# An Introduction to the **PALM model system**

The PALM modelling group of the Institute of Meteorology and Climatology at the Leibniz University Hannover, Germany, is offering a **full time 5-day seminar from 14th to 18th August 2023**. The seminar will be given in presence.

The PALM model system has been continuously developed at the Institute of Meteorology and Climatology (IMUK), Leibniz Universität Hannover (LUH), Germany, since 1997. It is used to study micro- and meso-scale turbulent boundary layer flows in the atmosphere and the ocean. PALM includes a number of advanced features like topography, non-cyclic boundary conditions with turbulent inflow, an embedded Lagrangian particle model allowing explicit treatment of cloud droplet physics, a wind turbine model for simulating complete wind parks including wake effects, or an interface for adding user defined code. Recently, the model has been significantly extended in a collaborative effort of several research institutions for urban applications, which includes explicit treatment of urban surfaces, chemistry, radiation, but also LES-nesting and nesting into larger scale models. Data input and output is in NetCDF format. PALM is optimised for high performance on all kind of state-of-the-art processor architectures and it scales on up to several tens of thousands of processors. PALM is free software and can be redistributed and/or modified under the terms of the GNU General Public License (v3). Download information and a detailed online documentation is available under http://palm-model.org.

What is the seminar about?

The one week seminar gives an overview of PALM, and demonstrates how to carry out runs on Linux computers/notebooks provided by the participants. Seminar contents comprise, for example, a general introduction to large-eddy simulation, an overview of PALM's governing equations, applied numerical methods, the various PALM features and application examples. Besides a brief introduction to the PALM installation, the main focus of the seminar is on how to set up PALM simulations, how to run them using the shell scripts provided with PALM, and how to analyse the output. Setups for several standard applications will be explained in detail (e.g. convection, flow around buildings, etc.). Further attention is given to topics like how to extend PALM by user-generated code and how to debug the code.

Besides the theoretical lessons, there will be hands-on sessions, where participants carry out exercises under the guidance of the lecturers. The lecture and exercise PDFs can be downloaded.
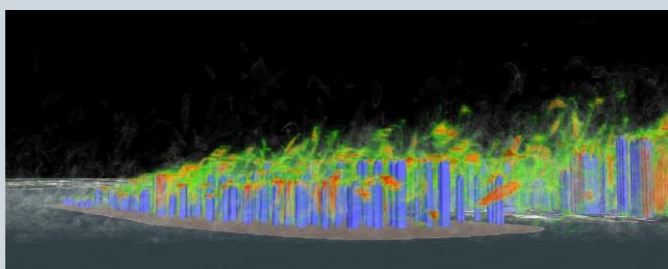
Simulation of building generated turbulence for new reclamation areas in Macau.

PALM allows detailed resolution of city parts, here the government quarter in Berlin, considering all relevant urban features and processes (surface materials, vegetation, radiation,...).
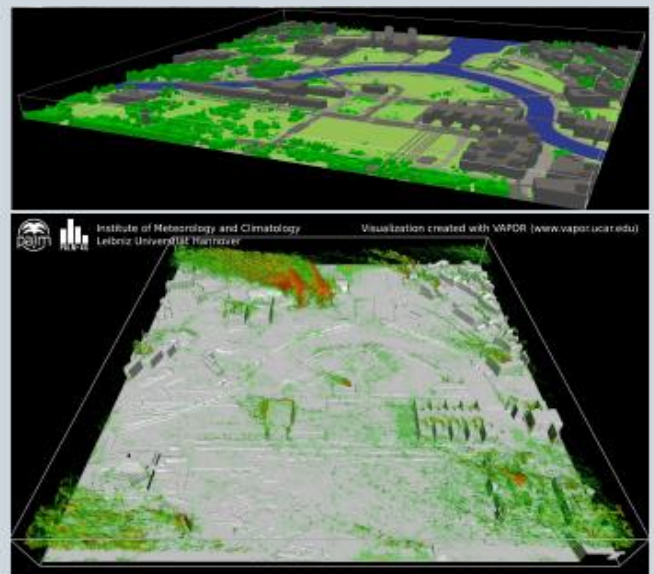

What does the seminar cost?

The fee will be 1000€ for commercial companies and 500€ for educational/research institutions. This includes tuition, seminar materials, support during the hands-on sessions, and beverages for the coffee breaks.

Who is this seminar meant for?

This seminar is designed for future scientific users of PALM, who have yet little to no experience with PALM. **A basic background in modelling, particularly CFD-modelling, Fortran 2003, and Linux/Unix is assumed.**
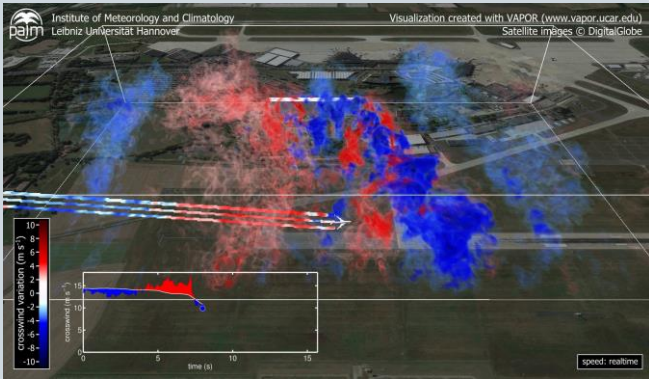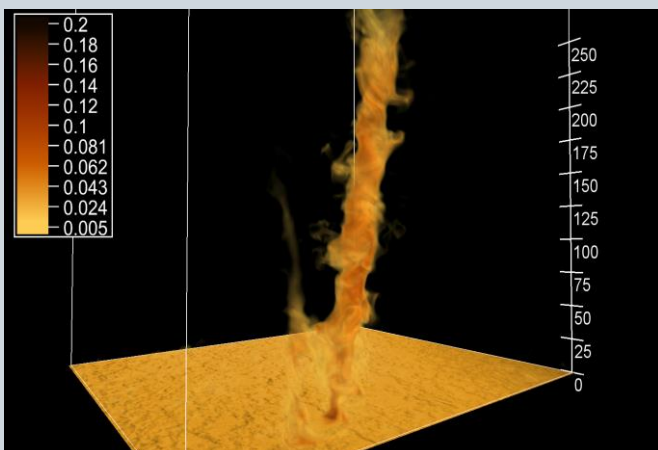
Building induced turbulence during final approach.

Simulated concentrations of NO_2 at 13:30 UTC for Ernst-Reuter-Platz in Berlin.

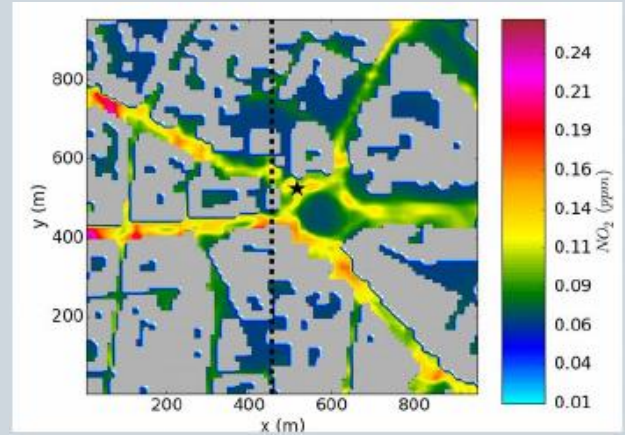## What are the technical requirements?

Participants should care for the following technical requirements in order to participate:

- Linux computer/notebook with at least a **quad-core processor** for running PALM during the seminar

- The following software is needed (to be installed in advance):
    - a pdf-viewer,
    - VLC player or similar,
    - a *Fortran-2003 compiler*,
    - an *MPI library*,
    - the *NetCDF library* (version >= 3.6.3),
    - graphics software to display *NetCDF* data (ncview, *NCL*),
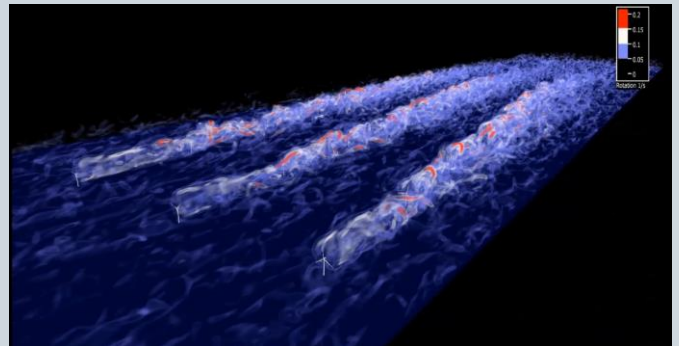   - the *bash shell* (*bash*),
    - *python 3.6.*

Experience has shown, that it can cause trouble to try running PALM on a virtual machine, which is why we would not recommend that.

Wake interactions in wind farms.

Where can I register?

For the registration please fill the registration form and send it by email to

giersch@meteo.uni-hannover.de

until latest **3rd July 2022 23:59 CEST**.

Please note that we might close the registration earlier if we reach our **maximum participant number of 50.**

Registered participants will receive more detailed information (method of payment, schedule, installation instructions, etc.) directly after the registration deadline.

Do you have any questions?

Feel free to contact Sebastian Giersch: giersch@meteo.uni-hannover.de

High resolution dust devil simulation with PALM.