Geophysical Research Abstracts, Vol. 6, 03618, 2004
SRef-ID: 1607-7962/gra/EGU04-A-03618


# AIR-SEA FLUXES INCLUDING THE EFFECT OF THE MOLECULAR SKIN LAYER

**Ch. Zülicke**

Institute of Atmospheric Physics, Kühlungsborn, Germany (zuelicke@iap-kborn.de)

Momentum, heat and mass are exchanged between ocean and atmosphere at a variety of space and time scales. The precise knowledge of these fluxes is necessary for the understanding of the interaction processes in the coupled ocean - atmosphere system. All vertical fluxes must pass the molecular sublayer at the interface (so-called skin), which is of particular importance for substances with small diffusion coefficients such like carbon dioxide and oxygene. A revision of concepts of similarity and boundary layer theory forms the base for construction of new parameterisations of the molecular and transport processes at a meter / hour scale for a smooth sea surface (calm winds). In this approach, the turbulent kinetic energy and related dissipation rate are the central quantities, which are treated consistently with the related momentum, heat and mass balances. The presented profiles respectively bulk formulae extend from a reference level in the air down to another reference level in the sea. This way, the surface quantities are returned independently and allow a clear interpretation of remotely sensed surface properties and a correct handling of stratification in both spheres. Cases are included when the major transfer resistance is located in either air or sea respectively skin or bulk. Another achievement is the transfer velocity for trace gases, which depends on stratification. As a consequence, the climate-relevant carbon and heat fluxes can be described more precise.