[NOTE – Part to be merged back to `651x2g0-[1-5,8]-core.docx` document]

ANNEX E ESA-SAFE – TRANSFER OF SAFE PRODUCTS

E1 CONTEXT AND BENEFITS

SAFE (Standard Archive Format for Europe, see "Standard Archive Format for Europe - Control Book - Volume 1 - Core Specifications - PGSI-GSEG-EOPG-FS-05-0001- v2.2.1", will be available at http://earth.esa.int/SAFE/) is an Earth Observation data archiving format standardized through the efforts of several European national, institutional and industrial space stakeholders. It provides a specification for the organization and content of an OAIS compatible Archival Information Package (AIP).

The ESA-SAFE use case is based on data and documentation provided by ESA (European Space Agency). These data are samples and subset from the European Remote Sensing Satellite (ERS) Synthetic Aperture Radar (SAR), and tailored for the scope of this test case.

In this use case, SAFE 2.0 Packages are wrapped inside SIPs for submission to an Archive. This tutorial illustrates the possibility of:

- Detailing the contents of the SAFE packages or not (packages seen as black boxes),
- Defining relationships (provides context for, provides representation information for, provides documentation of, …) among the packages or among the files contained in the packages, which might be used for example to identify the Representation Information for data format validation at the Archives side,
- Defining and controlling sequencing constraints among the delivered SIPs,
- Validating the integrity of the SIPs containing SAFE packages.

Two ways of modeling the transfer between the Producer and the Archive are proposed in this section so as to underline that such modeling depends on the level of details needed and the level of validation desired by the Producer and required by the Archive. These two ways of modeling are referred to further in the section as:

- "simple case": when the SAFE packages are transferred as black boxes,
- "detailed case": when the SAFE packages are described in detail.

Notes:

1) The SAFE 2.0 standard is still undergoing development and certain aspects may change without notice. The files and packages provided as examples are not actual SAFE Packages guaranteed to be valid against the SAFE 2.0 standard.
2) For practical reasons, the "MEASUREMENT.DAT" file included in the example SAFE 2.0 EO Product Package is a truncated version of an actual ERS SAR Level-0 strip line (which is typically a few Gigabytes large).

E2 OBJECTS TO BE TRANSFERRED

The objects selected for transfer consist of four examples of an ERS SAR SAFE 2.0 EO (Earth Observation) product package with their corresponding Representation Information (three other SAFE packages) and associated documentation. For convenience, the former packages are called SAFE Data Products.

Here is a short description of all packages pertaining to this use case:

1) Four SAFE Data Products transferred one by one. These products are:

- ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE which corresponds to a set of files as defined by the SAFE 2.0 format,
- And three copies of it (with XXXX, YYYY and ZZZZ instead of the string “43E3”) to simulate sequential delivery of additional products.

2) The associated Representation Information, in turn made up of three SAFE packages:

- The first package is the so-called Base Schemas Package, which is a SAFE 2.0 Representation Information Package. This package has to be present in any SAFE 2.0 compliant Archive. Its name in this case is ESA_101213T122045_1A3F_BAS.SAFE.
- The two other packages are also SAFE 2.0 Representation Information Packages but provide ERS SAR L0 Representation Information of the metadata (XSD schemas) and data (Data Format Description Language –DFDL- schemas) components present in all ERS SAR L0 SAFE Data Products. They are named respectively
  ERS-AMI-SAR-LEVEL-0_101213T122045_35AF_MTD.SAFE and
  ERS-AMI-SAR-LEVEL-0_101213T122045_1F25_DAT.SAFE.

3) A set of documents related to ERS missions (in PDF format) providing context information.

The objects to transfer to the Archive are gathered under three different directories:

- A directory named “SAFE_REPINFO” for the three SAFE 2.0 Representation Information Packages,
- A directory named “EO_PRODUCTS” for the four SAFE Data Products,
- A directory named “ERS-DOC” for the PDF documents.

The organization of the “simple case” is outlined in the following tree, where all packages are seen as black boxes (zip archives):

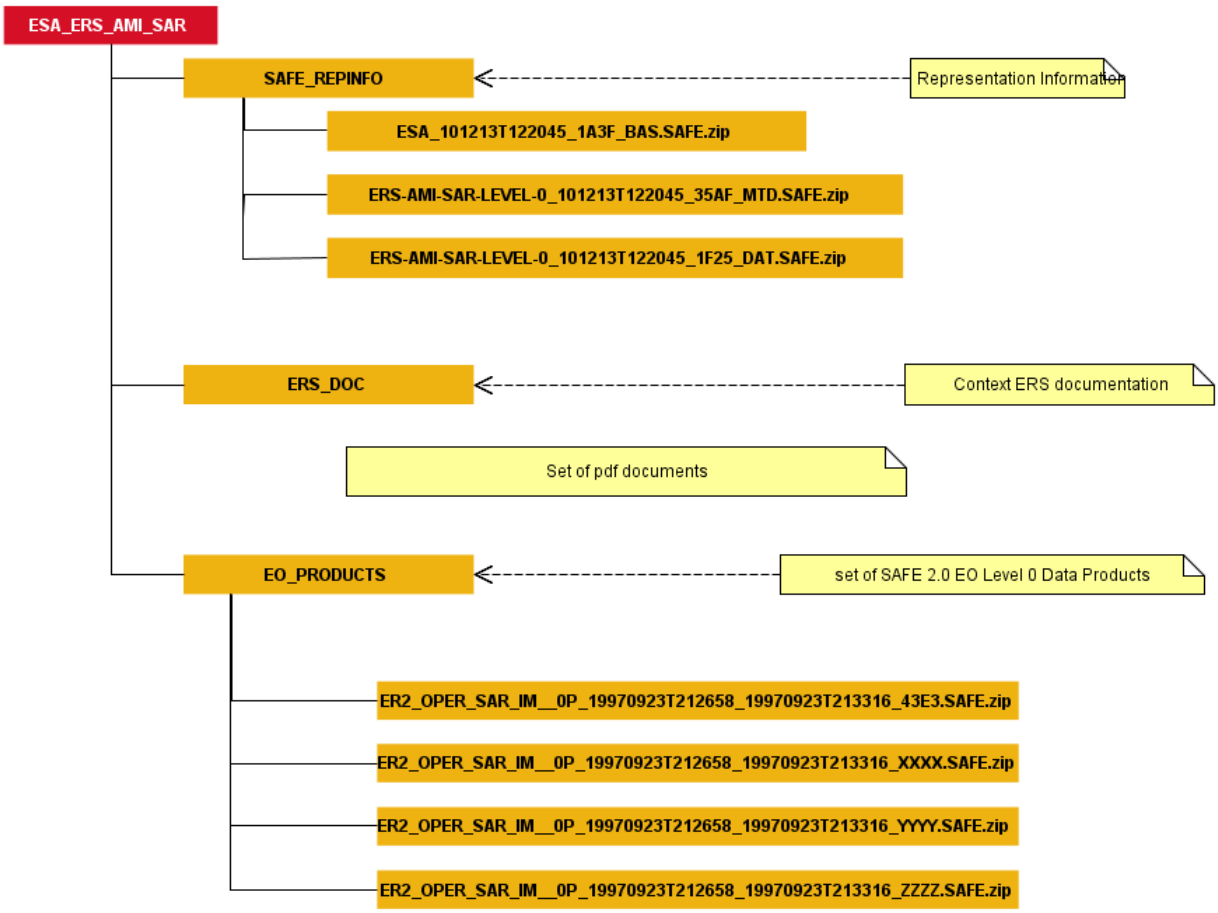

Figure E-1: ESA SAFE Repository Layout in « Simple Case »

The organization of the "detailed case" is outlined in the following tree where the contents of the packages are detailed at file level (not all files are shown here):

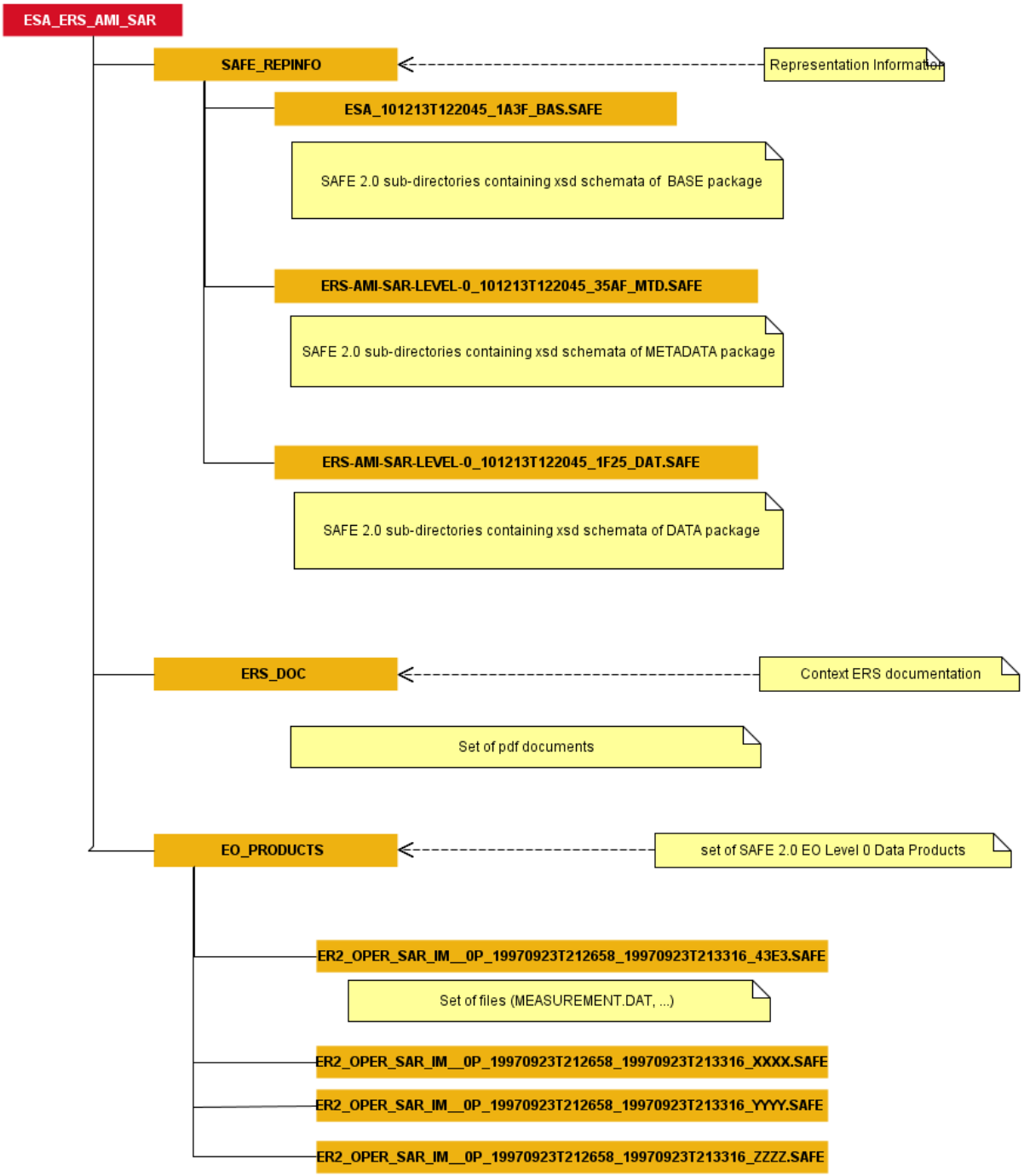

Figure E-2: ESA SAFE Repository Layout in « Detailed Case »

E3 MODEL OF OBJECTS FOR TRANSFER AND SIP CONSTRAINTS

E3.1 MOT

The Producer and the Archive jointly define the MOT, taking into consideration the level of details needed for understanding and the level of validation desired. Considerations include what objects are to be transferred, their frequency of occurrence, what relationships exist among the objects, and under what format they will be provided to the Archive. The Producer and Archive also specify the naming rules for the different identifiers of Collections, Transfer Object Types, Producer Sources, etc…

The following table presents a comparison between the two modeling choices:

	Simple Case	**Detailed Case**
Data as described (Producer)	Zip packages (black boxes)	Unpacked data
Model of Transfer	Minimal description	Up to the individual files inside packages
Links	High level between zip files	Between the individual files inside packages
Integrity	Checksum of SAFE package	Checksum of each Data Object (including SAFE Manifest) inside packages
Validations	Checksum (SAFE package), sequencing constraints, SIPs, and conformity to the Model	, Checksum of each individual Data Object, sequencing constraints, SIPs, and conformity to the Model

Table E-3: Comparison Between Simple and Detailed MOT

As three kinds of objects have been identified (data, Representation Information, documentation), the ESA-SAFE MOT chose to specify three Collections under the project root Collection ESA_ERS_AMI_SAR:

- COL_ERS-AMI-SAR-EO-DATA (level 0 data),
- COL_ERS-AMI-SAR-Rep-Info (Representation Information) and
- COL_ERS-AMI-SAR-DOC (documentation).

The COL_ERS-AMI-SAR-EO-DATA Collection logically gathers the description of a SAFE Data Product (with at least one occurrence and an unknown number of delivered data products): TRF_ER2_OPER_SAR_IM_PRODUCT.

The COL_ERS-AMI-SAR-Rep-Info Collection logically gathers the Representation Information conveyed by three Transfer Object Types (with only one occurrence for each) corresponding to each kind of SAFE 2.0 Representation Information package:

- TRF_BASE_PACKAGE_REP_INFO describes the Base Schemas Package,
- TRF_MTD_PACKAGE_REP_INFO describes the Metadata Schemas Package,
- TRF_DAT_PACKAGE_REP_INFO describes the Data Schemas Package.

The COL_ERS-AMI-SAR-DOC Collection logically gathers the description of the associated multi-mission documents (with only one occurrence): TRF_ERS_AMI_SAR_DOC.

Associations can be defined in both the simple and the detailed cases as follows:

- Representation association between the SAFE Data Product (TRF_ER2_OPER_SAR_IM_PRODUCT) and its Representation Information:
  - with TRF_MTD_PACKAGE_REP_INFO for the Representation Information of the metadata components of the SAFE Data Product,
  - with TRF_DAT_PACKAGE_REP_INFO for the Representation Information of the data components of the SAFE Data Product,
- Documentation association between the SAFE Data Product (TRF_ER2_OPER_SAR_IM_PRODUCT) and the general documentation
  - with TRF_ERS_AMI_SAR_DOC for the context documentation for the data package,
- Links (dependencies) among the Representation Information packages:
  - between metadata Representation Information package (TRF_MTD_PACKAGE_REP_INFO) and the base package (TRF_BASE_PACKAGE_REP_INFO),
  - between the data Representation Information package (TRF_DAT_PACKAGE_REP_INFO) and the base package (TRF_BASE_PACKAGE_REP_INFO).

Figure E-4 is a screenshot taken via the CNES prototype showing the MOT (Collections, Transfer Object Types and relationships) for the ESA-SAFE use case. The visualization is the same for both cases (simple and detailed).

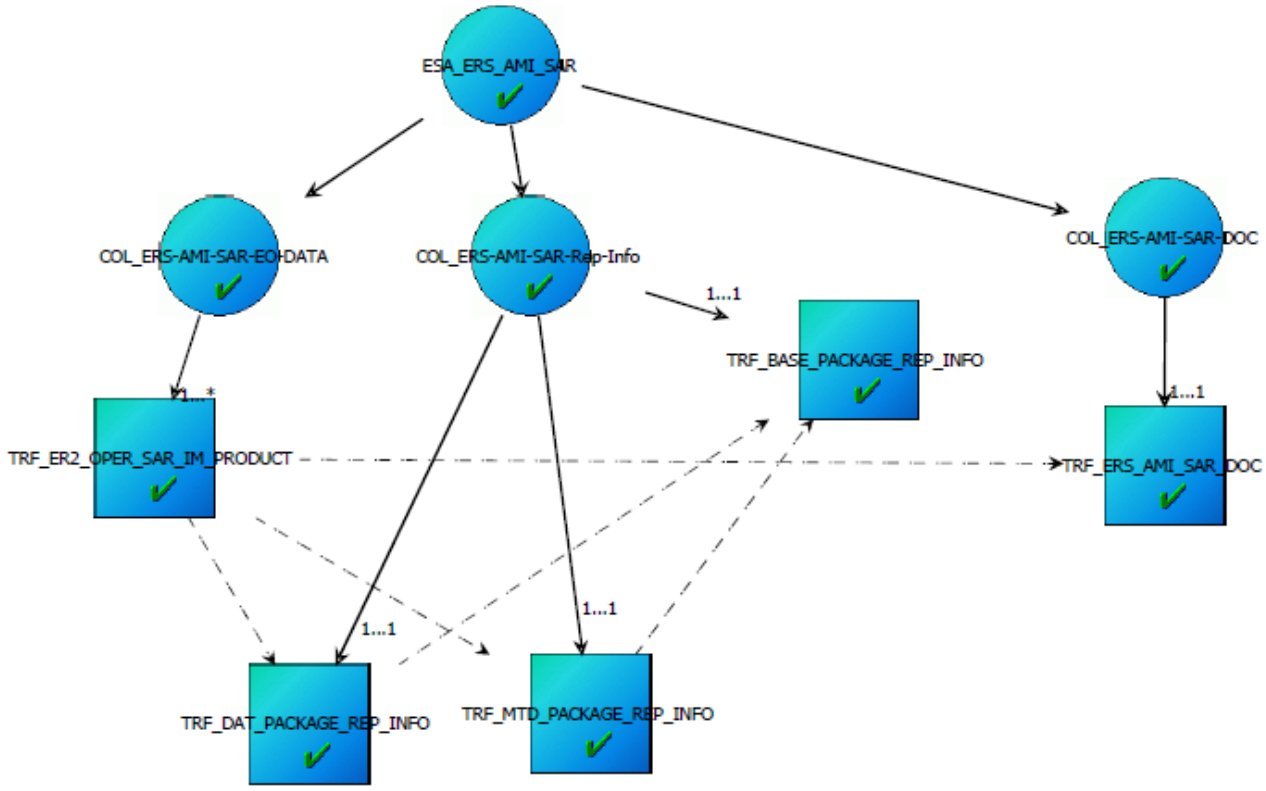

Figure E-4: ESA SAFE MOT

In the « detailed case » the description of a SAFE Level 0 Data Product corresponds to the transfer of four files (MEASUREMENT.SIX, MEASUREMENT.DAT, and two XML files).

If a Validation Phase has to be performed on the content of the product with regards to its DFDL description, each concerned file has to be clearly identified within its corresponding transfer description in order to add the required links at object level, i.e. between the object description corresponding to the MEASUREMENT.DAT file within TRF_ER2_OPER_SAR_IM_PRODUCT transfer description and the object description corresponding to the DFDL file within TRF_DAT_PACKAGE_REP_INFO transfer description.

Note that the “detailed case” does not implement this level of detail just explained (see Annex for further information).

E3.2 SIP CONSTRAINTS

Once the MOT has been specified, the next steps are:

- The identification of the Producer Archive Project Identifier,
- The identification of the SIPs,

- The sequence order of the SIPs.

The known delivery order constraints are:

1) SAFE Data Products are transferred one by one, one after the other for practical reasons since the products are a few Gigabytes large and for demonstration reasons (simulating a mission lifecycle when products are regularly provided).
2) SAFE Data Products have to be ingested in the Archive after all Representation Information Packages because SAFE Data products point to SAFE Representation Information packages. Note: also the case if the Archive wants to apply data file validation against the DFDL and XSD schemas –that is not the reason here.
3) Among the Representation Information Packages, the following constraints exist:
   - The Base Representation Information Schemas Package has to be ingested before any other package and is to be provided only once.
   - The two other Representation Information packages have to be ingested before any SAFE Product Package and are to be provided once.
4) The documents can be ingested all at the same time and at any moment.

These constraints lead to the definition of the following sequence order: base Representation Information package first, followed by metadata Representation Information schemas package, followed by data Representation Information schemas package, then by documentation package, finally by 1 up to n (=4) ESA SAFE Data Products. The sequence order is the same in both cases (simple and detailed). Consequently, 5 types of SIP are defined to match this delivery sequence order, each containing a single transfer object type. (Note that, alternatively, only 2 types of SIP could have been defined to accomplish the task: one SIP could contain the 3 Representation Information schema packages - base, metadata and data – as well as the documentation package since they could all arrive together, and a second type of SIP would contain the ESA SAFE Data Product).

The following figure presents the 5 types of SIP, their contents and their associated sequencing constraints:

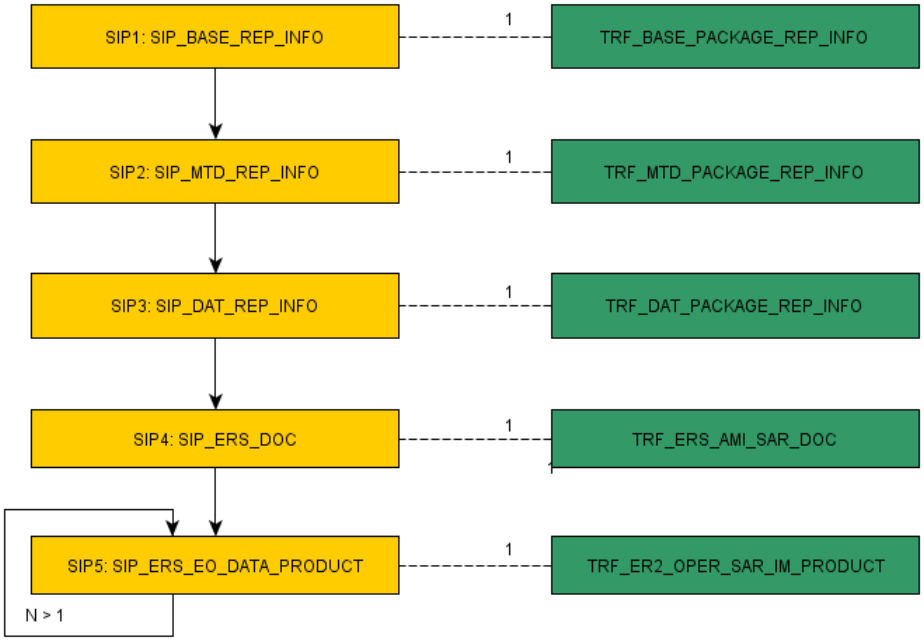

Figure E-5: ESA SAFE SIP and sequencing constraints

E4 SIPS

Up to 8 SIPs are generated as zip files and transferred to the Archive: the three Representation Information SIPs (SIP1 for BASE, SIP2 for MTD and SIP3 for DAT), then the documentation SIP4 followed by n (=1 to 4) SIPs (SIP5 up to SIP8), each containing one SAFE Data Product.

A SIP is based on the XFDU standard extended by the PAIS schema and therefore consists of:

- An **xfdumanifest.xml** file providing the following information:
  - The packageHeader containing in particular the PAIS sipGlobalInformation: sipID, producerSourceID, producerArchiveProjectID, sipContentTypeID, sipSequenceNumber,
  - The informationPackageMap describing the contained PAIS sipTransferObject corresponding to the Transfer Object Types authorized within the SIP,
  - The dataObjectSection listing the different transferred objects: a unique identifier, the size in bytes of the file, its location within the SIP, its MD5 checksum for integrity validation.
- The **different transferred objects** as files or directories/subdirectories containing files.

The following manifest is the one contained in SIP5 corresponding to a SIP transferring a SAFE Data Product in the “simple case” where the SAFE Data Products are handled as black boxes. Its sequence number is 5, there is only one object corresponding to a zip file containing the Data Product **ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE.**

PAIS elements/items	Contents
SIPGlobalInformation	
	sipID : ESA_ERS_AMI_SAR-SIP-0005 **producerSourceID :** ESA_ERS_PROJECT **producerArchiveProjectID:** ESA_ERS_AMI_SAR **sipContentTypeID:** SIP_ERS_EO_DATA_PRODUCT **sipSequenceNumber:** 5
sipTransferObject	
	descriptorID: TRF_ER2_OPER_SAR_IM_PRODUCT **transferObjectID:** TRF_ER2_OPER_SAR_IM_PRODUCT-0001 **lastTransferObjectFlag:** FALSE
sipTransferObjectGroup	
	associatedDescriptorGroupTypeID: GroupEODataProductPackagePart
sipDataObject	
	associatedDescriptorDataID: GroupEODataProductPackagePart_DO **dataObjectPointer:dataObjectID**= "DO-GroupEODataProductPackagePart_DO-0001”
dataObject	
	ID="DO-GroupEODataProductPackagePart_DO-0001" **size=**"8921”
	byteStream
	size="8921” fileLocation locatorType="**URL**" href="file:**ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE.zip**" checksum checksumName="MD5" **e6c99ab18c96015a267874c371accfc0**

Table E-6: Manifest File of a SIP of type “SIP_ERS_EO_DATA_PRODUCT” for « Simple Case »

The following manifest is an extract of the one contained in SIP5 corresponding to a SIP transferring a SAFE Data Product in the “detailed case” where the contents of the SAFE Data Products are detailed. Its sequence number is 5, there are four objects corresponding to the different files contained in the SAFE Data Product**:** MEASUREMENT.DAT, SAFE-SAR-ERS-AMI-SAR-LEVEL0.XML, MEASUREMENT.SIX and the SAFE manifest file.

PAIS elements/items	Contents
SIPGlobalInformation	
	sipID : ESA_ERS_AMI_SAR_det-SIP-0005

	producerSourceID : ESA_ERS_PROJECT **producerArchiveProjectID:** ESA_ERS_AMI_SAR_det **sipContentTypeID:** SIP_ERS_EO_DATA_PRODUCT_det **sipSequenceNumber:** 5	
sipTransferObject		
	descriptorID: TRF_ER2_OPER_SAR_IM_PRODUCT_det **transferObjectID:** TRF_ER2_OPER_SAR_IM_PRODUCT_det-0001 **lastTransferObjectFlag:** FALSE	
sipTransferObjectGroup		
	associatedDescriptorGroupTypeID: GroupEODataProductPackagePart_det	
	sipTransferObjectGroup	
		associatedDescriptorGroupTypeID: GroupEODataProduct_det **transferObjectGroupInstanceName:** ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE
sipDataObject		
	associatedDescriptorDataID: GroupEODataProduct_Meas_det **dataObjectPointer:dataObjectID**= " DO-GroupEODataProduct_Meas_det-0001”	
sipDataObject		
	associatedDescriptorDataID: GroupEODataProduct_XML_det **dataObjectPointer:dataObjectID**= " DO-GroupEODataProduct_XML_det-0001”	
sipDataObject		
	associatedDescriptorDataID: GroupEODataProduct_XML_det **dataObjectPointer:dataObjectID**= " DO-GroupEODataProduct_XML_det-0002”	
sipDataObject		
	associatedDescriptorDataID: GroupEODataProduct_SIX_det **dataObjectPointer:dataObjectID**= " DO-GroupEODataProduct_SIX_det-0001”	
dataObject		
	ID=" DO-GroupEODataProduct_Meas_det-0001" **size=**" 2097152”	
	byteStream	
		size=" 2097152” fileLocation locatorType="**URL**" href="file: **ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/MEASUREMENT.DAT**" checksum checksumName="MD5" **b2d1236c286a3c0704224fe4105eca49**

dataObject		
	ID=" DO-GroupEODataProduct_XML_det-0001" **size=**" 11239”	
	byteStream	
		size=" 11239” fileLocation locatorType="**URL**" href="file: **ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/MANIFEST.XML**" checksum checksumName="MD5" **10349ee55dc45733fbb2f674e706a7a8**
dataObject		
	ID=" DO-GroupEODataProduct_XML_det-0002" **size=**" 5458”	
	byteStream	
		size=" 5458” fileLocation locatorType="**URL**" href="file: **ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/SAFE-SAR-ERS-AMI-SAR-LEVEL0.XML**" checksum checksumName="MD5" **d81bc5df27f32d9562beeec587b87775**
dataObject		
	ID=" DO-GroupEODataProduct_SIX_det-0001" **size=**" 2772”	
	byteStream	
		size=" 2772” fileLocation locatorType="**URL**" href="file: **ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/MEASUREMENT.SIX**" checksum checksumName="MD5" **a7f8208e7e86929979ab0fdd407b605b**

Table E-7: Manifest File of a SIP of type “SIP_ERS_EO_DATA_PRODUCT” for « Detailed Case »

ANNEX F ESA-SAFE USE CASE DESCRIPTORS

This annex contains the PAIS XML descriptors of the ESA-SAFE detailed and simple use cases.

F.1 SIMPLE CASE

F1.1 ESA-SAFE – ESA_ERS_AMI_SAR COLLECTION DESCRIPTOR (ROOT)

```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>ESA_ERS_AMI_SAR</descriptorID>
  </identification>
  <description>
    <collectionTitle>Level 0 of ERS AMI SAR experiments</collectionTitle>
    <collectionDescription>LO data corresponding to Earth's oceans and land images obtained with a suite
of instruments, one of which is a SAR on the AMI, onboard a ERS satellite</collectionDescription>
  </description>
  <relation>
    <parentCollection>NONE</parentCollection>
  </relation>
</collectionDescriptor>
```

F1.2 ESA-SAFE – COL_ERS_AMI_SAR-REP-INFO COLLECTION DESCRIPTOR

```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>COL_ERS-AMI-SAR-Rep-Info</descriptorID>
  </identification>
  <description>
    <collectionTitle>ERS-AMI-SAR Representation Information for L0 data
   </collectionTitle>
    <collectionDescription>A set of SAFE v2.0 packages providing all the Representation Information
necessary for L0 data products </collectionDescription>
  </description>
  <relation>
    <parentCollection>ESA_ERS_AMI_SAR</parentCollection>
  </relation>
</collectionDescriptor>
```

F1.3 ESA-SAFE – COL_ERS_AMI_SAR-DOC COLLECTION DESCRIPTOR

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>COL_ERS-AMI-SAR-DOC</descriptorID>
  </identification>
  <description>
    <collectionTitle>ERS-AMI-SAR associated documentation</collectionTitle>
    <collectionDescription>All documents necessary for the understanding of the mission, instruments,
products, and sips</collectionDescription>
  </description>
  <relation>
    <parentCollection>ESA_ERS_AMI_SAR</parentCollection>
  </relation>
</collectionDescriptor>
```


F1.4 ESA-SAFE – COL_ERS-SAR-EO-DATA COLLECTION DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>COL_ERS-AMI-SAR-EO-DATA</descriptorID>
  </identification>
  <description>
    <collectionTitle>EO Product of level 0 for ERS-AMI-SAR
   </collectionTitle>
    <collectionDescription>COL_ERS-AMI-SAR-LEVEL-0</collectionDescription>
  </description>
  <relation>
    <parentCollection>ESA_ERS_AMI_SAR</parentCollection>
  </relation>
</collectionDescriptor>
```


F1.5 ESA-SAFE – TRF_BASE_PACKAGE_REP_INFO TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0014</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>TRF_BASE_PACKAGE_REP_INFO</descriptorID>
  </identification>
  <description>
    <transferObjectTypeTitle>Base Package Representation Information </transferObjectTypeTitle>
<transferObjectTypeDescription>&lt;transferObjectTypeDescription&gt;Representation information to be
present in any SAFE 2.0 compliant archive. It should be ingested before any other packages.
</transferObjectTypeDescription>
    <transferObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
```

```
    <maxOccurrence>1</maxOccurrence>
  </transferObjectTypeOccurrence>
 </description>
 <relation>
  <parentCollection>COL_ERS-AMI-SAR-Rep-Info</parentCollection>
 </relation>
 <groupType>
  <groupTypeID>GroupBaseRepInfoPackagePart</groupTypeID>
  <groupTypeStructureName>set</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupBaseRepInfoPackagePart_DO</dataObjectTypeID>
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
      <mimeType>binary</mimeType>
    </dataObjectTypeFormat>
    <dataObjectTypeEncoded>
      <encodingName>application/zip</encodingName>
      <encodingDescription />
    </dataObjectTypeEncoded>
  </dataObjectType>
 </groupType>
</transferObjectTypeDescriptor>
```


F1.6 ESA-SAFE – TRF_MTD_PACKAGE_REP_INFO TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
 <identification>
  <descriptorModelID>CCSD0014</descriptorModelID>
  <descriptorModelVersion>1.0</descriptorModelVersion>
  <descriptorID>TRF_MTD_PACKAGE_REP_INFO</descriptorID>
 </identification>
 <description>
  <transferObjectTypeTitle>Meta Data Package Representation Information
  </transferObjectTypeTitle>
  <transferObjectTypeDescription>General Documentation associated to ERS EO
SIP formats: Strip line and Strip scene
  </transferObjectTypeDescription>
  <transferObjectTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </transferObjectTypeOccurrence>
 </description>
 <relation>
  <parentCollection>COL_ERS-AMI-SAR-Rep-Info</parentCollection>
 </relation>
 <groupType>
```

```
  <groupTypeID>GroupMTDRepInfoPackagePart</groupTypeID>
  <groupTypeStructureName>Set</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupMTDRepInfoPackagePart_DO</dataObjectTypeID>
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
      <mimeType>binary</mimeType>
    </dataObjectTypeFormat>
    <dataObjectTypeEncoded>
      <encodingName>application/zip</encodingName>
      <encodingDescription>Zip Archive file</encodingDescription>
    </dataObjectTypeEncoded>
          <dataObjectTypeAssociation>
     <targetID>TRF_BASE_PACKAGE_REP_INFO</targetID>
    <relationDescription>
      <relationType>linked Representation Information</relationType>
      <relationTextualDescription>meaningful with base Package
Representation Information
      </relationTextualDescription>
      </relationDescription>
    </dataObjectTypeAssociation>
  </dataObjectType>
 </groupType>
</transferObjectTypeDescriptor>
```


F1.7 ESA-SAFE – TRF_DAT_PACKAGE_REP_INFO TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
 <identification>
  <descriptorModelID>CCSD0014</descriptorModelID>
  <descriptorModelVersion>1.0</descriptorModelVersion>
  <descriptorID>TRF_DAT_PACKAGE_REP_INFO</descriptorID>
 </identification>
 <description>
  <transferObjectTypeTitle>Data Package Representation Information
  </transferObjectTypeTitle>
  <transferObjectTypeDescription>ERS SAR L0 Representation Information of
        the data components (DFDL schemas)
  </transferObjectTypeDescription>
  <transferObjectTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </transferObjectTypeOccurrence>
 </description>
 <relation>
```

```
    <parentCollection>COL_ERS-AMI-SAR-Rep-Info</parentCollection>
  </relation>
  <groupType>
    <groupTypeID>GroupDatRepInfoPackagePart</groupTypeID>
    <groupTypeStructureName>Set</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <dataObjectType>
      <dataObjectTypeID>GroupDatRepInfoPackagePart_DO</dataObjectTypeID>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>1</maxOccurrence>
      </dataObjectTypeOccurrence>
      <dataObjectTypeFormat>
        <mimeType>binary</mimeType>
      </dataObjectTypeFormat>
      <dataObjectTypeEncoded>
        <encodingName>application/zip</encodingName>
        <encodingDescription>Zip Archive file</encodingDescription>
      </dataObjectTypeEncoded>
            <dataObjectTypeAssociation>
       <targetID>TRF_BASE_PACKAGE_REP_INFO</targetID>
      <relationDescription>
        <relationType>linked Representation Information</relationType>
        <relationTextualDescription>meaningful with base Package
                Representation Information
        </relationTextualDescription>
        </relationDescription>
      </dataObjectTypeAssociation>
    </dataObjectType>
  </groupType>
</transferObjectTypeDescriptor>
```


F1.8 ESA-SAFE – TRF_ERS_AMI_SAR_DOC TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0014</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>TRF_ERS_AMI_SAR_DOC</descriptorID>
  </identification>
  <description>
    <transferObjectTypeTitle>Documentation associated with the data products
    </transferObjectTypeTitle>
    <transferObjectTypeDescription>Various documents related to ERS L0 data
        products
    </transferObjectTypeDescription>
    <transferObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </transferObjectTypeOccurrence>
```

```
  </description>
  <relation>
    <parentCollection>COL_ERS-AMI-SAR-DOC</parentCollection>
  </relation>
  <groupType>
    <groupTypeID>GroupEODoc</groupTypeID>
    <groupTypeStructureName>Directory</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <dataObjectType>
      <dataObjectTypeID>GroupEODoc_DO</dataObjectTypeID>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>6</maxOccurrence>
      </dataObjectTypeOccurrence>
      <dataObjectTypeFormat>
        <mimeType>application/pdf</mimeType>
      </dataObjectTypeFormat>
    </dataObjectType>
  </groupType>
</transferObjectTypeDescriptor>
```


F1.9 ESA-SAFE – TRF_ER2_OPER_SAR_IM_PRODUCT TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0014</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>TRF_ER2_OPER_SAR_IM_PRODUCT</descriptorID>
  </identification>
  <description>
    <transferObjectTypeTitle>EO Data Product</transferObjectTypeTitle>
    <transferObjectTypeDescription>ERS SAR L0 data product
    </transferObjectTypeDescription>
    <transferObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown />
    </transferObjectTypeOccurrence>
  </description>
  <relation>
    <parentCollection>COL_ERS-AMI-SAR-EO-DATA</parentCollection>
  </relation>
  <groupType>
    <groupTypeID>GroupEODataProductPackagePart</groupTypeID>
    <groupTypeStructureName>Set</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <dataObjectType>
      <dataObjectTypeID>GroupEODataProductPackagePart_DO</dataObjectTypeID>
```

```
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
      <mimeType>binary</mimeType>
    </dataObjectTypeFormat>
    <dataObjectTypeEncoded>
      <encodingName>application/zip</encodingName>
      <encodingDescription>Zip Archive file</encodingDescription>
    </dataObjectTypeEncoded>
    <dataObjectTypeAssociation>
      <targetID>TRF_DAT_PACKAGE_REP_INFO</targetID>
      <relationDescription>
        <relationType>linked Representation Information</relationType>
        <relationTextualDescription>DATA Package Representation Information
        </relationTextualDescription>
      </relationDescription>
    </dataObjectTypeAssociation>
    <dataObjectTypeAssociation>
      <targetID>TRF_MTD_PACKAGE_REP_INFO</targetID>
      <relationDescription>
        <relationType>linked Representation Information</relationType>
        <relationTextualDescription>METADATA Package Representation
                Information
      </relationTextualDescription>
      </relationDescription>
    </dataObjectTypeAssociation>
          <dataObjectTypeAssociation>
      <targetID>TRF_ERS_AMI_SAR_DOC</targetID>
      <relationDescription>
        <relationType>linked context documentation</relationType>
        <relationTextualDescription>Associated documents
        </relationTextualDescription>
      </relationDescription>
    </dataObjectTypeAssociation>
  </dataObjectType>
 </groupType>
</transferObjectTypeDescriptor>
```


F1.10 ESA-SAFE – SIP CONSTRAINTS


```
<?xml version="1.0" encoding="UTF-8"?>
<sipConstraints xmlns="urn:ccsds:schema:pais:1">
 <producerArchiveProjectID>ESA_ERS_AMI_SAR</producerArchiveProjectID>
 <sipContentType>
  <sipContentTypeID>SIP_BASE_REP_INFO</sipContentTypeID>
  <authorizedDescriptor>
    <descriptorID>TRF_BASE_PACKAGE_REP_INFO</descriptorID>
    <occurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </occurrence>
```

```
  </authorizedDescriptor>
</sipContentType>
<sipContentType>
  <sipContentTypeID>SIP_MTD_REP_INFO</sipContentTypeID>
  <authorizedDescriptor>
    <descriptorID>TRF_MTD_PACKAGE_REP_INFO</descriptorID>
    <occurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </occurrence>
  </authorizedDescriptor>
</sipContentType>
<sipContentType>
  <sipContentTypeID>SIP_DAT_REP_INFO</sipContentTypeID>
  <authorizedDescriptor>
    <descriptorID>TRF_DAT_PACKAGE_REP_INFO</descriptorID>
    <occurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </occurrence>
  </authorizedDescriptor>
</sipContentType>
<sipContentType>
  <sipContentTypeID>SIP_ERS_DOC</sipContentTypeID>
  <authorizedDescriptor>
    <descriptorID>TRF_ERS_AMI_SAR_DOC</descriptorID>
    <occurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </occurrence>
  </authorizedDescriptor>
</sipContentType>
<sipContentType>
  <sipContentTypeID>SIP_ERS_EO_DATA_PRODUCT</sipContentTypeID>
  <authorizedDescriptor>
    <descriptorID>TRF_ER2_OPER_SAR_IM_PRODUCT</descriptorID>
    <occurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </occurrence>
  </authorizedDescriptor>
</sipContentType>
<sipSequencingConstraintGroup>
  <groupName>ERS Group</groupName>
  <constraintItem>
    <sipContentTypeID>SIP_BASE_REP_INFO</sipContentTypeID>
    <constraintSerialNumber>1</constraintSerialNumber>
  </constraintItem>
  <constraintItem>
    <sipContentTypeID>SIP_MTD_REP_INFO</sipContentTypeID>
    <constraintSerialNumber>2</constraintSerialNumber>
  </constraintItem>
  <constraintItem>
    <sipContentTypeID>SIP_DAT_REP_INFO</sipContentTypeID>
    <constraintSerialNumber>3</constraintSerialNumber>
  </constraintItem>
```

```
    <constraintItem>
      <sipContentTypeID>SIP_ERS_DOC</sipContentTypeID>
      <constraintSerialNumber>4</constraint SerialNumber>
    </constraintItem>
    <constraintItem>
      <sipContentTypeID>SIP_ERS_EO_DATA_PRODUCT</sipContentTypeID>
      <constraintSerialNumber>5</constraint SerialNumber>
    </constraintItem>
  </sipSequencingConstraintGroup>
</sipConstraints>
```


F.2 DETAILED CASE

F2.1 ESA-SAFE – ESA_ERS_AMI_SAR_DET COLLECTION DESCRIPTOR (ROOT)


```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>ESA_ERS_AMI_SAR_det</descriptorID>
  </identification>
  <description>
    <collectionTitle>Level 0 of ERS AMI SAR experiments</collectionTitle>
    <collectionDescription>LO data corresponding to Earth's oceans and land images obtained with a suite
of instruments, one of which is a SAR on the AMI, onboard a ERS satellite</collectionDescription>
  </description>
  <relation>
    <parentCollection>NONE</parentCollection>
  </relation>
</collectionDescriptor>
```


F2.2 ESA-SAFE – COL_ERS-AMI-SAR-REP-INFO_DET COLLECTION DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>COL_ERS-AMI-SAR-Rep-Info_det</descriptorID>
  </identification>
  <description>
    <collectionTitle>ERS-AMI-SAR Representation Information for L0 data</collectionTitle>
    <collectionDescription>A set of SAFE v2.0 packages providing all the Representation Information
necessary for L0 data products</collectionDescription>
  </description>
  <relation>
    <parentCollection>ESA_ERS_AMI_SAR_det</parentCollection>
```

```
  </relation>
</collectionDescriptor>
```

F2.3 ESA-SAFE – COL_ERS-AMI-SAR-DOC_DET COLLECTION DESCRIPTOR

```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>COL_ERS-AMI-SAR-DOC_det</descriptorID>
  </identification>
  <description>
    <collectionTitle>ERS-AMI-SAR associated documentation</collectionTitle>
    <collectionDescription>All documents necessary for the comprehension of the mission, instruments,
products, and sips</collectionDescription>
  </description>
  <relation>
    <parentCollection>ESA_ERS_AMI_SAR_det</parentCollection>
  </relation>
</collectionDescriptor>
```

F2.4 ESA-SAFE – COL_ERS-AMI-SAR-DOC_DET COLLECTION DESCRIPTOR

```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>COL_ERS-AMI-SAR-EO-DATA_det</descriptorID>
  </identification>
  <description>
    <collectionTitle>EO Product of level 0 for ERS-AMI-SAR</collectionTitle>
    <collectionDescription>COL_ERS-AMI-SAR-LEVEL-0</collectionDescription>
  </description>
  <relation>
    <parentCollection>ESA_ERS_AMI_SAR_det</parentCollection>
  </relation>
</collectionDescriptor>
```

F2.5 ESA-SAFE – TRF_BASE_PACKAGE_REP_INFO_DET TRANSFER DESCRIPTOR

```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0014</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
```

```
    <descriptorID>TRF_BASE_PACKAGE_REP_INFO_det</descriptorID>
  </identification>
  <description>
    <transferObjectTypeTitle>Base Package Representation Information
    </transferObjectTypeTitle>
    <transferObjectTypeDescription>Representation information to be present in any SAFE 2.0 compliant
archive.It should be ingested before any other packages.
   </transferObjectTypeDescription>
    <transferObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </transferObjectTypeOccurrence>
  </description>
  <relation>
    <parentCollection>COL_ERS-AMI-SAR-Rep-Info</parentCollection>
    <association>
      <targetID>TRF_ERS-DOC_det</targetID>
      <relationDescription>
        <relationType>context information</relationType>
        <relationTextualDescription>associated documentation
        </relationTextualDescription>
      </relationDescription>
    </association>
  </relation>
  <groupType>
    <groupTypeID>GroupBasePackage_det</groupTypeID>
    <groupTypeStructureName>Directory</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <groupType>
      <groupTypeID>GroupConformance_det</groupTypeID>
      <groupTypeDescription>There will be one Conformance directory
      </groupTypeDescription>
      <groupTypeStructureName>directory</groupTypeStructureName>
      <groupTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>1</maxOccurrence>
      </groupTypeOccurrence>
      <dataObjectType>
        <dataObjectTypeID>GroupConformance_DO_det</dataObjectTypeID>
        <dataObjectTypeDescription>contents of Conformance directory
        </dataObjectTypeDescription>
        <dataObjectTypeOccurrence>
          <minOccurrence>1</minOccurrence>
          <maxUnknown />
        </dataObjectTypeOccurrence>
        <dataObjectTypeFormat>
          <mimeType>text/plain</mimeType>
        </dataObjectTypeFormat>
      </dataObjectType>
    </groupType>
    <groupType>
      <groupTypeID>GroupDocumentation_det</groupTypeID>
      <groupTypeDescription>There will be one Documentation directory
```

```
  </groupTypeDescription>
  <groupTypeStructureName>directory</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupDocumentation_DO_det</dataObjectTypeID>
    <dataObjectTypeDescription>contents of documentation directory
    </dataObjectTypeDescription>
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown />
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
      <mimeType>text/plain</mimeType>
    </dataObjectTypeFormat>
  </dataObjectType>
</groupType>
<groupType>
  <groupTypeID>GroupIndex_det</groupTypeID>
  <groupTypeDescription>There will be one Index directory
  </groupTypeDescription>
  <groupTypeStructureName>Directory</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupIndex_DO_det</dataObjectTypeID>
    <dataObjectTypeDescription />
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown />
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
      <mimeType>text/plain</mimeType>
    </dataObjectTypeFormat>
  </dataObjectType>
</groupType>
<groupType>
  <groupTypeID>GroupMetaData_det</groupTypeID>
  <groupTypeDescription>There will be one metadata directory
  </groupTypeDescription>
  <groupTypeStructureName>Directory</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupMetaData_DO_det</dataObjectTypeID>
    <dataObjectTypeDescription />
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown />
    </dataObjectTypeOccurrence>
```

```
      <dataObjectTypeFormat>
        <mimeType>text/plain</mimeType>
      </dataObjectTypeFormat>
    </dataObjectType>
  </groupType>
  <groupType>
    <groupTypeID>GroupXFDU_det</groupTypeID>
    <groupTypeDescription>There will be one xfdu directory
    </groupTypeDescription>
    <groupTypeStructureName>Directory</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <dataObjectType>
      <dataObjectTypeID>GroupXFDU_DO_det</dataObjectTypeID>
      <dataObjectTypeDescription>contents of xfdu directory
      </dataObjectTypeDescription>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxUnknown />
      </dataObjectTypeOccurrence>
      <dataObjectTypeFormat>
        <mimeType>text/plain</mimeType>
      </dataObjectTypeFormat>
    </dataObjectType>
  </groupType>
  <groupType>
    <groupTypeID>GroupOtherFiles_det</groupTypeID>
    <groupTypeDescription>Set</groupTypeDescription>
    <groupTypeStructureName>Directory</groupTypeStructureName>
    <dataObjectType>
      <dataObjectTypeID>GroupOtherFiles_DO_det</dataObjectTypeID>
      <dataObjectTypeDescription />
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>2</maxOccurrence>
      </dataObjectTypeOccurrence>
    </dataObjectType>
  </groupType>
 </groupType>
</transferObjectTypeDescriptor>
```


F2.6 ESA-SAFE – TRF_MTD_PACKAGE_REP_INFO_DET TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
 <identification>
  <descriptorModelID>CCSD0014</descriptorModelID>
  <descriptorModelVersion>1.0</descriptorModelVersion>
  <descriptorID>TRF_MTD_PACKAGE_REP_INFO_det</descriptorID>
 </identification>
```

```
 <description>
  <transferObjectTypeTitle>Meta Data Package Representation Information</transferObjectTypeTitle>
  <transferObjectTypeDescription>General Documentation associated to ERS EO SIP formats: Strip line
and Strip scene</transferObjectTypeDescription>
  <transferObjectTypeOccurrence>
   <minOccurrence>1</minOccurrence>
   <maxOccurrence>1</maxOccurrence>
  </transferObjectTypeOccurrence>
 </description>
 <relation>
  <parentCollection>COL_ERS-AMI-SAR-Rep-Info</parentCollection>
  <association>
   <targetID>TRF_BASE_PACKAGE_REP_INFO_det</targetID>
   <relationDescription>
    <relationType>linked Representation Information</relationType>
    <relationTextualDescription>meaningful with base Package
     Representation Information
   </relationTextualDescription>
   </relationDescription>
  </association>
 </relation>
 <groupType>
  <groupTypeID>GroupMTDPackage_det</groupTypeID>
  <groupTypeStructureName>Directory</groupTypeStructureName>
  <groupTypeOccurrence>
   <minOccurrence>1</minOccurrence>
   <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
 <groupType>
  <groupTypeID>GroupMTDMetaData_det</groupTypeID>
  <groupTypeDescription>There will be one metadata directory
  </groupTypeDescription>
  <groupTypeStructureName>Directory</groupTypeStructureName>
  <groupTypeOccurrence>
   <minOccurrence>1</minOccurrence>
   <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
   <dataObjectTypeID>GroupMTDMetaData_DO_det</dataObjectTypeID>
   <dataObjectTypeDescription>contents of metadata directory
   </dataObjectTypeDescription>
   <dataObjectTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxUnknown />
   </dataObjectTypeOccurrence>
   <dataObjectTypeFormat>
    <mimeType>text/plain</mimeType>
   </dataObjectTypeFormat>
  </dataObjectType>
 </groupType>
 <groupType>
  <groupTypeID>GroupMTDXFDU_det</groupTypeID>
  <groupTypeDescription>There will be one xfdu directory
  </groupTypeDescription>
  <groupTypeStructureName>Directory</groupTypeStructureName>
  <groupTypeOccurrence>
```

```
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupMTDXFDU_DO_det</dataObjectTypeID>
    <dataObjectTypeDescription>contents of xfdu directory
    </dataObjectTypeDescription>
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown />
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
      <mimeType>text/plain</mimeType>
    </dataObjectTypeFormat>
  </dataObjectType>
 </groupType>
 <groupType>
  <groupTypeID>GroupMTDOtherFiles_det</groupTypeID>
  <groupTypeStructureName>Set</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupMTDOtherFiles_DO_det</dataObjectTypeID>
    <dataObjectTypeDescription>stand-alone files : manifest + schema
    </dataObjectTypeDescription>
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>2</maxOccurrence>
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
      <mimeType>text/plain</mimeType>
    </dataObjectTypeFormat>
  </dataObjectType>
 </groupType>
  </groupType>
</transferObjectTypeDescriptor>
```


F2.7 ESA-SAFE – TRF_DAT_PACKAGE_REP_INFO_DET TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
 <identification>
  <descriptorModelID>CCSD0014</descriptorModelID>
  <descriptorModelVersion>1.0</descriptorModelVersion>
  <descriptorID>TRF_DAT_PACKAGE_REP_INFO_det</descriptorID>
 </identification>
 <description>
  <transferObjectTypeTitle>Data Package Representation Information</transferObjectTypeTitle>
  <transferObjectTypeDescription>ERS SAR L0 Representation Information of the data components
(DFDL schemas)</transferObjectTypeDescription>
```

```
  <transferObjectTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </transferObjectTypeOccurrence>
</description>
<relation>
  <parentCollection>COL_ERS-AMI-SAR-Rep-Info</parentCollection>
  <association>
    <targetID>TRF_BASE_PACKAGE_REP_INFO_det</targetID>
    <relationDescription>
      <relationType>linked Representation Information</relationType>
      <relationTextualDescription>meaningful with base Package
          Representation Information
    </relationTextualDescription>
    </relationDescription>
  </association>
</relation>
<groupType>
  <groupTypeID>GroupDATPackage_det</groupTypeID>
  <groupTypeStructureName>Directory</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <groupType>
    <groupTypeID>GroupDATMeasurementData_det</groupTypeID>
    <groupTypeDescription>There will be one measurement directory
    </groupTypeDescription>
    <groupTypeStructureName>Directory</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <dataObjectType>
      <dataObjectTypeID>GroupDATMeasurementData_DO_det</dataObjectTypeID>
      <dataObjectTypeDescription>contents of measurement directory
      </dataObjectTypeDescription>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxUnknown />
      </dataObjectTypeOccurrence>
      <dataObjectTypeFormat>
        <mimeType>text/plain</mimeType>
      </dataObjectTypeFormat>
    </dataObjectType>
  </groupType>
  <groupType>
    <groupTypeID>GroupDATOtherFiles_det</groupTypeID>
    <groupTypeStructureName>Set</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <dataObjectType>
      <dataObjectTypeID>GroupDATOtherFiles_DO_det</dataObjectTypeID>
      <dataObjectTypeDescription>stand-alone files : manifest + schema
```

```
      </dataObjectTypeDescription>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>2</maxOccurrence>
      </dataObjectTypeOccurrence>
      <dataObjectTypeFormat>
        <mimeType>text/plain</mimeType>
      </dataObjectTypeFormat>
    </dataObjectType>
  </groupType>
 </groupType>
</transferObjectTypeDescriptor>
```


F2.8 ESA-SAFE – TRF_ERS_AMI_SAR_DOC_DET TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
 <identification>
  <descriptorModelID>CCSD0014</descriptorModelID>
  <descriptorModelVersion>1.0</descriptorModelVersion>
  <descriptorID>TRF_ERS_AMI_SAR_DOC_det</descriptorID>
 </identification>
 <description>
  <transferObjectTypeTitle>Documentation associated with the data products </transferObjectTypeTitle>
  <transferObjectTypeDescription>Various documents related to ERS L0 data products
</transferObjectTypeDescription>
  <transferObjectTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxUnknown>1</maxUnknown>
  </transferObjectTypeOccurrence>
 </description>
 <relation>
  <parentCollection>COL_ERS-AMI-SAR-DOC_det</parentCollection>
 </relation>
 <groupType>
  <groupTypeID>GroupEODoc_det</groupTypeID>
  <groupTypeStructureName>Directory</groupTypeStructureName>
  <groupTypeOccurrence>
    <minOccurrence>1</minOccurrence>
    <maxOccurrence>1</maxOccurrence>
  </groupTypeOccurrence>
  <dataObjectType>
    <dataObjectTypeID>GroupEODoc_DO_det</dataObjectTypeID>
          <dataObjectTypeDescription>A document in pdf format relative to ERS
      L0 EO products
    </dataObjectTypeDescription>
    <dataObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>6</maxOccurrence>
    </dataObjectTypeOccurrence>
    <dataObjectTypeFormat>
```

```
      <mimeType>application/pdf</mimeType>
     </dataObjectTypeFormat>
    </dataObjectType>
  </groupType>
</transferObjectTypeDescriptor>
```


F2.9 ESA-SAFE – TRF_ERS_AMI_SAR_IM_DET TRANSFER DESCRIPTOR


```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0014</descriptorModelID>
    <descriptorModelVersion>1.0</descriptorModelVersion>
    <descriptorID>TRF_ER2_OPER_SAR_IM_PRODUCT_det</descriptorID>
  </identification>
  <description>
    <transferObjectTypeTitle>EO Data Product</transferObjectTypeTitle>
    <transferObjectTypeDescription>ERS SAR L0 data product
    </transferObjectTypeDescription>
    <transferObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown />
    </transferObjectTypeOccurrence>
  </description>
  <relation>
    <parentCollection>COL_ERS-AMI-SAR-EO-DATA</parentCollection>
  </relation>
  <groupType>
    <groupTypeID>GroupEODataProductPackagePart_det</groupTypeID>
    <groupTypeStructureName>Directory</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <groupType>
      <groupTypeID>GroupEODataProduct_det</groupTypeID>
      <groupTypeDescription>There will be one SAFE directory per product
      </groupTypeDescription>
      <groupTypeStructureName>Directory</groupTypeStructureName>
      <groupTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>1</maxOccurrence>
      </groupTypeOccurrence>
      <dataObjectType>
        <dataObjectTypeID>GroupEODataProduct_Meas_det</dataObjectTypeID>
                    <dataObjectTypeDescription>the MEASUREMENT.DAT file
        </dataObjectTypeDescription>
        <dataObjectTypeOccurrence>
          <minOccurrence>1</minOccurrence>
          <maxOccurrence>1</maxOccurrence>
        </dataObjectTypeOccurrence>
        <dataObjectTypeFormat>
          <mimeType>application/binary</mimeType>
```

```
      </dataObjectTypeFormat>
    </dataObjectType>
    <dataObjectType>
      <dataObjectTypeID>GroupEODataProduct_XML_det</dataObjectTypeID>
                <dataObjectTypeDescription>the MANIFEST.XML file and the SAFE-
          SAR-ERS-AMI-SAR-LEVEL0.XML file
      </dataObjectTypeDescription>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>2</maxOccurrence>
      </dataObjectTypeOccurrence>
      <dataObjectTypeFormat>
        <mimeType>application/xhtml+xml</mimeType>
      </dataObjectTypeFormat>
    </dataObjectType>
    <dataObjectType>
      <dataObjectTypeID>GroupEODataProduct_SIX_det</dataObjectTypeID>
      <dataObjectTypeDescription>the MEASUREMENT.SIX file
      </dataObjectTypeDescription>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>1</maxOccurrence>
      </dataObjectTypeOccurrence>
      <dataObjectTypeFormat>
        <mimeType>application/octet-stream</mimeType>
      </dataObjectTypeFormat>
    </dataObjectType>
   </groupType>
  </groupType>
</transferObjectTypeDescriptor>
```


F2.10 SIP CONSTRAINTS


```
<?xml version="1.0" encoding="UTF-8"?>
<sipConstraints xmlns="urn:ccsds:schema:pais:1">
<producerArchiveProjectID>ESA_ERS_AMI_SAR_det</producerArchiveProjectID>
  <sipContentType>
        <sipContentTypeID>SIP_BASE_REP_INFO_det</sipContentTypeID>
        <authorizedDescriptor>
                <descriptorID>TRF_BASE_PACKAGE_REP_INFO_det</descriptorID>
                <occurrence>
                        <minOccurrence>1</minOccurrence>
                        <maxOccurrence>1</maxOccurrence>
                </occurrence>
        </authorizedDescriptor>
        </sipContentType>
        <sipContentType>
                <sipContentTypeID>SIP_MTD_REP_INFO_det</sipContentTypeID>
                <authorizedDescriptor>
                        <descriptorID>TRF_MTD_PACKAGE_REP_INFO_det</descriptorID>
                        <occurrence>
                                <minOccurrence>1</minOccurrence>
```

```
                        <maxOccurrence>1</maxOccurrence>
                    </occurrence>
                </authorizedDescriptor>
            </sipContentType>
            <sipContentType>
                <sipContentTypeID>SIP_DAT_REP_INFO_det</sipContentTypeID>
                <authorizedDescriptor>
                    <descriptorID>TRF_DAT_PACKAGE_REP_INFO_det</descriptorID>
                    <occurrence>
                        <minOccurrence>1</minOccurrence>
                        <maxOccurrence>1</maxOccurrence>
                    </occurrence>
                </authorizedDescriptor>
            </sipContentType>
            <sipContentType>
             <sipContentTypeID>SIP_ERS_DOC_det</sipContentTypeID>
                <authorizedDescriptor>
                    <descriptorID>TRF_ERS_AMI_SAR_DOC</descriptorID>
                    <occurrence>
                        <minOccurrence>1</minOccurrence>
                        <maxOccurrence>1</maxOccurrence>
                    </occurrence>
                </authorizedDescriptor>
            </sipContentType>
        <sipContentType>
             <sipContentTypeID>SIP_ERS_EO_DATA_PRODUCT_det</sipContentTypeID>
                <authorizedDescriptor>
            <descriptorID>TRF_ER2_OPER_SAR_IM_PRODUCT_det</descriptorID>
                    <occurrence>
                        <minOccurrence>1</minOccurrence>
                        <maxOccurrence>1</maxOccurrence>
                    </occurrence>
                </authorizedDescriptor>
            </sipContentType>
        <sipSequencingConstraintGroup>
                <groupName>Group Safe2</groupName>
                <constraintItem>
                    <sipContentTypeID>SIP_BASE_REP_INFO_det</sipContentTypeID>
                    <constraintSerialNumber>1</constraintSerialNumber>
                </constraintItem>
                <constraintItem>
                    <sipContentTypeID>SIP_MTD_REP_INFO_det</sipContentTypeID>
                    <constraintSerialNumber>2</constraintSerialNumber>
                </constraintItem>
              <constraintItem>
                    <sipContentTypeID>SIP_DAT_REP_INFO_det</sipContentTypeID>
                    <constraintSerialNumber>3</constraintSerialNumber>
                </constraintItem>
                <constraintItem>
                    <sipContentTypeID>SIP_ERS_DOC_det</sipContentTypeID>
                    <constraintSerialNumber>4</constraintSerialNumber>
                </constraintItem>
                <constraintItem>
            <sipContentTypeID>SIP_ERS_EO_DATA_PRODUCT_det</sipContentTypeID>
                    <constraintSerialNumber>5</constraintSerialNumber>
                </constraintItem>
```

```
  </sipSequencingConstraintGroup>
</sipConstraints>
```


F2.11 MANIFEST OF THE EO DATA PRODUCT


```
<?xml version="1.0" encoding="UTF-8"?>
<xfdu:XFDU xmlns:xfdu="urn:ccsds:schema:xfdu:1" xmlns:pais="urn:ccsds:schema:pais:1">
  <packageHeader ID="ESA_ERS_AMI_SAR_det-SIP-0005">
    <volumeInfo>
      <specificationVersion>1.0</specificationVersion>
    </volumeInfo>
    <environmentInfo>
      <extension>
        <pais:sipGlobalInformation>
          <pais:sipID>ESA_ERS_AMI_SAR_det-SIP-0005</pais:sipID>
           <pais:producerSourceID> ESA_ERS_PROJECT
           </pais:producerSourceID>
          <pais:producerArchiveProjectID>ESA_ERS_AMI_SAR_det </pais:producerArchiveProjectID>
         <pais:sipContentTypeID>SIP_ERS_EO_DATA_PRODUCT_det</pais:sipContentTypeID>
          <pais:sipSequenceNumber>5</pais:sipSequenceNumber>
        </pais:sipGlobalInformation>
      </extension>
    </environmentInfo>
  </packageHeader>
  <informationPackageMap>
    <xfdu:contentUnit>
      <extension>
        <pais:sipTransferObject>
         <pais:descriptorID>TRF_ER2_OPER_SAR_IM_PRODUCT_det</pais:descriptorID>
          <pais:transferObjectID>TRF_ER2_OPER_SAR_IM_PRODUCT_det-0001
         </pais:transferObjectID>
         <pais:lastTransferObjectFlag>FALSE</pais:lastTransferObjectFlag>
        </pais:sipTransferObject>
      </extension>
      <xfdu:contentUnit>
        <extension>
          <pais:sipTransferObjectGroup>
         <pais:associatedDescriptorGroupTypeID>GroupEODataProductPackagePart_det
         </pais:associatedDescriptorGroupTypeID>
             <pais:transferObjectGroupInstanceName/>
          </pais:sipTransferObjectGroup>
        </extension>
        <xfdu:contentUnit>
          <extension>
            <pais:sipTransferObjectGroup>
           <pais:associatedDescriptorGroupTypeID>GroupEODataProduct_det
          </pais:associatedDescriptorGroupTypeID>
                  <pais:transferObjectGroupInstanceName>
                  ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE
          </pais:transferObjectGroupInstanceName>
            </pais:sipTransferObjectGroup>
          </extension>
          <xfdu:contentUnit>
            <extension>
```

```
            <pais:sipDataObject>
          <pais:associatedDescriptorDataID>GroupEODataProduct_Meas_det
                </pais:associatedDescriptorDataID>
              </pais:sipDataObject>
            </extension>
            <dataObjectPointer dataObjectID="DO-GroupEODataProduct_Meas_det-0001"/>
          </xfdu:contentUnit>
          <xfdu:contentUnit>
            <extension>
              <pais:sipDataObject>
                  <pais:associatedDescriptorDataID>GroupEODataProduct_XML_det
                </pais:associatedDescriptorDataID>
              </pais:sipDataObject>
            </extension>
            <dataObjectPointer dataObjectID="DO-GroupEODataProduct_XML_det-0001"/>
          </xfdu:contentUnit>
          <xfdu:contentUnit>
            <extension>
              <pais:sipDataObject>
                  <pais:associatedDescriptorDataID>GroupEODataProduct_XML_det
                  </pais:associatedDescriptorDataID>
              </pais:sipDataObject>
            </extension>
            <dataObjectPointer dataObjectID="DO-GroupEODataProduct_XML_det-0002"/>
          </xfdu:contentUnit>
          <xfdu:contentUnit>
            <extension>
              <pais:sipDataObject>
                  <pais:associatedDescriptorDataID> GroupEODataProduct_SIX_det
                  </pais:associatedDescriptorDataID>
              </pais:sipDataObject>
            </extension>
            <dataObjectPointer dataObjectID="DO-GroupEODataProduct_SIX_det-0001"/>
          </xfdu:contentUnit>
        </xfdu:contentUnit>
      </xfdu:contentUnit>
    </xfdu:contentUnit>
  </informationPackageMap>
  <dataObjectSection>
    <dataObject ID="DO-GroupEODataProduct_Meas_det-0001" size="2097152">
      <byteStream size="2097152">
        <fileLocation locatorType="URL"
href="file:ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/MEASUREME
NT.DAT"/>
        <checksum checksumName="MD5">b2d1236c286a3c0704224fe4105eca49</checksum>
      </byteStream>
    </dataObject>
    <dataObject ID="DO-GroupEODataProduct_XML_det-0001" size="11239">
      <byteStream size="11239">
        <fileLocation locatorType="URL"
href="file:ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/MANIFEST.X
ML"/>
        <checksum checksumName="MD5">10349ee55dc45733fbb2f674e706a7a8</checksum>
      </byteStream>
    </dataObject>
    <dataObject ID="DO-GroupEODataProduct_XML_det-0002" size="5458">
```

```
      <byteStream size="5458">
        <fileLocation locatorType="URL"
href="file:ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/SAFE-SAR-
ERS-AMI-SAR-LEVEL0.XML"/>
        <checksum checksumName="MD5">d81bc5df27f32d9562beeec587b87775</checksum>
      </byteStream>
    </dataObject>
    <dataObject ID="DO-GroupEODataProduct_SIX_det-0001" size="2772">
      <byteStream size="2772">
        <fileLocation locatorType="URL"
href="file:ER2_OPER_SAR_IM__0P_19970923T212658_19970923T213316_43E3.SAFE/MEASUREME
NT.SIX"/>
        <checksum checksumName="MD5">a7f8208e7e86929979ab0fdd407b605b</checksum>
      </byteStream>
    </dataObject>
  </dataObjectSection>
</xfdu:XFDU>
```