UP 6: Other Topics

Time: Wednesday 14:30–15:15 Location: ELP 6: HS 4

UP 6.1 Wed 14:30 ELP 6: HS 4

Resource-aware Research on Universe and Matter: Call-to-Action in Digital Transformation — •Ben Brüers — Deutsches Elektronen Synchrotron DESY, Zeuthen

Given the urgency to reduce fossil fuel energy production to make climate tipping points less likely, we call for resource-aware knowledge gain in the research areas on Universe and Matter with emphasis on the digital transformation. A portfolio of measures is described in detail and then summarized according to the timescales required for their implementation. The measures will both contribute to sustainable research and accelerate scientific progress through increased awareness of resource usage. This talk is based on the publication arXiv:2311.01169, which is the result of a three-days workshop on sustainability in digital transformation held in May 2023.

UP 6.2 Wed 14:45 ELP 6: HS 4

Atmospheric Gravity Wave Spectra: A Study Using Lidar Data — •Mohamed Mossad, Irina Strelnikova, Robin Wing, Gerd Baumgarten, Michael Gerding, Jens Fiedler, and Eframir Franco-Diaz — Leibniz Institute of Atmospheric Physics, Kühlungsborn, Germany.

Gravity waves (GWs) play a crucial role in Earth's atmospheric dynamics. The propagation, breaking and dissipation of GWs drive the general circulation of the atmosphere, redistributing energy and momentum through the different layers of the atmosphere. Changes in wind and temperature measured by lidars and other instruments help us understand the spectral properties of GWs, such as their frequencies, amplitudes, and scales. Better understanding of these parameters and the sources that produce GWs is important to model parameterizations of their impact on the average state of the atmosphere.

In this study, we analyze lidar data from Kühlungsborn (54°N, 12°E) and ALOMAR (69°N, 16°E) to examine the GW spectra in the atmosphere. We present a thorough analysis of GW spectra across various atmospheric conditions, focusing on seasonal and altitudinal variations. This work contributes to a deeper comprehension of energy transfer within the atmosphere, bridging theoretical models with empirical observations and offering insights beneficial for climatological research and environmental forecasting.

UP 6.3 Wed 15:00 ELP 6: HS 4

The occurrence and sources of Ni in ambient air particulates using Synchrotron Radiation Based X-ray Fluorescence and X-ray Absorption Near Edge Structure — •Abdallah Shaltout[1], Messaoud Harfouche[2], and Diane Eichert[3] — [1]Spectroscopy Department, Physics Research Institute, National Research Centre, El Behooth St., 12622 Dokki, Cairo, Egypt — [2]Synchrotron-light for Experimental and Scientific Applications in the Middle East (SESAME), P.O. Box 7, Allan 19252, Jordan — [3]ELETTRA Sincrotrone Trieste, Strada Statale, Science Park 34149 Basovizza, Trieste, Italy

High concentrations of Ni in the ambient air might induce carcinogenic effects. The present work aims at investigating the presence of Ni in ambient air particulates using advanced X-ray synchrotron radiation techniques. Total suspended and fine particulates (TSP, PM2.5) were collected from residential and industrial areas of Cairo, Egypt. Quantitative results indicate remarkable high concentrations of Ni in the ambient air particulates which are higher than the annual allowance thresholds as indicated by the world health organization (WHO). Elemental maps of Ni were acquired to unravel the natural spatial distribution of Ni on the filters carrying the ambient air particulates. Complementary X-ray absorption near edge structure (XANES) spectroscopy at the Ni K-edge (8.331 keV) was used to determine Ni speciation. Our results demonstrate that Ni is predominantly found under its divalent oxidation state in the studied ambient air particulates.