2016 Jülich – OCPC – Programme
for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project: Aerosol Ageing and Cloud Formation

Jülich's institute: Institute of Energy and Climate Research 8 - Troposphere

Project leader: PD Dr. Thomas F. Mentel

Web-address: http://www.fz-juelich.de/iek/iek-8/EN/

Description of the project (max. 1 page)[1]**:** see overleaf

Description of existing or sought Chinese collaboration partner institute (max. half page)**:** We are looking for a partner with strong interest in tropospheric aerosols and heterogeneous chemistry in context of air pollution and climate change. Since we are covering the clouds/climate aspect ourselves within the proposed project, it would add extra value if the partner in PR China could contribute to the air pollution aspects and cover the health aspects of tropospheric aerosols. We are looking for a partner who is active in experimental work with experience in laboratory studies and in field observations.

Required qualification of the post-doc:

- PhD in chemistry, physics or environmental science
- experience with CCN measurements, heterogeneous chemistry, aerosol mass spectrometry
- additional skills in programming, data administration, working in teams

PART B

Documents to be provided by the post-doc:

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae, copies of degrees
- List of publications
- 2 letters of recommendation

[1] Please add overleaf

PART C

Additional requirements to be fulfilled by the post-doc:

- Max. age of 33 years
- PhD degree not older than 5 years
- Very good command of the English language
- Strong ability to work independently and in a team

Description of the project:

Aerosols are important constituents of the atmosphere. They are either emitted directly or formed by gas-to-particle conversion during the (photo-)oxidation of trace gases. Atmospheric aerosol particles are undergoing chemical and morphological changes during their tropospheric lifetime of a few days. Tropospheric aerosols play an important role for climate as they affect the radiative balance of the Earth system. Most important, they determine formation, lifetime, and optical properties of clouds. They contribute to air pollution and can cause severe health problems (e.g. cardio-vascular diseases). Despite their obvious importance, aerosols are the least under-stood component in the atmosphere and regional air quality models have difficulties to predict aerosol properties that are important for radiative balance, cloud formation, and health effects. The reasons are the diversity of aerosols sources, the ageing processes, and the medium long lifetime of aerosols, which causes overlapping trans-port and local processes. In cooperation with a partner from the People's Republic of China we want to exploit long term monitoring of aerosols, covering the four seasons of the year. We aim at measurements of particle size distributions and of the most important hygroscopic property: the ability to act as nucleii for cloud droplet activation (CCN activity). The monitoring will be operated on the Meteorological Tower of the Research Center in Jülich in three different heights: at the ground, at 50m, and outside the surface layer at 120m. Comparing observations at three different heights allows for separating local and regional effects. In addition we will perform in-situ chemical composition measurements by top of the art high resolution spectrometry at the meteorological tower. The projected novel and unique data set and will be used

i) to relate the CCN-activity in 120m altitude to cloud base properties observed by the ground based remote sensing center JOYCE, located in the Research center

ii) to understand chemical processing of atmospheric particles

iii) to optimize the chemical weather forecast of the regional model EURAD.

Especially the first requires longer monitoring (and statistical analysis as only in a convective, well a mixed atmosphere sub-cloud aerosol properties can be related to observations in 120m height.) The two topics i) and iii) will be supported by partners from University of Cologne and RIU. For topic ii) we will perform accompanying chemical simulation experiments in the laboratory and in our simulation chamber SAPHIR in order to understand ageing processes and their effect on droplet activation. One focus will be the coating of inorganic substrates by secondary organic components, especially mineral dust components which are an important topic in China. As a novel tool we will implement high resolution FIGAERO-CIMS which measures gas-phase and particulate-phase composition by in-situ thermal desorption mass spectrometry.