

UVIT Data Pipeline Software

A status Report



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UVIT::Overview

- **Instrument**
 - Multiple filters and grism
 - FOV: 30' with ~2" resolution
 - Co-aligned with X-ray telescopes
- **Observing mode**
 - Pointed, ability to scan
 - 35 minute observations
- **Raw Data Volume**
 - 50 GB/day
 - 35 TB/year



DESIGN::Considerations

- **Large datasets: TBs of data**
 - Efficient and Quick Search
 - Data+header in one file or separate metadata?
 - Web interface
- **Mission Lifetime: Years**
 - Different arch. & platforms
 - Data formats, database software, versions
 - Generations of developers & maintainers



SOFTWARE::Philosophy

- **Open source (GPL)**
 - Java (First of its kind)
- **Platform neutral**
 - Support limited by manpower/availability.
- **Modern**
 - Modular
 - Self-documenting
 - Easily maintained
 - Reusable tools
- **Baselined for Sun Java 1.4.x on GNU/Linux**
 - Tested on both Intel and AMD arch.



SOFTWARE::Components

- **Simulations**
 - UVIT responsibility
- **Pipeline**
 - UVIT responsibility
- **Archival/Dissemination**
 - ISSDC responsibility
- **High level products**
 - ISSDC, with inputs from Science team
- **Misc. tools – Exposure time calculator, Obs. planner**
 - Software Team (IIA)



SOFTWARE::Personnel

- **1 Boss**
 - J. Murthy
- **3 PDFs**
 - R. Mohan
 - M. Safonova (TAUVEX)
 - P. Gopakumar (TAUVEX)
- **3 software trainees**
 - M. Fayaz
 - V. Sharan
 - L. Geetha



UVIT::Pipeline

- **Tasks**

- Ingest
- Data validation
- Data correction
- Data registration
- Production of Level 2 data

- **Data Definitions**

- Level 0: Out of the Spacecraft, into Ground Station
- Level 1: Out of the Ground Station, into pipeline
- Level 2: Images from individual observations
- Level 3: Data from multiple Observations
- Level 4: Derived products



PIPELINE::Operation

- Run from a shell script
- Operation governed by parameter files
- Data file produced at each logical step
- May be run interactively
 - **Steps can be skipped or substituted**
- Data file is self-documenting
 - **History of file contained in header.**



DATA::Ingest

- **Read the data from ground station (level 1)**
 - Reformat data in software
 - All the work on Level 1 data dealt with by a single module
- **Expect a single data file (For one observation)**
 - Mission data can come separately
- **Writes out Level 1a data (will be archived)**



DATA::Validation

- **Validation checks for data quality**
 - Mission parameters
 - Data parameters
- **Issues? => Keep it aside for manual processing**
- **Errors and info. Messages written to log file**
 - Blinking screen?
 - Message window pop-up?
 - Play music?
 - Speak out loud?
 - SMS concerned people?



DATA::Processing

- **Data correction**
 - Distortion correction
 - Flat fielding
 - Calibration
- **Data registration**
 - *Work in progress*
- **Parameter files govern corrections**
 - Ancillary software required to produce and update these parameter files
- **Writes out Level 2 Data**



DATA::Products

- **Level 2 data**
 - FITS images of individual observations
 - Point source lists
- **Level 3 data**
 - Data from multiple observations
- **Level 4 data**
 - Derived data products
- **Only Level 2 data is our (UVIT) responsibility**



PIPELINE::Status

- **Stable version (1.0) is ready for TAUUVEX**
 - UVIT specific modules need to be worked on!
 - Detailed testing required
 - Data registration not yet done
- **Need to run extensive simulations**
 - No shortage of time (hopefully)
 - Open issues – a few, none critical



Open Issues

- **Level 0 data format – Not available**
- **Mission parameters**
 - Requires coordinates of the look direction
 - Information on SSM movements
- **Do we store all raw data?**

