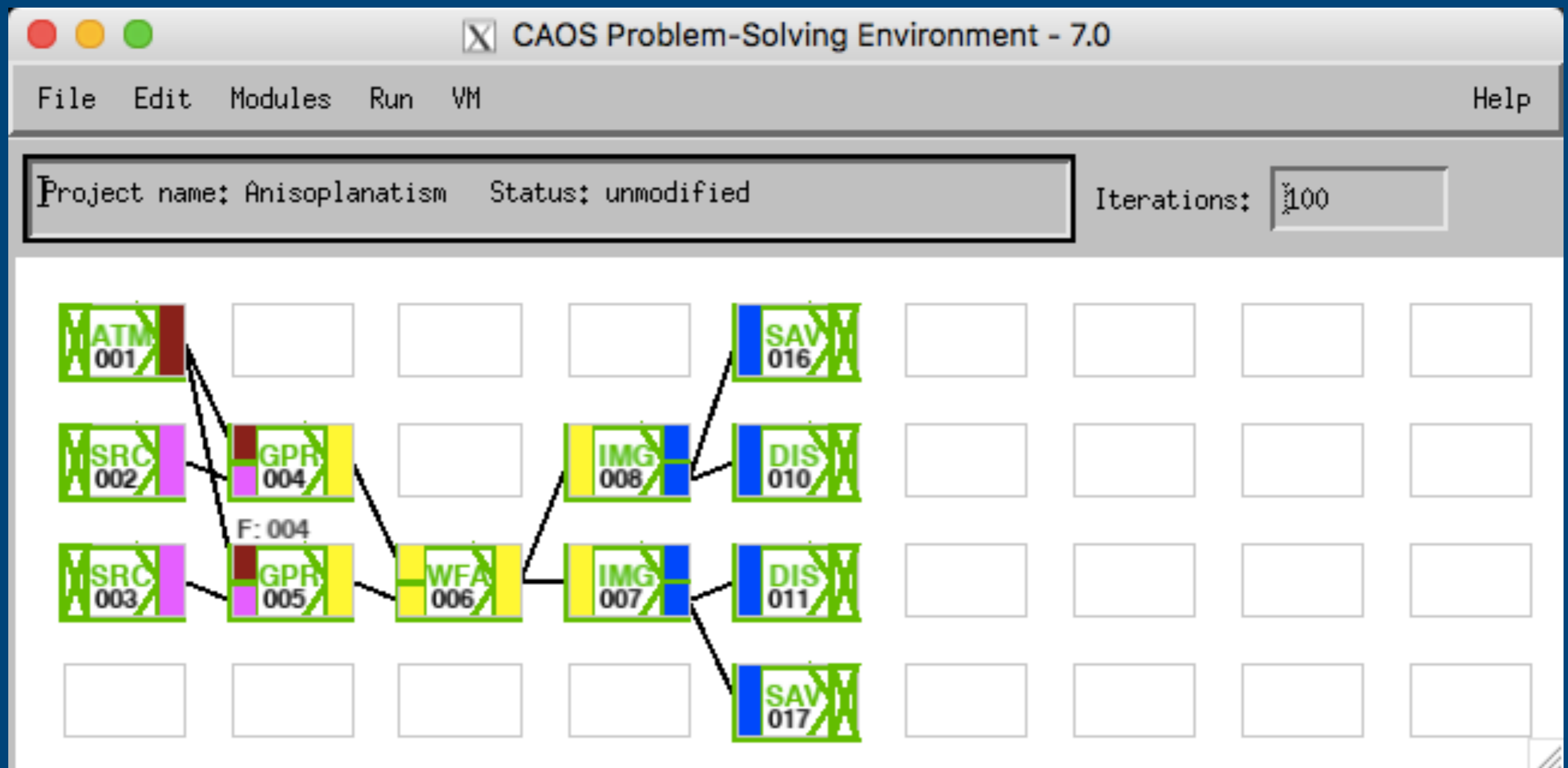


Imaging through the turbulent atmosphere: anisoplanatism ! – 2



Installation of CAOS-lite – 1

(CAOS PSE + lite version of Soft.Pack.CAOS)

```
1 |-----|
2 |INSTALLATION PROCESS (& BRIEF INTRODUCTION):|
3 |-----|
4 | (CAOS-lite, version 2024)|
5 |
6 |01-Unpack CAOS-install.zip somewhere on your account, the directory|
7 |   "CAOS-install/" is created, and it contains both a lite version of CAOS|
8 |   (within directory "CAOS-lite/") and the IDL Astronomy Library (within|
9 |   directory "astrolib/"). The lite version of CAOS contains itself both|
10 |  the CAOS PSE (Problem-Solving Environment – the IDL-based CAOS global|
11 |  architecture and interface) and a special lite edition of the CAOS|
12 |  Software Package (based on CAOS Software Package version 7.0), as well|
13 |  as a working directory, "work_caos/".|
14 |
15 |02-Go to the working directory "work_caos/" and fix the paths in the|
16 |  environment-parameters files "caos_env.sh" and "caos_startup.pro".|
17 |
18 |03-Still within the working directory, type "source caos_env.sh".|
19 |
20 |04-Launch IDL.|
21 |
22 |05-Type "@compile_all_CAOSlite_modules" in order to re-generate the|
23 |  default parameter files of the whole set of modules (upgrading so|
24 |  any possible pre-defined path).|
25 |
26 |06-Type "worksheet" at the CAOS prompt in order to use the CAOS|
27 |  Application Builder (the global interface of the tool).|
28 |
29 |NB-1: Steps 01,02,05 are necessary just once, during installation.|
30 |NB-2: Steps 03,04,06 are necessary for each opened terminal from which|
31 |  you wish to use IDL together with CAOS.
```

Installation of CAOS-lite – 2

(CAOS PSE + lite version of Soft.Pack.CAOS)

```
34 -----
35 SOME ADDITIONAL REMARKS:
36 -----
37
38 01-Refer to
39     http://lagrange.oca.eu/caos
40     for further informations on the CAOS PSE and its official packages.
41
42 02-Please never redistribute any CAOS part by yourself, rather refer to
43     http://lagrange.oca.eu/caos.
44
45 03-New projects start within the worksheet with "File"->"New Project". Modules
46     are put within the worksheet through button "Modules", and can be cloned
47     or deleted using "Edit"->"Clone module" or "Edit"->"Delete item". Each color
48     at the left- or right-side of a module represents a type of input or output.
49     In order to link two modules, click on the output of the first one and then
50     click on the input of the second one. When the design of your simulation is
51     completed, including setting of the total number of iterations, save the
52     project using "File"->"Save Project". Then you can set the parameters related
53     to each module using its dedicated GUI called by clicking on the module at
54     any moment.
55
56 04-For a detailed tutorial refer to:
57     http://lagrange.oca.eu/caos/tutorial/tutorial.html
58
59 05-In order to run a project, for example a project named "Anisoplanatism":
60     > .rn ./Projects/Anisoplanatism/project.pro
61     or alternatively use button "Run" from the CAOS PSE worksheet.
62
63
64 -----
65 Completed March 2024 – Marcel Carbillet
```

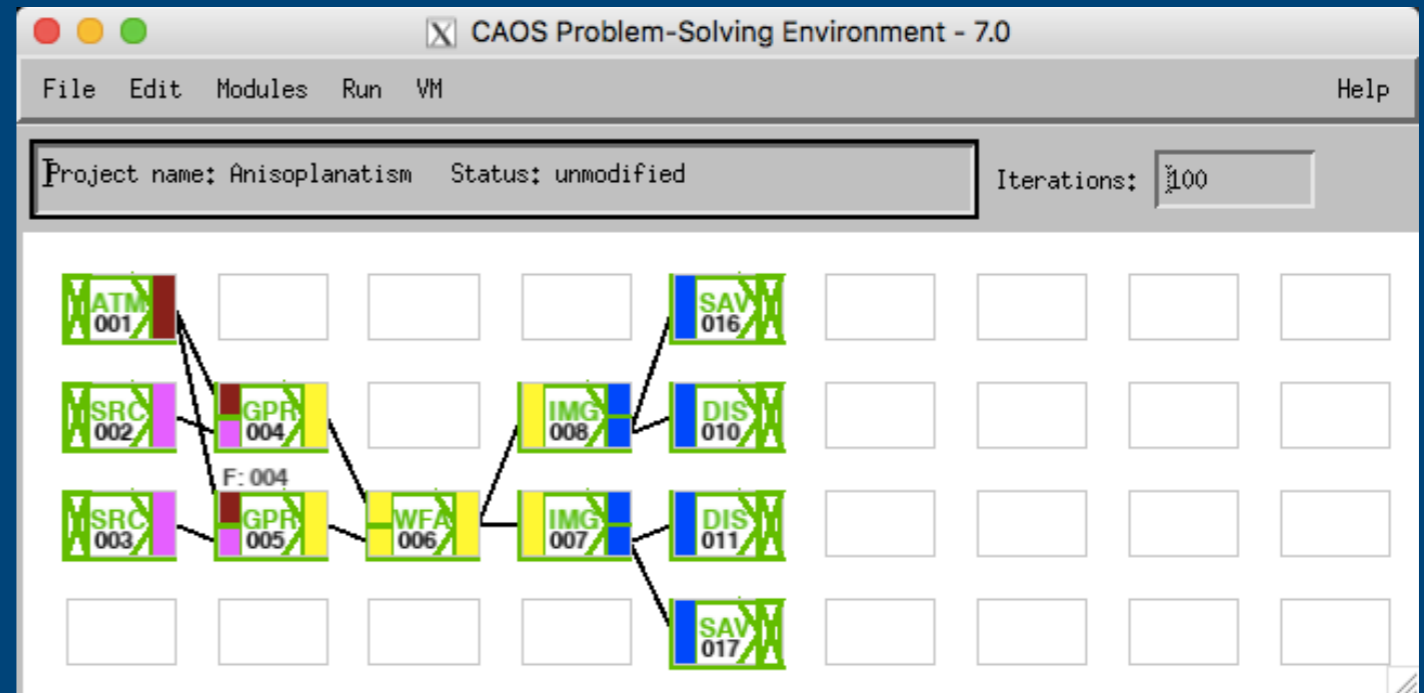
Build project for anisoplanatism...

0- COMPLETELY FINALISE INSTALLATION OF "CAOS LITE" BEFORE GOING ON !!

Then, within the CAOS interface...

1- Reproduce the project "Anisoplanatism" here beside.

2- Click on the ATM module, its graphical user interface (GUI) opens, then change its parameters into your own ones (r_0 , L_0 , altitude of the layers, mainly), and finally save them with button "Save".



3- Choose a value for the off-axis angle (typically in between 0" and 60") within second occurrence of module SRC and, as a consequence, adapt the name of the saved PSFs within the two modules SAV (one for each module IMG, i.e. one for each considered wavelength: for example 500nm and 1650nm).

4- Fix the parameters of the other modules.

5- Run the simulation project by using button "Run" within the CAOS interface (or with the IDL-CAOS command ``.rn ./Projects/Anisoplanatism/project.pro`` for a project called "Anisoplanatism").

6- Repeat steps 3 to 5 for each chosen value of the off-axis angle.

7- Compute the rms of the corrected wavefront and the FWHM for each resulting PSFs (two for each off-axis angle value) with routine "dataprocessing.pro".

(Another metrics: the Strehl ratio – 1)

$$S = \frac{I_{\text{post AO}}[0, 0]}{I_{\text{perfect}}[0, 0]}$$

$$S \simeq \exp\{-\sigma_{\text{post AO}}^2\}$$

where $I[0,0]$ is the intensity of the PSF at the optical center of the field (K. Strehl, *Zeit. Instrumentkde* 22, 213 (1902)).

in the framework of the Maréchal's approximation, where the variance (in radians²) is supposed to be small enough...

