WEDNESDAY 17 November 2004: SURFACE OCEAN AND LOWER ATMOSPHERE

Prof James Aiken Plymouth Marine Laboratory and Director of CASIX: **New UK initiatives on the interaction of the lower atmosphere and surface ocean -**

Abstract not available

Prof Wade R McGillis Lamont Doherty Earth Observatory and the Department of Earth and Environmental Engineering, Columbia University, New York :**Surface processes controlling air-sea gas fluxes**
The physical processes influencing the transport and transformations of climate relevant compounds across the ocean-atmospheric interface and through the ocean and marine atmospheric boundary layers will be presented. In both the laboratory and field, measurements of air-sea gas exchange using micrometeorological techniques and conservative mass balances are used to elucidate the many physical processes controlling air-sea gas transfer. These techniques provide quantification of carbon dioxide fluxes on small temporal scales adequate to reveal and understand the processes controlling the exchange. Focus of the presentation will be on the wide range of environmental conditions including wind, wind stress, waves, surfactants, bubbles, atmospheric and ocean stability, incident heat fluxes, and solubility. A synopsis of multi-disciplinary ocean-atmospheric carbon dioxide flux experiments and the physical and biogeochemical processes controlling the flux will be discussed. The implications of ocean-atmospheric exchange on the local and global carbon cycle will also be presented.

Prof Tim Jickells, University of East Anglia:**:Atmospheric inputs to the oceans and their effects**
In this talk I will present estimates of atmospheric inputs to the oceans and some coastal areas of iron, nitrogen and phosphorus, all of which are key nutrients regulating ocean productivity. The sources, cycling and deposition of these nutrients will be considered, along with their individual and collective effects on the ocean system and the potential feedbacks of these effects to the global climate system.

Prof Colin O'Dowd, National University of Ireland, Galway : **Aerosol dynamics, fluxes and chemical composition in the marine boundary layer**
Marine aerosol is formed through two mechanisms: primary (mechanical/bubble bursting) and secondary (gas-to-particle conversion) production processes. The sub-micron component of marine aerosol controls the number concentration, which in turn, determines the cloud condensation nuclei (CCN) population and thus, plays a major role

in cloud formation with potential climate impacts. The conventional picture of primary marine aerosol production regards inorganic sea-salt as being the primary component of sea-spray aerosols and DMS as being the primary species involved in secondary aerosol production (so-called new particle production). Recent research, however, has revealed a new picture of marine aerosol formation, both in terms of primary and secondary processes. New particle production via DMS oxidation has been shown to be generally inhibited as a result of aerosol dynamical interaction of new particles with sea-spray aerosol and a new route to the production of secondary particles has been identified involving iodine oxides. In terms of primary produced sea-spray, flux measurements have indicated that the production of sea-spray can occur down to sizes of 10s of nm while associated chemical measurements have shown that organic matter, produced by plankton and concentrated at the ocean surface, can dominant sea-spray composition during periods of high biological activity. Both these processes have important implications for CCN production and comprise new components of the marine biota – aerosol – cloud – climate feedback mechanism.

Dr Jim Gunson, Met Office : **Feedbacks of DMS and Fe on climate in a coupled ocean-atmosphere model**

The hypothesis of Charlson et al. (1987), that production of dimethylsulphide (DMS) by ocean phytoplankton can form part of a feedback on global climate, has long been an important area of research

In this hypothesis, the DMS flux to the atmosphere is a source of aerosols for cloud formation, which can affect the amount of radiation reaching the ocean, and hence the planktonic production of DMS.

Iron limitation of phytoplankton growth could also be included in this hypothesis, through climate changes in atmospheric dust deposition. At the Hadley Centre, a coupled ocean-atmosphere GCM has been used to investigate these processes.