NATIONAL POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM (NPOESS) PREPARATORY PROJECT (NPP)

SCIENCE DATA SEGMENT DATA DEPOSITORY AND DISTRIBUTION ELEMENT (SD3E) TO PRODUCT EVALUATION AND ANALYSIS TOOLS ELEMENTS (PEATES) AND NPP INSTRUMENT CALIBRATION SUPPORT ELEMENT (NICSE) INTERFACE CONTROL DOCUMENT (ICD)

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**GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND**

National Polar-orbiting Operational Environmental Satellite System
(NPOESS) Preparatory Project (NPP)

Science Data Segment
Data Depository and Distribution Element (SD3E)
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ABSTRACT

This document provides the design specifications for implementing the interfaces between the NPP Science Data Segment (SDS) Data Depository and Distribution Element (SD3E) located at the Goddard Space Flight Center (GSFC) to the NPP SDS Product Evaluation and Analysis Tools Elements (PEATEs) and the NPP Instrument Calibration Support Element (NICSE).   All Elements are components of the NPP Science Data Segment supporting the NPP mission.

This ICD focuses on the data transfer flows between the SD3E and the five PEATEs (Atmosphere, Land, Ocean, Ozone, and Sounder) and the NICSE. It specifies the mechanisms for data exchange, the handshaking messages transferred, the format of the messages, the format for the product request, and the transfer of the NPP products.

Keywords: checksum, digital signature, ingest, interface, NPP products, FTP, subscription request, ad-hoc requests, XML

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1.0   INTRODUCTION

This document describes the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) Science Data Depository and Distribution Element (SD3E) to Product Evaluation and Analysis Tool Elements (PEATEs) and NPP Instrument Calibration and Support Element (NICSE) interface. It defines all required physical, communication, and logical interfaces between these two systems. This interface is necessary to complete the design, development, and testing of the interface between these two elements.

1.1   SCOPE

The provisions of this document apply to the development and operation of the interfaces between the SD3E and PEATEs/NICSE necessary to support NPP installation, mission/research operations, and delivery of NPP mission data products satisfying SDS mission requirements.

1.2   SD3E OVERVIEW

The SD3E performs data acquisition, temporary storage, and distribution. The sources of these data are the IDPS, ADS, and NSIPS. The SD3E follows all necessary data acquisition protocols and procedures for nominal data acquisition, reception, and for anomaly resolution according to appropriate Interface Control Documents (ICD) with the external interfaces. The SD3E subsequently makes these data accessible to the PEATEs and the NICSE. The PEATEs/NICSE provides the SD3E with a subscription, an ad-hoc request, and/or a retransmission request, as needed.

The SD3E is a central system dedicated strictly to storing and making the data accessible to the five PEATEs and NICSE. It provides local storage for a maximum of 32 days (TBD1) of acquired data. The acquired data products include xDRs (e.g. RDRs, SDRs, EDRs, TDRs, and ARPs), operational calibration products, operational algorithms and source codes, and official ancillary/auxiliary data. The intermediate products, both the selected and retained, are stored for 7 days. Additionally, the five most recent versions of the algorithms and software and documentation are stored. Figure 1.2-1 SD3E Context Diagram describes the dataflow between the SD3E and its interfaces.
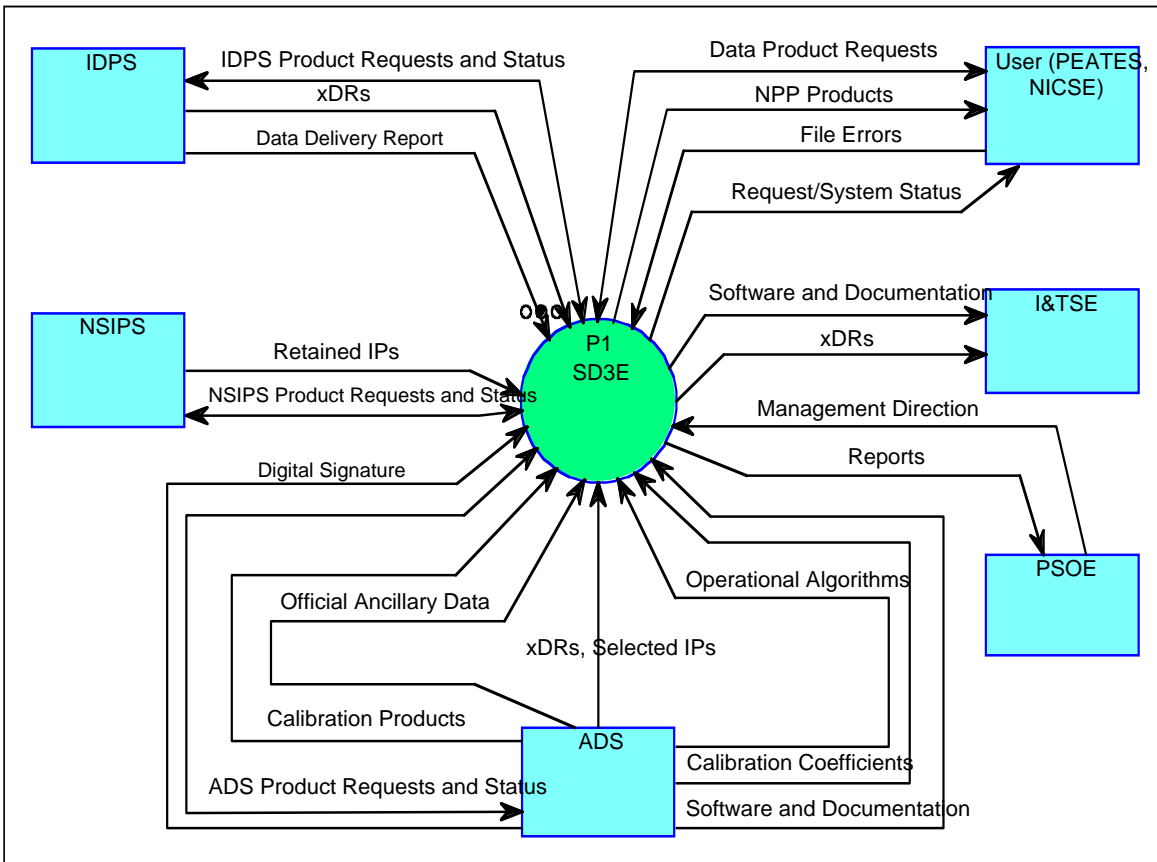
Figure 1.2-1 SD3E Context Diagram

1.3   PEATES AND NICSE OVERVIEW

The SDS Product Evaluation and Analysis Tool Elements (PEATEs) include the Atmosphere PEATE, Land PEATE, Ocean PEATE, Ozone PEATE, and Sounder PEATE. Each system extracts the data of interest into its respective systems for xDR quality evaluation, selected subset processing, and algorithm enhancements.

The NICSE is responsible for assessing and validating pre-launch and post-launch radiometric and geometric calibration and characterization of VIIRS instrument data. The NICSE ingests the xDRs, the operational calibration look-up table (LUT) updates, and the operational calibration software updates from the SD3E. The NICSE will evaluate and, if necessary, provide recommendations for enhancements of calibration

software and look-up tables (LUTs). The recommended calibration algorithms and LUTs will be tested in the PEATEs' environment before being submitted to the Project Science Office Element (PSOE) for further review.

2.0   DOCUMENT OVERVIEW

2.1   DOCUMENT ORGANIZATION

Section 1 provides an introduction to the document. Section 2 identifies the compliance and reference documents. Section 3 provides the specifications for all of the interfaces identified between SD3E and the PEATEs/NICSE. A list of acronyms and abbreviations used in this document along with definitions and sample XML requests are supplied in the Appendices.

Appendix A is a list of the acronyms. Appendix B contains examples of the ad-hoc and subscription requests. Appendix C contains an example of the XML schema. Appendix D shows the SD3E directory structure where the requested products are made available for FTP access. Appendix E contains a table of the TBDs and TBSs. Appendix F contains an example of the SD3E request status directory structure. And last, Appendix G contains an example of the SD3E request status file/e-mail.

2.2   COMPLIANCE DOCUMENTS

The following documents have been identified as compliance documents in the development and preparation of this document.

Table 2.2-1 Reference Compliance Documents

Ref. No	Document Title	Document No.
C-1	NPOESS to NPOESS Preparatory Project (NPP) Science Data Segment Interface Control Document (ICD)	NGST D34645
C-2	NPP Mission Requirements Specification Volume 1&2	GSFC429-99-02-03-R1
C-3	NASA NPP Level 1 Requirements	
C-4	NASA NPP Science Data Segment Requirements Specification	GSFC 429-05-11-01
C-5	NASA NPP Science Data Segment Operations Concept	GSFC 429-05-11-02

2.3   REFERENCE DOCUMENTS

The following documents have been used as reference information in the development and preparation of this document.

Table 2.3-1 Reference Documents

Ref No.	Document Title	Document No.
R-1	NPOESS Common Data Format Control Book – External Volume I – Overview	D34862-01
R-2	NPOESS Common Data Format Control Book – External Volume II – RDR Formats	D34862-02
R-3	NPOESS Common Data Format Control Book – External Volume III – SDR/TDR Formats	D34862-03
R-4	NPOESS Common Data Format Control Book – External Volume IV – EDR/IP/ARP Formats	D34862-04
R-5	NPOESS Common Data Format Control Book – External Volume V – Metadata	D34862-05
R-6	NPOESS Common Data Format Control Book – External Volume VI – Ancillary Data, Auxiliary Data, Messages, and Reports	D34862-06
R-7	NPOESS Common Data Format Control Book – External Volume VII – Application Packets	D34862-07
R-8	National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) Science Data Segment Requirements Specification	GSFC 429-05-11-01
R-9	National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) Science Data Segment Operations Concept	GSFC 429-05-11-02

3.0   INTERFACES

3.1   SUMMARY OF DATA FLOWS

Figure 3.1-1 summarizes the data flows between the SD3E and the PEATEs/NICSE. This figure shows three categories of data exchange interfaces.

1. In response to subscription, ad-hoc, or retransmission requests from the PEATEs/NICSE, for the machine-to-machine interface, the SD3E sends an acknowledgement/status of the request either automatically by software or manually by the operator. For the Web interface, the status is displayed on the Web.
2. For file error notifications, the PEATEs/NICSE will notify the SD3E operator to resolve request errors as soon as the problem is known. If the file error notification problem cannot be resolved within a reasonable amount of time, then the problem will be submitted to the Mantis bug-tracking tool. If there are software, hardware, or system problems (problems that do not require an immediate response), the PEATEs/NICSE will submit a problem report in the Mantis bug-tracking tool.
3. The SD3E provides the NPP Products in a directory structure described in Appendix D. The NPP Products include the RDRs, SDRs, EDRs, TDRs, ARPs, delivered and retained IPs, official ancillary/auxiliary data, calibration products, software and documentation, and operational algorithms. Additionally, the SD3E checks the integrity of the ingested products. For products passing integrity checks, the SD3E will provide data integrity files for products received from the IDPS and NSIPS to the PEATE/NICSE. In majority of the cases, the SD3E ingests the RDRs from IDPS and retained IPs from NSIPS. For all other products, the SD3E will pass the Archive and Distribution System (ADS) digital signature files to the PEATEs/NICSE. The format of the SD3E data integrity file is described in Section 3.2.2 and the ADS digital signature file is described in Section 3.2.3.
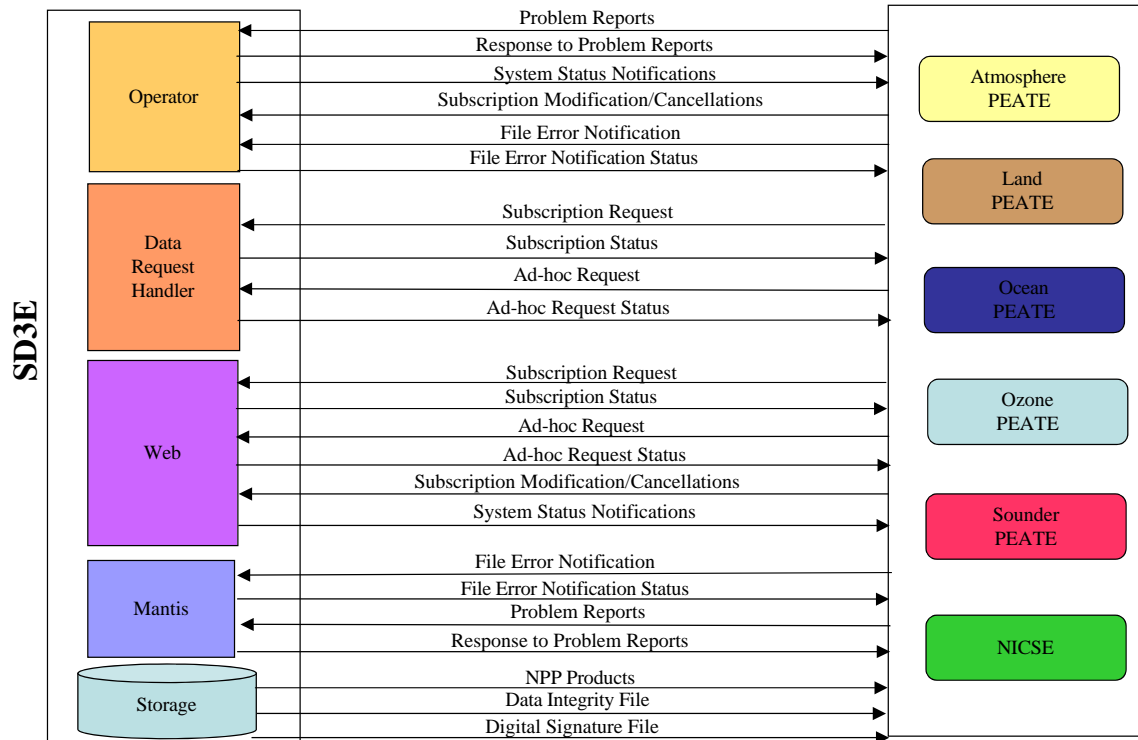
Figure 3.1-1 SD3E to PEATEs/NICSE Data Flows

Each interface includes a table to summarize the description of the interface between the SD3E and the PEATEs/NICSE and the mechanism for delivery or transfer of products. It assumes an electronic interface for delivery of products between the SD3E and the PEATEs/NICSE. Each table consists of six columns. The item number describes the sequence of events. The source defines the initiator or where the source of information is provided. The destination defines where the product is delivered. The data flow describes the item being transferred. The description describes the data flow. The transfer mechanism describes the mechanism or protocols used to transfer the data.

The SD3E has no priority capabilities. All users of the SD3E data repository have equal priority for data acquisition. All users have a maximum of 32 days (TBD1) to retrieve their data products from the SD3E and seven days to retrieve their Intermediate Products (IPs).

The SD3E provides two mechanisms for data requests: a machine-to-machine interface and a Web interface. The machine-to-machine interface will use anonymous FTP push with IP restriction to submit product requests and anonymous FTP pull to retrieve data products. Details of these interfaces are described in the following sections. See Section 3.3 Accessing The Web Interface on obtaining Web user accounts and receiving statuses via email. See Section 4.0 regarding providing the SD3E operator with a valid IP address.

3.1.1 PROBLEM REPORTS

The problem reports are entered into Mantis, the bug-tracking tool, located at https://nppsds.nascom.nasa.gov/bugs. Mantis will automatically send email to the initiator and other interested parties. Problem reports may include, but are not limited to, issues regarding system problems (e.g., hardware or software), accessibility issues, or product issues. Table 3.1.1-1 describes the mechanisms for report submission.

Questions that may be addressed quickly may be emailed to the SD3E operator at sd3_ops@nppsds2.nascom.nasa.gov (TBS3) or called in by phone to the operator. However, it is highly recommended that all problems be submitted using Mantis.

Table 3.1.1-1 Problem Reports

Item No	Source	Destination	Data Flow	Description	Transfer Mechanism
1	PEATEs /NICSE	Mantis – http://nppsds.nascom.nasa.gov/bugs	Problem report	Report problems using the bug tracking tool	Mantis
2	Mantis	PEATEs/NICSE	Response to problem report	Bug tracking application provides responses to bug report	Mantis

If submitting questions to the SD3E operator using email, at a minimum, the report should include the following information described in Table 3.1.1-2. Operations are supported during normal business hours, Monday through Friday. The operator will attempt to respond to email within 24 hours, Monday through Thursday. Responses to email received on Fridays or holidays will be attempted the next business working day.

Table 3.1.1-2 Email Question Contents

Message Field	Description
Subject of email message	The subject of the message identifies the purpose.
Contact Information	The email address and/or phone number of the initiator of the problem report.
Date and time	Date and time when problem was encountered
Body of message	List as much detail as possible regarding the question.

3.1.2 RESPONSE TO PROBLEM REPORTS

The Mantis bug-tracking tool will automatically email the status of problem reports to the initiator and any interested parties of the problem report.

The Mantis administrator will make every attempt to respond to problems during normal business hours, Monday through Friday. If the problem cannot be resolved immediately,

Check the NPP CCR website at http://nppcm.gsfc.nasa.gov/ccr/npp to verify that this is the correct version prior to use.

the administrator will provide a date as to when the problem is expected to be resolved. Every problem reported will be tracked using the bug report tracking number.

3.1.3   SYSTEM STATUS NOTIFICATION

The SD3E operator will notify the PEATEs/NICSE, in advance when possible, of system maintenance. In the event of system problems, the SD3E operator will attempt to notify the PEATEs/NICSE 24 hours in advance, Monday through Friday. In the event that there is insufficient time to warn users of a system problem in advance, the operator will send an email to the PEATEs/NICSE as soon as the problem is known. Daily system status such as system down times, maintenance, problems (e.g., hardware/software failures), etc. will also be made available at the SD3E Web site. The URL is https://nppsds.nascom.nasa.gov/sd3e/.

If the status is desired via email, the PEATEs/NICSE will need to provide the SD3E with their email address for receipt of such messages. Table 3.1.3-1 provides an overview of this data flow. Section 3.3.2 describes how a user can submit their email address to the SD3E.

Table 3.1.3-1 System Status Notification

Item No	Source	Destination	Data Flow	Description	Transfer Mechanism
1	SD3E Operator	PEATEs/NICSE	System Status	Description of system problem (e.g., down time)	email

3.1.4   SUBSCRIPTION MODIFICATIONS

There are two mechanisms that can be used to modify a subscription. The first is to contact the SD3E operator by phone or email and supply the operator with the product type and information that needs to be modified. The second method is to use the Web interface at https://nppsds.nascom.nasa.gov/sd3e/.

To make changes to a subscription using the Web interface, the user will use the Request Status page. This page lists all of the products requested within a subscription as an individual product order. Any change made to an individual product order does not affect any of the other products ordered within the same subscription.

To modify an order, the user will first cancel the product by selecting "Cancel" in the drop down menu under the User Action column. The user will then submit the request and be prompted to confirm the action. Once confirmed, the user will use the Subscription Request Form to submit another subscription for the product with the desired parameters. To cancel all products related to the PEATE/NICSE, the user can select ALL products and use the Cancel option. A PEATE/NICSE may only cancel the products that they subscribe to (e.g., Ozone can only modify/cancel Ozone subscriptions).

To modify an existing subscription by email, the PEATEs/NICSE should include, at a minimum, the information described in Table 3.1.4-1.

Table 3.1.4-1 Subscription Modifications

Message Field	Description
Subject of email message	The subject of the message identifies the purpose. The subject must explicitly state "Modification" or "Update".
Contact Information	The email address and/or phone number of the initiator of the .
Date and Time	Date and time when problem was encountered
Subscription Information	The information provided in the subscription request.
Number of changes	The total number of modifications requested.
From	The original parameter.
To	The new parameter to change to.
…	…
From	The original parameter.
To	The new parameter to change to.

3.1.5 SUBSCRIPTION CANCELLATIONS

There are two methods to cancel an existing subscription. The first is for the PEATEs/NICSE to contact the SD3E operator by phone and provide the product's information

The second option is to use the Request Status page found at https://nppsds.nascom.nasa.gov/sd3e/. This table lists all of the products requested. To cancel, the user would select "Cancel" under the User Action drop down menu. A cancel 'ALL' option is provided to cancel all products related to the PEATE/NICSE. Once the action is submitted, the user is prompted to confirm the action.

Instead of canceling an order, the user may suspend receipt of the product for a period of time. This is available under the User Action drop down menu. The SD3E will halt ingest of the selected product indefinitely until the PEATE/NICSE directs the SD3E to again receive the product. The user will select the Resume option in the User Action column to resume product ingest or Cancel to cancel the receipt of the product. To suspend or resume all of the products, selecting ALL and either suspend or resume option will suspend or resume all products for their PEATE/NICSE. Only the PEATE/NICSE who owns the product (e.g. Land PEATE can only cancel a Land request) may request the cancel, suspend, or resume actions. The user will be prompted to confirm all actions that they request.

3.1.6 SUBSCRIPTION REQUEST

The subscription requests are standing orders fulfilled whenever the requested data become available. Table 3.1.6-1 provides an overview of the subscription data flows. The PEATEs/NICSE will use anonymous FTP or the Web interface to push their

subscription request to the system. Users will FTP push the request to the SD3E and place the request in the directory /NPPSD3/incoming/requests. If using the machine-to-machine interface, users must provide the SD3E operator with a valid IP address. See Section 4.0.

Table 3.1.6-1 Subscription Request

Item No	Source	Destination	Data Flow	Sample/ Description	Transfer Mechanism
1	PEATEs /NICSE	SD3E /NPPSD3/incoming /requests	Subscription request	See Appendix A or Section 3.1.6.1 for an example.	Anonymous FTP push
2	SD3E	PEATEs/NICSE	Acknowledging/ status of subscription	See section 3.2	email
3	SD3E	PEATEs/NICSE	NPP Products	NPP Products in /pub. See Section 3.2.1	Anonymous FTP pull

Once the PEATEs/NICSE submit a subscription request to the SD3E and the SD3E accepts the subscription order, a return status is emailed to the requester with a copy of the request information. The request information is used to update or cancel an existing subscription. See Sections 3.1.4 and 3.1.5 for descriptions of the subscription updates and cancellations.

Users may also submit their subscription request via the Web interface at https://nppsds.nascom.nasa.gov/sd3e. The subscription request page is located under the Request Form link. Users will be requested to provide parameters described in Table 3.1.6-2 Subscription Requests Using the Web.

Table 3.1.6-2 Subscription Requests Using the Web

Parameter	Description
Satellite	NPP
Sensor	ATMS, CrIS, CrIMSS, OMPS, VIIRS
Product Type	RDR, SDR, EDR, TDR, etc.
Collection Short Name	See R-1
Aggregation (OPTIONAL FIELD)	Integer. The aggregation of the product in seconds. A valid range for the aggregation is 1–6090 seconds. The maximum aggregation is one orbit's worth of data or 101.5 minutes. A blank defaults to no aggregation.

With regards to the aggregation, PEATEs of the same sensor (e.g., VIIRS) must agree beforehand as to the format of the products they want via the subscription. The SD3E does not provide the capability to subscribe to the same product in multiple formats (e.g. granules vs. aggregation). If this is desired, then an ad-hoc request must be submitted. See Section 3.1.9 Ad-Hoc Request for more detail.

3.1.6.1   SUBSCRIPTION REQUEST FORMAT

Table 3.1.6.1-1 describes the format and the contents of the subscription request for the machine-to-machine interface. The subscription request format is in XML. A sample XML template is described in Appendix B. The sample XML schema is provided in Appendix C.

Table 3.1.6.1-1 Subscription Request Fields

Message Field	Description	Type	Format/Max Size	Value or Content with Value
Name	Name of requester	String	varies	
Satellite	NPP	String	3 alpha-chars	NPP
Sensor	Sensor	String	3-5 alpha-chars	VIIRS, CrIS, CrIMSS, ATMS, OMPS
Product Type	Type of product	String	varies alpha-chars	RDR, SDR, EDR, TDR, ARP, IP, Ancillary, Algorithm, Calibration
Product ID	Data product identifiers. If xDRs then use ProductID, else use collection short name.	fixed string	5 characters	See R-1
CollectionShortName	If Ancillary/Auxiliary use this description, else if xDRs then use product id.	string	variable	See R-1
Aggregation (OPTIONAL FIELD)	Aggregation of products by time	Integer	Integer. Valid range 1 – 6090 seconds. A blank defaults to no aggregation.	Sensor based. Report in seconds.

The following is a sample of the XML request file used to order products.
```
<?xml version="1.0" ?>
<sd3requests>
  <request>
    <Name>Land</Name>
    <EmailAddr>james.marshall@gsfc.nasa.gov</EmailAddr>
    <Satellite>NPP</Satellite>
    <Sensor>VIIRS</Sensor>
    <ProductType>RDR</ProductType>
    <ProductId>RVIRD</ProductId>
```

```
    <Aggregation>300</Aggregation>
  </request>
</sd3requests>
```

To request multiple products, multiple request blocks (<request> … </request>) must be created.

3.1.6.2   SUBSCRIPTION REQUEST FILE-NAMING

The PEATEs/NICSE will use the following file-naming convention for subscription requests using the machine-to-machine interface.

<Name of Element><Year><Month><Day><Hour><Minute><Second>.xml

Each one of the parameters is described in Table 3.1.6.2-1.

Table 3.1.6.2-1 Subscription File Naming Convention

Field	Precision	Description
Name of Element	N/A	Atmosphere, Land, Ocean, Ozone, Sounder, NICSE
Year	4	Four digit year (Valid range 2000 – 2099)
Month	2	01 – 12
Day	2	01 – 31
Hour	2	00 – 23
Minute	2	00 – 59
Second	2	00 – 60
Extension	N/A	.xml

An example of a possible filename is:

Land20061018102001.xml

3.1.7   FILE ERROR NOTIFICATION

A file error notification is when the PEATEs/NICSE notice a problem with the product. This file error could include, but is not limited to, file transfer issues (e.g., checksum or digital signature) or file content issues. that would warrant a re-request or a retransmission of the data products. See Section 3.1.9 for a description of the ad-hoc request. It is recommended that the PEATEs/NICSE submit a problem report in Mantis, http://nppsds.nascom.nasa.gov/bugs.   If a problem report cannot be submitted via Mantis, then the user will notify the SD3E operator to investigate the possible cause(s) of the problem by sending an email to the operator stating the problem. A phone call can also be placed to the operator. The SD3E operator will send an acknowledgement and/or a status to the error notification via email or by phone.

Table 3.1.7-1 File Error Notification

Item No	Source	Destination	Data Flow	Sample/ Description	Transfer Mechanism
1	PEATEs	SD3E Operator	Statement of	N/A	email/

Check the NPP CCR website at http://nppcm.gsfc.nasa.gov/ccr/npp to verify that this is the correct version prior to use.

	/NICSE	sd3_ops@nppsds2.nascom.nasa.gov (TBS3)	problem files.		phone
2	SD3E	PEATEs/NICSE	Acknowledgement /status of file error.	N/A	email

If the PEATEs/NICSE choose to send an email, the email should include, at a minimum, the information described in Table 3.1.7-2.

Table 3.1.7-2 File Error Notification Email Contents

Message Field	Description
Subject of email message	The subject of the message identifies the purpose.
Contact Information	The email address and phone number of the initiator of the problem report.
Date and Time	Date and time when problem was encountered
Files in Error	List of the files that are in question
Statement of Problem	A detailed description of the problem encountered with the files.

In the event that the file error issue cannot be resolved within a reasonable amount of time, the SD3E operator will submit a problem report to the Mantis bug-tracking tool.

3.1.8   FILE ERROR NOTIFICATION STATUS

The operator will respond to each file error notification request by email or by phone. If by email, the status may include the date, time, problem, status, and possible resolution. However, if a report was submitting using Mantis, http://nppsds.nascom.nasa.gov/bugs, then the response will be reported in the tool.

For the Web user, failed subscription requests and the details of the failure are reported immediately.

3.1.9   AD-HOC REQUEST

Ad-hoc requests, one time requests, are for a few specific products that otherwise would not require the use of a subscription. Table 3.1.9-1 provides an overview of the ad-hoc request flow. This format is used for the machine-to-machine request mechanism where the PEATEs/NICSE request is anonymous FTP pushed to the /NPPSD3/incoming/requests directory.

Table 3.1.9-1 Ad-hoc Requests

Item No	Source	Destination	Data Flow	Sample/ Description	Transfer Mechanism
1	PEATEs /NICSE	SD3E /NPPSD3/inco ming/requests	Ad-hoc request	See Appendix A or sample below	Anonymous FTP push
2	SD3E	PEATEs/ NICSE	Acknowledging/ status of request	See Section 3.2	email
3	SD3E	PEATEs/ NICSE	NPP Products	NPP Products in /pub. See Section 3.2.1	Anonymous FTP pull

Ad-hoc requests may also be submitted using the Web interface at https://nppsds.nascom.nasa.gov/sd3e/. The ad-hoc request page is located under the Request Form link. The user needs to provide the information described in Table 3.1.9-2 Ad-hoc Requests Using the Web.

Table 3.1.9-2 Ad-hoc Requests Using the Web

Parameter	Description
Start date	The start date of the product(s).
Start time	The start time of the product(s).
Stop date	The stop date of the product(s).
Stop time	The stop time of the product(s).
Satellite	NPP
Sensor	ATMS, CrIS, CrIMSS, OMPS, VIIRS
Product Type	RDR, SDR, EDR, TDR, etc.
Collection Short Name	See R-1
Aggregation (OPTIONAL FIELD)	Integer. The aggregation of the product in seconds. A valid range for the aggregation is 1–6090 seconds. The maximum aggregation is one orbit's worth of data or 101.5 minutes. A blank defaults to no aggregation.
UpperLatitudeInDegrees	Upper Bound. Valid range: -90.0-90.0
LowerLatitudeInDegrees	Lower Bound. Valid range: -90.0-90.0
RightLongitudeInDegrees	Right Bound. Valid range: -180.0-180.0
LeftLongitudeInDegrees	Left Bound. Valid range: -180.0-180.0

Once the user completes the request form, the user will be prompted to confirm the data request. Once confirmed, the data request is submitted to the SD3E. Once ad-hoc requests are submitted, they cannot be cancelled, suspended, or resumed. Ad-hoc requests can only be viewed from the Request Status page.

The ad-hoc requests are limited to products that are found to be corrupt, lost, or only

requested occasionally, meaning the product is not a part of an existing subscription.

3.1.9.1 AD-HOC REQUEST FORMAT

Table 3.1.9.1-1 describes the format and the contents of the ad-hoc request for the machine-to-machine interface. The ad-hoc request format is in XML. A sample XML template is described in Appendix B. The sample XML schema is provided in Appendix C.

Table 3.1.9.1-1 Ad-Hoc Request Fields

Message Field	Description	Type	Format/Max Size	Value or Content with Value
Name	Name of requester	String	varies	
Satellite	NPP	String	3 alpha-chars	NPP
Sensor	Sensor	String	3-5 alpha-chars	VIIRS, CrIS, CrIMSS, ATMS, OMPS
Product Type	Type of product	String	varies alpha-chars	RDR, SDR, EDR, TDR, ARP, IP, Ancillary, Algorithm, Calibration
Product ID	Data product identifiers. If xDRs use ProductID else use CollectionShortName	fixed string	5 characters	See R-1
CollectionShortName	If Ancillary/Auxiliary products use this description, else if xDRs use product ID	string	variable	See R-1
ProductStartDate	Starting date of product	Date	YYYY-MM-DD	
ProductStartTime	Starting time of product	Time	HH:MM:SS	
ProductStopDate	Ending date of product	Date	YYYY-MM-DD	
ProductStopTime	Ending time of product	Time	HH:MM:SS	
Aggregation (OPTIONAL FIELD)	Aggregation of products by time	Integer	Integer. Valid range between 1 – 6090 seconds. A blank defaults to no aggregation.	Sensor based. Report inseconds.
UpperLatitudeInDegrees	Upper Bound	Float	Float	-90.0-90.0

Check the NPP CCR website at http://nppcm.gsfc.nasa.gov/ccr/npp to verify that this is the correct version prior to use.

Message Field	Description	Type	Format/Max Size	Value or Content with Value
LowerLatitudeInDegrees	Lower Bound	Float	Float	-90.0-90.0
RightLongitudeInDegrees	Right Bound	Float	Float	-180.0-180.0
LeftLongitudeInDegrees	Left Bound	Float	Float	-180.0-180.0

The following is a sample of an ad-hoc request for a single product.

```
<?xml version="1.0" ?>
<sd3requests>
  <request>
    <Name>Ozone</Name>
    <EmailAddr>james.marshall@gsfc.nasa.gov</EmailAddr>
    <Satellite>NPP</Satellite>
    <Sensor>ATMS</Sensor>
    <ProductType>SDR</ProductType>
    <ProductId>ATMS</ProductId>
    <Interval>
      <ProductStartDate>2005-11-01</ProductStartDate>
      <ProductStartTime>12:00:00</ProductStartTime>
      <ProductStopDate>2005-11-02</ProductStopDate>
      <ProductStopTime>11:59:59</ProductStopTime>
      <UpperLatitudeInDegrees>90.0</UpperLatitudeInDegrees>
      <LowerLatitudeInDegrees>-90.0</LowerLatitudeInDegrees>
      <RightLongitudeInDegrees>180.0</RightLongitudeInDegrees>
      <LeftLongitudeInDegrees>-180.0</LeftLongitudeInDegrees>

    </Interval>
  </request>
</sd3requests>
```

To request multiple products within one ad-hoc request, multiple request blocks (<request> … </request>) must be created.

3.1.9.2 AD-HOC REQUEST FILE-NAMING

The PEATEs/NICSE will use the following file-naming conventionfor ad-hoc requests using the machine-to-machine interface.

<Name of Element><Year><Month><Day><Hour><Minute><Second>.xml

Each one of the parameters is described in Table 3.1.9.2-1.

Table 3.1.9.2-1 Ad-hoc File Naming Convention

Field	Precision	Description
Name of Element	N/A	Atmosphere, Land, Ocean, Ozone, Sounder,

		NICSE
Year	4	Four digit year (Valid range 2000 – 2099)
Month	2	01 – 12
Day	2	01 – 31
Hour	2	00 – 23
Minute	2	00 – 59
Second	2	00 – 60
Extension	N/A	.xml

An example of a possible filename is:

Land20061018102001.xml

3.2   REQUEST STATUS

The request status will include a short message describing the status of the request, the filename of the XML document (as named by SD3E), and an exact duplicate of the contents of the request file. This status is only sent to users who use the machine-to-machine request mechanism. The file name will be of the form <PEATE/NICSE>-YYYY.MM.DD_hh-mm-ss.txt. This is on a per XML request basis; there will be one status file per XML request file. These will only be received in the case of syntactically valid XML request files. In the case of invalid XML request files, the SD3E operator will be notified of the error. This file will be placed in the outbound FTP directory. NICSE and each PEATE will have its own directory as shown in Appendix F. An example of the status file is in Appendix G.

For users of the Web interface, selecting the Request Status link at the Web site will show the current status of their request. Users will immediately receive status of their requests and any details related to failures.

3.2.1   NPP PRODUCTS

The NPP Products include the RDRs, SDRs, EDRs, TDRs, ARPs, IPs, calibration products, official ancillary/auxiliary data, operational algorithms, and software and documentation (also known as the release packages). These data flows are shown in Figure 3.2.1-1 and described in Table 3.2.1-1.
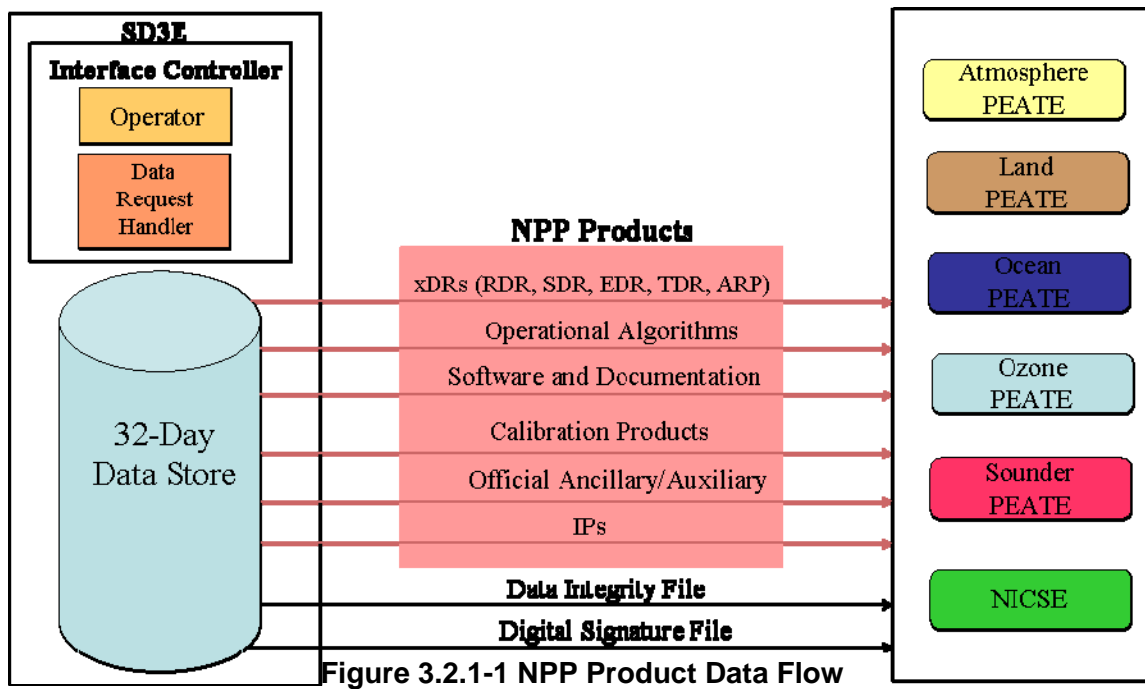
Figure 3.2.1-1 NPP Product Data Flow

Table 3.2.1-1 NPP Product Transfers

Item No	Source	Destination	Data Flow	Description	Transfer Mechanism
1	SD3E	PEATEs/ NICSE	NPP Products	NPP Products in /pub. See Appendix D.	Anonymous FTP pull

3.2.2   SD3E DATA INTEGRITY FILE

The data integrity file is a file generated by the SD3E for specific products ingested into the system.   This file is available for all RDRs and retained IPs (RIPs).   The PEATEs/NICSE will FTP pull this file along with the RDRs or RIPs of interest. This file contains the ingest time, file size in bytes, and checksum for the product. Both the IDPS and NSIPS provides the CRC-32 checksum to the SD3E to perform integrity checks.. In the event that the SD3E has to re-acquire RDRs from the ADS, then those RDRs will use the digital signature instead of a checksum.   All other files will use the digital signature provided by the ADS (see Section 3.2.3).

Table 3.2.2-1 SD3E Data Integrity File

Item No	Source	Destination	Data Flow	Description	Transfer Mechanism
1	SD3E	PEATEs/NICSE	Data Integrity File	/pub. See Appendix D.	Anonymous FTP pull

In the event that RDRs are re-requested from the ADS, then the digital signature file will accompany that particular RDR.

3.2.2.1   SD3E DATA INTEGRITY FILE-NAMING

The file-naming convention for the data integrity file will use the product file name with the .int extension appended. For example, if the product file name is

RVIRS_npp_d20061003_t084729_e085229_b4459_c20061003104752_devl_dev.h5,

then the data integrity file name would be

RVIRS_npp_d20061003_t084729_e085229_b4459_c20061003104752_devl_dev.h5.int

3.2.2.2   SD3E DATA INTEGRITY FILE CONTENTS

The format of the data integrity file is described in Table 3.2.2.2-1.

Table 3.2.2.2-1 SD3E Data Integrity File Contents

Message Field	Description
File Name	The name of the file
Timestamp	The time the file was ingested. The time is in eastern local time.
File size	The size of the file in bytes

| CkSum | The checksum. Using the UNIX cksum, CRC-32. |

The following is a sample of the contents of the SD3E Data integrity file.

File Name: RVIRS_npp_d20061003_t084729_e085229_b4459_c20061003104752_devl_dev.h5
Timestamp: 2006-10-03 10:58:19.468486
File Size: 20215
CkSum: 508640989

3.2.3   DIGITAL SIGNATURE FILE

The digital signature file is used to verify the source and the integrity of the product. The SDRs, EDRs, TDRs, ARPs, selected IPs, official ancillary/auxiliary data, calibration products, and software and documentation are retrieved from the ADS. The ADS uses the digital signature instead of a checksum to verify files. A digital signature file is available for every product. In the event that the SD3E has to re-acquire RDRs from the ADS, then those RDRs will use the digital signature instead of a checksum. Only products obtained from the IDPS or NSIPS use a checksum. The SD3E will make the ADS digital signature file available, as is, to the PEATEs/NICSE to verify the data integrity of the products. The PEATEs/NICSE must download the digital signature key from the NOAA/CLASS site, http://www.class.noaa.gov, in order to check the files. The ADS uses the GNU Privacy Guard.

The PEATEs/NICSE will pull the digital signature file from the SD3E along with their requested products.

Table 3.2.3-1 Digital Signature File

Item No	Source	Destination	Data Flow	Description	Transfer Mechanism
1	SD3E	PEATEs/NICSE	Digital Signature	/pub. See Appendix D.	Anonymous FTP pull

3.2.3.1   DIGITAL SIGNATURE FILE-NAMING

The ADS file-naming convention for the digital signature file uses the entire filename and appends the .sig. For example, if the filename were

RVIRS_npp_d20061003_t084729_e085229_b4459_c20061003104752_devl_dev.h5,

then the resulting digital signature file would be

RVIRS_npp_d20061003_t084729_e085229_b4459_c20061003104752_devl_dev.h5.sig

3.2.3.2   DIGITAL SIGNATURE FILE CONTENTS

The contents of the digital signature file include the signature version and the signature. The following shows an example of the contents of the digital signature file.

-----BEGIN PGP SIGNATURE-----
Version: GnuPG v1.4.0 (AIX)

iD8DBQBFIq7LTbOkZUZw4nARAs/FAJ9Nw9LikCs8haJecKDEvneU9LnbsACeKqeE
tZQoxUMOuddtoX+AG4y/sGI=
=Qoda
-----END PGP SIGNATURE-----

3.2.4   VERIFICATION OF RETAINED IPS

The method for verifying the integrity of a retained IP from NSIPS is similar to verifying an RDR from IDPS. Both NSIPS and IDPS use the CRC-32 checksum. See Section 3.2.2 SD3E Data Integrity File for more detail.

3.3   ACCESSING THE WEB INTERFACE

3.3.1   OBTAINING USER ACCOUNTS

User accounts can be requested by contacting the SD3E operator and sending e-mail to sd3_ops@nppsds2.nascom.nasa.gov (TBS3). Each element (PEATE or NICSE) is limited to one user account. These accounts are used to log in to the Web interface system, by providing the user name and password, to make requests or get the status of requests.

3.3.2   RECEIVING EMAIL

For receiving status via email, users may go to the Web interface, specify the PEATE/NICSE group and submit their email address. Any information regarding system status, request status, etc. will be via this mechanism. When a change occurs that affects a PEATE/NICSE (e.g., subscription addition or cancellation), all individuals who have registered to receive emails for that element will be notified of the change. The SD3E operator may be notified by email at sd3_ops@nppsds2.nascom.nasa.gov (TBS3) to change, add, or delete an email address.

4.0 IP RESTRICTIONS

For the machine-to-machine interface, users will need to have an IP address that is in the NASA Goddard Space Flight Center, NASA Jet Propulsion Laboratory, or University of Wisconsin IP address ranges in order to write their subscription/ad-hoc request to the SD3E's /NPPSD3/incoming/requests location. Users will provide this information to the SD3E operator by sending email to sd3_ops@nppsds2.nascom.nasa.gov (TBS3) with a valid IP address.

5.0 DATA CATCH-UP

This section describes how the SD3E plans to catch-up on missing data in the event that the SD3E is down for more than 24 hours. In the event that the SD3E is down for less than 24 hours, the SD3E will request the full set of RDRs from the IDPS. If the SD3E is down for more than 24 hours, the SD3E will obtain the full set of RDRs from the ADS/CLASS. In both scenarios, the SD3E will not be able to perform catch-up of missing xDRs due to processing limitations. The SD3E will require 24 hours to ingest and verify approximately 4 TB of daily data from subscriptions. The missing xDRs will need to be requested from ADS/CLASS by the PEATE/NICSE.

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APPENDIX A – ACRONYMS

ADS	Archive and Distribution Segment
ARP	Application Related Product
CLASS	Comprehensive Large Array-data Stewardship System
CM	Configuration Management
DDR	Data Delivery Report
DFCB	Data Format Control Book
EDR	Environmental Data Record
EOS	Earth Observing System
FTP	File Transfer Protocol
GSFC	Goddard Space Flight Center
GUI	Graphical User Interface
HDF	Hierarchical Data Format
ICD	Interface Control Document
IDPS	Interface Data Processing Segment
IP	Intermediate Products
LUT	Look-Up Tables
PEATE	Product Evaluation and Analysis Tool Element
PERL	Practical Extraction and Report Language
PGP	Pretty Good Privacy
NASA	National Aeronautics and Space Administration
NICSE	NPP Instrument Calibration Support Element
NGST	Northrop Grumman Space Technology
NOAA	National Oceanic and Atmospheric Administration
NPOESS	National Polar-Orbiting Operational Environmental Satellite System
NPP	NPOESS Preparatory Project
NSIPS	NPOESS Science Investigator Processing System
RDR	Raw Data Record
RIP	Retained Intermediate Products
SD3E	Science Data Segment Data Depository and Distribution Element
SDR	Science Data Record
SDS	Science Data Segment
TBD	To Be Determined
TBS	To Be Supplied
TDR	Temperature Data Record
xDR	RDR, SDR, EDR, TDR
XML	eXtensible Markup Language

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APPENDIX B – SAMPLE XML REQUEST (AD-HOC AND SUBSCRIPTION)

```
<?xml version="1.0" ?>
<sd3requests>
   <request>
      <Name>Ozone</Name>
      <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
      <Satellite>NPP</Satellite>
      <Sensor>VIIRS</Sensor>
      <ProductType>SDR</ProductType>
      <ProductId>ROMDD</ProductId>
   </request>
<request>
      <Name>Ozone</Name>
      <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
      <Satellite>NPP</Satellite>
      <Sensor>OMPS</Sensor>
      <ProductType>RDR</ProductType>
      <ProductId>ROMDD</ProductId>
      <Aggregation>32</Aggregation>
   </request>
   <request>
      <Name>Ozone</Name>
      <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
      <Satellite>NPP</Satellite>
      <Sensor>OMPS</Sensor>
      <ProductType>RDR</ProductType>
      <ProductId>ROMDD</ProductId>
      <Aggregation>32</Aggregation>
   </request>
   <request>
      <Name>Ozone</Name>
      <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
      <Satellite>NPP</Satellite>
      <Sensor>ATMS</Sensor>
      <ProductType>EDR</ProductType>
      <ProductId>ROMDD</ProductId>
      <Interval>
         <ProductStartDate>2005-11-01</ProductStartDate>
         <ProductStartTime>12:00:00</ProductStartTime>
         <ProductStopDate>2005-11-02</ProductStopDate>
         <ProductStopTime>11:59:59</ProductStopTime>
      </Interval>
   </request>
</sd3requests>
```

APPENDIX C – SAMPLE SUBSCRIPTION AND AD-HOC REQUEST SCHEMA

Please go to https://nppsds.nascom.nasa.gov/sd3e/schema.xml for the latest version of the request schema.

APPENDIX D – SAMPLE SD3E DIRECTORY STRUCTURE OF NPP PRODUCTS

D.1   NPP Products Directory Structure

The common directory path, /pub, is the path in which users may access any NPP products via the FTP application. Below the common path, the top-level is the NPP_Products. This directory houses the 32-day rolling buffer of NPP products ingested by the SD3E, 7-days for IPs, and 5 latest versions of algorithms. The second level directory is grouped into instruments, ancillary and auxiliary data product, and algorithms packages. The third level is the data date. The fourth level further divides the products by data product type and the fifth level by data product ID. Additionally, each product has a corresponding data integrity file residing in the same directory. For the ancillary and auxiliary data, since the IDPS does not provide data product IDs for these products, the collection short name is used instead. The ancillary data directory contains the ancillary data and data quality monitoring reports. The auxiliary data contains the calibration coefficients, algorithm processing, data quality threshold tables, etc. The software and documentation directory, or Package, is separated by package type and contains the five latest versions and contains the software and documentation bundles. The others directory is for multi-product packaged files or for products received that do not fall into any one of the subdirectories. The EDR directory will also contain the ARPs.

Example:

```
/pub/NPP_Products
    /Ancillary
          /YYYYMMDD
                  /CollectionShortName … /CollectionShortName
          … /YYYYMMDD
    /Auxiliary
          /YYYYMMDD
           /CollectionShortName … /CollectionShortName
          … /YYYYMMDD
    /Package
           /Software
                  /Version0 … /Version5
            /Documentation
                  /Version0 … /Version5
            /Support-Data
                  /Version0 … /Version5
           /Test-Data
                  /Version0 … /Version5


    /ATMS  /CrIS  /CrIMSS  /OMPS   /VIIRS
             /YYYYMMDD
                    /Others
```

```
/RDR
        /DataProductID … /DataProductID
/SDR
        /DataProductID … /DataProductID
/EDR
        /DataProductID … /DataProductID
/TDR
        /DataProductID … /DataProductID
/IP
        /DataProductID … /DataProductID
/GEO
        /DataProductID … /DataProductID
```

D.2   Closed Directory Structure

The common directory path, /pub, is the path in which users may access any NPP products via the FTP application. Below the common path, the top-level is the NPP_Closed directory. A closed directory indicates that no more files are expected to arrive for that data day. When this condition is met, a soft link is created to point to the corresponding data product ID or collection short name in the NPP_Products directory that are considered "closed".

Example:

```
/pub/NPP_Closed
    /Ancillary
            /YYYYMMDD
                    /CollectionShortName … /CollectionShortName
            … /YYYYMMDD
    /Auxiliary
            /YYYYMMDD
             /CollectionShortName … /CollectionShortName
            …. /YYYYMMDD

    /ATMS  /CrIS  /CrIMSS  /OMPS   /VIIRS
            /YYYYMMDD

                    /RDR
                            /DataProductID … /DataProductID
                    /SDR
                            /DataProductID … /DataProductID
                    /EDR
                            /DataProductID … /DataProductID
                    /TDR
                            /DataProductID … /DataProductID
                    /IP
                            /DataProductID … /DataProductID
                    /GEO
                            /DataProductID … /DataProductID
```

D.3   Daily Ingest Directory Structure

The common directory path, /pub, is the path in which users may access any NPP products via the FTP application. Below the common path, the top level is the DailyIngest. This directory provides a 32-day rolling buffer of products ingested by the SD3E on a daily basis. The second level uses the calendar date (Eastern local time); the time the product was ingested by the SD3E. The third level then divides the directories by PEATE and NICSE. The contents of the directories are lists of the files that were ingested by the SD3E for the current day. A data integrity file is also provided and corresponds to each product ingested. The fourth level directory is by product type. Further breakdown of the data directory to a fifth level is TBD3. (Tests of directory searches, number of files, etc., will determine if further breakdown of the directory structure is needed.) (The PEATEs/NICSE must indicate to the SD3E the list of products they would like reported in the daily ingest directory. By default, the directory will only include products requested by the particular PEATE/NICSE that were requested in their subscription or ad-hoc request.

Example:

```
 /pub/DailyIngest
        /YYYYMMDD
                /Atmosphere
                        /RDR
                        /SDR
                        ….
                /Land
                /NICSE
                /Ocean
                /Ozone
                /Sounder

        … /YYYYMMDD
```

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APPENDIX E – TABLE OF TBXS

Table of TBDs

TBD #	Description	Status
TBD1	It provides local storage for a maximum of 32-days.	
TBD2	The method for verifying the integrity of the retained IPs from NSIPS.	Closed. 9/17/2007. Use of CRC-32 checksum.
TBD3	Further breakdown of DailyIngest directory structure will depend on search, listing, etc., performance numbers.	

Table of TBSs

TBS #	Description	Status
TBS1	SD3E host name	
TBS2	The location of where subscription and ad-hoc requests will be placed on the SD3E server. /NPPSD3/incoming/requests	Closed. Determined incoming location for requests in build 3.
TBS3	Email address of the SD3E operator.	

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APPENDIX F – SAMPLE SD3E REQUEST STATUS DIRECTORY STRUCTURE

Example:
 /pub/RequestStatus
        /Atmosphere
        /Land
        /NICSE
        /Ocean
        /Ozone
        /Sounder

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APPENDIX G – SAMPLE SD3E REQUEST STATUS FILE/E-MAIL

The product request you submitted to the SD3E was successfully received.
Your request will be fulfilled normally. Thank you.

-- SD3E Operator
sd3_ops@nppsds2.nascom.nasa.gov (TBS3)

Attachment: Ozone20061018102001.xml
```
<?xml version="1.0" ?>
<sd3requests>
  <request>
    <Name>Ozone</Name>
    <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
    <Satellite>NPP</Satellite>
    <Sensor>VIIRS</Sensor>
    <ProductType>SDR</ProductType>
    <ProductId>ROMDD</ProductId>
  </request>
  <request>
    <Name>Ozone</Name>
    <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
    <Satellite>NPP</Satellite>
    <Sensor>VIIRS</Sensor>
    <ProductType>SDR</ProductType>
    <ProductId>ROMDD</ProductId>
  </request>
  <request>
    <Name>Ozone</Name>
    <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
    <Satellite>NPP</Satellite>
    <Sensor>OMPS</Sensor>
    <ProductType>RDR</ProductType>
    <ProductId>ROMDD</ProductId>
    <Aggregation>32</Aggregation>
  </request>
  <request>
    <Name>Ozone</Name>
    <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
    <Satellite>NPP</Satellite>
    <Sensor>OMPS</Sensor>
    <ProductType>RDR</ProductType>
    <ProductId>ROMDD</ProductId>
    <Aggregation>32</Aggregation>
  </request>
  <request>
    <Name>Ozone</Name>
    <EmailAddr>james.j.marshall@gsfc.nasa.gov</EmailAddr>
    <Satellite>NPP</Satellite>
```

Check the NPP CCR website at http://nppcm.gsfc.nasa.gov/ccr/npp to verify that this is the correct version prior to use.

```
<Sensor>ATMS</Sensor>
<ProductType>EDR</ProductType>
<ProductId>ROMDD</ProductId>
<Interval>
   <ProductStartDate>2005-11-01</ProductStartDate>
   <ProductStartTime>12:00:00</ProductStartTime>
   <ProductStopDate>2005-11-02</ProductStopDate>
   <ProductStopTime>11:59:59</ProductStopTime>
</Interval>
   </request>
</sd3requests>
```