

## **SPACE : A cost effective solution for your observatory.**

- We have a telescope farm where you could install your telescope and use it from your own country. We are at GMT-3 or 4 (depending on local summer or winter). We try to provide a good service while maintaining costs low. This document lists a number of items relevant to the installation of an observatory in our place.

- We are located in the north of the Atacama desert, and have both a latitude of  $-23^{\circ}$  (meaning you can see almost all of the sky except the zone around the north celestial pole), more than 300 clear nights per year. One observer here observes every single possible night and has been able to obtain data 319 nights in 2012 and 318 in 2013. Of course he observes during the full moon, etc.. The seeing is rarely below 1 arc seconds, on average 2 to 3 arc seconds (median is 1.7 arc seconds), but this is the price to pay to have an accessible place, where electricity, water and internet is available. The best sites in Chile are on mountaintops, hard to access, no water, no electricity (i.e. diesel generator), no internet (therefore expensive satellite links), and are not places where to live on a permanent basis. The sky background here is normally very dark. On moonless and milkywayless nights :), one can very often measure sky magnitudes lower than 22 per arc second. Our site is a good compromise between a large number of nights, decent (while not superb like at Paranal and other similar professional observatories) and relatively economic price.

- I have worked maintaining professional telescopes in several observatories before and can set up, align, clean and repair the equipment here (electronic lab, competences in optics, mechanical tools), you know your telescope will be in good hands. I have another engineer working with me.

- We only have a 10 megabits/seconds internet service so far, so we can not, for now, offer a mode where people download all their individual images every night. We need you to make an automated preprocessing on site (i.e. upload a script on your computer), then download the processed, stacked images. As you will see very quickly the main problem with such observing conditions is to observe full time, reduce full time and produce interesting results on a nightly basis. The use of software like ACP, CCDautopilot, CCDcommander and PRISM are highly recommended. Don't expect to use your telescope nights after nights while sitting on your chair from local sunset to sunrise unless that's what your life is all about. Automation is the key to efficiency. We are of course studying solution to get a faster internet, but so far the other solutions have proven to be very expensive (the current one is already very expensive). Some of our clients have their own private link (cost around 400 dollars per month).

- So far, the telescopes have been hosted in your individual shelter. We are currently installing a third solar power plant, because on average the electricity provided by the electricity company in San Pedro has been lousy at best. You receive an IP number and can connect to your own pc through VNC or another such software. Most telescopes here have an IPCAM allowing to see the telescope in case of a problem (don't leave it on all the time, this is an emergency tool). The situation with the electricity is such that we now recommend people use a notebook computer to control their telescope. A typical setup (PC, mount, focuser, filter wheel, camera, guiding camera) use around 100 watts in normal use. If yours takes 1000 watts, we have to talk about you providing your own electricity.
- We won't take new telescopes than the ones already scheduled in 2014 (we have 6 of them).
- The price of the services depend of your needs. The basic price is now 5000 euros per year if you provide your dome. You can of course install an instrument as a group of friends and share the observing time and the cost. If the telescope is used for professional purposes, the price is 10000 euros. Professional purpose include a higher quality service, 24h per day maintenance. This also includes the use of your telescope to subrent time to other people. On average problems are fixed relatively quickly, but Murphy being a bastard, telescopes tend to fail all at the same time, in which case, it might take a few days before we can do something. The idea is that you have quite a lot of observing time, and a few days lost are not a catastrophe.
- Shipping an installation to Chile means you have to ship your equipment, pay importation taxes, and this is generally speaking quite expensive. We suggest we purchase your PC in Chile instead of you purchasing it in your country and paying the shipping and taxes to Chile.
- We only receive tested equipment. If the equipment is not a standard one, you must provide documentation on the different aspects of the maintenance. If you have already observed automatically, you know how poor german equatorial mounts are (meridian flip, flexures, etc...), but in the german equatorial mounts, there are several level of quality. The recent direct drive mounts are really recommended (Astelco, ASA, Skyvision Nova). Purchasing quality equipment is generally the low cost solution in the long run. 2 of the Ritchey Chretien telescopes I host here coming from unknown manufacturers have had to be partly rebuilt, because their conception was poor and was not allowing a correct optical alignment. Because we have a large temperature changes between the day and night (can be up to 40°C of difference), carbon fiber tubes are highly

recommended, including for short focal length instruments. You can of course talk to us before selecting your equipment, we have several brands of equipment here and have a pretty good idea of how they perform on a nightly basis. There are some brands which I clearly prohibit here. Either because they tend to fail, or because the optomechanics are not good, or the service of the company is simply not good.

- I am available from noon to the beginning of the night every night, then later after my tours. I am normally on Skype (spaceobs) and can check things in case of problems or at the beginning of the night or after the tours (typically after midnight). The contact email is support@spaceobs.com. I already have 9 telescopes here (plus two of mine) working in robotic mode and normally don't have problems.

- We understand that the first year of hosting is a year when you have to pay for the transportation of your telescope. But it is also the year where we have to install your telescope (i.e. make a pillar, install and align the mount, install the shelter/dome, etc...). We try to put the installation fees to a minimum, but depending of your setup we fix a value, which is typically around 1000 euros or less to get your telescope up and running (not including the importation taxes that you pay). In fact we suggest you come here when we install the telescope, send the mount and scope through a container, and come with the CCD camera (and PC) in your luggage even though it may be cheaper to purchase a PC directly here in Chile.

- We have a local weather page which you can consult. If needed we can arrange so as to close automatically your installation in case of poor weather. But not to worry this is a rare case.

We hope this document explains how you could setup a telescope in the Atacama desert. If you have more questions, please don't hesitate to [contact](#) us.