IMT
EPFL
ASTRON
MPIA Heidelberg
Observatoire de Genève
University of Leiden/NOVA

Astrometric Survey for Extra-Solar Planets with PRIMA
PRIMA Data Formats

Specification

Prepared . . . . W.J. Jaffe   September 21, 2004 . . . .

               Name   Date   Signature

Approved . . . . N.N. . . . .

               Name   Date   Signature

Released . . . . N.N. . . . .

               Name   Date   Signature

Change Record

Issue	Date	Section/Parag. affected	Reason/Initiation/Documents/Remarks
0.1	07-Jun-2004	all	created

Contents

List of Figures

List of Tables

1 Scope

This document will define the data formats to be used in the PRIMA data analysis system. These formats fall in three major catagories:

1. Data sets used only internally to the AOS

2. Output data sets to be delivered to users/community

3. Data sets produced by other PRIMA systems. In this case the inclusion in this document will either be only by reference to a defining document, or a summary of specifications from the original defining documents.

2 Design Principles

To the largest extent possible, the data sets will be defined as FITS Binary tables, since these are flexible enough to meet most needs, and many utilities currently exist for reading/writing and handling these formats at higher levels of sophistication.

The basic FITS structures are defined in NOST 100-2.0 (NASA/Science Office of Standards and Technology) March 29, 1999).

Additionally we will attempt to stay as close as possible to existing standard adaptations of FITS to optical/IR interferometry and astronomtry. These include the IAU OIFITS standards Pauls and Young http://www.mrao.cam.ac.uk/ jsy1001/exchange/DataExStd_ rel5_ apr03_ A4.pdf) based on the Jaffe/Cotton proposal, ESO VLTI specifications, and existing radio astronomical or optical astrometry formats.

We will attempt to define formats for raw data, which will be quite voluminous, but should contain everything necessary for later processing, intermediate reduced data, which should contain historical information defining the reduction process and in some cases compressed extracts of reference data used during the reduction, output reduced data, and simulation data as necessary to develop and test software.

Possibly database format descriptions will be included here, or archivable/transportable versions of the database, or these may be included in separate database design documents.

The descriptions below do not define which **files** or archives contain the particular tables. Many tables (e.g. *target* may be copies from one file to the next in the course of reduction.

3 System Descriptions

These describe input information on the setup of the VLTI (in the broadest sense) that must be understood to understand its geometry and optical configuration. Some of this information will be only of a documentary nature: e.g. perhaps a description of the specific release of an on-line solar system ephemeris program. As such it will probably consist of several keyword lines in a header table. It may be preferable in this case to extract a tabular, interpolatable, summary of the ephemeris for the period of interest. This allows downline analysis to extract the information they need without going back

to the original source. This has the advantage that if a source is changed (e.g. new release of a program), the exact information used for the reduction of PRIMA data is preserved in its original form.

Name	description
Inertial Coord System	ICRF: for documentation only; which coord system/params
Solar System Ephemeris Doc	Documentation (which ephemeris/version...)
Solar System Ephermis	Table extract for relevant period
Earth Model Doc	Doc
Earth Model	Orientation of earth in solar system
	Tides, pole wander...
VLT Coordinates	Relation of VLT local system to Earth Model
Array Geom	Position of telescopes in VLT coords, c.f. VLT standards
	function of time when telescopes are moved??
Optical Train	c.f. VLT standards; nominal config of optical train
Target	c.f. VLT standards; description of all targets under consideration
	including calibrators with position, size, flux, color... described

4   Raw Data

Name	description
Detector Description	c.f. VLTI std.
Raw Detector Data	c.f. VLTI std.

5   VLTI environment

Name	description
Delay	c.f. jaffe/cotton. nominal delay introduced by main/differential delay lines
Metrology	measured end-end delay at 1.3μ
Engineering	raw/compressed engineering data per subsystem
Environment	temperature/humidity... vs time
Atmosphere Model	atmospheric dispersion model parameters

6   Reduced Data

Name	description
Fringe	ABCDEF .. per channel
Photometry	photometry estimates per channel
Fringe Delay	estimated phase delay per channel/group delay
Compressed Delay	smoothed and averaged delay+delay rate at wide intervals
Reduced Delay	Result of each "independent" measurement of delay per star pair
Astrometry/Orbit	astrometric+orbital parameters per source pair

7   Calibrations

Name	description
Delay Calibration	Correction to delay to to effect n.
Baseline Cal	Corrections to nominal baselines as fn of time
Time Cal	corrections to clock(s)
Telescope Cal	Corrections to telescope positions as fn of Az/Al/time

8   Simulator data

Name	description
Electric Field	Input field (strength and correlation coeff)
	at two telescopes as fn of frequency, time, polarization
	To be used by corruption programs prior to simulated "Detection"
	After "detection" simulated data should agree in format to real data

9   Documents

9.1   Acronyms

ASTRON	Stichting Astronomisch Onderzoek in Nederland http://www.astron.nl
AT	Auxiliary Telescope (of the VLTI)
DDL	Differential Delay Line
EPFL	École Polytechnique Fédérale de Lausanne http://www.epfl.ch
ESO	European Southern Observatory http://www.eso.org

--oOo---