PROPOSAL FOR A PHASE B STUDY OF PILOT

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Abstract. Construction of PILOT at the existing French/Italian Concordia Station at Dome C in Antarctica would bring about major benefits for the astronomical research activities of the European and international astronomical communities. Because of these potential benefits, it is proposed that the PILOT Project move into Phase B—the Preliminary Design Phase. The output from the study will be a Conceptual Design Report allowing policy makers and their advisors to prepare relevant strategic decisions for the detailed development (final design), manufacturing and installation of the PILOT astronomical research infrastructure at Dome C.

1 Introduction

PILOT (the Pathfinder for an International Large Optical Telescope) is a proposed 2.5 m optical/infrared telescope to be located at Dome C on the Antarctic plateau (Storey et al. 2007). Conditions at Dome C are known to be exceptional for astronomy. The seeing (above $\sim 30$ m height), coherence time and isoplanatic angle are all twice as good as at typical mid-latitude sites, while the water vapour column as well as the sky and telescope thermal emissions are an order of magnitude better.

PILOT is a key step to a major international observatory at Dome C. It is proposed as a high spatial resolution wide-field telescope with an optical design that is matched to the atmospheric conditions, and a suite of instruments operating at wavelengths from the visible to the mid-infrared and beyond.

There are two specific aims for PILOT:

1. To perform cutting-edge science, and

2. To demonstrate that large optical telescopes can be built and operated in Antarctica within a reasonable time and cost, and the excellent natural seeing and thermal backgrounds can be fully utilised.

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DOI: (will be inserted later)
2 The Phase A study

The Phase A design study of PILOT (Saunders et al. 2008) was carried out by the University of NSW and the Anglo-Australian Observatory with funding from the Australian government’s NCRIS scheme. Important additional input came from European groups, with particularly valuable contributions being a GLAO concept study from France (Le Roux et al. 2008) and infrared instrument design work carried out in Spain (Mora et al. 2008).

Briefly, the telescope would be installed on a ~30m tower, above most of the turbulent surface layer. The tower design is extremely stiff to twisting and bending, giving a fundamental frequency of ~3Hz and an expected windshake of less than 0.2″. The tower does not need to lift the telescope entirely above the boundary layer. What is needed is that any residual surface layer turbulence above the telescope be correctable, via a tip-tilt system, down to a level much smaller than the free seeing.

PILOT would be in a thermally and humidity-controlled enclosure. Warming the telescope components above their frost point would cause unacceptable mirror, telescope and dome seeing. Hence we propose to flush the dome with subsaturated air, matched in temperature to the external air at the dome aperture.

PILOT would allow 24 hour remote operation with minimal human intervention. In addition to the telescope, tower and enclosure, the PILOT project includes the necessary communications and power infrastructure to minimize its burden on the Antarctic continent.

3 A PILOT-Like Telescope

In the past six months, several possible adaptations of the original PILOT design have been proposed (e.g., Saunders et al. (2009), these proceedings). What we present here is a proposal for a Phase B study based on the original PILOT concept. Clearly, this study proposal can be modified as appropriate to adapt to a different design concept. Furthermore, by referring to the costs presented in this proposal, it is possible to make a realistic assessment of the marginal cost of adding or deleting particular capabilities to a new “PILOT-Like Telescope”.

4 The Preliminary Design Phase

This PILOT Design Study Project is proposed as a European Collaborative Project, funded at least in part with FP7 resources. The basic concept of the Phase B is to use the results of a PILOT Phase A study as a basis for the development of proven final concept(s)—ready for detailed design and development—of this new research infrastructure of European interest. For a project of this nature a robust project management structure is essential (e.g., Ansorg, 2007). In Figure 1 we show a possible work breakdown structure for this Preliminary Design Phase. Six “Level 1” work packages are identified, and these can broken down further into a
series of sub-packages as shown. A preliminary estimate of the resources required is for 322 person-months of effort, spread over 24 months.

5 Project management organisation and task description

In Figure 2 we show a possible organisation structure, assuming an EU FP7-funded project. The main responsibilities are carried by:

- **The Coordinator**, who acts as the interface between the consortium and the European Commission, and carries out the tasks specified in the contract and as defined by the consortium council.

- **The Consortium Council**, the ultimate decision-making body of the consortium. Senior management representatives of all partners meet regularly to evaluate, discuss, and decide on consortium-level issues, e.g., working policies and strategies, budget, operational issues including evolution of the partnership.

- **RTD Steering Committee**, whose task is to discuss the actual scientific/technical results of the research activities and to recommend changes to the conceptual design study when scientific/technical problems occur during the course of the project.

- **The Scientific Advisory Committee**, (SAC) consisting of scientists from the participating institutions. The SAC defines the scientific and oper-
Fig. 2. Project management organisation

ational site user requirements, and evaluates and/or validates the results of the individual project phases.

- The Project Management Office, a pool of experienced project management experts executing the system-level project management tasks and providing professional support to all partners of the Consortium. The main goal is to harmonise the project-wide management activities at a high level, thus guaranteeing the most efficient and economic project execution.

References

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