GILDAS

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Scope: I. Softwares at IRAM

- Many different kinds of softwares at IRAM:
  1. Proposal and scheduling (statistics, dynamic scheduling, pool observing).
  2. Preparation of observations, e.g. setups.
  3. Data acquisition:
     3.1 Low level, e.g. hardware control (antennae, receivers, correlators, etc...)
     3.2 High level, e.g. operator and observer interface.
  4. Data archiving.
  5. Data reduction and analysis (single dish + interferometry).

- GILDAS deals only with a subset. Points: 2, 3.2, 5 and 6.
Scope: II. GILDAS at IRAM
425 000 executable lines (800 000 with MOPSIC)

- Common facilities
  - Command line interpreter: SIC;
  - Graphical possibilities: GREG
    (1D: curves, 2D: images, 3D: spectra cubes).
  - Preparation of observations: ASTRO, MOPSIC.

- 30m
  - Bolometer + Monitoring: MOPSIC;
  - Spectroscopy: TELCAL + MIRA + CLASS.

- PdBI
  - Calibration: CLIC;
  - Imaging + Deconvolution: MAPPING.

- ALMA
  - Simulator: MAPPING @ alma.map;
  - Holographies of ALMA antennae are done in CLIC at San Pedro.
GILDAS Strengths

- Large range of supported systems: Linux, Mac/OSX, Windows.
- Light weight: Data reduction and analysis possible on laptops.
- 25 years of history ⇒ Accumulated expertise.
- Powerful advanced tools, e.g.
  - Easy OTF processing;
  - Easy interferometric mosaicing;
  - General fitting routines.
GILDAS users

• IRAM AODs: Instrument monitoring, data pipelining.

• IRAM users: Data reduction.

• Others:
  – JMMC/ASPRO tool is based on GILDAS libraries;
  – CLASS is used in many facilities (e.g. APEX, CSO, NANTEN2, GBT, HHT, Effelsberg, Kosma, ...); CLASS is considered for use by Herschel/HIFI, SOFIA, 45m.
  – ALMA: (Single Dish characterization in San Pedro).

⇒ GILDAS evolutions must be thought with all users in mind.
GILDAS Manpower

- People participating in one way or another
  - **IRAM/Granada**  H. Wiesemeyer, H. Ungerechts, A. Sievers.
  - **LAOG/Grenoble**  S. Maret, P. Hily-Blant.
  - **L3AB/Bordeaux**  S. Guilloteau.

- Large code contributors:
  - **R. Zylka**  MOPSIC.
  - **H. Wiesemeyer**  MIRA + TELCAL.
  - **E. Reynier**  kernel.
  - **V. Pietu**  CLIC.
  - **J. Pety**  kernel + TELCAL + CLASS + ASTRO + MAPPING.
  - **S. Maret**  CLASS (Line survey analysis).
  - **F. Gueth**  CLIC + ASTRO.
  - **S. Bardeau**  kernel (python binding) + CLASS.
  - **P. Hily-Blant**  CLASS (double sideband deconvolution).
  - **S. Guilloteau**  Kernel + CLASS + MAPPING.

- Research & Development:
  - **N. Rodriguez-Fernandez**  PdBI OTF.
User support:

I. Documentation

CLASS evolution: I. Improved OTF support

P. Hily-Blant1, J. Pety1,2, S. Guillot3

1. IRAM (Grenoble)
2. LERMA, Observatoire de Paris
3. L3AB, Observatoire de Bordeaux

Dec. 20th 2005
Version 1.0

IRAM Memo 2009-4

Averaging spectra with CLASS

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1. IRAM (Grenoble)
2. LERMA, Observatoire de Paris
July 20th 2009
Version 1.0

Abstract

CLASS is a spectral-line analysis program which provides a set of commands capable to average two or more spectra. These commands allow the user to perform otherwise difficult or almost impossible operations, namely removing and weighting average. Combining these operations at the same time may imply some non-trivial effects as described here.

On October 2009, it appeared that some particular combination of the various modes were not working as expected (either in CLASS or in CLASS++). A complete checking and testing of the algorithm was performed, associated to extraction tests of all configurations. A test suite was also provided to check the output of each command and mode.

During this maintenance of the code, and the use of these capabilities to compute the new SIMBAD spectra, it was decided to write this document in order to keep a trace of all the methods applied. This was also the occasion to investigate deeply in the code and to examine the effects which can occur during all the possible processes.

Keywords: CLASS, CLASS++, averaging, weighting, combination

Related documents: IRAM memo 2005-1 CLASS evolution: I. Improved OTF support
User support:

II. Web page http://www.iram.fr/IRAMFR/GILDAS

INTRODUCTION

GILDAS is a collection of state-of-the-art softwares oriented toward (sub-)millimeter radioastronomical applications (either single-dish or interferometer). It is daily used to reduce all data acquired with the IRAM 30M telescope and Plateau de Bure Interferometer DBI (except VLBI observations). GILDAS is easily extensible. GILDAS is written in Fortran-90, with a few parts in C/C++ (mainly keyboard interaction, plotting, widgets).

ACKNOWLEDGMENT IN PUBLICATIONS

The GILDAS team welcomes an acknowledgment in publications using GILDAS software to reduce and/or analyze data.

Please use the following reference in your publications: http://www.iram.fr/IRAMFR/GILDAS

RECENT MILESTONES

(detailed news here)

nov-08 CLASS spectra writing was considerably optimized for data files containing more than 100000 spectra.

jul-08 The FITS command now knows how to handle the CDI FITS keyword for rotated images. It also knows again how to read AIPS UVFITS data.

jun-08 There is a new binary version of GILDAS under Intel Mac. Gildas is now also available in Fink.

mar-08 There is a new binary version of GILDAS under WINDOWS.

feb-08 CLASS90 is now the default version of CLASS. Although still distributed in GILDAS, CLASS77 is now obsolescent, i.e. not maintained anymore. Reminder: CLASS90 has all the CLASS77 possibilities, plus a much improved On-The-Fly support (see IRAM memo 2005-1).

dec-07 GAUSSCLUMP is now part of the standard GILDAS compilation.

nov-07 Major overhaul of the gildas building system.

oct-07 ASTRO has been adapted to support the new 2mm receivers for Plateau de Bure Interferometer.

jul-07 MIRA is now shipped with GILDAS.

jun-07 First release of a stable CLIC version tailored for the new generation of receivers at bure.

may-07 A fully new user interface for MAPPING.

apr-07 A fully new (POSIX compliant) interprocess communication for GILDAS.

mar-07
User support:

III. answers to gildas@iram.fr

- Total number of threads: 398.
- Median time to
  - First answer: 11h;
  - Final answer: 32h.
Hi,

I have just stumbled on an obnoxious bug which prevents me from making the discovery of the century. I will defend my PhD thesis tomorrow. Fix this bug in the coming minutes.

Toto.
Dear Gildas team,

Your software is great. For the first time in my life, I encountered a segmentation fault using it. I succeeded to reproduce the bug with a simple list of commands. I attach the following information: version of gildas I am currently using, list of commands and the data set to reproduce the bug. I hope this will help you solve the bug in the coming months. Continue the great work.

Best regards, Toto.

********************************************************************************
gildas version: dev (07oct08 13:45) (x86_64-fedora6-ifort) source tree

List of commands:
LAS90> file in test
LAS90> find
Blablablabla...
Segmentation fault

Data set attached: test.30m

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Naive thoughts about interoperability

- No software is the answer to all these:
  - Best *(i.e. most recent)* computing technology.
  - Best portability.
  - Best speed.
  - Best ease of use (CLI and GUI).
  - Best *(i.e. shortest)* learning curve.
  - Best functionalities.
    * Best data calibration methods.
    * Best data mapping methods.
    * Best *(i.e. most complete)* analysis methods.
    * Best graphical possibilities.
  - Best cost.

- One possible answer: Interoperability
  - Tight *(Microsoft view)*: Everybody develops in the same framework.
  - Lose *(Linux view)*: One common exchange data format, every packages input/output this format ⇒ Best reuse of all the existing tools.

GILDAS J. Pety, 2009
Future Prospects

• Strategy: Maintain high-quality software for IRAM instruments while staying open to outside world.
  – Focused but generic developments;
  – In/out fillers;
  – Python binding.