

OBSERVATORIES AND THEIR SOCIAL ENVIRONMENT: THE CASE OF PIC DU MIDI OBSERVATORY

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Abstract. The case of Pic du Midi Observatory is an interesting one. The end of its scientific operations were announced in 1993 by the French National Agency CNRS. But the observatory activities were saved by a national and international social reaction, triggering an original solution. The summit was parted into a scientific administration comprising Paul Sabatier University (Toulouse) and CNRS, and a public administration comprising the Regional government, and local cities and villages. The public administration was endowed with the task of maintaining buildings in a sustainable fashion with incomes from touristic visits of the Summit. This organisation turned to be very efficient. In 2021, Pic du midi Observatory is on a dynamic track, growing fast both touristically and science wise. This communication describes Pic du midi organisation in 2021 and the reasons that concurred towards it.

Keywords: observatory, history, social

1 Introduction

The observatory of Pic du Midi de Bigorre (2877 m, N 42°56'11", E 0°8'34") is the first high-altitude site in the world (1872). Its history flows through two world wars, and a fair share of the emergence of the Modern World. Its meteor records span almost 150 years, including temperature, humidity, winds, and ozone measurements. This long history of science observations at Pic du Midi encompasses a broad range of disciplines, readers interested in Pic du Midi history may read Sanchez (2014); Davoust (2014). Among the numerous sciences that Pic du Midi hosted in his history, one may cite Meteorology, Geology, Glaciology, Atmospheric Sciences (Thunder, Sprites, Chemistry), Botany, Studies of Cosmic Rays, Nuclear and Particle Physics, Medical Studies, Earth Magnetism, Radioactivity Studies, Lunar cartography, Small Planets and planetary observations, Studies of galaxies, Cosmology, Stellar Magnetism, Solar studies and Coronagraphy, Ethology, Ecology and most recently climate studies. This fantastic wealth of data gathering continues at its best in 2021 thanks to the contemporaneous organisation that emerged in the latest part of the twentieth century. We will describe here the way Pic du Midi works in 2021, describe how this organisation emerged, and conclude on a few ongoing emblematic projects for the future. (This communication is part of two, interested readers may look at the S22 communication on Pic du Midi patrimony).

2 Pic du Midi in 2021

In 2021, the activities of Pic du Midi Observatory are shared between two independent administrations, one administration takes care of science, and the other is in charge of Education and Public Outreach (EPO) activities. The two partners have separate budgets, their management is independent and most of their activities are non-overlapping. This organisation turns out to be very efficient for fund raising, because each partner pursues distinct objectives. Hence, any funding administration knows when money is spent on the public side or the science side. Thanks to this clarification, over the past ten years, about 10 million euros were invested on various science projects, and similar amounts on public infrastructures.

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2.1 Science

The science activities at Pic du midi are managed by the Observatoire Midi Pyrénées (OMP), component of the University of Toulouse 3 Paul Sabatier. The science staff is shared between CNRS (9 people) and the University (15 people). Pic du midi comprises 3 national services; the Telescope Bernard Lyot, the Atmosphere science platform (P2OA, European network Actris, ...), the Solar Corona service (coronagraph) and a national platform welcoming researchers and experiments at the summit all year round. In addition to national services, 3 telescopes are active (T1M, managed by IMCCE small planets team, T60 managed by OMP, Jean-Rösch telescope managed by IRAP) and geophysics experiments (GPS for tectonics, Bonner sphere neutron spectrograph of ONERA, fast cameras for Luminous transitory Events or sprites, ...). Apart from long-term experiments, numerous short-lived public or private experiments use Pic du Midi for its qualified staff and pristine observing conditions. Pic du midi astronomers are actively involved in teaching astronomical observation techniques to Master students all over France through training sessions with small telescopes and state-of-the-art instruments. The science future of Pic du midi is oriented towards a world-leading instrumental suite on the 2-m TBL, (i) a visible spectro-polarimetre and velocimeter Neo-Narval, (ii) IR spectro-polarimetre and velocimeter SPIP, and (iii) a new bonnet allowing observers to use both instruments simultaneously. The science goal is to study stellar magnetism as well as exo-planetary systems evolution from birth to death, in particular exo-Earths in habitable zone. In addition to the TBL, A new coronagraph in the making will be the largest in the world studying the solar polarised corona in highly-ionised species.

2.2 Public

150000 people visit the summit every year. The public administration comprises ca. 40 staff members and manages the public flow. The board of the public administration is composed of regional and local government members and the mayors of close by cities. The public administration runs a 25-bed hotel at the summit, a restaurant that equally serves tourists and science staff, and a tourist shop at the cablecar base. Thanks to a dynamic funding program, the public administration can invest every year in new outreach capabilities. As of 2021, the summit hosts a modern museum, a planetarium, a set of open terraces, connected history tablets lead visitors to a rich visit of the patrimonial summit. A wide variety of activities are offered to culturally diverse groups, from downhill skying, biking, sight-seeing, to science-oriented visits of the summit. Night visitors are led by an EPO professional, they can visit the science premises and star-gaze through small telescopes set on the terrace. An important duty of the public administration is to perpetuate the long-term science activities at Pic du Midi. Among its supporting activities, access to the summit from the skying resort, power and food supplies, and sanitary infrastructures are central to the observatory science capabilities. Among the on-going public projects are a museum at the nearby Tourmalet Pass (a well-known Tour de France stop) dedicated to night-sky protection and rehabilitation of a mountain refuge connected to the summit by cablecar to increase tourists night access.

3 The making of Pic 2000

Today idyllic situation has emerged from a much darker period of the 1990s. After a long period of prolific science activities over the XXth century, the Pic du Midi stalled in the 80s-90s leading the french funding agency CNRS to stop investments at the summit while redirecting investments to other international sites, until 1993 where the complete close down of the Pic du Midi Observatory was announced by CNRS. That announcement triggered a large support over France and international communities from scientists and public likewise. The OMP director Michel Blanc, the local MP and senator François Fortassin and State Prefect Jean Dussourd worked together to create an original solution to "save Pic du Midi". The public administration was born with the primary goal to perpetuate science activities at the summit by opening part of the premises to the public. More than 30 million euros were invested in a cable car and summit infrastructures. That was the beginning of a fruitful collaboration between University Paul Sabatier and a public administration. After a transition period when the old users and the new administration learned how to work with the other partner, a clear synergy emerged and science re-invented itself, creating citizen science projects fully relying on volunteers and sponsor (Fiducial) to run the coronagraph (responsible JC Noëns) years before the internet citizen science initiatives. The contract between University Paul Sabatier and the public administration runs over 30 years, ending in 2029. Partners are already working on new secure long-term contracts to pursue the successful adventure.



Fig. 1. Illustrations of activities at Pic du Midi. **Top left:** Museum, **Top right:** training session on astronomical observing techniques with Masters students of Toulouse, **Top right:** artist view of the future science building in the making (opening 2023) for science workshops, training sessions, centralised control of summit telescopes and experiments

4 Projects for the future

Among projects that emerged because of the current management of the Pic du Midi, three are worth mentioning: The International Darksky Association Reserve, the new science building, and the UNESCO World Heritage project.

4.1 IDA reserve

The idea to preserve the pristine night sky of Pic to Midi through an International Darksky Association Reserve dubbed RICE in French for Réserve Internationale de Ciel Etoilé (<https://picdumidi.com/en/discover-the-pic-du-midi/rice-en>) was launched by François Colas (IMCCE, OPM), responsible of Pic du Midi T1M, immediately supported by University Paul Sabatier (OMP), and soon delegated to the Public administration that provided manpower and resources. The IDA reserve was the first of its kind in Europe in 2013. In 2021, the IDA reserve covers 700 km² of core area around Pic du Midi over ca. 200 nearby villages. The key-element to a successful future was to involve, from the beginning, institutional partners (mayors, MP, State), technical experts (Energy Supply administration responsible of developing public lighting for the area), and Pic du Midi partners (scientists, EPO experts). Over the past years, the RICE successfully replaced thousand of light points

around Pic du Midi and launched campaigns of night sky protection leading many villages to switch-off public lights midnight to 5 am.

4.2 *New building: Dauzère-Soler*

Although, most of data gathering is today performed in an autonomous way (specially atmosphere science experiments), our capabilities to welcome researchers, astronomers and students is of the essence to a bright science future of Pic du Midi. This is the goal of a new building erected in 2021 (opening 2023) to allow ca. 30 scientists to stay at the summit for a few days. This new building will also provide a 40-seat conference room, technical rooms, a network room and a centralised control room to run all telescopes of the summit days and nights. A new dome is provisioned on the new building top, as well as a larger experiment area for atmosphere science experiments. The new building will allow workshops and training sessions for a large science community, opening a new domain of science activities at the summit.

4.3 *UNESCO World Heritage*

The Pic du Midi was the first high-mountain observatory to be built in the world, and one of the last pioneering site still active in the XXIst century. Its long science adventure and history of 150 years generated a rich patrimony. The fact that the summit is a connecting site between a larger public and scientists is very unique in the world today. All these characteristics argue for an outstanding universal value under criteria III and IV (<https://whc.unesco.org/en/criteria/>) for a nomination to UNESCO World Heritage. The public administration, the University Paul Sabatier and the State prefect work together to make that happen in the coming years. If the site is nominated, it will attract international visitors and preserve its science activities for the foreseeable future. Becoming a UNESCO World Heritage is a long two-step process. First, the site must join the French national indicative list. This shall happen in the late months of 2021, and then build a site management document detailing how partners will work together to protect the site. An important point of this UNESCO World Heritage is that science activities are at the heart of the outstanding universal value, they are what needs to be protected and developed, the summit historical artefacts are subject to evolve to support this universal science adventure.

5 Conclusions

After 150 years of science observations at Pic du Midi, our duty is to pass this extraordinary site to future generations in the best state possible to continue this Human adventure. Each year, tens of thousands of visitors can admire the panorama and learn about the science advances done at Pic du Midi. Maintaining such an high-mountain observatory is a difficult task, demanding dedication and hard work. Thanks to the dedication of the staff working at the summit, from both Science and Public Administrations, we are today in a good position to face this challenging task. Ongoing projects both on the science and public sides allows us to claim that the best is to come at Pic du Midi Observatory. Two conditions are mandatory to keep Pic du Midi future bright, one, visitors must continue to support the science activities and two, the funding agency CNRS and University Paul Sabatier must continue to invest in people at the summit. Until today, those two conditions were filled, let's hope that this will continue in the coming years!

References

- Davoust, E. 2014, Pic du Midi: cent ans de vie et de science en haute montagne, 1st edn. (65500 Vic-en-Bigorre: MSN)
- Sanchez, J.-C. 2014, Le Pic du Midi de Bigorre et son Observatoire, 1st edn. (BP 1503 29, rue Carrerot 64015 Pau: Editions CAIRN), www.editions-cairn.fr