Final Report on Madagascar Astronomy Python Workshop

(MadaAstroPy)

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1- Short summary of the project

We have run the Madagascar Astronomy Python Workshop (MadaAstroPy) which is a practical programming in Python for scientific postgraduate students in the field of physics / mathematics / engineering and particularly targeted for astrophysics students in Antananarivo, Madagascar for the first time. The workshop was held at the Institute & Observatory of Geophysics in Antananarivo (IOGA) within the University of Antananarivo from 03 July to 06 July 2017. It's aimed at teaching students the necessary tools that they would need for research. We believe that this workshop has introduced the students into Unix/Linux environment and Python as tools for research and also have helped / motivated students to develop their computer skills for their scientific career endeavor. And as such MadaAstroPy plays a critical role for skills development for scientific / astrophysics students in the country.

2- Achieved objectives/deliverables

First of all, we do thank the IOGA for hosting this activity-- see enclosed some pictures that we were able to take at the IOGA while working during the workshop. The workshop was officially opened by Prof Solofoarisoa RAKOTONIAINA who is the deputy director of the IOGA, and by Dr Hery Zo RANDRIANANDRAINA: deputy chair of the astrophysics and astronomy (who then all left right after the opening speech for other academic duties).

We did follow the objectives that are originally proposed and as such we have successfully conducted the following: (a) short lectures, (b) tutorials, and (c) mini-projects. We have attached to this report the workshop schedule that presents the programme we did perform and achieve in each of the outlined sessions above. The list of students who participated in the workshop is also attached.

We would like to acknowledge and give credits for some materials that we compiled from the Astropy tutorials at http://www.astropy.org/astropy-tutorials/ and the Python for scientists courses by Tom Robitaille at www2.mpia-hd.mpg.de/~robitaille/ retrieved on Tuesday, May 9, 2017 at 11:23 AM.

3- Deviations from the original project

There are connectivity-wise issues that cancelled our plan for learning some remote login activities. We had to pre-plan activities and made access to data to be simple. Therefore, in order to move forward, we have to have all materials and do any of the activities offline (see also next section).

We targeted for audience from astrophysics students and others that might have close interests in astrophysics and scientific computing that include for instance energy physics, statistical, and computer science students and as equally important as for the junior physics lecturers / researchers. However, there were no lecturers/ researchers participated in the workshop maybe e.g. due to overlapping to other schedules or else.

4- Significant challenges encountered

The majority of the activities went smoothly as planned except that students did not have internet network and lecturers only have little patchy connectivity. In addition there are also a frequent power cuts that briefly interpreted most of the activities but fortunately IOGA has an automated backup generator which kept us back continue working in every while.

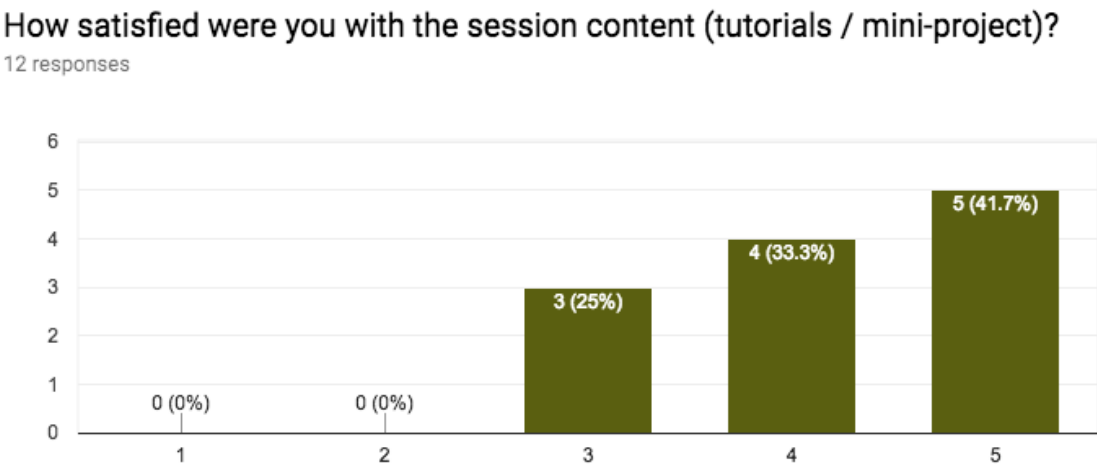
We would indicate here that these technical problems are not general issues of the workshop planning rather than challenges that any researcher at IOGA and the university of Antananarivo encounter frequently.

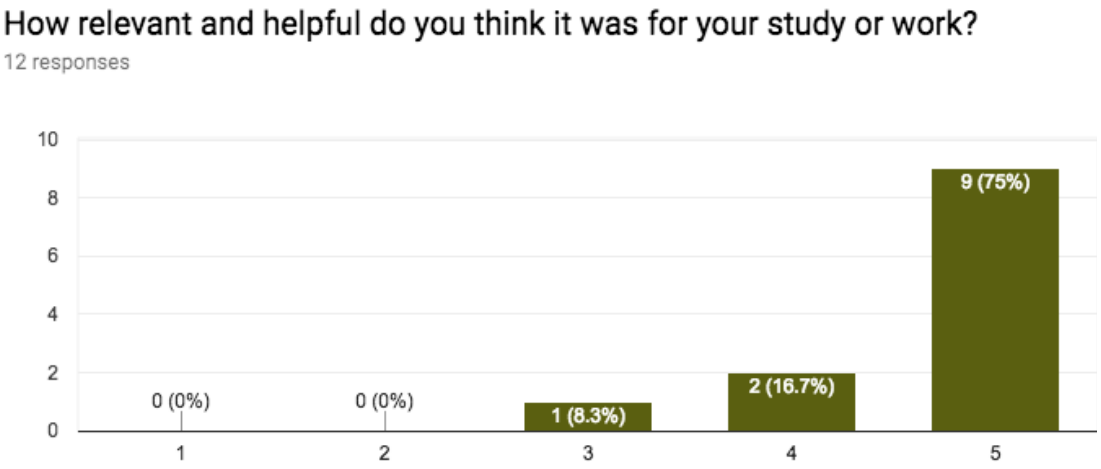
On a related note, the lack of internet connectivity has limited us to adjust the: (a) mini-projects to only based on observations that do not require online data retrieval; and (b) students to not be able to connect and try to learn for example of to ssh to local / overseas computers clusters.

5- Self evaluation

We once again thank the OAD/IAU supports to the MadaAstroPy project. As this was the first workshop that took place in the country, as such the Unix/Linux and Python programing courses were the first ever locally conducted for and aimed for scientific students.

From our point of view, we have achieved a successful event and this is evidenced by the online feedback that we have conducted. In summary, even though ~ 40% of the students responded to the online survey (receiving this fewer responses maybe again due to lack of access to the internet), the majority of the students are satisfied and indicated that the activities were quite useful for their study / research (see sample of event feedback graphs below). And given the few days long considered for the workshop, most of the students recommended that, if possible, to have even longer and regular event in the future.





6- Suggestions/Recommendations to the OAD

We believe that this workshop has provided students valuable experience to overcome various aspects of their coursework and research projects due to lack of computer and Python programing skills.

To this end, we presume that lack of such skills may also exist predominantly in a number of developing nations. Therefore, we would suggest / recommend that OAD/IAU continues supporting any potentially similar activities in Africa and worldwide.

7- Full financial report

We are grateful for the support that we received from the OAD/IAU even though it was not the full amount that we requested. We would like to reiterate that we would not have been successful in this event without the support from the OAD/IAU.

We managed to revise the expenses and fit our project spending to match the awarded budget in order to enable us to proceed with the workshop. The allocated budget of 2000 Euro allows us to therefore have to cover airfares for two lecturers from South Africa to conduct the workshop in Antananarivo (rather than three of us based in SA; and thus one could not make it to physically execute the plan).

We did attempt to utilize the approved funds in the best and an optimal way. We summarize all our expenses in the following table where 1 Euro ~ 13.92 Rand ; and 1 Euro ~ 3235.67 MGA. As we have tried to optimize the expenses and thus we did save some funds from the item #2 (see Table below).

We then decided to purchase a video projector, which is critically in need for the local teaching and research activities that was suggested and supported by the deputy chair of the astrophysics & astronomy group, Dr Hery Zo Randrianandraina, some time ahead of the workshop. The projector is being used by astrophysics students/lecturers for computational courses and research projects.

The purchased projector has been formally handed-in to, and is a permanent property of, the Astrophysics & Astronomy group under the department of Physics, University of Antananarivo. To this end, and to serve as a confirmation, please see attached a letter of acknowledgment from the deputy chair of the Astrophysics group.

Item	Description of expenditures	Total
1- Airfares	For two return ticket flights	1750
2- Tea & coffee with sweet treats; launches & taxis	Tea & coffee with sweet treats for students and lecturers. Launches & taxis for lectures	125
3- Projector	Purchased for the astrophysics & astronomy group	125

8- Copies of invoices/receipts

We have enclosed a copy of all the invoices/receipts to this end year reporting document.

PROGRAMME

Madagascar Astronomy Python Workshop

(MadaAstroPy)

03 – 06 July 2017

Day 1

09:00	Welcome note by the head of IOGA, University of Antananarivo (chaired by Dr Solohery Randriamampandry)
09:30	Lecture 1: Introduction to Linux & Python
10:30	Break
10:45	Lecture 2: Introduction to Python for data science
12:00	Lunch
14:00	Tutorial 1: Running Python code, Numbers, Strings, and Lists, Booleans, Tuples, and Dictionaries, Control Flow
15:30	Break
15:45	Tutorial 2: Python Functions, Reading and Writing files, Modules and Variable
17:00	Day 1 ends

Day 2

09:00	Lecture 3: Python for Astronomical data analysis: Astropy
10:30	Break
10:45	Lecture 4: Observational astronomy, FITS images, and data analysis: Astropy FITS images handling
12:00	Lunch
14:00	Tutorial 3: Introduction to Numpy, Introduction to Matplotlib, Files and paths, String formatting
15:30	Break
15:45	Tutorial 4: Astropy tutorial on Read and plot catalog information from a text file
17:00	Day 2 ends

Day 3

09:00	Tutorial 5: Astropy tutorial on Making a plot with both redshift and universe age axes

10:30 Break

10:45 Tutorial 6: Viewing and manipulating FITS images

12:00 Lunch

14:00 Tutorial 6 continues

15:30 Break

15:45 Tutorial 7: Viewing and manipulating data from FITS tables

16.:45 Mini-project: Team work assignment (Objective, Presentation)

17:00 Day 3 ends

Day 4 (Hack Day: FITS images manipulation: Multi-wavelength data)

09:00 Mini-project continues

12:00 Lunch

14:00 Mini-project: Presentation

16:00 Program evaluation & wrap up

16.:30 Social event

17:00 Workshop ends

MADAGASCAR ASTRONOMY PYTHON WORKSHOP

(MadaAstroPy)

LIST OF PARTICIPANTS

Number	Title	Full Name & E-mail address	Field of Study / Work
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