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Current and future activities in education and public outreach at the *Observatoire de Haute Provence*

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Abstract

The Haute Provence Observatory has for primary mission the operation of telescopes, up to two meters in diameter, for the astrophysics community, and the measurements of various upper atmosphere parameters for the geophysics community. An education and outreach program has been developed with several reached: from school pupils to post-doctorate students, teachers, and the general public. In the recent years we put emphasis on the formation of teachers and on the renewal of the general public visit. Given the wide range of education and outreach activities we cover, we had to develop a relation network with individuals, amateurs, teachers and institutions, amplifying our efforts. For the future, we will try to make an optimal use of the resources available in the St Michel l'Observatoire area, taking steps to reach an agreement with the neighbouring "Centre d'Astronomie", a structure devoted to education and public outreach belonging to the local authorities.

Keywords: Education and public outreach; Astronomy; Environmental sciences; Geophysics

1. Introduction

The Haute-Provence Observatory (hereafter OHP – http://www.obs-hp.fr) belongs to the Centre National de la Recherche Scientifique (National Centre for Scientific Research, hereafter CNRS), the main French research agency; it is located in France, approximately 100 km north of the city of Marseille, at an altitude of 650 m near the village of Saint Michel l'Observatoire (Alpes de Haute-Provence). It was funded in 1937, but started its activities in 1943 when the 1.2 m telescope came on line (Véron, 2005). In 1958 its 1.93 m telescope entered into operations. OHP operates routinely 4 telescopes in the range 0.8–1.93 m for spectroscopy and photometry, with a specialization to high resolution spectroscopy and extrasolar planet studies (actually the first extrasolar planet was discovered using the 1.93 m telescope – Mayor and Queloz, 1995). In the seventies, prompted by the discovery of the depletion of the Ozone layer the LIDAR ranging technique was developed to monitor the atmospheric temperature, wind, as well as its minor constituent, mostly Ozone (Mégie et al., 1977). Nowadays OHP hosts one of the main stations of the *Network for the Detection of Atmospheric Composition Changes* (NDACC, http://www.ndacc.org). OHP belongs also to other geophysical networks such as AERONET (AErosol ROboic NETwork; http://aeronet.gsfc.nasa.gov/) for the monitoring of the aerosol content of the atmosphere and PAES (Pollution A l'Echelle Synoptyque, Synoptic Scale Pollution; http://www.aero.obs-mip.fr/PAES/accueil/paes_index.htm) for the study of the pollution at the regional scale; We plan to participate to major initiatives such as the "Mediterranean workshop", a long term campaign for the study of the impact of the global climate change at the regional scale. Table 1 summarizes the main instruments in use at OHP, both for astrophysics and geophysics. We can summarize the first mission of OHP as to give access to telescopes to the community, from stellar physics to extragalactic sources, and to acquire measurements of the vertical column of

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Table 1
Main instruments in use at OHP

Branch	Instrument name	Characteristics	Comments
Astrophysics	Telescope 193 cm	Equipped with high and low resolution spectrographs	Research only
	Telescope 152 cm	With high resolution coudé spectrograph	Research, technological development, and training of students; will be use for laser guide star experiment
	Telescope 120 cm	CCD camera for photometry	Research, training of students
	Telescope 80 cm	CCD camera for photometry	Research, training of students
	BEST[a]	30 cm telescope	Research, detection of extrasolar transits
	Tübingen-OHP telescope	60, 10 cm, with webcams	Remote operated for education
	ROSACE	50 cm telescope with CCD camera	Research, extrasolar transits, Gamma-ray bursts and orbital debris/satellite positioning
	TAROT-Calern[b]	25 cm robotic telescope on plateau du Calern observatory	Research (Gamma-Ray bursts, and secondary science), has been used for EPO
	TAROT-Chile	25 cm robotic telescope at ESO, La Silla (Chile)	Research (Gamma-Ray Bursts and secondary science)
	CARLINA[c]	Interferometry with diluted pupils	R&D
Geophysics	NDACC (Network)	O3 Lidars	Research, O3 atmosphere profiles in stratosphere and troposphere
		Aerosol Lidar	Research, Aerosol and temperatura in atmosphere
		Dobson Spectrometer	O3 in atmosphere
		SAOZ Spectrometer	O3 and NO2 in atmosphere
		Stratospheric balloons	In situ measurement of T, O3, H...
		BrO Spectrometer	Measure of BrO
		UV spectrometer	UV content of Sun radiation at ground level
	AERONET (network)	Spectrophotometer	Aerosols in atmosphere
	PAES (network)	Pollution analyser	Measures of CO and O3 at ground level
	Miscellaneous instruments	H2O Lidar	Research, atmospheric vapor content
		Wind LIDAR	Wind profile in high atmosphere
		Decimetric radar	Research, interface troposphere/Stratosphere
		Interferometer	Monitoring of winds in the thermosphere
		Pyranometer	Used for transfer of radiation in atmosphere
		Cloud camera	High altitude (cirrus) cloud monitoring for radiation transfer

[a] Berlin Extrasolar Transit Telescope, Rauer et al. (2004).
[b] Télescope à Action Rapide pour les Objets Transitoires (Rapid Action Telescope for Transient Objects) Calern OCA and ESO La Silla, Boër et al. (2006).
[c] Le Coroller et al. (2004).

atmosphere (including dynamics) from the troposphere to the mesosphere.

OHP has about 60 employees, including a research group of 10, covering both fields of astrophysics and geophysics. For astrophysics, an independent assessment of the impact of the 193 cm telescope of OHP has been made by Trimble et al. (2005). Among other facilities we can mention mechanical and electrical workshops, a large integration facility, large available space in its historical style building, meeting rooms (up to 80 persons), a guesthouse with 40 beds, including a restaurant. OHP is well connected to the various transportation networks, thanks to a close motorway, linking the OHP to the Aix-TGV train station and to the Marseille airport in about 1 h drive (making Paris at a "distance" of 3 h:30). It is close also (1 h:15 m) to the densely populated area of Marseille, and the Rhone river valley.

Since the fifties, OHP has opened its doors to the general public. However, it is only in the recent past years that a program has been developed for education and public outreach (hereafter EPO). In 1987, a structure devoted to education and public outreach, the "Centre d'Astronomie" (Astronomy Center, http://www.centre-astro.fr; hereafter CA) owned by the territorial authorities (Conseil Général des Alpes de Haute-Provence) and run by a non-profit association has been opened in the neighbouring village of Saint Michel l'Observatoire to popularize astronomy and receive school classes for periods from few days to one week. The CA has 17 FTE, including 7 specialized educators for children and/or in astronomy. It features several small telescopes (up to 60 cm in diameter) and a siderostat which was given by the CNRS. In order to mutually benefit from their expertise and experience, the two structures (OHP and CA) are establishing closer links, as described below.

In this paper we describe the EPO activities of OHP, their development and the problems encountered, as well as the evolution we see for the future. We address successively the different publics targeted by our action.