the corresponding data file. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Leader File Pointer Record, Start Byte 109 |
| | Permitted_Values: | \$\$\$\$\$512 |
| FDR_Length_2 | Meaning: | The length of the file descriptor record in the corresponding data file. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Imagery File Pointer Record, Start Byte 109 |
| | Permitted_Values: | \$\$\$21508 |
| FDR_Length_3 | Meaning: | The length of the file descriptor record in the corresponding data file. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Annotation File Pointer Record, Start Byte 109 |
| | Permitted_Values: | \$\$\$\$2662 |
| File_Name_1 | Meaning: | The name of the file. The convention used implies "SeaStar 1 - SeaWIFS - LEAD/IMAG/ANNO" |
| | Type: | ASCII Character String (16 Bytes) |
| | Position: | Volume Directory File, Leader File Pointer Record, Start Byte 21 |
| | Position: | Leader File, File Descriptor Record, Start Byte 49 |
| | Permitted_Values: | SS1\$SEAWIFS\$LEAD |
| File_Name_2 | Meaning: | The name of the file. The convention used implies "SeaStar 1 - SeaWIFS - LEAD/IMAG/ANNO" |
| | Type: | ASCII Character String (16 Bytes) |
| | Position: | Volume Directory File, Imagery File Pointer Record, Start Byte 21 |
| | Position: | Imagery File, File Descriptor Record, Start Byte 49 |
| | Permitted_Values: | SS1\$SEAWIFS\$IMAG |
| File_Name_3 | Meaning: | The name of the file. The convention used implies "SeaStar 1 - SeaWIFS - LEAD/IMAG/ANNO" |
| | Type: | ASCII Character String (16 Bytes) |
| | Position: | Volume Directory File, Annotation File Pointer Record, Start Byte 21 |
| | Position: | Annotation File, File Descriptor Record, Start Byte 49 |
| | Permitted_Values: | SS1\$SEAWIFS\$ANNO |
| File_No_1 | Meaning: | The File number identifies the sequence of the file within the data product. |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Volume Directory File, Leader File Pointer Record, Start Byte 17 |
| | Position: | Leader File, File Descriptor Record, Start Byte 45 |
| | Permitted_Values: | \$\$\$2 |

| Name | Data Description Attributes | |
|-----------------------------|-----------------------------|--|
| File_No_2 | Meaning: | The File number identifies the sequence of the file within the data product. |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Volume Directory File, Imagery File Pointer Record, Start Byte 17 |
| | Position: | Imagery File, File Descriptor Record, Start Byte 45 |
| | Permitted_Values: | \$\$\$3 |
| File_No_3 | Meaning: | The File number identifies the sequence of the file within the data product. |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Volume Directory File, Annotation File Pointer Record, Start Byte 17 |
| | Position: | Annotation File, File Descriptor Record, Start Byte 45 |
| | Permitted_Values: | \$\$\$4 |
| Gain_TDI | Meaning: | Gain & TDI as provided in the HRPT frame |
| | Type: | 8 * {Unsigned Integer (2 Bytes)} |
| | Position: | Imagery File, Image Data Record, Start Byte 885 |
| Image_Data | Meaning: | Image data pixels for the 8 SeaWiFS bands as provided in the HRPT frame |
| | Type: | 1285 * {8* {Unsigned Integer (2 Bytes)}} |
| | Position: | Imagery File, Image Data Record, Start Byte 933 |
| | Permitted_Values: | 0 - 1023 (for each pixel) |
| Inclination | Meaning: | Inclination |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte 49 |
| | Unit: | Degree |
| Instrument_Info | Meaning: | Data structure providing information about the instrument, such as the wavelength range, scan rate, etc. |
| | Type: | Structure (172 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 233 |
| Instrument_Telemetry | Meaning: | Instrument or Ancillary Telemetry as provided in the HRPT frame |
| | Type: | 44* {Unsigned Integer (2 Bytes)} |
| | Position: | Imagery File, Image Data Record, Start Byte 9 |
| Lower_Left_Lat | Meaning: | Latitude of the lower left corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-90.00000000 - \$\$\$90.00000000 |
| | Unit: | Degree |

| Name | Data Description Attributes | |
|-------------------------|-----------------------------|---|
| Lower_Left_Lon | Meaning: | Longitude of the lower left corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-180.00000000 - \$\$\$180.00000000 |
| | Unit: | Degree |
| Lower_Right_Lat | Meaning: | Latitude of the lower right corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-90.00000000 - \$\$\$90.00000000 |
| | Unit: | Degree |
| Lower_Right_Lon | Meaning: | Longitude of the lower right corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-180.00000000 - \$\$\$180.00000000 |
| | Unit: | Degree |
| Max_Rec_Length_1 | Meaning: | The maximum length of a data record in the corresponding data file |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Leader File Pointer Record, Start Byte 117 |
| | Default: | \$\$\$512 |
| Max_Rec_Length_2 | Meaning: | The maximum length of a data record in the corresponding data file |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Imagery File Pointer Record, Start Byte 117 |
| | Default: | \$\$\$21508 |
| Max_Rec_Length_3 | Meaning: | The maximum length of a data record in the corresponding data file |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Annotation File Pointer Record, Start Byte 117 |
| | Default: | \$\$\$2662 |
| Mean_Anomaly | Meaning: | Mean Anomaly |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte 97 |
| | Unit: | Degree |

| Name | Data Description Attributes | |
|---------------------------|-----------------------------|---|
| Media_ID | Meaning: | The identifier of the source product. |
| | Type: | ASCII Character String (16 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 45 |
| MOE | Meaning: | Main Orbital Elements calculated for the first line of the pass from which the scene has been extracted |
| | Type: | Structure (112 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 1 |
| Navigation_Info | Meaning: | Coordinates (lat, lon), Sun and satellite angles for each tie point |
| | Type: | Structure (24 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 57 |
| Node_Crossing_Lon | Meaning: | Equator crossing longitude |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte |
| | Permitted_Values: | \$\$\$-180.00000000 - \$\$\$180.00000000 |
| | Unit: | Degree |
| Node_Crossing_Time | Meaning: | Equator crossing longitude |
| | Type: | ASCII Character String (32 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte |
| | Formation: | (CCYYMMDDThhmmss,sss followed by Blanks) |
| Nominal_Altitude | Meaning: | Altitude nominal of the SeaStar satellite |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte 201 |
| | Permitted_Values: | \$705 (constant) |
| | Unit: | km |
| Nominal_G_Speed | Meaning: | Nominal ground speed of the SeaStar satellite |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte 205 |
| | Permitted_Values: | \$\$\$\$\$6.6660000 |
| | Unit: | km/s |
| Orbit_No | Meaning: | Absolute orbit number |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Leader File, Satellite Information Record, Start Byte |
| | Permitted_Values: | \$\$\$\$\$\$0 - \$\$\$99999 |

| Name | Data Description Attributes | |
|----------------------------|-----------------------------|---|
| Perigree_Arg | Meaning: | |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte |
| | Unit: | Degree |
| Product_Files | Meaning: | Number of data files belonging to the SeaWiFS LAC 1B data product (5 data product files) |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 161 |
| | Permitted_Values: | \$\$\$5 |
| Product_ID | Meaning: | Identifier of the current data product. |
| | Type: | ASCII Character String (16 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 61 |
| | Formation: | YMMDDhhmmFFSS - YY for acquisition year - MM for acquisition month in the year - DD for acquisition day in the month - hh for acquisition hour time in the day - mm for acquisition minute time in the hour - FF for the acquisition facility identifier: TM (Tromsoe), DD (Dundee), OP (Oberpfaffenhofen), SC (Scanzano), MP (Maspalomas), RU (La Reunion), ES (Frascati) - SS for the satellite identifier: S1 (SeaStar), N9 (NOAA 09), N0 (NOAA 10), N2 (NOAA 12), N1 (NOAA 11), N4 (NOAA 14) |
| Processing_Country | Meaning: | Identifier of the processing country of the data product. |
| | Type: | ASCII Character String (12 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 129 |
| | Permitted_Values: | NORWAY\$\$\$\$\$, SCOTLAND\$\$\$\$\$, GREATBRITAIN, GERMANY\$\$\$\$\$, ITALY\$\$\$\$\$\$\$, SPAIN\$\$\$\$\$\$\$, FRANCE\$\$\$\$\$\$ |
| Processing_Facility | Meaning: | Identifier of the processing facility of the data product. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 141 |
| | Permitted_Values: | TMS\$\$\$\$\$, DDE\$\$\$\$\$, OPF\$\$\$\$\$, SCZ\$\$\$\$\$, MPS\$\$\$\$\$, RUN\$\$\$\$\$, ESR\$\$\$\$\$ |
| Processing_Time | Meaning: | The time of product processing (following the date/time conventions from ISO) |
| | Type: | ASCII Character String (16 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 113 |
| | Formation: | {CCYYMMDDThhmmss followed by Blanks} |

| Name | Data Description Attributes | |
|------------------------|-----------------------------|---|
| Product_Type | Meaning: | Identifier of the type of data product. |
| | Type: | ASCII Character String (16 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 77 |
| | Permitted_Values: | SS1\$SWF\$LEVEL\$1B |
| Records_1 | Meaning: | The number of records of the corresponding data file. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Leader File Pointer Record, Start Byte 101 |
| | Permitted_Values: | \$\$\$\$\$\$3 |
| Records_2 | Meaning: | The number of records of the corresponding data file. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Imagery File Pointer Record, Start Byte 101 |
| | Permitted_Values: | \$\$\$1441 (for a standard 4 minutes length product) |
| Records_3 | Meaning: | The number of records of the corresponding data file. |
| | Type: | ASCII Character String (8 Bytes) |
| | Position: | Volume Directory File, Annotation File Pointer Record, Start Byte 101 |
| | Permitted_Values: | \$\$\$1441 (for a standard 4 minutes length product) |
| Scan_Line_Day | Meaning: | Julian Day of this scan line, the Julian Day is calculated from the 13 January 1993 at 00:00:00.0 UTC Day Counter = Julian Date - 2449000.5 |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 3 |
| | Unit: | day |
| Scan_Line_Flag1 | Meaning: | Scan line flag |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File, Image Data Record, Start Byte 1 |
| | Permitted_Values: | 0 - 7 |
| | Formation: | Each SeaWiFS scan line has a 2-bytes flag describing the errors detected during the time quality check Each bit represent a different error detected, if flag=0 no error 1 Bit (LSB): Data Gap (1=this line is an empty line added replacing a line missing during the acquisition) 2 Bit: Time bad (1=The time value of this line has been rectified because it was wrong) 3 Bit: Day bad (1=The day value of this line has been rectified because it was wrong) 4-8 Bits: Not used. 9-16 Bits: Not used |

| Name | Data Description Attributes | |
|--------------------------|--|---|
| Scan_Line_Flag2 | Meaning: Type: Position: Permitted_Values: Formation: | Flag to determine if the state vector was interpolated (each 3 lines only the original state vector is provided, otherwise interpolated) Unsigned Integer (2 Bytes) Annotation File, Annotation Data Record, Start Byte 1 0 -1023 Identical to Scan_Line_Flag1 for the first byte, plus indicates the lines where the navigation information has been interpolated Each bit represent a different error detected, if flag=0 no error 1 Bit (LSB): Data Gap (1=this line is an empty line replacing a line missing during the acquisition) 2 Bit: Time bad (1=The time value of this line has been rectified, 0=The time value is extracted from HRPT stream) 3 Bit: Day bad (1=The day value of this line has been rectified, 0=The day value is extracted from HRPT stream) 4-8 Bits: Not used. 9 Bit: Navigation Data interpolated (1=Interpolated, 0=calculated) 10 Bit: State Vector Interpolated (1=Interpolated, 0=extracted from HRPT stream) 11-16 (MSB) Bits: Not used |
| Scan_Line_Time | Meaning: Type: Position: Permitted_Values: Unit: | Time in milliseconds of this scan line Unsigned Integer (4 Bytes) Imagery File, Image Data Record, Start Byte 5 0 - 86400000 millisecond (ms) |
| Scan_Rate | Meaning: Type: Position: Permitted_Values: Unit: | Scan Rate measured in lines/second. ASCII Character String (4 Bytes) Leader File, Satellite Information Record, Start Byte 365 \$\$\$6 (constant) 1/s |
| Scene_Coordinates | Meaning: Type: Position: | The 4 scene corners (latitude and longitude) coordinates Structure (128 Bytes) Leader File, Scene Header Record, Start Byte 161 |
| Scene_Start_Time | Meaning: Type: Position: Formation: | Date and time of the first line of the scene ASCII Character String (32 Bytes) Leader File, Scene Header Record, Start Byte 97 (CCYYMMDDThhmmss,sss followed by Blanks) |
| Scene_Stop_Time | Meaning: Type: Position: Formation: | Date and time of the last line of the scene ASCII Character String (32 Bytes) Leader File, Scene Header Record, Start Byte 129 (CCYYMMDDThhmmss,sss followed by Blanks) |

| Name | Data Description Attributes | |
|----------------------------|-----------------------------|---|
| Semi_Major_Axis | Meaning: | Semi major axis |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte 17 |
| | Unit: | km |
| Spacecraft_ID | Meaning: | Spacecraft Identifier as provided in the HRPT frame |
| | Type: | Unsigned Integer (2 Bytes) |
| | Position: | Imagery File. Image Data Record, Start Byte 9 |
| Spacecraft_SOH | Meaning: | Spacecraft State of Health Telemetry as provided in the HRPT frame |
| | Type: | 775 * {(Integer (1 Byte))} |
| | Position: | Imagery File. Image Data Record, Start Byte 22 |
| Spacecraft_Time_Tag | Meaning: | Spacecraft Time Tag as provided in the HRPT frame |
| | Type: | 4 * {Unsigned Integer (2 Bytes)} |
| | Position: | Imagery File, Image Data Record, Start Byte 14 |
| State_Vector | Meaning: | SeaStar Satellite State Vectors for this scan line, the State vectors are in ECEF reference |
| | Type: | Structure (24 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 9 |
| State_Vector_X | Meaning: | Orbit Position data in the X direction |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 9 |
| | Unit: | meter |
| State_Vector_Y | Meaning: | Orbit Position data in the Y direction |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 13 |
| | Unit: | meter |
| State_Vector_Z | Meaning: | Orbit Position data in the Z direction |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 17 |
| State_Vector_X_Vel | Meaning: | Orbit Velocity data in the X direction |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 21 |
| | Unit: | meter/second |

| Name | Data Description Attributes | |
|----------------------------|-----------------------------|--|
| State_Vector_Y_Vel | Meaning: | Orbit Velocity data in the Y direction |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 25 |
| | Unit: | meter/second |
| State_Vector_Z_Vel | Meaning: | Orbit Velocity data in the Z direction |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 29 |
| | Unit: | meter/second |
| Software_ID | Meaning: | Software Release Number |
| | Type: | ASCII Character String (12 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 33 |
| | Position: | Leader File, File Descriptor Record, Start Byte 33 |
| | Position: | Imagery File, File Descriptor Record, Start Byte 33 |
| | Position: | Annotation File, File Descriptor Record, Start Byte 33 |
| Start_Synch_Pixel | Meaning: | Start-synch pixel for the 8 SeaWiFS bands as provided in the HRPT frame |
| | Type: | 8* {Unsigned Integer (2 Bytes)} |
| | Position: | Imagery File, Image Data Record, Start Byte |
| | Permitted_Values: | 0 -1023 |
| Stop_Synch_Pixel | Meaning: | Stop-synch pixel for the 8 SeaWiFS bands as provided in the HRPT frame |
| | Type: | 8* {Unsigned Integer (2 Bytes)} |
| | Position: | Imagery File, Image Data Record, Start Byte |
| | Permitted_Values: | 0 - 1023 |
| Tie_Point_Increment | Meaning: | Line number increment between two lines having the tie points location included (the tie points are provided for every line) |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Annotation File, Image File Descriptor Record, Start Byte |
| | Permitted_Values: | \$\$\$1 (constant) |
| Tie_Point_Lat | Meaning: | Latitude of the tie point |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 57 |
| | Permitted_Values: | -90000 - +90000 |
| | Unit: | 1/1000 degree |

| Name | Data Description Attributes | |
|----------------------------|-----------------------------|---|
| Tie_Point_Location | Meaning: | Structure containing information about the tie points |
| | Type: | Structure (342 Bytes) |
| | Position: | Annotation File, File Descriptor Record, Start Byte 181 |
| Tie_Point_Lon | Meaning: | Longitude of the tie point |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 61 |
| | Permitted_Values: | -180000 - +180000 |
| | Unit: | 1/1000 degree |
| Tie_Point_No | Meaning: | Number of tie points provided by line. The number currently used is 55. |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Annotation File, File Descriptor Record, Start Byte 189 |
| | Permitted_Values: | \$\$55 (constant) |
| Tie_Pixel_Positions | Meaning: | List of pixels positions where the tie points are calculated |
| | Type: | 55 * {ASCII Character String (6 Bytes)} |
| | Position: | Annotation File, File Descriptor Record, Start Byte 193 |
| | Permitted_Values: | \$\$\$\$\$1 - \$\$1285 |
| Tie_Point_Sat_Azi | Meaning: | SeaStar Satellite Azimuth angle value at the tie point |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 73 |
| | Permitted_Values: | -180000 - +180000 |
| | Unit: | 1/1000 degree |
| Tie_Point_Sat_Elev | Meaning: | SeaStar Satellite Elevation angle value at the tie point |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 77 |
| | Permitted_Values: | -180000 - +180000 |
| | Unit: | 1/1000 degree |
| Tie_Point_Sun_Azi | Meaning: | Sun Azimuth angle value at the tie point |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 65 |
| | Permitted_Values: | -180000 - +180000 |
| | Unit: | 1/1000 degree |

| Name | Data Description Attributes | |
|---------------------------|-----------------------------|---|
| Tie_Point_Sun_Elev | Meaning: | Sun Elevation angle value at the tie point |
| | Type: | Integer (4 Bytes) |
| | Position: | Annotation File, Annotation Data Record, Start Byte 69 |
| | Permitted_Values: | -180000 - +180000 |
| | Unit: | 1/1000 degree |
| Tie_Point_1_Line | Meaning: | First line number with tie points |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Annotation File, File Descriptor Record, Start Byte 181 |
| | Permitted_Values: | \$\$\$1 |
| Tilt_Angle | Meaning: | Tilt angle value of the SeaWiFS instrument during the scene acquisition |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Satellite Information Record, Start Byte 377 |
| | Permitted_Values: | \$\$\$\$-20.00000000, \$\$\$\$\$0.00000000, \$\$\$\$+20.00000000 |
| | Unit: | Degree |
| Upper_Left_Lat | Meaning: | Latitude of the upper left corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-90.00000000 - \$\$\$\$90.00000000 |
| | Unit: | Degree |
| Upper_Left_Lon | Meaning: | Longitude of the upper left corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-180.00000000 - \$\$\$180.00000000 |
| | Unit: | Degree |
| Upper_Right_Lat | Meaning: | Latitude of the upper right corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-90.00000000 - \$\$\$\$90.00000000 |
| | Unit: | Degree |

| Name | Data Description Attributes | |
|------------------------|-----------------------------|--|
| Upper_Right_Lon | Meaning: | Longitude of the upper right corner of the scene |
| | Type: | ASCII Character String (16 Bytes), following the F(16.8) notation |
| | Position: | Leader File, Scene Header Record, Start Byte |
| | Permitted_Values: | \$\$\$-180.00000000 - \$\$\$180.00000000 |
| | Unit: | Degree |
| VDF_Records | Meaning: | Number of records in the Volume Directory File |
| | Type: | ASCII Character String (4 Bytes) |
| | Position: | Volume Directory File, Volume Descriptor Record, Start Byte 165 |
| | Permitted_Values: | \$\$\$4 |
| Wavelengths | Meaning: | Upper and lower limits of wavelength, for the 8 nominal bands of SeaWiFS instrument. |
| | Type: | 16 * {ASCII Character String (8 Bytes)} |
| | Position: | Leader File, Satellite Information Record, Start Byte |
| | Unit: | nanometer |