

*Formats  
for  
Oceansat-2 Scatterometer Data Products*

**Advanced Image Processing Group  
Signal and Image Processing Area  
Space Applications Centre (ISRO)  
Ahmedabad  
Gujarat, India**



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## 1.0 Parameters list for Level-1B products in HDF-5

This section describes parameters list for various output products. Table 1.1 describes the structure for Level 1B header record.

| No. | ElementName                           | Num Bytes | Storage Format | No. | ElementName                | Num Bytes | Storage Format |
|-----|---------------------------------------|-----------|----------------|-----|----------------------------|-----------|----------------|
| 1   | ProductIdentification                 | 129       | string         | 17  | EphemerisType              | 17        | string         |
| 2   | OrganizationName                      | 17        | string         | 18  | ProductionDate             | 22        | string         |
| 3   | SatelliteName                         | 17        | string         | 19  | SkipStartTime              | 5*22      | string         |
| 4   | SensorName                            | 17        | string         | 20  | SkipStopTime               | 5*22      | string         |
| 5   | DataFormatType                        | 17        | string         | 21  | SkipStartScan              | 5*5       | 4d             |
| 6   | DataFormatVer                         | 17        | string         | 22  | SkipStopScan               | 5*5       | 4d             |
| 7   | ProcessorVer                          | 17        | string         | 23  | PRF                        | 5         | 4d             |
| 8   | EquatorCrossingLongitude (Descending) | 9         | 8.3f           | 24  | L1bActualScans             | 5         | 4d             |
| 9   | EquatorCrossingDate                   | 22        | string         | 25  | SliceSize                  | 9         | 8.3f           |
| 10  | OrbitPeriod                           | 9         | 8.3f           | 26  | LatScale                   | 9         | 8.6f           |
| 11  | OrbitInclination                      | 9         | 8.3f           | 27  | LonScale                   | 9         | 8.6f           |
| 12  | OrbitSemiMajorAxis                    | 9         | 8.3f           | 28  | IncAngleScale              | 9         | 8.6f           |
| 13  | OrbitEccentricity                     | 9         | 8.6f           | 29  | AziAngleScale              | 9         | 8.6f           |
| 14  | RevNumber                             | 12        | string         | 30  | Sigma0Scale                | 9         | 8.6f           |
| 15  | RangeBeginningDate                    | 22        | string         | 31  | SNRScale                   | 9         | 8.6f           |
| 16  | RangeEndingDate                       | 22        | string         | 32  | xfactorScale               | 9         | 8.6f           |
|     |                                       |           |                | 33  | BrightnessTemperatureScale | 9         | 8.6f           |

Table 1.2 describes the structure for output parameters of Scan Header.

| Element Name  | Storage Type | Num Bytes | Scale Factor |
|---------------|--------------|-----------|--------------|
| ScanStartTime | char         | 22        | -N.A.-       |
| ScanNumber    | uint16       | 2         | 1            |
| NumFootprints | uint16       | 2         | 1            |

Level 1B output parameters at footprint level are described in Table 1.3.

| Element Name           | Storage Type | Num Bytes | Scale Factor |
|------------------------|--------------|-----------|--------------|
| FootprintNumber        | uint16       | 2         | 1            |
| Latitude               | int16        | 2         | 0.01         |
| Longitude              | uint16       | 2         | 0.01         |
| IncidenceAngle         | int16        | 2         | 0.01         |
| AzimuthAngle           | uint16       | 2         | 0.01         |
| DopplerFreq            | float32      | 4         | 1            |
| Range                  | float32      | 4         | 1            |
| Sigma0                 | int16        | 2         | 0.01         |
| Kp                     | float32      | 4         | 1            |
| SNR                    | int16        | 2         | 0.01         |
| XFactor                | int16        | 2         | 0.01         |
| Kpa                    | float32      | 4         | 1            |
| Sigma0Flag             | uint16       | 2         | 1            |
| NumEleSlices           | uint8        | 1         | 1            |
| Brightness Temperature | uint16       | 2         | 0.01         |

Table 1.4 describes Level 1B output parameters at slice level.

| Element Name           | Storage Type | Num Bytes | Scale Factor |
|------------------------|--------------|-----------|--------------|
| SliceNumber            | uint16       | 2         | 1            |
| Latitude               | int16        | 2         | 0.01         |
| Longitude              | uint16       | 2         | 0.01         |
| IncidenceAngle         | int16        | 2         | 0.01         |
| AzimuthAngle           | uint16       | 2         | 0.01         |
| DopplerFreq            | float32      | 4         | 1            |
| Range                  | float32      | 4         | 1            |
| Sigma0                 | int16        | 2         | 0.01         |
| Kp                     | float32      | 4         | 1            |
| SNR                    | int16        | 2         | 0.01         |
| XFactor                | int16        | 2         | 0.01         |
| Sigma0Flag             | uint16       | 2         | 1            |
| Brightness Temperature | uint16       | 2         | 0.01         |

## 2.0 Parameters list for Level-2A products in HDF-5

Table 2.1 describes Level 2A header record structure.

| No. | ElementName                           | Num Bytes | Storage Format | No. | ElementName                | Num Bytes | Storage Format |
|-----|---------------------------------------|-----------|----------------|-----|----------------------------|-----------|----------------|
| 1   | ProductIdentification                 | 129       | string         | 16  | RangeEndingDate            | 22        | string         |
| 2   | OrganizationName                      | 17        | string         | 17  | EphemerisType              | 17        | string         |
| 3   | SatelliteName                         | 17        | string         | 18  | ProductionDate             | 22        | string         |
| 4   | SensorName                            | 17        | string         | 19  | SkipStartTime              | 5*<br>22  | string         |
| 5   | DataFormatType                        | 17        | string         | 20  | SkipStopTime               | 5*<br>22  | string         |
| 6   | DataFormatVer                         | 17        | string         | 21  | L2aActualWVCRows           | 5         | 4d             |
| 7   | ProcessorVer                          | 17        | string         | 22  | L2aActualWVCCells          | 5         | 4d             |
| 8   | EquatorCrossingLongitude (Descending) | 9         | 8.3f           | 23  | WVCSize                    | 9         | 8.3f           |
| 9   | EquatorCrossingDate                   | 22        | string         | 24  | LatitudeScale              | 9         | 8.6f           |
| 10  | OrbitPeriod                           | 9         | 8.3f           | 25  | LongitudeScale             | 9         | 8.6f           |
| 11  | OrbitInclination                      | 9         | 8.3f           | 26  | IncAngleScale              | 9         | 8.6f           |
| 12  | OrbitSemiMajorAxis                    | 9         | 8.3f           | 27  | AziAngleScale              | 9         | 8.6f           |
| 13  | OrbitEccentricity                     | 9         | 8.6f           | 28  | Sigma0Scale                | 9         | 8.6f           |
| 14  | RevNumber                             | 12        | string         | 29  | SNRScale                   | 9         | 8.6f           |
| 15  | RangeBeginningDate                    | 22        | string         | 30  | BrightnessTemperatureScale | 9         | 8.6f           |

Level 2A output parameters are provided in Table 2.2.

| Element Name       | Storage Type | Num Bytes | Scale Factor |
|--------------------|--------------|-----------|--------------|
| WVCRowTime         | char         | 22        | -N.A.-       |
| RowIndex           | uint16       | 2         | 1            |
| NumSigma0PerRow    | int16        | 2         | 1            |
| NumSigma0PerCell   | int16        | 2         | 1            |
| LatitudeFootprint  | int16        | 2         | 0.01         |
| LongitudeFootprint | uint16       | 2         | 0.01         |
| IncidenceAngle     | int16        | 2         | 0.01         |
| AzimuthAngle       | uint16       | 2         | 0.01         |
| Sigma0             | int16        | 2         | 0.01         |

|                           |         |   |      |
|---------------------------|---------|---|------|
| SNR                       | int16   | 2 | 0.01 |
| KpA                       | float32 | 4 | 1    |
| KpB                       | float32 | 4 | 1    |
| KpC                       | float32 | 4 | 1    |
| Sigma0QualFlag            | uint16  | 2 | 1    |
| CellIndex                 | uint8   | 1 | 1    |
| Brightness<br>Temperature | uint16  | 2 | 0.01 |

### 3.0 Parameters list for Level-2B products in HDF-5

Table 3.1 provides Level 2B header record structure.

| Table 3.1: Lev-2B header structure |  |           |                |     |                       |           |                |
|------------------------------------|--|-----------|----------------|-----|-----------------------|-----------|----------------|
| No.                                | ElementName                              | Num Bytes | Storage Format | No. | ElementName           | Num Bytes | Storage Format |
| 1                                  | ProductIdentification                    | 129       | string         | 18  | ProductionDate        | 22        | string         |
| 2                                  | OrganizationName                         | 17        | string         | 19  | SkipStartTime         | 5*22      | string         |
| 3                                  | SatelliteName                            | 17        | string         | 20  | SkipStopTime          | 5*22      | string         |
| 4                                  | SensorName                               | 17        | string         | 21  | L2bActualWVC<br>Rows  | 5         | 4d             |
| 5                                  | DataFormatType                           | 17        | string         | 22  | L2bActualWVC<br>Cells | 5         | 4d             |
| 6                                  | DataFormatVer                            | 17        | string         | 23  | WVCSize               | 9         | 8.3f           |
| 7                                  | ProcessorVer                             | 17        | string         | 24  | LatitudeScale         | 9         | 8.6f           |
| 8                                  | EquatorCrossingLongitude<br>(Descending) | 9         | 8.3f           | 25  | LongitudeScale        | 9         | 8.6f           |
| 9                                  | EquatorCrossingDate                      | 22        | string         | 26  | ModelSpeedScale       | 9         | 8.6f           |
| 10                                 | OrbitPeriod                              | 9         | 8.3f           | 27  | ModelDirScale         | 9         | 8.6f           |
| 11                                 | OrbitInclination                         | 9         | 8.3f           | 28  | WindSpeedScale        | 9         | 8.6f           |
| 12                                 | OrbitSemiMajorAxis                       | 9         | 8.3f           | 29  | WindDirScale          | 9         | 8.6f           |
| 13                                 | OrbitEccentricity                        | 9         | 8.6f           | 30  | CostFunctionScale     | 9         | 8.6f           |
| 14                                 | RevNumber                                | 12        | string         | 31  | WindSpeedSelScale     | 9         | 8.6f           |
| 15                                 | RangeBeginningDate                       | 22        | string         | 32  | WindDirSelScale       | 9         | 8.6f           |
| 16                                 | RangeEndingDate                          | 22        | string         |     |                       |           |                |
| 17                                 | EphemerisType                            | 17        | string         |     |                       |           |                |



Level 2B output parameters are provided in Table 3.2.

| Table 3.2: Lev-2B product parameters |              |           |              |
|--------------------------------------|--------------|-----------|--------------|
| Element Name                         | Storage Type | Num Bytes | Scale Factor |
| WVCRowTime                           | char         | 22        | -N.A.-       |
| RowIndex                             | uint16       | 2         | 1            |
| Latitude                             | int16        | 2         | 0.01         |
| Longitude                            | uint16       | 2         | 0.01         |
| ModelSpeed                           | int16        | 2         | 0.01         |
| ModelDir                             | uint16       | 2         | 0.01         |
| NumAmbigs                            | int8         | 1         | 1            |
| WindSpeed                            | int16        | 2         | 0.01         |
| WindDir                              | uint16       | 2         | 0.01         |
| CostFunction                         | uint16       | 2         | 0.001        |
| WVCSelection                         | int8         | 1         | 1            |
| WindSpeedSelection                   | int16        | 2         | 0.01         |
| WindDirSelection                     | uint16       | 2         | 0.01         |
| CostFunctionSelection                | uint16       | 2         | 0.001        |
| WVCQualFlag                          | uint16       | 2         | 1            |

#### 4.0 Parameters list for Level-3 products in HDF-5

Table 4.1 describes Level 3 header record structure.

| Table 4.1: Lev-3 Header Record |                                       |           |                |     |                   |           |                |
|--------------------------------|---------------------------------------|-----------|----------------|-----|-------------------|-----------|----------------|
| No.                            | ElementName                           | Num Bytes | Storage Format | No. | ElementName       | Num Bytes | Storage Format |
| 1                              | ProductIdentification                 | 129       | string         | 13  | ProductionDate    | 22        | string         |
| 2                              | OrganizationName                      | 17        | string         | 14  | StartRevNumber    | 12        | string         |
| 3                              | SatelliteName                         | 17        | string         | 15  | EndRevNumber      | 12        | string         |
| 4                              | SensorName                            | 17        | string         | 16  | StartRevTime      | 22        | string         |
| 5                              | DataFormatType                        | 17        | string         | 17  | EndRevTime        | 22        | string         |
| 6                              | DataFormatVer                         | 17        | string         | 18  | L3WVCRows         | 5         | 4d             |
| 7                              | ProcessorVer                          | 17        | string         | 19  | L3WVCCells        | 5         | 4d             |
| 8                              | EquatorCrossingLongitude (Descending) | 16*9      | 8.3f           | 20  | WVCSize           | 9         | 8.3f           |
| 9                              | EquatorCrossingDate                   | 16*22     | string         | 21  | ProdTypeIndicator | 11        | string         |
| 10                             | OrbitInclination                      | 9         | 8.3f           | 22  | WindSpeedScale    | 9         | 8.6f           |
| 11                             | OrbitSemiMajorAxis                    | 9         | 8.3f           | 23  | WindDirScale      | 9         | 8.6f           |

|    |                   |   |      |    |                   |   |      |
|----|-------------------|---|------|----|-------------------|---|------|
| 12 | OrbitEccentricity | 9 | 8.6f | 24 | Sigma0Scale       | 9 | 8.6f |
|    |                   |   |      | 25 | Sigma0stddevscale | 9 | 8.5f |

Level 3 output parameters for wind and sigma-0 products are described in Tables 4.2(a) and 4.2(b) respectively.

| Element Name    | Storage Type | Num Bytes | Scale Factor |
|-----------------|--------------|-----------|--------------|
| AscWindSpeed    | int16        | 2         | 0.01         |
| AscWindDir      | uint16       | 2         | 0.01         |
| AscWindQualFlag | uint16       | 2         | 1            |
| DesWindSpeed    | int16        | 2         | 0.01         |
| DesWindDir      | uint16       | 2         | 0.01         |
| DesWindQualFlag | uint16       | 2         | 1            |

| Element Name       | Storage Type | Num Bytes | Scale Factor |
|--------------------|--------------|-----------|--------------|
| Sigma0             | int16        | 2         | 0.01         |
| Sigma0QualFlag     | uint16       | 2         | 1            |
| Std. dev. Sigma0   | int16        | 2         | 0.01         |
| No.points averaged | int16        | 2         | 1            |

Information provided by sigma-0 quality flag is provided in Table 4.3.

| Bit position | Bit value=1 indicates              | Bit value=0 indicates                      |
|--------------|------------------------------------|--|
| 0 (LSb)      | Asc                                | Des  |
| 1            | Outer                              | Inner                                      |
| 2            | Fore                               | Aft  |
| 3            | Land                               | Sea  |
| 4            | $\sigma_0$ is poor                 | $\sigma_0$ is ok                           |
| 5            | kp is poor                         | kp is ok                                   |
| 6            | Invalid footprint                  | Valid footprint                            |
| 7            | Footprint contains saturated slice | Footprint does not contain saturated slice |
| 8            | Land-Water boundary                | No Land-Water boundary                     |
| 9            | Negative Sigma-0                   | No negative sigma-0                        |
| 10           |                                    |  |
| 11           |                                    |  |
| 12           |                                    |  |

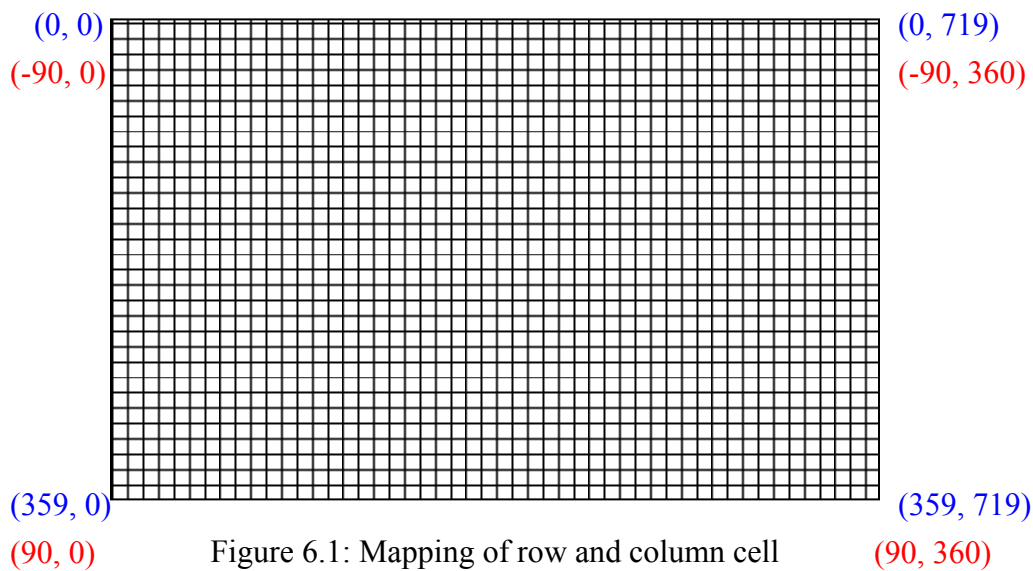
|         |  |                                     |
|---------|--|-------------------------------------|
| 13      | Ocean as per Sigma-0 data, however it was Ice in climatology | No-Ice if Bit-14 = 0 and Bit-15 = 0 |
| 14      | Ice as per Sigma-0 data and Climatology                      | No Ice If Bit-15 = 0                |
| 15(MSb) | Climatology Ice flag reproduced due to Sigma-0 data problem  | No Ice If Bit-14= 0                 |

Table 4.4 provides information provided by wind quality flag.

| Table 4.4: Wind Quality flag information |                        |           |   |
|--|------------------------|-----------|---|
| Bit Number                               | Related Parameter      | Bit Value | Significance  |
| 1  | Rain-Flag              | 0         | Rain-flagging not attempted                                       |
|  |                        | 1         | Rain-flagging attempted   |
| 2  |                        | 0         | Rain-free   |
|  |                        | 1         | Rain present /doubtful  |
| 3  | Ambiguity Filter       | 0         | Model data available  |
|  |                        | 1         | Model data not available  |
| 4  |                        | 0         | Amb filtered using model  |
|  |                        | 1         | Amb filtered without model  |
| 5  |                        | 0         | Sufficient neighbors  |
|  |                        | 1         | Insufficient neighbors, Ambiguity not filtered                    |
| 6  | Vector quality         | 0         | Retrieval attempted   |
|  |                        | 1         | Retrieval aborted due to poor quality or insufficient sigma0 data |
| 7  |                        | 0         | Quality is good   |
|  |                        | 1         | Winds out of range or no solutions                                |
| 8  |                        | 0         | Quality good wrt to rain  |
|  |                        | 1         | High winds, possibly rain contamination                           |
| 9  | Surface                | 0         | Pure ocean  |
|  |                        | 1         | Other surfaces (Retrieval aborted)                                |
| 10                                       | Atmospheric Correction | 0         | Correction data available   |
|  |                        | 1         | Correction data not available                                     |
| 11                                       | Orbit-mean sigma0      | 0         | Normal  |
|  |                        | 1         | Abnormal  |
| 12                                       | Orbit-mean wind speed  | 0         | Normal  |
|  |                        | 1         | Abnormal  |
| 13-16                                    | Spares                 |           |   |

## 5.0 Mapping of Grid cells of Level-3S & 3W to Latitude and Longitude on earth:

Figure 6.1 demonstrates the correspondence between physical latitude (-90 to +90) to row cells (0 to 359) and longitude (0 to 360) to column cells (0 to 719) for 50 km grid of Level-3 (Sigma-0 VV & HH and Wind) products. In the figure, product boundaries in terms of cell no. are shown in blue colour and corresponding latitude/ longitude are in red colour.



## 6.0 File naming conventions:

Filename conventions for various levels of data products are mentioned below:

- ❖ Level 1B: S1L1BYYYYDDD\_NNNNN\_MMMMM.h5
- ❖ Level 2A: S1L2AYYYYDDD\_NNNNN\_MMMMM.h5
- ❖ Level 2B: S1L2BYYYYDDD\_NNNNN\_MMMMM.h5
- ❖ Level 3: S1L3PPYYYYDDD.h5

where:

- L\$ : Indicates Level of product
- YYYY: The calendar year when data was acquired
- DDD: The day of the year when data was acquired
- NNNNN: satellite orbit no. at start of revolution

- MMMMM: satellite orbit no. at end of revolution
- PP: Indicator of wind(WW) or sigma0(SV or SH) product

The date *1<sup>st</sup> January 2007* corresponds to day number *1*, and *31<sup>st</sup> December 2007* corresponds to day number *365*. Using this convention, product names for *31<sup>st</sup> December 2007* and orbit no. *12345* will be as shown in Table 7.1. Level-1B, 2A and 2B products are defined revolution wise (north pole to north pole) while Level-3W and 3S are global grid (0.5 deg) products.

**Table 7.1: File naming convention for Oceansat-2 Scatterometer**

| Product Level        | Product File Name           |
|----------------------|-----------------------------|
| Level 1B             | S1L1B2007365_12345_12346.h5 |
| Level 2A             | S1L2A2007365_12345_12346.h5 |
| Level 2B             | S1L2B2007365_12345_12346.h5 |
| Level 3 Wind         | S1L3WW2007365.h5            |
| Level 3 v-pol sigma0 | S1L3SV2007365.h5            |
| Level 3 h-pol sigma0 | S1L3SH2007365.h5            |

**Contact Address: Kirti Padia**  
**Advanced Image Processing Group**  
**Space Applications Centre**  
**AHMEDABAD- 380 015**  
**GUJARAT**  
**INDIA**  
**Email: kirtipadia@sac.isro.gov.in**  
**kirtipadia@yahoo.com**