OBJECTIVES

Greenhouse gas and aerosol emissions are increasingly recognized as a threat to the quality of life as well as to the economies of the world; a threat that requires close observation, forecast and policy. Transparent and accountable verification of greenhouse gas and aerosol sources and sinks is required. Such verification relies on the quantification of air-sea exchange of greenhouse gases and aerosols, both at the regional and global levels. In the wake of the Kyoto agreement, the political imperative for monitoring is running well ahead of scientific understanding.

The recent international research initiative on Surface Ocean-Lower Atmosphere Study (SOLAS, sponsored by IGBP/SCOR/CACGP, with strong support from WCRP) aims to achieve quantitative understanding of the key biogeochemical-physical interactions and feedbacks between the ocean and the atmosphere, and to understand how this coupled system affects and is affected by climate and environmental change. Today, some air-sea exchange processes are well understood at the local level, but remain inaccurately quantified globally. For example, in spite of the fact that the partial pressure of CO_2 in water and the atmosphere is relatively well measured in the North Atlantic, the mean flux of CO_2 is known to less than 50% accuracy and its variability in unknown. For other processes, even the theoretical principles of local interactions remain uncertain. The generation of dimethylsulphide (leading to sulphate aerosols) is for instance linked to phytoplankton through unknown mechanisms. Building both on recent oceanographic and atmospheric research, SOLAS is a willful attempt at advancing the understanding of air-sea processes through interdisciplinary collaborations. This 3rd SOLAS summer school has brought young researchers in contact with leading scientists of different components of SOLAS research, not only in a theoretical framework, but also through practical exercises and laboratory experiments.

The SOLAS-School has included advanced theoretical lectures (7 days) as well as practical workshops (3 days), one day of rest (please see http://www.uea.ac.uk/env/solas/summerschool/programme.html for all details of the school program)

The advanced lectures covered specialized topics in marine biogeochemistry such as ecology and the cycles of nutrients, the physics and micro-meteorology of gas exchange, atmospheric trace gas and particles transformations, and climate, as well as cross-cutting topics in coastal systems, modelling, satellite observations and paleo-data. The first week has treated more general concepts and introductory lectures in SOLAS research. The second week has focused on specialized topics.

The practical workshops were held intensively during 3 consecutive days and were followed continuously throughout the school. The workshops aim to give students the experience necessary to relate theoretical concepts to observations, and to understand uncertainties related to observations and modelling. It has included a research cruise within the Gulf of Propriano, laboratory experiments, computer modelling, gas exchange experiment and communication skills (written and oral).

The research cruise aboard the R/V TETHYS II aims to give the students real experience in the complexities and problems associated with measuring at sea. The measurements to be performed will include the standard temperature-salinity-depth profiles and meteorological measurements, water sampling from a rosette and if possible more complex measurements such as plankton nets will be performed.