Antarctica, in combination with the Arctic, represents the preferential observatory for understanding the evolution of our planet. As this continent records the key trends in current global changes, it is the ideal place for improving our knowledge on the environmental quality of Earth as well as on the processes governing the transport and distribution of pollutants and chemical components.

This Special Section collects six selected papers based on investigations carried out in the framework of the Polar Chemistry project of the Italian National Antarctic Research Programme (Programma Nazionale di Ricerche in Antartica, PNRA) and follows the former Special Section (The Microchemical Journal, Vol. 92, 2009, No. 1, 1–48) with its seven papers.

The studies reported in the two Special Sections focus on four major areas, namely: i) the direct and indirect effects of some organic and inorganic substances on the global climate change; ii) the human impact on the chemical composition of the atmosphere from the past up to today; iii) the distribution processes of microcomponents in the marine environment; iv) the atmosphere-to-snow transfer processes and transport via aerosols of contaminants and other chemical substances of environmental interest.

It should also be stressed that, since its inception, the Polar Chemistry project has been collecting historical series of data for a number of chemical parameters of paramount importance to better grasp the significance of the results obtained in the above research areas. Hence, the two Special Sections are probative of the contribution of the Italian PNRA to the study of worldwide chemical contamination as well as to the comprehension of global change processes.

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