InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

Areas That Should Be Covered Validated

Case Study 26: Microvariability & Oscillations of Stars (MOST) Satellite Mission – Preservation of Space Telescope Data

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Creator of the Fonds		
TOPIC	***SPECIFICS***	***SOURCE***
Name	Microvariability & Oscillations of STars (MOST) project	FR, p. 2
Location	University of British Columbia, Vancouver, B.C., Canada. (Also Universities of Toronto and Vienna, although these sites are not case study subjects and were not interviewed.)	FR, p. 1, 2

Origins	• Founded 2003 by University of British Columbia Physics & Astronomy and UTIAS (University of Toronto Institute for Aerospace Studies) Space Flight Lab. Later joined by University of Vienna.
	• **Purpose**: to attempt to
	  ○ understand our Sun in the context of other stars
	  ○ set a limit to the age of the solar system by dating the oldest stars in the 'solar neighbourhood'
	  ○ understand how strong magnetic fields affect the physics of other stars and our Sun
	  ○ determine the nature of planets around other stars
	  ○ understand how the atoms which make up our planet escaped from stars in the first place
	• Satellite launched 2003 and will continue operating indefinitely
		FR, p. 1, 2 and Web site[1]

Legal Status	• MOST is a non-profit research group established 2003 • Dynacon Enterprises under contract with MOST to build and maintain the satellite. All technical matters are the legal responsibility of Dynacon. • Although not articulated in the contract between CSA and MOST, the research team has an agreement to make all scientific data publicly available after one year of data transmissions. ○ MOST project has a unwritten agreement with CADC (Canadian Astronomy Data Centre) to submit data files that have passed the one year proprietary period.	FR, pp. 1-3

[1] http://www.astro.ubc.ca/MOST/overview.html#glance.

	• Intellectual property rights are not an issue for MOST team once data are made available, although they request that acknowledgement be given them if data are used for outside research and scholarship.	
Legislation	Unavailable in Final Report or from Web site.	
Norms	• Methodologies related to academic research best practice of the astronomical research community (use of FITS file format for data storage) • MOST is funded by the Canadian Space Agency and must, therefore, abide by guidelines and standards applicable to CSA and Canadian scientific missions.	FR, p. 3
Funding	• funded by the Canadian Space Agency (CSA) • CSA is willing to continue funding the project (on an annual contractual basis) as long as satellite/cameras function and researchers make use of collected data • As a non-Canadian partner, University of Vienna receives no CSA funding. However, it is considered a full partner by the two Canadian teams.	FR, p. 1, 2
Resources	• Satellite in space transmits data to 3 ground stations (Universities of British Columbia, Toronto, and Vienna). Satellite is owned by Dynacon. • Research team at UBC has one large office w/ separate compartments and several computers which store data (one of these computers serves as the main storage space). • Office mainly serves researchers but also student participants. Office is located in the UBC Astronomy Building and is secured. • Main Computer and ground station devices kept in a locked compartment. • Satellite dish located on roof of Astronomy Building	FR, p. 4
Governance	• Body is managed as a partnership—no official written organizational structure. • All researchers have specific areas of expertise, and principal scientist accountable to funding agency. • Principle researcher is an Astronomy professor. All other researchers are hired for the project and hold graduate or post graduate degrees in astronomy. Astronomy students may also assist in research.	FR, p. 4
Mandate	MOST team is responsible, through CSA funding, for gathering and using data transmitted from the satellite to their 3 ground stations. Continuation of the project and funding depend on successful, ongoing fulfillment of this responsibility and is evaluated annually.	FR, p. 4
Philosophy	MOST researchers are astronomers and are thus guided by best practice, ethics, standards and guidelines relevant in that field of study	FR, p. 4
Mission	No specifically stated mission, although Web site lists "scientific goals," which may be interpreted as a mission statement. (See "purpose" under *Origins* above).	Web site: under "The MOST Project at a Glance"[2]

[2] http://www.astro.ubc.ca/MOST/overview.html.

Functions	Main function of MOST is scientific research. This comprises collection of data in FITS files and data reduction and interpretation. For a complete description of activities involved, see the IDEF0 activity model for this case study.	FR, p. 4
Recognitions	CSA funding and collaboration with other space projects throughout the world indicate a recognition of the value and importance of the research of MOST project.	Inferred

Activities Resulting in Document Creation

Administrative and Managerial Framework

TOPIC	***SPECIFICS***	***SOURCE***
General Description	• Basic administrative duties relating to the scientific process (some are described in manuals such as the *MOST Archiving Manual*) • No administrative responsibilities have been formally articulated in writing, although each team member does have some specific responsibilities	FR, p. 4
Type of activities	Collection of data into FITS files; subsequent reduction and analysis of files.	FR, p. 4
Documents resulting from activities	• Raw data files from satellite and other sources (sds files) • Data files (FITS files) based on raw data files and other sources • Collections and reductions based on FITS files • Texts with graphs for publications and presentations	FR, pp. 5-8
Existence of a RM and/or archives program	• No formal records management program or written policy due to time constraints and higher priorities • Basic record keeping system, using Microsoft Windows tools o One person responsible for preservation of data, including routine backup onto DVD (originally CD) o Other entities are removed from the system when they are no longer up-to-date. o Files are organized by target (star) and date. o Some internal guidelines and written documents concerning the preservation or “archiving” of files (naming conventions, metadata included in the FITS files, an “archiving manual”). Guidelines/manuals are the result of experience and perceived best practice, not archival science. Guidelines are not rigorously adhered to in practice.	FR, pp. 5, 12
Individuals responsible for preservation	One astronomer is responsible for management and preservation of data (storage and backup), another for monitoring the integrity of data sent by satellite through daily technical analyses (technical difficulties can sometimes disrupt the integrity of transmitted data).	FR, p. 5
Existence of preservation strategies	• Official datasets are stored on a computer in the MOST office at UBC and are regularly backed up onto 2 DVDs, which are then held in different locations. Files were previously saved on CDs, which have yet to be migrated to DVD. • A second ‘non-official” set of the data are stored on the computer of one of the MOST researchers • Backups are also made of the custom made software	FR, pp. 5, 7, 8, 10

	programs that are used in the project. Old versions of the programs are preserved whenever anything in the software is altered or updated so that researchers are able to recreate results previous created. • Files with scientific data always preserved even if corrupt or false, as corruptions can later be filtered out without having to delete the corrupt file.	
Legal Requirements and Constraints	There are no legal, moral or ethical requirements or constraints. However, see discussion of legal status in Final Report on p. 3.	FR, p. 13
Normative Requirements and Constraints	Unavailable in final report	
Technological Requirements and Constraints	Unavailable in final report	
Digital entity being studied		

General Description	• sds files transmitted from satellite to ground stations
	  ○ sds raw—created immediately after images are taken by the satellite's camera.
	  ○ sds 2—contain all critical and some supplementary data..
	  ○ sds 1—compacted version of SDS 2 files, created in fulfillment of CSA requirement that satellite is equipped to store data for seven days in case of communication problems. In principle, not used at all.
	• FITS files—sds2 files converted into FITS files by C++. These are the basis for all scientific reductions and data.
	• various metadata—contextual info about the satellite camera, info about how the image is cut into relevant pieces (captured in a RASTA file), timing info for each exposure, orbit info downloaded from Norad Web site.
		FR, p. 5-7

Type of activities	• data input • transformation of data into new file type • reduction (analysis) of data • publication of data	FR, p. 5
Documents resulting from activities	Various types of data files (FITS files and other types of records resulting from analysis of preliminary data). For complete list and explanations, see FR, pp. 6-7.	FR, p. 6-7
Existence of preservation strategies	• Files stored in a directory according to primary target (star) and time. • Files burned onto DVDs • data sets generated by satellite camera are preserved and remain unchanged	FR, p. 7
Legal Requirements and Constraints	There are no legal, moral or ethical requirements or constraints. However, see discussion of legal status in Final Report on p. 3.	FR, p. 13

Normative Requirements and Constraints	*Scientific requirements and constraints*—use of FITS file format based on best practice in astronomy.	FR, p. 13
Technological Requirements and Constraints	**Equipment**: satellite camera, satellite processors, transmission equipment, computers, custom made software **Media**: textual and graphic. Raw data are strings of numbers. Outputs are analyses, incl. light curve graphs, images, text. **Software:** Since the MOST project's software is mostly custom-made, preservation of the software is as important as preservation of the data.	FR, p. 13 FR, p. 7