

# La Ruta de los Origenes stops in Montsec: observations and other educational activities

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## Abstract

La Ruta de los Origenes is an European Cooperation Project POCTEFA funded by FEDER-UE. The main objective of this project is to establish a touristic route on both sides of the Pyrenees to approach Origins topic to the public. This project is developed by six partners, three in Catalonia and three in Midi-Pyrenees, and is focused in Astronomy, Paleontology and Archaeology. Montsec mountains are placed in the Pre-Pyrenees area of Lleida province and they are a very good place for astronomy (dark skies, good seeing, good weather conditions). Parc Astronomic Montsec is the major astronomy project in that area and it includes a research astronomical observatory and an outreach and education center. So Montsec mountains and their Parc Astronomic are one of the stops of this route with an important number of activities to approach astronomy to public.

## 1 Introduction

La Ruta de los Origenes is an European Project devoted to establish a touristic route on both sides of the Pyrenees. This touristic route is a scientific route around the topic Origins in different sciences: Astronomy, Paleontology and Archaeology. The main goal is to promote science and culture tourism to develop areas with very good equipments and installations related to those research and outreach topics. To establish this kind of education and outreach project it is necessary to have good infrastructures to approach science to public and good environmental conditions to do it in the best way (e.g low light pollution for astronomical activities or easy accessibility to an archaeological dig).

In this project there are six partners involved. Three of them are from Midi-Pyrenees (France) : Cite de l'Espace (Space Sciences), Museum of Toulouse (Paleontology) and A Ciel Ouvert (Astronomy) and in the other side of Pyrenees there are the other three partners: Consorci del Montsec - Parc Astronomic (Astronomy), Universitat Autònoma de Barcelona (Archaeology) and ARDPH Noguera (Archaeology).

This partners are developing a huge number of activities, some of them all together and many others in each site. The most important joining activities are the creation of a temporary exhibition around the Origins of Universe, Earth, Life and Humans, and the starting of a common website (<http://www.larutadelosorigenes.es>) to communicate science and our project activities. In the case of Montsec, in these Pre-Pyrenees mountains, Parc Astronomic Montsec is developing new activities to communicate Astronomy, specially to schools, with special emphasis in remote astronomical observations and webcasts.

## 2 Activities of Parc Astronomic Montsec in the project

Parc Astronomic Montsec (PAM) is an infrastructure of Consorci del Montsec dedicated to develop astronomical activities in the area through high-qualified astronomical equipments. PAM is located in Montsec mountain range in the north-east of Iberian Peninsula, around 180 km from Barcelona <http://www.parcstronomic.cat>. Montsec is a calcareous mountain range more than 40 kilometers long, covering an area of 18 696 hectares divided between Aragon and Catalonia. These equipments was installed at Montsec region because this is the best place in Catalonia for astronomy due to its special meteorological conditions, a sky free of light pollution and an exceptional natural environment. PAM has two main parts: the research observatory and the Centre d'Observacio de l'Univers. The research observatory is placed on the top of the mountain and the outreach center is placed in the Ager Valley in Montsec area. The main objectives and activities of PAM are the astronomical research using these updates infrastructures and the communication and outreach of astronomy and natural environment.

In fact the outreach center (COU), with more than 100 000 visitors in the last three years, is just the perfect place to do the La Ruta de los Origenes activities, because it is specially designed for education and outreach of sciences. The activities can be divided in two blocks with some overlapping: school and general public activities.

### School Activities:

- Discovery stages of Catalan and Midi-Pyrenees students on both sides of Pyrenees (see Fig. 1)
- New planetarium shows available in four languages (Catalan, Spanish, French and English)
- New portable planetarium to do the activities in the schools
- Remote Astronomical Observations (described in next sections)

### Public Activities:

- New planetarium shows in four languages (Catalan, Spanish, French and English)
- Improvements on the COU ordinary visits (Translation systems, new astronomical equipments)
- Remote Astronomical Observations (described in next sections)
- Follow up of special astronomical events with webcasts (described in next sections)



Figure 1: Discovery stages of Catalan students in Midi-Pyrenees.

### 3 Remote Astronomical Observations

This remote astronomical observations are one of the fundamental elements of this European project. The idea is operate a system that could approach the observations to the students in their own schools. This activities will allow the students to follow a remote classroom using an e-learning platform and see what is happening in the domes of the Centre d'Observacio de l'Univers. After the explanations it is possible to let the students to control remotely the telescope system to move it to another object or to obtain images of any object. Always under our staff supervision to prevent any damage to the system. This facility could be very useful for schools with activities related to astronomy, for cultural events of the schools or for the development of "students research". This last option is very common in Catalan education system, because in the upper level of secondary school the students have to develop a research work and astronomy is one of the preferred topics.

One of the major problems of this kind of educational proposal is the fact the system has to be very stable and safe. So this activity required of many months of work of our staff to improve different elements. The system had to be easy controlled remotely and it is necessary to increase the security of the operations to guarantee the system is safe (e.g no impacts of the telescope or the synchronicity of different instruments). We are integrating to the system all these equipments:

- Two Web servers to link all the systems with the remote connection
- Selection, test and integration of an E-Learning Platform. The current selected platform is Webex-CISCO.
- Environment cams in the Telescopes area (inside and outside the domes)
- Weather station information
- Clouds and rain detectors warnings
- Two telescopes: 16-inches Schmidt-Cassegrain and 15cm Takahashi refractor
- Domes of every telescope operated by pc and synchronized with their telescope

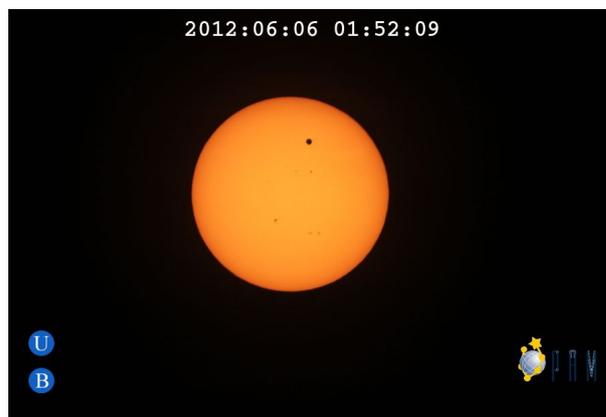


Figure 2: An example image from Transit of Venus webcast.

- CCD cameras with their filter wheels in each dome
- Electronic Focusing system in each telescope
- Flat Fielding panels for dome flats in every dome

At present time the status is work in progress, but in any case we have made real tests with public. For example we made an astronomical observation during the Barcelona Science Party 2012 and during the Reunion Cientifica de la SEA Valencia 2012. So the system is working properly and it is almost ready to be useful for students all around the world.

#### 4 Follow up of special events (webcasts)

In addition to this new remote astronomy we continue with the 'classic' follow up of special astronomical events through Internet. When we have an important astronomical event, like an eclipse or a planetary transit, it appears in newspapers and audiovisual mass media. The outreach and education centers can extend the impact of these events with observations on site and using Internet to broadcast everywhere around the Earth. This is another way to approach astronomy to students or general public that is one of the important goals of La Ruta de los Origenes European Project.

In the last two years we have made webcasts of the Partial Solar Eclipse (January 2011) and Lunar Eclipse (June 2011) from our observatories to the world. Of course we will continue with future events that are visible from Montsec. But this 2012, we decided to prepare a joint expedition with Universitat de Barcelona to observe and webcast the most important event of the year, the Transit of Venus 2012. The team of Parc Astronomic and UB went to Svalbard Islands in Norway to do the observations and obtaining images for a live webcast through internet (see an example image on Fig. 2). The big impact of this kind of activities confirms the interest of public for astronomical events.

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