SAAPS

Satellite Anomaly Analysis and Prediction System

Test Plan

Version 0.2

ESA/ESTEC Contract No. 11974/96/NL/JG(SC)

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14 November 2000

Document status sheet

Test Plan, SAAPS		
Version	Date	Comment
0.1	1 November 2000	Created
0.2	14 November 2000	Major revision

Contents

Chapter 1

Introduction

SAAPS consists of three parts: the database and database tools (DB&T), the satellite anomaly analysis module (SAAM), and the satellite anomaly prediction module (SAPM). The DB&T runs both automatically by updating the database and manually from requests from the SAAM or SAPM. The SAAM and SAPM only runs manually and are connected to a user interface.

In the SAAPS Manual [*Wintoft,* 2000c] are described how the DB&T, SAAM, and SAPM are operated. There are also examples of how two perform various operations.

1.1   Abbreviations

Table 1.1: Abbreviations used in the text

SAAPS_DATA	The base directory of the SAAPS database
SAAPS_MODELS	The base director of the SAAPS models database
GUI	Graphical User Interface
DataInspector	A GUI to inspect the data in the database

Chapter 2

Test plan for database and database tools

The test of the database routines can only be performed on the SAAPS server as these are not accessible from the outside.

2.1 Check available data

The database consists of a number of files under the SAAPS home database directory, which we hereafter call `SAAPS_DATA`. The data files ends with the suffix `.data` and the meta data files with `.meta`. In Tables 1 and 2 in the database URD [*Wintoft,* 2000a] the data are listed.

The files listed in Table 2.1 shall exist with suffixes `.data` and `.meta` in `SAAPS_DATA`. Listing the directory shall verify this.

Table 2.1: The files in the database. Each file exists in two versions: `.data` and `.meta`.

OMNIDB	OMNI data
LANLDB	LANL particle data
GOES08partDB	GOES-08 particle data
GOES08xrayDB	GOES-08 x-ray data
GOES10partDB	GOES-10 particle data
GOES10xrayDB	GOES-10 x-ray data
ACEmagDB	ACE magnetic field data
ACEsweDB	ACE plasma data
KpEstDB	Estimated Kp
KpPredDB	Predicted Kp

2.2   Check latest available data

Part of the database is updated in real time with between 10 minutes and 1 hour intervals. The real time data are listed in Table 2 in the database URD [*Wintoft,* 2000a]. In Table 2.2 the real time data files are shown together with the update frequency.

Table 2.2: The files of the real time data with updating frequencies

GOES08partDB	10 min
GOES08xrayDB	10 min
GOES10partDB	10 min
GOES10xrayDB	10 min
ACEmagDB	10 min
ACEsweDB	10 min
KpEstDB	1 hour
KpPredDB	1 hour

The data inspector tool (`DataInspector`) can be used to examine the data for the day when the test is performed. Examination of the output will show the latest data in the SAAPS database which can be compared with the latest data at the ftp source.

2.3   Inpect meta data

Use the meta data explore tool (`ShowMetaData`) to verify that the meta data for each database object exist.

2.4   Add a new database object

To add a new database object the (system) user must create two Java classes. The classes are created by copying two template classes available on the SAAPS server. The user must then add the necessary information of the database object, such as the name of the object, the data fields, and the field units. The creation of the database object is described in the SAAPS Manual [*Wintoft,* 2000c].

After the creation of the Java source code for the new database object the two classes must be compiled.

Finally, the database objects are added to the database by executing the `AddDatabaseObject` command. This step will create the `.data` and `.meta` files in the database. The new object will automatically appear in any of the tools in SAPM or SAAM.

Carry out the above steps on the `Dummy.java` and `DummyDB.java` files as described in the SAAPS Manual.

Check that the new database object exists by list the contents of the SAAPS database directory. The files `DummyDB.meta` and `DummyDB.data` should exist. The contents of the files are explored with the data inspect tool (`DataInspector`).

2.5 Updating of the meta data

DB&T.CAP.5

Run the `DummyUpdate1` program that will add new data to the DummyDB database. Inspect and verify that the meta data has been updated.

2.6 Updating the database

DB&T.CAP.8

When new data are appended to existing data there can arise different situation as described in Section 2.4.2.12 in the SAAPS SRD [*Wintoft,* 2000b].

The program `DummyUpdate2` appends data for the situation when there is overlap in time between the SAAPS data and the new data. Use `DataInspector` to examine the result.

The program `DummyUpdate3` appends data for the situation when there is a gap in time between the SAAPS data and the new data. Use `DataInspector` to examine the result.

2.7 Remove data and meta data

DB&T.CAP.6
DB&T.CAP.11

A database object is removed by simply deleting the `.data` and `.meta` files in the database with the UNIX command `rm`. The Java classes need not to be removed.

If there is an automatic update that is still running after the database object that has been removed it will be created automatically again.

Remove the `DummyDB.data` and `DummyDB.meta` files and verify that the objects disappear from e.g. the data plotter tool in SAAM.

2.8 Read meta data

DB&T.CAP.9

The meta data can be read either locally on the SAAPS server or over the Internet.

On the SAAPS server the program `ShowMetaData` uses the local read function. Run `ShowMetaData` on any data

2.9 Read data

DB&T.CAP.10

2.10 Export SAAPS data to ASCII

DB&T.CAP.12

2.11 Import ASCII data to the SAAPS database

DB&T.CAP.13

2.12 Meta data user interface

DB&T.CAP.14

2.13 Data user interface

DB&T.CAP.15

2.14 Latest available data

Examine that the latest available data actually exist in the SAAPS database with `DataInpsector`. The data that shall be stored are listed in Table 1 in the database URD [*Wintoft*, 2000a].

2.15 Short interrupts in network communication

DB&T.CON.2

Short interrupts in network communication shall not affect the database more than that the latest data will not be available. An interrupt is considered short when it lasts for a time period shorter than the time extent of the original ftp data. This means that when the interrupt has passed the missing data in SAAPS shall be filled with the data available at the source.

The test is performed by physically disconnecting the SAAPS server from the network for one hour. During this hour the data in the database shall be examined. This verifies that the server is still running but the latest data are missing. The SAAPS server is the reconnected to the network and the database is examined again. The data for the period when SAAPS was disconnected shall now exist in the database.

2.16 Long interrupts in network communication

DB&T.CON.2

Long interrupts in network communication will affect the SAAPS database. The database will contain data gaps for the time period for which the interrupt lasted. An interrupt is considered long if the interrupt lasts for a time period that is longer than the time period for which the data at the source extends over.

This test is carried out by physically disconnecting the SAAPS server from the network for four hours. This will affect the ACE and GOES data as the data sources only contain the latest two hours of data. After SAAPS has been reconnected with the network the database shall be examined. The data will show a two hour long period for which the data fields are set to NaNs.

2.17   Data gaps in source data

Occasionally there will be data gaps in the source data from the ftp site. The description of the data gaps varies from the different sources. In the SAAPS database the gaps shall always be described with NaNs (Not a Number). Sometimes the last data in the source contain a data gap while a few minutes later this gap has been replaced by a value.

The propagation of the data gaps are tested by searching the data source for periods with data gaps, and exploring the data in the SAAPS database for the same period.

Chapter 3

Test plan for the satellite anomaly analysis module – models

Chapter 4

Test plan for the satellite anomaly analysis module – user interface

There are two aspects of the testing of the user interface. Firstly, there is the test of the expected behaviour of the tool when the user proceeds along the right steps. Secondly, there is the test of when the user misses some essential step and tries to proceed. The different tools usually contain several items that need to be specified by the user to be able to produce expected action. If the items in the interface have not been correctly set the user shall be notified.

4.1   Data plotter

If the user pushes the `Get Data` button before selecting any database object a dialog shall notify him.

When the `Get Data` button is pushed and there are no data for the selected database object, for the given start and end dates, the user shall be notified.

When the Plot button is pushed and the data fields to plot has not been selected the user shall be notified.

The test is carried out by going through the database object list, one at a time, and produce a plot for the current day.

4.2   Superposed epoch analysis tool

Clear the event window list and push Generate random list. The user shall be notified that no events have been specified.

Chapter 5

Test plan for the satellite anomaly prediction module – models

Chapter 6

Test plan for the satellite anomaly prediction module – user interface

6.1   Anomaly prediction tool

6.2   Help pages

Chapter 7

URD reference tables

7.1 Database and database tools

Test id	URD id	Test reference
1	DB&T.CAP.1	2.1
2	DB&T.CAP.2	2.2
3	DB&T.CAP.3	2.3
4	DB&T.CAP.4	2.4
5	DB&T.CAP.5	2.5
6	DB&T.CAP.6	2.7
7	DB&T.CAP.7	2.4
8	DB&T.CAP.8	2.6
9	DB&T.CAP.9	2.8
10	DB&T.CAP.10	2.9
11	DB&T.CAP.11	2.7
12	DB&T.CAP.12	2.10
13	DB&T.CAP.13	2.11
14	DB&T.CAP.14	2.12
15	DB&T.CAP.15	2.13
15.1	DB&T.CON.1	??
15.2	DB&T.CON.2	2.15, 2.16, 2.17

7.2   Satellite anomaly analysis module

Test id	URD id	Reference
16	SAAM.CAP.1	??
17	SAAM.CAP.2	4.1
18	SAAM.CAP.3	4.1
19	SAAM.CAP.4	4.1
20	SAAM.CAP.5	??
21	SAAM.CAP.6	??
22	SAAM.CAP.7	??
23	SAAM.CAP.8	4.2
24	SAAM.CAP.9	??
25	SAAM.CAP.10	??
26	SAAM.CAP.11	??
27	SAAM.CAP.12	??
28	SAAM.CAP.13	??

7.3   Satellite anomaly prediction module

Test id	URD id	Reference
29	SAPM.CAP.1	6.1
30	SAPM.CAP.2	??
31	SAPM.CAP.3	??
32	SAPM.CAP.4	??
33	SAPM.CAP.5	??
34	SAPM.CAP.6	??
35	SAPM.CAP.7	??
36	SAPM.CAP.8	??
37	SAPM.CAP.9	??
38	SAPM.CAP.10	??
39	SAPM.CAP.11	6.2

References

Wintoft, P., *Satellite Anomaly Analysis and Prediction System SAAPS WP 110 Database and Database Tool User Requirements Document, Version 1.1*, ESA/ESTEC Contract 11974/96/NL/JG(SC), April 2000.

Wintoft, P., *Satellite Anomaly Analysis and Prediction System SAAPS Software Requirements Document, Version 1.0*, ESA/ESTEC Contract 11974/96/NL/JG(SC), 18 August 2000.

Wintoft, P., *Satellite Anomaly Analysis and Prediction System SAAPS Manual*, In preparation, 2000.