



---

# DU438 Software User Manual

## Simulated Test Data for Non Single Stars processing

---

prepared by: Frédéric Arenou  
approved by: Steering Committee of CU4  
reference: GAIA-C4-UG-OPM-FA-055-1  
issue: 1  
revision: 3  
date: 2009-05-25  
status: Issued

## Abstract

This is the Gaia DPAC Software User Manual Document for DU 438, describing how to obtain simulated test data for Non-Single Stars.

Draft

## Document History

Issue	Revision	Date	Author	Comment
1	3	2009-05-25	F.A.	Update for cycle 6 (switch to gbin)
1	2	2009-05-03	F.A.	Typos
1	1	2009-04-22	F.A.	Cycle 6 update + mention to SRN
D	1	2008-11-18	F.A.	Title and bib. ref. corrected
D	0	2008-11-15	F.A.	First draft

Last svn reference:

\$Id: GAIA-C4-UG-OPM-FA-055.tex 89692 2009-05-25 15:03:01Z farenou \$

## Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
1.1	Objectives . . . . .	5
1.2	Scope . . . . .	5
1.3	Applicable Documents . . . . .	5
1.4	Reference Documents . . . . .	5
1.5	Definitions, acronyms, and abbreviations . . . . .	6
<b>2</b>	<b>Provided user functions</b>	<b>6</b>
2.1	DU438Main . . . . .	6
2.1.1	Prerequisites . . . . .	6
2.1.2	User input . . . . .	6
2.1.3	Input data . . . . .	7
2.1.4	Output data . . . . .	7
2.1.5	Logging . . . . .	8
2.1.6	Controls . . . . .	8
2.1.7	How to run . . . . .	8
2.1.8	Contingencies . . . . .	9
2.1.9	Properties . . . . .	9

# 1 Introduction

## 1.1 Objectives

Simulated data have to be produced to be used as input, and for the validation, of the various Non Single Stars (NSS) softwares. The DU438 software allows to obtain the needed simulated data for the following CU4 DUs: DU432, DU433, DU434, DU436, DU437, DU439. The software delivers part of the data only (the list of sources), while the other CU2 tools (GASS, GIBIS, GOG) have to be run afterwards using these sources. Typically, DU433 will provide the source list to GIBIS while the other DUs will use GOG.

The specific needs of the CU4 NSS DUs implies however that these tasks may have to modify the software content and some information for this purpose is given here.

## 1.2 Scope

This document is intended for the CU4 NSS use only, and in particular for the DU432, DU433, DU434, DU436, DU437, DU439.

## 1.3 Applicable Documents

- [1] T. Levoir et al., Product Assurance and Engineering Provisions for Software Development, GAIA-C1-SP-CNES-TL-001
- [2] F. Arenou, Software Requirement Specification for DU438, GAIA-C4-SP-OPM-FA-051

## 1.4 Reference Documents

Arenou, F., 2009, *DU438 Software Release Note*, Tech. Rep. GAIA-C4-SP-OPM-FA-057, Observatoire de Paris / CNRS,  
URL <http://wwwhip.obspm.fr/~arenou/PS-papers/gaia/GAIA-C4-SP-OPM-FA-057.pdf>

Hernandez, J., 2009, *Main Database Interface Control Document*, GAIA-C1-SP-ESAC-JH-001,  
URL <http://www.rssd.esa.int/lmlink/livmlink/open/2786145>

Reylé, C., Robin, A., Arenou, F., Grux, E., 2008, *Universe model ICD*, Tech. Rep. GAIA-C2-SP-LAOB-CR-001-5, Laboratoire d'Astrophysique de l'Observatoire de Besançon

## 1.5 Definitions, acronyms, and abbreviations

The following is a complete list of acronyms used in this document:

Acronym	Description
CU	Coordination Unit (in DPAC)
DPAC	Data Processing and Analysis Consortium
DU	Development Unit
ICD	Interface Control Document
NSS	Non Single Stars

## 2 Provided user functions

### 2.1 DU438Main

#### 2.1.1 Prerequisites

Beside the DU438 software, the `GaiaSimu.jar` and some data files are also needed. The software installation is described in Arenou (2009).

#### 2.1.2 User input

The exact information about the options to the program may obtained with

```
ant help
```

which outputs:

```
Syntax: java DU438 [--options...] <DU-name> [<minNbStars> [<magLim> [<distLim>]]]
```

```
Generates the simulated sources for a given NSS DU
```

```
Options:
```

```
--ascii
```

```
Outputs old ascii data (not gbin format)
```

```
--fixedRandom
```

```
Generates always the same star list (fixed random seed)
```

```
--help
Displays this text and exits

--version
Displays program version

<DU-name>:
DMS: default standard NSS simulation (Def: 1000 stars)
DU432: VIMs with perspective effects (Def: 1000 stars)
DU433: Visual binaries (Def: 1000 stars)
DU434: Spectroscopic binaries (Def: 1000 stars)
DU436: Short period eclipsing binaries (Def: 1000 stars)
DU437: Extrasolar planets (Def: 1000 stars)
DU439: astrometric+spectroscopic binaries (Def: 1000 stars)

<minNbStars>:
minimum number of stars to generate
Default: (depends on DU - see above)

<magLim>:
limiting magnitude
Default: 20.0

<distLim>:
limiting distance (pc)
Default: 50000.0
```

Note the `--fixedRandom` option which uses always the same random seed, leading to the same objects in the same chosen sky zones. The physical properties of the object can change if the simulation code `DU43p` is modified, though.

### 2.1.3 Input data

No input data is needed as the data are simulated.

### 2.1.4 Output data

The data is written under the `output/cyclen` directory.

**Prior to cycle 6** (or when the `--ascii` option is used): The source list is written in `ascii` format and will be named `DU43p.source`. The format of the source can be found in the universe model ICD, (RD Reylé et al., 2008).

**From cycle 6 on:** The source list is in `gbin` format. It will be named `UMStellar.gbin` and written under a `DU43p` directory. Its content is described at section CU2:UM in Hernandez (JH-001).

The file can then be given to Gog as input user file to produce the epoch and final data.

### 2.1.5 Logging

The output of a short run using e.g.

```
ant DU437 -Dnbstars=1
```

would typically look like:

```
...
[java] 07:54:28 DEBUG...ultiDimReaderJarImpl: Opening ../GaiaSimu/data/gaiaparamdb//Nature/Neptune_Ephemeris_
[java] 07:54:28 INFO ...gaia.cu4.du438.DU438: DU438 (fixed random) init at May 15, 2009 7:54:28 AM
[java] 07:54:29 INFO ...gaia.cu4.du438.DU438: Using the [ DU437 ] simulation (Extrasolar planets) up to mag 1
[java] 07:54:29 INFO ...gaia.cu4.du438.DU438: Already 0 for 1 requested
[java] 07:54:29 INFO ...gaia.cu4.du438.DU438: l=215.5077 b=-37.4232 radius=0.0852 --> 2 objects, first Id=*12
[java] 07:54:29 INFO ...gaia.cu4.du438.DU438: Already 2 for 1 requested
[java] 07:54:29 INFO ...props.PropertyLoader: Loading jar:file:/Users/arenou/Gaia/DPCC/distributions/dpcccomm
...
[java] 13:37:00 DEBUG...otPersistanceManager: Finding class methods: methodName = setStrict methodProp = stri
[java] 13:37:00 DEBUG...le.GaiaRootGaiaTable: About to write object
[java] 13:37:00 DEBUG...le.GaiaRootGaiaTable: Written 1432 bytes
[java] 13:37:00 INFO ...utils.dal.DataWriter: Data stored to GBin file: ../DU438/output/cycle6/DU437/UMStellar
[java] 13:37:00 WARN ...utils.dal.DataWriter: No records to write.
[java] 13:37:00 WARN ...utils.dal.DataWriter: No records to write.
[java] 13:37:00 INFO ...gaia.cu4.du438.DU438: 1 sources written at May 15, 2009 1:37:00 PM
[java] in file: ../DU438/output/cycle6/DU437
```

### 2.1.6 Controls

#### 2.1.7 How to run

Beyond the classical call with the options shown above, and in order to simplify the run, the `build.xml` also provides the following targets:

- `ant DMS [-Dnbstars=n] [-Doption="--fixedRandom"] [-Doption2="--ascii"]`
- `ant DU432 [-Dnbstars=n] [...]`
- `ant DU433 [-Dnbstars=n] [...]`
- etc.

Once the source list is obtained, it can be submitted to GOG, through its web interface,



## 2.1.8 Contingencies

When software modifications are needed to accommodate special DU needs, the only file to be modified is

`gaia.cu4.du438.current_cycle/DmsSimuDU43p.java`

Most probably, only the `OrbitalParams secondaryOrbit()` public method will have to be adapted to change the desired range of period, etc.

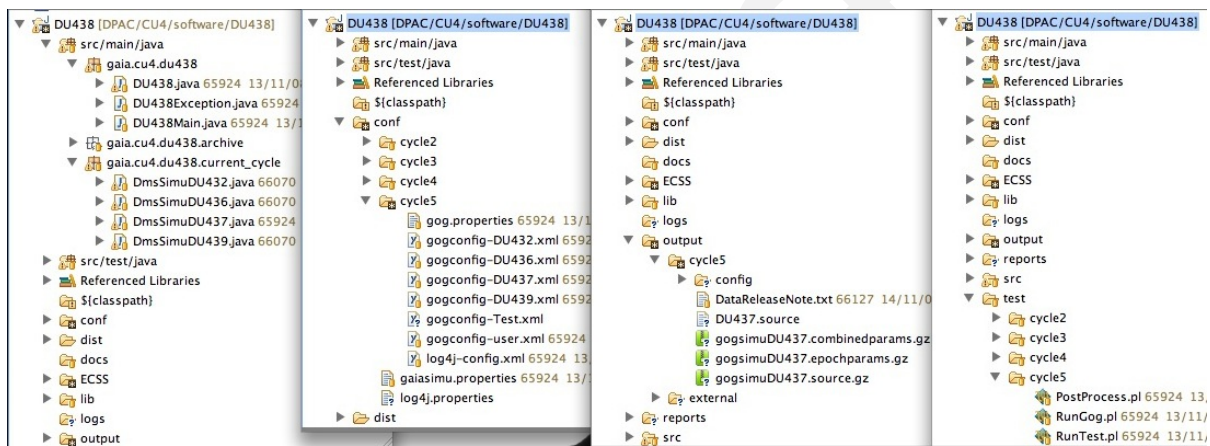


FIGURE 1: File directory organisation for DU 438, cycle 5. The DU438 software writes the source lists in `output/cyclen`, lists which can be used either using configurations in `conf/cyclen` to produce locally GOG output (if GOG software is locally present, or, preferably and more quickly, via web request to CNES). Perl scripts in `test/cyclen` are available for post-processing.

## 2.1.9 Properties

The needed properties files for DU438 are the `conf/gaiasimu.properties`, the `conf/gaiatools.p` and the `conf/logging.properties`. As for GOG, they are given in the `conf/cyclen` directory, e.g. `conf/cyclen/gog.properties`, or `conf/cyclen/gogconfig-DU43p.xml`.