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A STUDY OF THE TRANSPORT AND DEPOSITION OF MINERAL AEROSOL ONTO THE EASTERN MEDITERRANEAN

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During August 1991-December 1992, samples of aerosol particles, rain and dry deposition were collected from a 21 m high tower located at the Turkish coast of the Eastern Mediterranean (36°N 34°E). Concentration of aluminum have been measured in the samples by AAS. During transitional seasons (spring and autumn) the concentration of dust load and its total deposition was higher than the summer and winter seasons. When coupled with 3-D air mass back trajectories arriving at the sampling site, the data suggest that North African and Middle East deserts derived dust particles are transported to the region during the transitional seasons. This atmospherically transported mineral aerosol could play a significant role in biogeochemical cycles of the elements in this marine environment.

WET DEPOSITION INTO CHARLESTON HARBOR

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As part of a multi-disciplinary investigation of Charleston Harbor, we have been collecting and analyzing rainfall to determine influx of nutrients and pollutants into the Harbor via wet atmospheric deposition. Rainfall has been collected after every major rain event at ten sites distributed throughout the Charleston Harbor watershed over a 6 month period, and analyzed via ion chromatography and Inductively Coupled Plasma - Atomic Emission Spectroscopy. Concurrent meteorological data obtained from three remote weather stations determines the source of the nutrients and pollutants. We acknowledge support from the U.S. National Oceanic and Atmospheric Administration via the Charleston Harbor Project, a division of the South Carolina Department of Health and Environmental Control.

RESULTS OF STUDIES ON THE DEPOSITION AND THE CHEMICAL CONTENT OF AEROSOLS AND GASES IN THE ATMOSPHERE OVER THE NORTH ATLANTIC, BALTIC, MEDITERRANEAN AND BLACK SEAS

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The results of research into the chemical content of aerosols and gases in the marine atmosphere of the North Atlantic and the adjacent seas carried out on the research vessels of the UkrSCES in 1987-93 are discussed. The experimental data on the spatial distribution of the SO_2, NO_2, Na, NH_4, NO_3, SO_4 concentrations and their depositions and of the radionuclides Rn-222 (tracer of continental air masses) and Be-7 (indicator of vertical movements of atmosphere) concentrations are presented. The anthropogenic inputs of sulphur and nitrogen compounds into their total content in marine atmosphere are estimated. They amount to 25-40, 70-85 and 92-95% for the North Atlantic, the Mediterranean Sea and the Black Sea correspondingly. The influence of air masses from continents transport on the formation of fields of concentration of the substances under research is shown. Life times of aerosol and gas compounds in marine atmosphere are estimated. It is discussed experimental data of sulfur and nitrogen compounds deposition into the surface of Seas and Ocean. It is suggested to go on with this work in the framework of the NARE project or to create a new international IGAK project for research into the marine atmospheric chemistry in the intercontinental seas.

ATMOSPHERIC AEROSOL MAJOR ION COMPOSITION ABOVE THE EASTERN MEDITERRANEAN AREA

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Concentrations of the major soluble ions, non seasalt sulfate, nitrate, chloride, formic, methanesulfonic acid (MSA), sodium, ammonium, potassium calcium and magnesium have been measured in 50 aerosol samples collected over a year period at a coastal site in Crete island in the Eastern Mediterranean area. The above listed ions contribute altogether about 60-70% to the total aerosol mass. Significant correlations have been observed between nss-SO4 and NH4, chloride and nitrate. The NH4+/SO4 equivalent ratio was of 0.45 when the total anions and cations concentrations are compared a clear deficit of cations is observed. The observed correlation between this deficit and the nss-SO4 concentrations indicates that H+ could be the missing cation. The MSA/nss-SO4 observed ratio allows the evaluation of the contribution of biogenic sulfur in the Eastern Mediterranean area of 5-10%.

Deposition and Characteristics of radioactive aerosols in the middle troposphere after 1976 in Barents sea region

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Cosmogenic radionuclides Be-7, P-32,33, S-35 and anthropogenic radioisotopes Sr-90, Cs-137 and others are interest in the capasity of tracers of air movement and aerosol deposition on the ground and sear surfaces. In 1976-1990 the concentrations of radioactive aerosols were determined on the altitude 2-6 km over arhipelago Novaya Zemlya and Barents Sea shore. The aeroplane AN-24 was equipped with sampling nacells that had the FP filter material. In the September, 1976 the Cs-137 concentration was 300 mcBq/m3 and within 3 years diminished to 10 times. In autumn 1983 the Cs-137 concentration was 3-5 mcBq/m3. It means that in this time interval the "half-life" of the aerosols Cs-137 carrier increased from 1 to 2 years. The activity median aerodynamic diameter (AMAD) of radiocesium carriers was 0.1-0.4 microns. After Chernobyl accident in the april, 1986 the radioactive aerosol concentration significantly increased. In 1989-1990, through 4 years after accident, the Cs-137 content in air was equally that in 1977-1978 and AMAD of cesium carriers increased up to 0.6-0.8 microns. The middle concentrations of Be-7, P-32.33 and S-35 sampling at 3 flights in 1989-1990 were respectively 4700, 170, 90 and 55 mcBb/m3. The AMAD of cosmogenic radioactive aerosols was 0.1-0.5 microns. Such they had smaller diameters than anthropogenic radioactive aerosols after 4 years since Chernobyl accident. In June, 1990 aerosols were sampled in air volume 2E+5 m3.

EXPERIMENTAL EVALUATION OF ATMOSPHERIC AEROSOL TURBIDITY IN DIFFERENT ATLANTIC REGIONS

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Experimental values of atmospheric aerosol turbidity were considered over different Atlantic regions: from clean atmospheric conditions to the turbid ones, influenced by air masses from Africa, containing the continental Sahara aerosol. It was shown: aerosol was the main factor determining the values of the optical thickness variability. On basis of received relation between the aerosol optical thickness of the vertical atmosphere and aerosol concentration in the surface layer a height of the homogenous atmosphere has been estimated. Influence of the Sahara dust on the background aerosol content over the Atlantic ocean was estimated. Besides, the aerosol generation by ocean surface in storm conditions has been considered.

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