2026 Helmholtz – OCPC – Programme

for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

Quantification of ozone pollution potential using OH reactivity

Helmholtz Centre and/or institute:

Forschungszentrum Jülich

Project leader:

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Department: (at the Helmholtz centre or Institute)

Institute of Climate and Energy Systems: Troposphere (ICE-3)

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Description of the project (max. 1 page)**:**

Many different air pollutants (both organic and inorganic compounds) exist in the atmosphere. Only a few of these species are routinely detected by standard instrumentation at monitoring stations, so that many reactive species are not quantified. One solution to this inherent problem in scientific experiments and air quality monitoring is to measure OH reactivity, which is the inverse lifetime of the most important atmospheric oxidant, the OH radical. The advantage of OH reactivity is that it provides a direct quantification of the chemical activity of all compounds. Consequently, measurements taken during field experiments and at air quality monitoring stations as well as the analysis of OH reactivity in chemical transport models can be used to quantify the potential for ozone and particle pollution formation.
Forschungszentrum Jülich has a long-standing experience in measuring OH reactivity in field and simulation chamber experiments using custom-built instruments. Recent developments have enabled the unattended deployment of these instruments in monitoring stations for the first time. In this project, OH reactivity data that have already been measured at stations of the European Research Infrastructure ACTRIS will be analysed.

Furthermore, the applicant will be responsible for deploying the instrument at additional stations to extend the range of chemical environments investigated. The data will be analysed with a focus on comparing the total pollutant reactivity with measurements of individual reactive species that are available at the stations. One of the project's goals is to explore, how the quantitative values for the ozone pollution potential can be derived from OH reactivity measurements. Measurements from the different stations will be compared and contrasted to provide information about the variability of OH reactivity in Europe.
The measurements will also be compared with results from state-of-the-art chemical transport models used at Forschungszentrum Jülich in order to assess the model's capability to reproduce OH reactivity values. Potential model-measurements discrepancies will be analysed to improve the representation of OH reactivity in the model. As ozone formation rates are quantified in the model, their relation to OH reactivity can be analysed directly and used to establish a parameterisation of the relationship between observations and ozone formation potential.
The applicant will present the results at international conferences and publish them in peer-reviewed journals.

Description of existing or sought Chinese collaboration partner institute (max. half page)**:**

Forschungszentrum Jülich has a long-standing collaboration with Peking University. The scientific focus of the collaboration is on studying atmospheric processes responsible for the formation of secondary pollutants such as ozone and particles. Atmospheric observations were done in several field campaigns in China over the last 20 years and results were jointly analysed and published. Furthermore, atmospheric processes and chemical mechanisms were studied together in experiments in the SAPHIR atmospheric simulation chamber at Forschungszentrum Jülich.

Required qualification of the postdoc:

- PhD in physics, chemistry, environmental sciences
- Experience in atmospheric chemistry and physics
- The following additional skills are beneficial:
  - experiences with instruments for the measurement of atmospheric constituents
  - evaluation and interpretation of large datasets
  - working with chemical transport models for air quality predictions
- Language requirement: Very good skills in English