Foreword

This three day meeting in Toulouse gathered together about 100 scientists and engineers from all nations to discuss the advantages of the Italian-French Dome C station in Antarctica in relation to future scientific progress in Astronomy and Astrophysics.

This meeting followed two others on the same topic held in Hobart (2001) and Capri (2003). The Dome C Astronomy and Astrophysics meeting in Toulouse (2004) was mainly sponsored by the "Sciences de l'Univers" department of the CNRS and by the scientific programs of INSU. The presentations and discussions have contributed in showing the unique capabilities of the Dome C location for astronomy with respect to any other location on Earth, including the South Pole. The transparency and stability of the atmosphere are the best in the world all over the electromagnetic spectrum, favouring panchromatic astronomy. The maximum benefits seem to be for high resolution or high contrast interferometry, and for the measurement of low surface brightness millimetre emissions. The very low winter temperatures dramatically reduce telescope emissivity: as an example, unprecedented sensitivities may be reached in the infrared range. The winter night, and the polar location offer the possibility of continuous monitoring of celestial sources over long periods. This is required to probe star oscillations over a broad and continuous frequency spectrum, and to follow variable or transient phenomena. Finally, the polar penetration of ionospheric particles to a very low altitude allows their composition and energy properties to be studied.

The meeting was organized in five scientific sessions covering major astrophysical fields: the Interstellar Medium, Galaxies and Cosmology, the Sun and the Earth, Stars, and Extrasolarplanets. A first session was devoted to the characterization of the properties of the site for astronomical observation, and a final one to the presentation of a number of instrumental projects for Dome C.

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DOI: 10.1051/eas:2005001