

My experience as a SOFIA observer

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In this document, I will briefly give a description of my experience as a SOFIA observer. For some points, I will offer my personal point of view, in addition to my professional one. If you have more questions, or even suggestions, feel free to contact me via email.

I wrote my first SOFIA proposal for Cycle 6, during summer 2017. Being less than six months in my PhD, this represented my first preparation of an observing proposal. After that, I have been PI or co-PI of 4 other SOFIA proposals, of which only one got accepted. I would like to emphasise that I have been working only with HAWC+ camera, and my experience is therefore focused on this instrument in particular.

1 Preparing Phase I

The proposal submission is handled by a dedicated tool (USPOT), in a similar way as for ALMA (ALMA Observing Tool). The interface, especially if you are completely new to it, could appear difficult to use at the beginning. My advice is that first of all one takes his time to get familiar with it. The latest version of USPOT are usually released close to the Cycle opening, but there is always the chance to practise with the older versions. It can be also very useful if you know a scientist who already wrote a few SOFIA proposals, and who can introduce you to the basics of the software.

Furthermore, already at the moment of preparing the proposal, contacts with the instrument expert team can be very useful. One has to input in USPOT a number of technical details for the instrumental setup. The manual is helpful, but if you are not sure about any detail, ask someone: I always had positive experiences. SOFIA webpage usually provides the contacts of PIs and support teams for each instrument. This advice is particularly important when you want to use modes or setups which are offered *on a shared risk basis*. In this case, always get in contact with the instrument team in order to understand exactly what is the detector status.

In USPOT, the set of inputs to perform an observation is known as AOR (Astronomical Observation Request). The software allows you to validate it (i.e. check for errors and warnings), which I highly suggest to do often, in order to avoid last-minute problems that you may realise only when you hit the “submit” button. Furthermore, you can also save locally your work in a .aor file, that you can re-open later: I think this is also very helpful.

1.1 On the Scientific Justification

As any other telescope, SOFIA requires a text file providing the scientific context and justification, and the project feasibility. In my experience, the page limit is quite high (you can submit up to 9 pages in total) with respect to other facilities, so there is plenty of space to present your project in detail. Be sure to make it clear why SOFIA is unique to perform your proposed study (frequency range, observability from the southern hemisphere,...). If you are a student, there is a dedicated section to mention how the proposed observations will be used in your thesis. I highly recommend to fill in this part.

2 Preparing Phase II

If the proposal is accepted, the Phase II is prepared starting from the AOR prepared in USPOT. Successful PIs are assigned a Contact Scientist, who -as far as I can tell- can be very helpful in answering your questions on how to actually perform the observations.

3 Actual observations

The selected projects are usually observed by the SOFIA staff. However, there is the chance for the PI to take part to the flight(s) during which his/her project is scheduled. I personally did not take this opportunity mainly for logistic reasons (I am based in Europe, and my source was observed from the New Zealand deployment). Nevertheless I think it may be a good idea. First of all, it gives the opportunity to check the data you are acquiring immediately, and hence to make immediate changes to the observations if needed. Furthermore, from a personal point of view flying on SOFIA sounds amazing.

4 Data reduction and analysis

The SOFIA team will let you know when your project is finished, and your data are ready. They provide both raw data, and already reduced ones (Level 3 or Level 4 depending on the observing mode). The reduction is done with the standard pipeline, which in some cases may not exactly what you want. However, especially for inexperienced observers, my suggestion is always to start working with the highest Level available. If later you realise that something is wrong with your data, or that you want to process the raw ones in a peculiar way, there is always time.

In my experience, for instance, my observations collected during Cycle 6 were way noisier than what I asked for. In order to assess if there were systematic problems in the uncertainty evaluation, we had to reprocess the raw data to perform a particular analysis on them. For this I contacted a colleague, who had strong expertise with SOFIA. and in particular with HAWC+. Unfortunately there was nothing more to be done. Most likely, the sensitivity of the instrument was overestimated, which led to predict a too short integration times. When I later resubmitted the proposal, it was not accepted, which I did not fully understand because it was clear to me that my goal was not achieved due to an instrumental problem. One has always to remember however that the SOFIA call is highly competitive, due to the limited amount of available observing time.

5 Final remarks: SOFIA community

Since my first proposal, I had the chance to be in contact with the “SOFIA community” several times, i.e. taking part to the annual SOFIA workshop, or to the SOFIA Teletalks. My overall experience has been great. There is a community of scientists around SOFIA which I found very welcoming and indeed helpful. Some collaborations and several scientific ideas came out of those meetings. I strongly recommend to take part to these occasions, if possible, especially for students, because there is a lot to be learnt from them.