

Sardinia, an island of ancient history and high technology

INTRODUCTION

Sardinia is an enchanting island in the center of the Mediterranean Sea.

It is part of Italy but in some sense it is a very particular region, different from the rest of Italy for its history, its culture, its language, its people.

Its economy is essentially based on the tourism: Sardinia offers to tourists beautiful landscapes of uncontaminated nature, naturalistic parks, white sand beaches over transparent sea, superb trekking trails, an unique and very ancient historical heritage (the nuragic culture), excellent cooking, warm hospitality.

And, since is it sparsely populated, a gorgeous sky!



OFFER

Brief description of the Astrotourism offer (state of Astrotourism in the destination, zone or region)

Astronomical tours have never been proposed by travel tour operators in Sardinia, even if this island offers, to respect to other parts in Italy, several areas in which the quality of the sky is still good (see picture).

Moreover, Sardinia is a privileged place where to learn and enjoy astronomy, from very different points of view. In this short report, we try to summarize the astronomical facilities present in Sardinia.

One of the key factor of strength of the astrotourism in Sardinia is the presence in the territory of one of the institute of the National Institute for Astrophysics (INAF, the leading Italian Research Institute for the Study of the Universe): the Cagliari Astronomical Observatory.

The National Institute for Astrophysics (INAF) is the leading Italian Research Institute for the Study of the Universe: it leads 19 institutes in the Italian territory and one national facility (Telescopio Nazionale Galileo) in La Palma (Roque de los Muchachos). As a national institute, INAF promotes, develops and coordinates, as part of EU programs and international organizations, research activities in the fields of astronomy and astrophysics, in collaboration with Universities and with other public and private entities, national and international. INAF projects and develops innovative technologies and advanced instrumentation for the study and exploration of the cosmos. Moreover, it promotes the dissemination of scientific culture through educational and outreach projects for School and Society.

The INAF – Osservatorio Astronomico di Cagliari (INAF-OAC) is one of the 19 Institutes of INAF in Italy, established in Sardinia, one of the two major Italian island. Founded in 1899 in the small St. Peter Island, the new INAF-OAC headquarters are now in the municipality of Selargius, near Cagliari (Sardinia capital), very close to the Cagliari University. INAF-OAC counts about 40 employers (staff researchers, technologists, administrative, technicians), and about 20 non-staff (graduate students, PhD students, post-Docs...).

Several research fields are carried on in INAF-OAC, all internationally relevant, both on astronomy and astrophysics (pulsars and compact objects, supernovae, astrochemistry and astrobiology, exoplanets atmosphere modeling and

characterization, extragalactic radio astronomy, extragalactic magnetic fields, galaxies clusters) and on technology (software engineering, microwaves receivers, atmosphere analysis, metrology, RFI monitoring, time and frequency) Lot of attention is devoted to the public outreach: the new headquarters (see fig) offers a didactical room, an optical telescope inside a dome, a small radio telescope for didactical purposes. Moreover, it offers a large library open to the general public, a Planetarium (with a digital instrument inside a 10.5 mt dome), a museum of historical instruments, a multi-purposes Auditorium (even equipped for scientific theater shows), and several high innovation laboratories for technologic development, open to high school classes for on-site working stages.

INAF-OAC staff is moreover responsible, with other several staff coming from the Radio Astronomy Institute of Bologna and from the Arcetri Astrophysical Observatory (Florence) of the building, commissioning and scientific validation of the **Sardinia Radio Telescope (SRT)**.

SRT is a highly innovative radio telescope with diameter of 64 m, approximately 70 m high, and more than 3.000 tons heavy. Besides being the biggest antenna in Italy, SRT is conceived as a modern, highly efficient and versatile instrument, having several focal points, a large coverage of observational frequencies (from 0.3 to 100 GHz) and sophisticated robotic systems aimed to quickly and precisely change the receivers.

SRT is extremely innovative also in the antenna structure: an «active surface», composed by a mosaic of over 1.000 aluminum panels supported by electro-mechanical computer-controlled actuators, allows the astronomers to compensate the structure deformations due to gravity effects, temperature fluctuations and wind pressure.

All these features make SRT the most advanced single-dish radio telescope in Europe. Once completed, SRT will be an international astrophysical facility, a scientific pole attractive for astronomers from all over the world. Recently, SRT entered in the AeroSpace Sardinian District. Its role is to develop technology and innovation in radio waves, but in particular SRT could be extremely helpful in space debris monitoring, together with other transmitting antenna in Sardinia (ex-military areas) and in Italy.

But SRT will be also an appealing pole for the large public of astronomy and high technology enthusiasts.

The public visitors program had begun in April 2012, with guided tour twice a month, all the year. Without any specific advertising, around 4,000 visitors came in this two last year to visit SRT and to talk with astronomers and technologist about radio astronomy, space science, radio interferometry, space debris monitoring, showing that scientific tourism is a feasible and practical way.

Astro-tourism in Sardinia is a major challenge also for the presence of some private facilities devoted to astronomy (the "Sardinia in Miniatura Park" and the "Planetario di Cagliari", property of the local newspaper Unione Sarda) and the presence of several, very active, amateur astronomers clubs .

List of services and activities directly related to Astrotourism

Sardinia in Miniatura Park:

It is a private entertainment park that offers a Miniature Park, a biosphere, a Darwin exhibition, a Nuragic pavilion, some botanical trails, but most of all it offers a Planetarium (the biggest in Sardinia, with a 11m dome, 80 seats and a digital instrument, completely customizable) and an astronomical exhibition, with scaled reproductions of Solar system planets, didactical panels about cosmology and life of the Universe, several diorama, a small radio telescope and some hands-on activities. On request, some thematic laboratories could be afforded.

All the exhibition had been developed with the scientific support of the INAF-OAC astronomers, which had in charge also the formation of the guides.

Unione Sarda Planetarium A private planetarium in an exclusive area inside Cagliari, the 10m dome of the Unione Sarda Planetarium is equipped with an opto-mechanical instrument (Zeiss ZKP4) and a digital one (Zeiss Spacegate NOVA), synchronized via a dedicated software.

They organize daily shows, thematic conferences with professional astronomers, university professors and experts and dedicated school activities.

The Ferdinando Caliumi Observatory (Monte Armidda, Lanusei): an amateur Observatorium, operated by the components of the Ogliastrina Association of Astronomy, a group of amateurs from Ogliastro and other places, who share a passion for the observation of the sky.

It is located on the top of Monte Armidda, Lanusei, a place where you could enjoy one of the darkest skies in Europe, ideal characteristics for astrophotography and observation. These qualities attract many astrophiles, who come from all over Italy to observe and research, both with the equipment at their disposal (several refractors telescopes), and their own devices.

The Siligo Observatory (SS): It is another amateur observatory, located close to the city of Sassari, in the north of Sardinia. It is operated by the Turrigan Astronomical Society.

Inaugurated in 2005, It is equipped with a 45cm reflector, and two apochromatic instruments.

In the Observatory you can find also a multimedia conference room, where astronomers often presents their research fields issues.

Amateur Associations in Sardinia

There are several groups of astronomy amateur in Sardinia, but essentially only three associations are particularly active in the territory.

Sardinian Amateur Association. It is a group of amateur operating mostly in the southern part of Sardinia, in the area surrounding Cagliari.

They have a strong experience in the astrophotography field. They organize often stargazing events during all the year, lectures of astro-photography techniques and shows of astrophotography.

They are official collaborators of INAF-OAC: they hence have their operative center in the INAF-OAC headquarter, since they collaborate in organizing stargazing events and operate the didactical optical telescope property of INAF.

Ogliastrina Association of Astronomy. It is a group of amateurs mostly coming from Ogliastra (center of Sardinia).

They operate the Ferdinando Calumi Observatory in Monte Armidda (Lanusei) and they are very active in organizing stargazing events, public conferences and observational events during astronomical events such as total eclipses or meteor showers. They are available for stargazing events under request.

Astronomical Association of Nuoro: it is a very active group organizing often public conferences and stargazing events. They own a mobile planetarium, which they use to explain people how to recognize stars and constellations in the sky. They also participate to local science Festival-

Turritan Astronomical Society: it is a group of amateurs and ex professors of science coming from the North of Sardinia. They operate the Siligo Observatory (SS).

The Turritan Society owns also an inflatable planetarium, with a digital instrument, which is used during public events.

Astrotourism-related information about the destination currently available (web, social networks...)

Most of the information about astronomy-related events are available on web sites.
In particular:

INAF-OAC and SRT web Pages:
www.oa-cagliari.inaf.it/divulgazione ;
www.srt.inaf.it

Sardegna in Miniatura Park: www.sardegna-in-miniatura.it

Ogliastrina Amateur Association: <http://www.astroarmidda.it/>

Planetarium Unione Sarda: www.planetariounionesarda.it

Sardinia Amateur Association: www.astrofilisardi.it/

Astronomical Turritan Society: <http://www.satsardegna.org/web/>

Associazione astronomica nuorese: <http://www.associazioneastronomicanuorese.it/>

All the previous sites have Facebook pages.

Another interesting page is the Astronomia in Sardegna FB page: <https://www.facebook.com/astronomiasardegna>

Communication channels for the offered services (main channels in which the activities and services are sold)

Services are offered mainly online: it is possible to book for a tour or a simple visit/participation to an event by online forms or by email contacts.

Phone numbers are available for special events, short deadlines or general info.

Tourism resources of special interest for Astrotourism (infrastructure, natural resources, education...)

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Events related with Astrotourism.

There is no a special event related to astro tourism in Sardinia. Usually several events have been organized for astronomical events like eclipses or meteoroid passages and for special national and international events (Occhi su SATurno in may; International Moon watching Party in september)

The INAF-OAC and SRT organize several working stages of three day – one week for high school selected students, usually during the school year. Moreover, they organize a summer school of one week at SRT the first week of September (La radio del cosmo).

Starlight Certification or similar ones.

No certification is present for sky quality in Sardinia. Several valuation can be done for special sites, like the location of SRT.

DEMAND

Average visitors per year that perform the activity.

No specific data are available on the web in general. We asked the Regional Tourism Office, but they didn't reply. For SRT visits, an average number of visitors per year is 3,000.

For Sardegna in Miniatura Park, the average numbers of visitors is 40,000 per year.

For the Unione Sarda Planetarium, the average number is 30,000 per year.

Profile of the tourist who engages in Astrotourism-related activities (where available)

No specific data are available on the web. Official data from the Regional Tourism Office eb site show that most of the Sardinia visitors came from Italy, a good number from UK, Germany, the Netherlands, France.

Evolution of visits to Astrotourism-related activities in the last three years.

No official data are available.