

6 USE CASES

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

6.4 COROT – END OF MISSION BULK TRANSFER

6.4.1 CONTEXT AND BENEFITS

This use case deals with the transfer of a full set of auxiliary and Level 0 data acquired by CoRoT space mission. The setup of this use case was contemporary to the actual transfer of CoRoT data after the end of the mission, from the acquisition centers to the long-term archiving center at CNES. It served as a PAIS demonstration of capabilities for the bulk transfer of medium-large data sets.

CoRoT is a space astronomy mission devoted to the study of the variability with time of stars brightness, with an extremely high accuracy (100 times better than from the ground), on very long durations (up to 150 days) and a very high duty cycle (more than 90%). The original scientific objectives were focused on the study of stellar pulsations (asteroseismology) and the detection of small exoplanets. However, the data collected are now feeding many domains of stellar physics. The mission was led by CNES in association with four French laboratories, and seven participating countries and agencies (Austria, Belgium, Brazil, Germany, Spain, and the ESA Science Programme). It has been launched on December 27, 2006 by a Soyuz Rocket, from Baikonur. The mission has lasted almost six years (the nominal three years duration and a three years extension) and has observed more than 160,000 stars. It stopped to send data suddenly on November 2, 2012.

This use case provides an example of PAIS configuration for bulk transfers and especially highlights the following benefits:

- **The transfer of “typed” packets of well-known contents and of controlled sizes:** instead of a single and continuous stream of “opaque” bytes such as those established by common “copy” system commands improves the reliability and enables partial (re)processing;
- **The control of the sequence of transfer:** can be done at the “type” or domain level and not only at the byte/bit level e.g. this CoRoT case imposes the transfer the housekeeping data prior to the payload “N0” data;
- **The validation by the Archive of the fixity, provenance and consistency:** can be performed from the first packet received, during the overall period of transfer and not only at the very end of the process;
- The declarative model provided by the PAIS descriptors provides semantic that can help the Archive to **classify of the input SIPs and to minimize the metadata extraction activity**. The Archive may even get the metadata without being aware of their origin inside or outside the SIPs.

This use case does not cover the transfer of documents or representational information about the content of the transferred files and supposes this information transferred through any separate means. The transfer of metadata, documentation and the relationships with the actual data is covered by the ISEE and POLDER use cases, see sections 6.1 and 6.2 respectively.

6.4.2 OBJECTS TO BE TRANSFERRED

On the Producer side, the CoRoT repository of Level 0 data and accompanying auxiliary data is composed of about 460,000 files representing a total size of about 3.2 Tb. The file size spans from 1 Kb to 1.2 Gb with an average value of 1.5 Mb.

The logical layout of the repository is depicted in the following figure **Figure 6-1** below. The logical layout, also known as static layout, represents the hierarchy of directory and file “types” with their cardinalities. It does not represent the full list of directory and file instances.

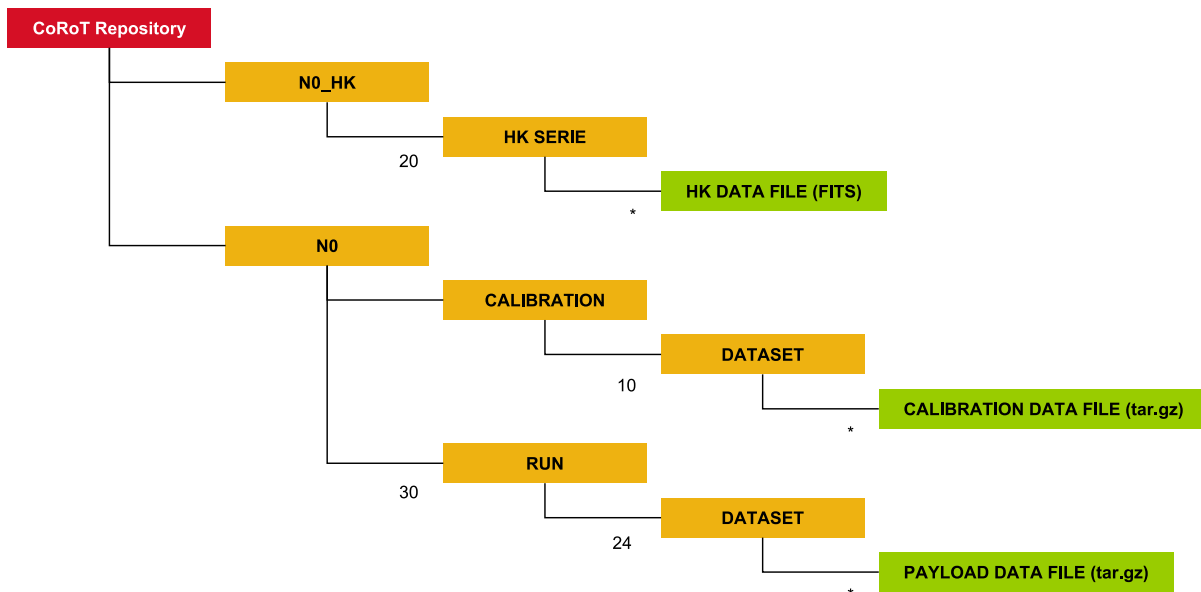


Figure 6-1: CoRoT Repository – Logical Layout

Once again, the CoRoT data to be transferred consists of auxiliary and Level 0 data.

The housekeeping data are those dedicated to the Level 0 data only and are filed under an NO_HK folder of the repository. The NO is an abbreviation of “Niveau 0” meaning “Level 0” in French, and the HK stands for Housekeeping. The housekeeping data is then distributed in 20 distinct series of parameters as currents, temperatures, etc. The folders of “HK SERIE” type depicted in the above figure can take the following names: FRACTIOPPS1, FRACTIOPPS2, LATCHEDOBT, MAX1553RATE, MODECC, PINJLINE01, PINJLINE02, PINJLINE03, PINJLINE15, PINJLINE16, PINJLINE17, PINJLINE18, PINJLINE19, PINJLINE20, PINJLINE21, SECONDPSS, SHIFTDELAY, WEEKPPS, ZIZM1GC and ZIZM2GC. Those

folders contain a variable number of files formatted according Flexible Image Transport System (FITS) specifications.

The Level 0 data is filed in an NO folder containing 28 sub-folders corresponding to the CoRoT observation “runs” that represent continuous observations of 20 to 150 days. The run folder names follow the pattern RUN{NN}_{CODE} where {NN} is a counter and the {CODE} is a non-null string whose definition will not be detailed here e.g. RUN12_LRC03. The first run breaks this rule and is named CALIBRATION. It can be considered as a RUN00 that was used for calibration and validation of the CoRoT telescope. It has the same structure and content types as the other runs. The RUN01 and RUN02 are not included in the CoRoT repository.

Each run folder is further subdivided in subfolders called datasets corresponding to different types of data or different processing levels. A dataset is a set of FITS files archived and compressed in Tar/Gz format. A run may not contain all datasets but most of them include a majority of the datasets defined in the following table.:

Table 6-1: CoRoT Level 0 Datasets

Dataset	Total Size	Max. File Size	File Number	Title
AN0_BKGGROUND	16.8 Gb	392 Mb	190	Asteroseismology Background
AN0_ECARTO_AFPS	6.8 Gb	404 Mb	43	Ecartometry Fine Pointing mode
AN0_ECARTO_ARPS	66.5 Mo	14 Mb	38	Ecartometry Rough Pointing mode
AN0_ECARTO_Undefined	1.1 Mb	0.2 Mb	60	Ecartometry mode non-detected
AN0_FULLIMAGE	549 Mb	29.6 Mb	76	Asteroseismology Full Image
AN0_FULLWINDOW	317.3 Mb	35.8 Mb	36	Asteroseismology Full Window
AN0_IMAGETTE ①	82.80 Gb	1.3 Gb	194	Asteroseismology imagette
AN0_MASK	164 Kb	2 Kb	141	Asteroseismology templates
AN0_OFFSET	6.62 Gb	268 Mb	58	Asteroseismology Offset
AN0_STARWIND	15.85 Gb	185 Mb	216	Asteroseismology channel
AN0_THRESHOLDIMAGE	65.7 Gb	11 Mb	16	Asteroseismology Threshold Image
EN0_BKGGROUND_MONOCHROM	1.37 Gb	1.2 Mb	5544	Monochr. Exoplanet Bkgd.
EN0_BKGGROUND_SAMPLEM	3.04 Gb	7.6 Mb	1623	Monochr. Oversampled Exoplanet Bkgd.
EN0_BRIGHT_PIX_32	1.64 Gb	5.3 Mb	1372	Exoplanet sky bkg. impacted pixels 32
EN0_BRIGHT_PIX_512	710 Mb	768 Kb	4116	Exoplanet sky bkg. impacted pixels 512
EN0_FULLIMAGE	1.71 Gb	111 Mb	74	Exoplanet Full Image
EN0_FULLWINDOW	282.2 Mb	663 Kb	6898	Exoplanet Full Window
EN0_IMAGETTE	72.64 Gb	168 Mb	1015	Exoplanet imagette
EN0_OFFSET_SAMPLEM	1.08 Gb	32 Mb	74	Offset Exoplanet Oversampled Mono.
EN0_STARWIND_CHROM	17.34 Gb	969 Mb	45987	Chromatic Exoplanet Observation

Dataset	Total Size	Max. File Size	File Number	Title
ENO_STARWIND_MONOCHROM	28.3 Gb	567 Mb	120143	Mono. Exoplanet Observation
ENO_STARWIND_SAMPLEC②	101.7 Gb	6.5 Mb	41917	Chromatic Overspld. Exoplanet Obs.
ENO_STARWIND_SAMPLEM	9.48 Gb	3.7 Mb	7777	Mono. Oversampled Exoplanet Obs.
ENO_TEMPLATE	6.08 Mb	1 Kb	6658	Exoplanet Templates

The scientific or engineering nature of the datasets will not be further described in this use case although their understanding could have helped setting up a finer model of transfer, for example by describing relationships between the datasets. However, the above table provide the size and count properties that are significant for the design of the transfer model. For example, the total size of the ENO_STARWIND_SAMPLEC ② is exceeds 100 Gb and shows that it is probably not a good idea to model the transfer with CoRoT datasets as the smallest unit. A modeling down to the files would allow the transfer of packets of more reasonable sizes. At this file level, the table shows that the maximum size of the individual files is 1.3 Gb for the ANO_IMAGETTE ① which is the smallest maximum Transfer Object size that the model can impose for this dataset. Actually, by construction, the PAIS does not allow a file to span over multiple Transfer Objects or SIPs so the maximum file size is an interesting property of the transfer. If this value would not have been reasonable, it would probably have been necessary to consider a change of the input repository, for example by slicing some of the big files into chunks of acceptable sizes.

The following **Figure 6-2** shows an abstract view of the physical layout of the CoRoT repository. According the large number of files, it is not possible to depict all of them, but the figure provide actual examples of folder and file names for CoRoT runs, datasets, or housekeeping series.

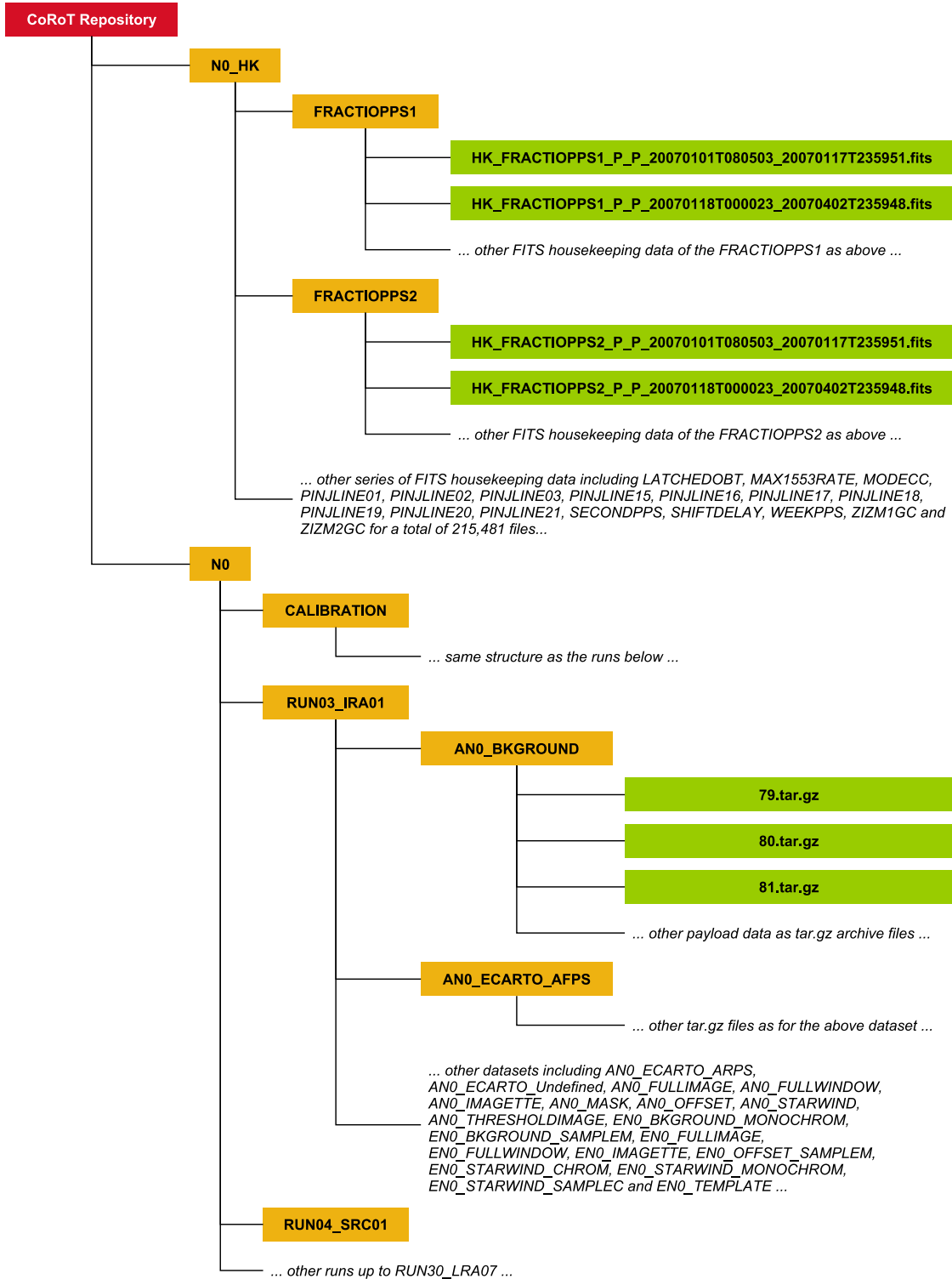


Figure 6-2: CoRoT Repository Physical Layout

6.4.3 MODEL OF OBJECTS FOR TRANSFER AND SIP CONSTRAINTS

TOPIC – The transfer a full run as a single SIP is not practical because some may exceed 100Gb. It has been preferred to build a transfer model that splits the runs in subparts of less than 4 Gb, but with the assurance that each transferred SIP deals with only one run and only one type of dataset e.g. RUN01 and AN0_BACKGROUND. However, a dataset of the same run may require multiple SIPs to be fully transferred, depending of the total size of the dataset.

6.4.3.1 MOT

TOPIC – The Model of Objects for Transfer tree can be summarized as follows:

TOPIC – One collection “CoRoT-N0” is modeled for the transfer.

TOPIC – A first Transfer Object Type “COROT-N0-RUN-PRODUCT-SET” represents the payload stream of CoRoT N0 products. There can be an unlimited number of objects of this type in the transfer project but each has a limited size of 4 Gb.

TOPIC – The purpose of the “COROT-N0-Run” Group Type is to assure that a “COROT-N0-RUN-PRODUCT-SET” object can contain data dealing with one and only one RUN.

TOPIC – The purpose of the “COROT-N0-Product-Type” Group Type is to assure that a “COROT-N0-RUN-PRODUCT-SET” object can contain data of the same set e.g. AN0_BACKGROUND.

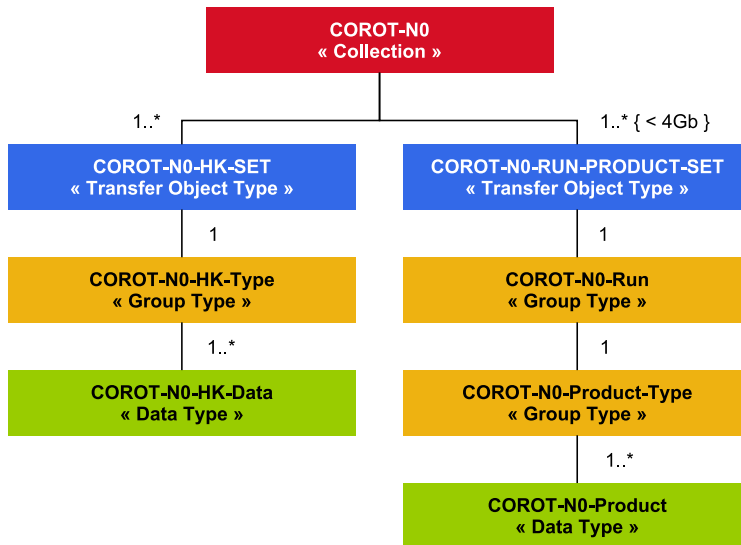


Figure 6-3: CoRoT Model of Objects For Transfer

TOPIC – A second Transfer Object Type “COROT-N0-HK-SET” represents the payload stream of CoRoT HK auxiliary data. There can be an unlimited number of objects of this type in the transfer project with no limitation of size.

TOPIC – The purpose of the “COROT-N0-HK-Type” Group Type is to assure that a “COROT-N0-HK-SET” object can contain data dealing with one and only one series e.g. FRACTIOPPS1.

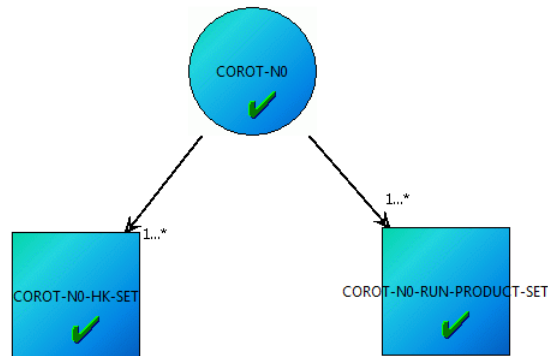


Figure 6-4: CoRoT Model of Objects For Transfer

TOPIC – Comment the above figure: the MOT viewed through the CNES prototype.

6.4.3.2 SIP Constraints

TOPIC – SIP Constraints XML document provided in Annex D4.

TOPIC – Defines two SIP Content Types:

- **SIP-COROT-N0-PRODUCT-SET:** authorizing only one COROT-N0-RUN-PRODUCT-SET Transfer Object per SIP of this type. It corresponds to one homogeneous set of dataset of the same type accumulated up to a maximum of 4 Gb;
- **SIP-COROT-N0-HK-SET:** authorizing only one COROT-N0-HK-SET Transfer Object per SIP of this type. It corresponds to one homogeneous set of FITS files accumulated without limit of count or size.

TOPIC – The SIP Constraints defines a sequence order imposing the housekeeping data to be transferred first or at least before any N0 product.

6.4.4 SIPS

6.4.4.1 SIPS Generation

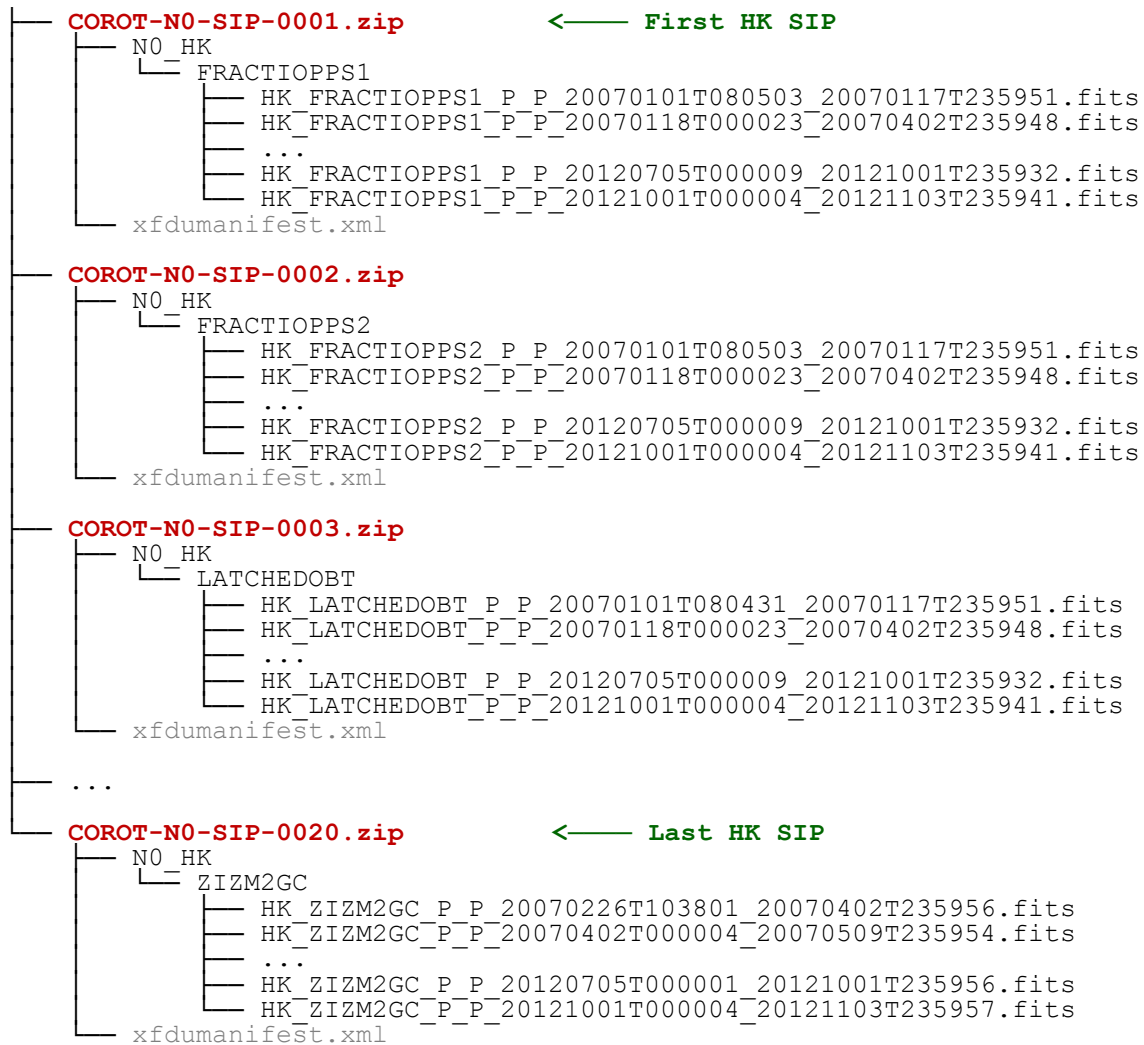
TOPIC – In this case, the SIPS are generated from the CoRot repository via the SIP Builder software, see section 7.2, with a configuration file provided in . In this case, the generated SIPS are 'XFDU PAIS SIP Conformant' as defined in PAIS BB but any other implementation would have been allowed.

TOPIC – 173 SIPS have been generated with the 20 firsts conveying Housekeeping auxiliary data followed by 153 packages of N0 products. More SIPS should have been generated from the

CoRoT repository but the process has been voluntarily limited to the first nine runs i.e. RUN01 to RUN09 that suffice for the demonstration.

6.4.4.2 SIPs Contents

TOPIC – The first series of SIPs are, as expected, of SIP-COROT-N0-HK-SET type illustrated by the abstract tree below:



The following tables show snippets of the Manifest `xfdumanifest.xml` file of the of first SIP containing the first housekeeping series. The extracts are focused on the PAIS extension elements and are generally stripped of XFDU elements. These latter are reported only when they bring value to the example and are explicitly prefixed by `xfdu` to avoid confusion, although that may not be the case in the actual manifest file. The complete Manifest document is provided in section E1 of ANNEX E.

Table 6-2: SIP-COROT-N0-HK-SET SIP Manifest – Header

Element	Content
sipGlobalInformation ①	
sipID	COROT-N0-SIP-0001
producerSourceID	CNES
producerArchiveProjectID	COROT-N0
sipContentTypeID	SIP-COROT-N0-HK-SET
sipSequenceNumber	1

TOPIC – Describe the above snippet about the header.

Table 6-3: SIP-COROT-N0-HK-SET SIP Manifest – Information Package Map

sipTransferObject ②	
descriptorID	COROT-N0-HK-SET
transferObjectID	COROT-N0-HK-SET-0001
lastTransferObjectFlag	FALSE
sipTransferObjectGroup ③	
associatedDescriptorGroupTypeID	COROT-N0-HK-Type
transferObjectGroupInstanceName	N0_HK/FRACTIOPPS1
sipDataObject { associatedDescriptorDataID xfd�:dataObjectPointer ④ @dataObjectID sipDataObject associatedDescriptorDataID xfd�:dataObjectPointer @dataObjectID	COROT-N0-HK-Data
	DO-COROT-N0-HK-Data-0001
	COROT-N0-HK-Data
	DO-COROT-N0-HK-Data-0029

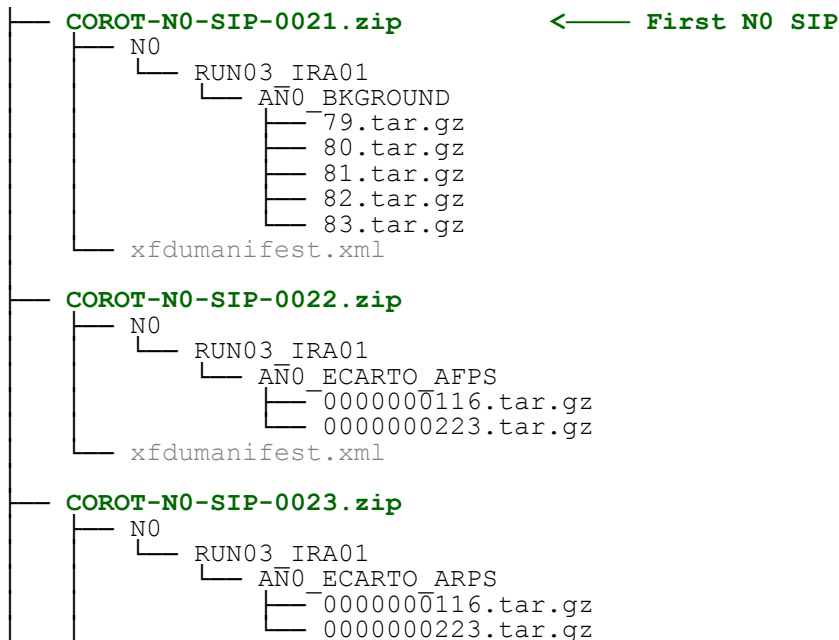
TOPIC – Describe the above snippet about the information package map.

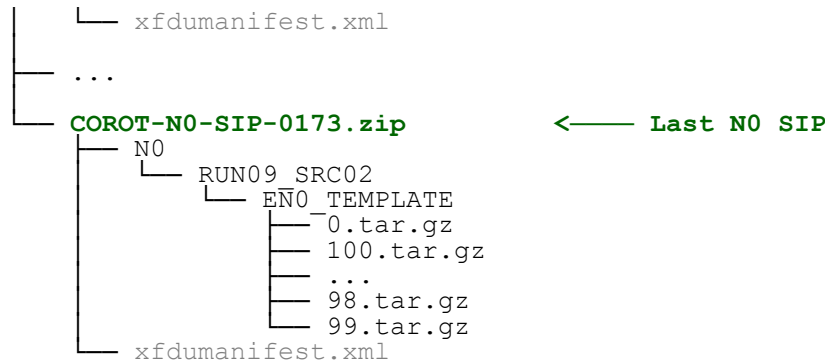
Table 6-4: SIP-COROT-N0-HK-SET SIP Manifest – Data Object Section

xfdu:dataObject	
@ID	DO-COROT-N0-HK-Data-0001
byteStream	
fileLocation	
@locatorType	URL
@href	N0_HK/FRACTIOPPS1/HK_FRACTIOPPS1_P_P_20070101T080503_20070117T235951.fits
Checksum	d41d8cd98f00b204e9800998ecf8427e
@checksumName	MD5
xfdu:dataObject	
@ID	DO-COROT-N0-HK-Data-0029
byteStream	
fileLocation	
@locatorType	URL
@href	N0_HK/FRACTIOPPS1/HK_FRACTIOPPS1_P_P_20121001T000004_20121103T235941.fits
Checksum	d41d8cd98f00b204e9800998ecf8427e
@checksumName	MD5

TOPIC – Describe the above snippet about the data object section.

TOPIC – The second series of SIPs are, as expected, of SIP-COROT-N0-PRODUCT-SET type illustrated by the abstract tree below:





TOPIC – Insert and describe tabulated snippets about SIP 0021 as for SIP 0001 above.

6.4.4.3 SIPs Ingestion

TOPIC – In this case, the SIPs are submitted and ingested by the CNES Prototype, see section 7.2.

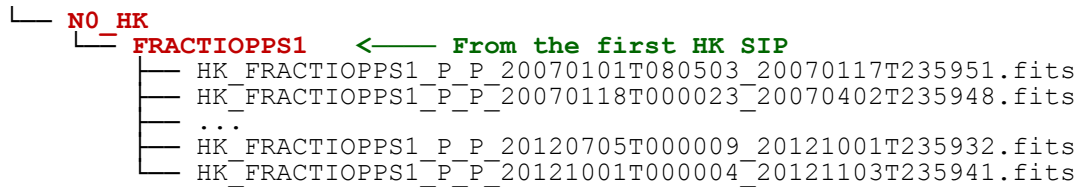
TOPIC – The SIP Prototype main ingestion steps:

- 1 Read project MOT and SIP Constraints
- 2 For each SIP received**
 - 2.1 Inflate input ZIP
 - 2.2 Open XFDU Manifest
 - 2.3 Check project ID
 - 2.4 Check SIP Type ID
 - 2.5 Check SIP sequence number
 - 2.6 For each Content Unit annotated as Transfer Object**
 - 2.6.1 Check that Transfer Object Type ID is allowed for the current SIP Type
 - 2.6.2 Check that last Transfer Object of this type has not already been ingested
 - 2.6.3 Check maximum occurrence with respect to a project global counter for each Transfer Object type
 - 2.6.4 Update project global counter for the Transfer Object type
 - 2.6.5 For each Group Type**
 - 2.6.5.1 Check maximum occurrence of this Group in the parent Group or Transfer Object type
 - 2.6.5.2 For each Data Object Type**
 - 2.6.5.2.1 Check maximum occurrence of this Data Object in the parent Group
 - 2.6.5.2.2 For each Data Object File**
 - 2.6.5.2.2.1 Check maximum occurrence of this Data Object File in the current Data Object
 - 2.6.5.2.2.2 Check Data Object file presence according the URL
 - 2.6.5.2.2.3 Verify file size
 - 2.6.5.2.2.4 Compute/update and check maximum size of this Transfer Object
 - 2.6.5.2.2.5 Verify file checksum
 - 2.6.5.2.2.6 Verify that this file was not already ingested
 - 2.6.5.2.2.7 Compute internal file path according to the name preservation rule of the current Transfer Object type
 - 2.6.5.2.2.8 Copy/move file to the internal file path

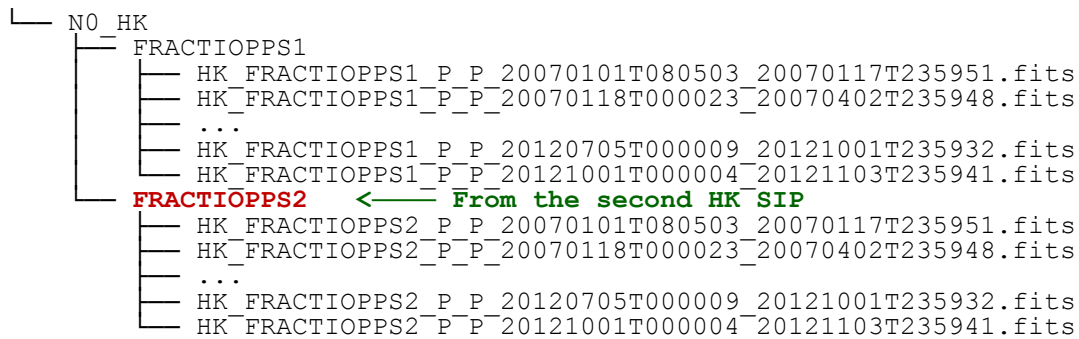
- 2.6.5.2.2.9 Register file as ingested
- 2.6.5.2.3 Check minimum occurrence of Data Object File(s) in this Data Object
- 2.6.5.3 Check minimum occurrence of Data Object(s) in this Group
- 2.6.6 Check minimum occurrence of Group(s) in this Transfer Object
- 2.7 Check minimum size of this Transfer Object
- 2.8 Increment a counter for this Transfer Object type
- 2.9 Cleanup SIP and temporary inflated files
- 2.10 If flagged as last Transfer Object
 - 2.10.1 Check that the counter for this Transfer Object type reaches or exceed the minimum occurrence
 - 2.10.2 Store that the last Transfer Object of this type has been received
- 3 Close project

TOPIC – In this case the Archive internal repository is a reconstruction of the original CoRoT repository on the Producer side.

TOPIC – Example of Archive internal repository after ingestion of the first SIP of CoRoT Housekeeping data.

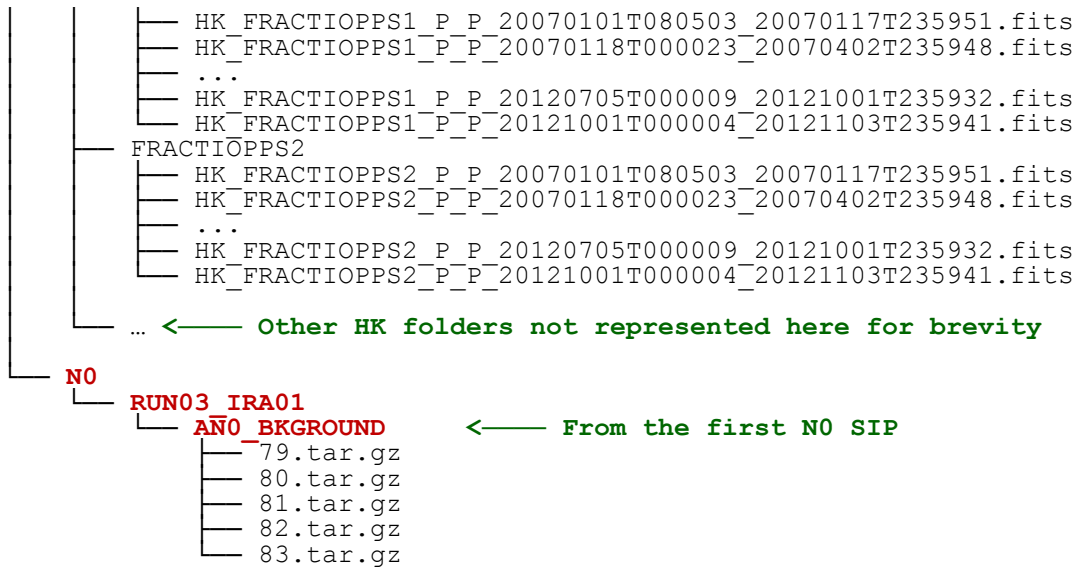


TOPIC – Example of Archive internal repository after ingestion of the two first SIPs of CoRoT Housekeeping data.



TOPIC – Example of Archive internal repository after ingestion of first SIP of CoRoT Level 0 data.





ANNEX D

COROT USE CASE – DESCRIPTORS

This annex contains the PAIS XML descriptors of the CoRoT use case (see section 6.4.3).

D1 COROT N0 – COLLECTION DESCRIPTOR

```
<?xml version="1.0" encoding="UTF-8"?>
<collectionDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0015</descriptorModelID>
    <descriptorModelVersion>V1.0</descriptorModelVersion>
    <descriptorID>COROT-N0</descriptorID>
  </identification>
  <description>
    <collectionTitle>CoRoT N0 Collection</collectionTitle>
    <collectionDescription>
      Collection of CoRoT N0 products and housekeeping data.
    </collectionDescription>
  </description>
  <relation>
    <parentCollection>NONE</parentCollection>
  </relation>
</collectionDescriptor>
```

D2 COROT N0 PRODUCTS – TRANSFER OBJECT DESCRIPTOR

```
<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0014</descriptorModelID>
    <descriptorModelVersion>V1.0</descriptorModelVersion>
    <descriptorID>COROT-N0-RUN-PRODUCT-SET</descriptorID>
    <producerSourceID>CNES</producerSourceID>
  </identification>
  <description>
    <transferObjectTypeTitle>
      CoRoT N0 RUN - Product Set
    </transferObjectTypeTitle>
    <transferObjectTypeDescription>
      A set of CoRoT N0 products of the same type and belonging
      to a single Run.
    </transferObjectTypeDescription>
  </description>
</transferObjectTypeDescriptor>
```

```

    <transferObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown/>
    </transferObjectTypeOccurrence>
    <transferObjectTypeSize>
      <maxSize>4</maxSize>
      <unitsType>GB</unitsType>
    </transferObjectTypeSize>
  </description>

  <relation>
    <parentCollection>COROT-N0</parentCollection>
  </relation>

  <groupType>

    <groupTypeID>COROT-N0-Run</groupTypeID>
    <groupTypeDescription>
      A group denoting a single run.
    </groupTypeDescription>
    <groupTypeStructureName>directory</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>

    <groupType>

      <groupTypeID>COROT-N0-Product-Type</groupTypeID>
      <groupTypeDescription>
        A group of CoRoT N0 products of the same type.
      </groupTypeDescription>
      <groupTypeStructureName>directory</groupTypeStructureName>
      <groupTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>1</maxOccurrence>
      </groupTypeOccurrence>

      <dataObjectType>
        <dataObjectTypeID>COROT-N0-Product</dataObjectTypeID>
        <dataObjectTypeDescription>
          A CoRoT N0 product
        </dataObjectTypeDescription>
        <dataObjectTypeOccurrence>
          <minOccurrence>1</minOccurrence>
          <maxUnknown/>
        </dataObjectTypeOccurrence>
      </dataObjectType>

    </groupType>
  </groupType>
</transferObjectTypeDescriptor>

```

D3 COROT HOUSKEEPING DATA (HK) – TRANSFER OBJECT DESCRIPTOR

```

<?xml version="1.0" encoding="UTF-8"?>
<transferObjectTypeDescriptor xmlns="urn:ccsds:schema:pais:1">
  <identification>
    <descriptorModelID>CCSD0014</descriptorModelID>
    <descriptorModelVersion>V1.0</descriptorModelVersion>
    <descriptorID>COROT-N0-HK-SET</descriptorID>
    <producerSourceID>CNES</producerSourceID>
  </identification>
  <description>
    <transferObjectTypeTitle>CoRoT N0 - HK Set</transferObjectTypeTitle>
    <transferObjectTypeDescription>
      A set of CoRoT N0 housekeeping data.
    </transferObjectTypeDescription>
    <transferObjectTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxUnknown/>
    </transferObjectTypeOccurrence>
  </description>
  <relation>
    <parentCollection>COROT-N0</parentCollection>
  </relation>
  <groupType>
    <groupTypeID>COROT-N0-HK-Type</groupTypeID>
    <groupTypeDescription>
      A group of CoRoT N0 housekeeping data type.
    </groupTypeDescription>
    <groupTypeStructureName>directory</groupTypeStructureName>
    <groupTypeOccurrence>
      <minOccurrence>1</minOccurrence>
      <maxOccurrence>1</maxOccurrence>
    </groupTypeOccurrence>
    <dataObjectType>
      <dataObjectTypeID>COROT-N0-HK-Data</dataObjectTypeID>
      <dataObjectTypeDescription>
        A CoRoT N0 housekeeping data.
      </dataObjectTypeDescription>
      <dataObjectTypeOccurrence>
        <minOccurrence>1</minOccurrence>
        <maxUnknown/>
      </dataObjectTypeOccurrence>
    </dataObjectType>
  </groupType>
</transferObjectTypeDescriptor>

```


D4 COROT – SIP CONSTRAINTS

```

<?xml version="1.0" encoding="UTF-8"?>
<sipConstraints xmlns="urn:ccsds:schema:pais:1">
  <producerArchiveProjectID>COROT-N0</producerArchiveProjectID>
  <!-- SIPs of COROT N0 products -->
  <sipContentType>
    <sipContentTypeID>SIP-COROT-N0-PRODUCT-SET</sipContentTypeID>
    <authorizedDescriptor>
      <descriptorID>COROT-N0-RUN-PRODUCT-SET</descriptorID>
      <occurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>1</maxOccurrence>
      </occurrence>
    </authorizedDescriptor>
  </sipContentType>
  <!-- SIPs of COROT N0 housekeeping (HK) data -->
  <sipContentType>
    <sipContentTypeID>SIP-COROT-N0-HK-SET</sipContentTypeID>
    <authorizedDescriptor>
      <descriptorID>COROT-N0-HK-SET</descriptorID>
      <occurrence>
        <minOccurrence>1</minOccurrence>
        <maxOccurrence>1</maxOccurrence>
      </occurrence>
    </authorizedDescriptor>
  </sipContentType>
  <!-- Constraints: force HK before products -->
  <sipSequencingConstraintGroup>
    <groupName>CoRoT N0</groupName>
    <constraintItem>
      <sipContentTypeID>SIP-COROT-N0-HK-SET</sipContentTypeID>
      <constraintSerialNumber>1</constraintSerialNumber>
    </constraintItem>
    <constraintItem>
      <sipContentTypeID>SIP-COROT-N0-PRODUCT-SET</sipContentTypeID>
      <constraintSerialNumber>2</constraintSerialNumber>
    </constraintItem>
  </sipSequencingConstraintGroup>
</sipConstraints>

```

ANNEX E

COROT USE CASE – EXAMPLES OF XFDU MANIFESTS

This annex contains examples of SIP XFDU Manifests extracted from the CoRoT use case (see section 6.4.3).

E1 FIRST SIP OF HOUSEKEEPING SERIES

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

<xfdu:XFDU xmlns:pais="urn:ccsds:schema:pais:1"
           xmlns:xfdu="urn:ccsds:schema:xfdu:1">

  <packageHeader ID="COROT-N0-SIP-0001">
    <volumeInfo>
      <specificationVersion>1.0</specificationVersion>
    </volumeInfo>
    <environmentInfo>
      <extension>
        <pais:sipGlobalInformation>
          <pais:sipID>COROT-N0-SIP-0001</pais:sipID>
          <pais:producerSourceID>CNES</pais:producerSourceID>
          <pais:producerArchiveProjectID>COROT-N0.↓
            </pais:producerArchiveProjectID>
          <pais:sipContentTypeID>SIP-COROT-N0-HK-SET.↓
            </pais:sipContentTypeID>
          <pais:sipSequenceNumber>1</pais:sipSequenceNumber>
        </pais:sipGlobalInformation>
      </extension>
    </environmentInfo>
  </packageHeader>

  <informationPackageMap>

    <xfdu:contentUnit>
      <extension>
        <pais:sipTransferObject>
          <pais:descriptorID>COROT-N0-HK-SET</pais:descriptorID>
          <pais:transferObjectID>COROT-N0-HK-SET-0001.↓
            </pais:transferObjectID>
          <pais:lastTransferObjectFlag>↓
            FALSE</pais:lastTransferObjectFlag>
        </pais:sipTransferObject>
      </extension>

    <xfdu:contentUnit>
      <extension>
        <pais:sipTransferObjectGroup>
          <pais:associatedDescriptorGroupTypeID>
            COROT-N0-HK-Type.↓</pais:associatedDescriptorGroupTypeID>
          <pais:transferObjectGroupInstanceName>↓
            NO_HK/FRACTIOPPS1</pais:transferObjectGroupInstanceName>
        </pais:sipTransferObjectGroup>
      </extension>
    </xfdu:contentUnit>
  </informationPackageMap>
</xfdu:XFDU>
```

```

</extension>
<xfdu:contentUnit>
  <extension>
    <pais:sipDataObject>
      <pais:associatedDescriptorDataID>↓
        COROT-N0-HK-Data</pais:associatedDescriptorDataID>
      </pais:sipDataObject>
    </extension>
    <dataObjectPointer dataObjectID="DO-COROT-N0-HK-Data-0001"/>
  </xfdu:contentUnit>

  <xfdu:contentUnit>
    <extension>
      <pais:sipDataObject>
        <pais:associatedDescriptorDataID>↓
          COROT-N0-HK-Data</pais:associatedDescriptorDataID>
        </pais:sipDataObject>
      </extension>
      <dataObjectPointer dataObjectID="DO-COROT-N0-HK-Data-0029"/>
    </xfdu:contentUnit>

  </xfdu:contentUnit>
</xfdu:contentUnit>
</informationPackageMap>

<dataObjectSection>

  <dataObject ID="DO-COROT-N0-HK-Data-0001">
    <byteStream size="0">
      <fileLocation locatorType="URL"
        href="file:N0_HK/FRACTIOPPS1/↓
          HK_FRACTIOPPS1_P_P_20070101T080503_20070117T235951.fits"/>
      <checksum checksumName="MD5">↓
        d41d8cd98f00b204e9800998ecf8427e</checksum>
    </byteStream>
  </dataObject>

  <dataObject ID="DO-COROT-N0-HK-Data-0029">
    <byteStream size="0">
      <fileLocation locatorType="URL"
        href="file:N0_HK/FRACTIOPPS1/↓
          HK_FRACTIOPPS1_P_P_20121001T000004_20121103T235941.fits"/>
      <checksum checksumName="MD5">↓
        d41d8cd98f00b204e9800998ecf8427e</checksum>
    </byteStream>
  </dataObject>

</dataObjectSection>

</xfdu:XFDU>

```

First SIP of Level 0 Datasets

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

```
<xfdu:XFDU xmlns:pais="urn:ccsds:schema:pais:1"
  xmlns:xfdu="urn:ccsds:schema:xfdu:1">

  <packageHeader ID="COROT-N0-SIP-0021">
    <volumeInfo>
      <specificationVersion>1.0</specificationVersion>
    </volumeInfo>
    <environmentInfo>
      <extension>
        <pais:sipGlobalInformation>
          <pais:sipID>COROT-N0-SIP-0021</pais:sipID>
          <pais:producerSourceID>CNES</pais:producerSourceID>
          <pais:producerArchiveProjectID>COROT-N0
            </pais:producerArchiveProjectID>
          <pais:sipContentTypeID>SIP-COROT-N0-PRODUCT-SET
            </pais:sipContentTypeID>
          <pais:sipSequenceNumber>21</pais:sipSequenceNumber>
        </pais:sipGlobalInformation>
      </extension>
    </environmentInfo>
  </packageHeader>

  <informationPackageMap>

    <xfdu:contentUnit>
      <extension>
        <pais:sipTransferObject>
          <pais:descriptorID>COROT-N0-RUN-PRODUCT-SET
            </pais:descriptorID>
          <pais:transferObjectID>COROT-N0-RUN-PRODUCT-SET-0001
            </pais:transferObjectID>
          <pais:lastTransferObjectFlag>FALSE
            </pais:lastTransferObjectFlag>
        </pais:sipTransferObject>
      </extension>

    <xfdu:contentUnit>
      <extension>
        <pais:sipTransferObjectGroup>
          <pais:associatedDescriptorGroupTypeID>COROT-N0-Run
            </pais:associatedDescriptorGroupTypeID>
          <pais:transferObjectGroupInstanceName>N0/RUN03_IRA01
            </pais:transferObjectGroupInstanceName>
        </pais:sipTransferObjectGroup>
      </extension>

    <xfdu:contentUnit>
      <extension>
        <pais:sipTransferObjectGroup>
          <pais:associatedDescriptorGroupTypeID>
            COROT-N0-Product-Type
          </pais:associatedDescriptorGroupTypeID>
          <pais:transferObjectGroupInstanceName>AN0_BKGROUND
            </pais:transferObjectGroupInstanceName>
```

```

    </pais:sipTransferObjectGroup>
</extension>

<xfdy:contentUnit>
  <extension>
    <pais:sipDataObject>
      <pais:associatedDescriptorDataID>COROT-N0-Product
    </pais:associatedDescriptorDataID>
    </pais:sipDataObject>
  </extension>
  <dataObjectPointer
    dataObjectID="DO-COROT-N0-Product-0001"/>
</xfdu:contentUnit>

<xfdy:contentUnit>
  <extension>
    <pais:sipDataObject>
      <pais:associatedDescriptorDataID>COROT-N0-Product
    </pais:associatedDescriptorDataID>
    </pais:sipDataObject>
  </extension>
  <dataObjectPointer
    dataObjectID="DO-COROT-N0-Product-0002"/>
</xfdu:contentUnit>

<xfdy:contentUnit>
  <extension>
    <pais:sipDataObject>
      <pais:associatedDescriptorDataID>COROT-N0-Product
    </pais:associatedDescriptorDataID>
    </pais:sipDataObject>
  </extension>
  <dataObjectPointer
    dataObjectID="DO-COROT-N0-Product-0003"/>
</xfdu:contentUnit>

<xfdy:contentUnit>
  <extension>
    <pais:sipDataObject>
      <pais:associatedDescriptorDataID>COROT-N0-Product
    </pais:associatedDescriptorDataID>
    </pais:sipDataObject>
  </extension>
  <dataObjectPointer
    dataObjectID="DO-COROT-N0-Product-0004"/>
</xfdu:contentUnit>

<xfdy:contentUnit>
  <extension>
    <pais:sipDataObject>
      <pais:associatedDescriptorDataID>COROT-N0-Product
    </pais:associatedDescriptorDataID>
    </pais:sipDataObject>
  </extension>
  <dataObjectPointer
    dataObjectID="DO-COROT-N0-Product-0005"/>
</xfdu:contentUnit>

```

```

        </xfdu:contentUnit>
    </xfdu:contentUnit>
</xfdu:contentUnit>
</informationPackageMap>

<dataObjectSection>

    <dataObject ID="DO-COROT-N0-Product-0001">
        <byteStream size="0">
            <fileLocation locatorType="URL"
                href="file:N0/RUN03_IRA01/AN0_BKGROUND/79.tar.gz"/>
            <checksum
                checksumName="MD5">d41d8cd98f00b204e9800998ecf8427e</checksum>
        </byteStream>
    </dataObject>

    <dataObject ID="DO-COROT-N0-Product-0002">
        <byteStream size="0">
            <fileLocation locatorType="URL"
                href="file:N0/RUN03_IRA01/AN0_BKGROUND/80.tar.gz"/>
            <checksum
                checksumName="MD5">d41d8cd98f00b204e9800998ecf8427e</checksum>
        </byteStream>
    </dataObject>

    <dataObject ID="DO-COROT-N0-Product-0003">
        <byteStream size="0">
            <fileLocation locatorType="URL"
                href="file:N0/RUN03_IRA01/AN0_BKGROUND/81.tar.gz"/>
            <checksum
                checksumName="MD5">d41d8cd98f00b204e9800998ecf8427e</checksum>
        </byteStream>
    </dataObject>

    <dataObject ID="DO-COROT-N0-Product-0004">
        <byteStream size="0">
            <fileLocation locatorType="URL"
                href="file:N0/RUN03_IRA01/AN0_BKGROUND/82.tar.gz"/>
            <checksum
                checksumName="MD5">d41d8cd98f00b204e9800998ecf8427e</checksum>
        </byteStream>
    </dataObject>

    <dataObject ID="DO-COROT-N0-Product-0005">
        <byteStream size="0">
            <fileLocation locatorType="URL"
                href="file:N0/RUN03_IRA01/AN0_BKGROUND/83.tar.gz"/>
            <checksum
                checksumName="MD5">d41d8cd98f00b204e9800998ecf8427e</checksum>
        </byteStream>
    </dataObject>

</dataObjectSection>
</xfdu:XFDU>

```

ANNEX F

COROT USE CASE – SIP BUILDER CONFIGURATION FILE

This annex contains an example of SIP Builder software configuration file for the generation of XFDU PAIS Conformant SIPs as described in output of CoRoT use case (see section 6.4.4.1).

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

<project xmlns="urn:fr:gael:schema:ccsds:pais:sip-builder:1">

  <descriptors>
    <descriptor file="pais-corot-descriptor-an0-bkground.xml"/>
    <descriptor file="pais-corot-descriptor-en0-bkground.xml"/>
    <descriptor file="pais-corot-sip-constraints.xml" />
  </descriptors>

  <!-- Note: baseDirectory depends on running environment.
       Update it to locate the root directory of the CoRoT file repository
       (relative path are from current working directory at execution) -->

  <collectors baseDirectory="../../../test-data/cnes-corot-tds-20140423">

    <collector typeId="N0_RUN_AN0_BKGROUND_Group">
      <include>N0</include>
    </collector>
    <collector typeId="RUN_AN0_BKGROUND_Group">
      <include>RUN.*</include>
    </collector>
    <collector typeId="AN0_BKGROUND_Data">
      <include>AN0_BKGROUND/*.tar.gz</include>
    </collector>

    <collector typeId="N0_RUN_EN0_BKGROUND_Group">
      <include>N0</include>
    </collector>
    <collector typeId="RUN_EN0_BKGROUND_Group">
      <include>RUN.*</include>
    </collector>
    <collector typeId="EN0_BKGROUND_MONOCHROM_Data">
      <include>EN0_BKGROUND_MONOCHROM/*.tar.gz</include>
    </collector>
    <collector typeId="EN0_BKGROUND_SAMPLEM_Data">
      <include>EN0_BKGROUND_SAMPLEM/*.tar.gz</include>
    </collector>

  </collectors>

</project>
```