UP 14: Methods - Data evaluation and Modelling

Time: Thursday 14:15–15:15 Location: H41

UP 14.1 Thu 14:15 H41

Determining volcanic SO_2 plume heights in satellite observations using meteorological wind fields — •Viktoria Keicher[1,2], Christoph Hörmann[1], Holger Sihler[1], Ulrich Platt[2], and Thomas Wagner[1] — [1]Max Planck Institute for Chemistry, Mainz, Germany — [2]Institute of Environmetal Physics, University of Heidelberg, Germany

Satellite observations provide the global monitoring of volcanic plumes via sulphur dioxide (SO_2) that is injected into the Earth's atmosphere. In turn, SO_2 may lead to the formation of sulphate aerosols that can influence climate via direct and indirect radiative effects.

In recent years, satellite observations helped to improve global SO_2 estimates. Passive satellite remote sensing offers the opportunity to observe the location of a plume in two dimensions, but information about the corresponding height is sparse. This information is important for the quantitative interpretation of satellite observations and to assess the radiative effect of volcanic plumes.

Here, we present first results for a newly developed approach using the Hybrid Single Particle Lagrangian Integrated Trajectory Model (HYSPLIT) in combination with data for different volcanic SO_2 plumes as observed by the second generation Global Ozone Monitoring Instrument (GOME-2). The main plume information that can be retrieved are used as input parameters in order to estimate the plume's profile at the time of the measurements. We use the calculated trajectories to further estimate eruption time and height for several case studies.

UP 14.2 Thu 14:30 H41

Spatiotemporal image analysis of water flow in porous media for numerical transport modelling — •Johanna Lippmann-Pipke[1], Sebastian Eichelbaum[1,2], and Johannes Kulenkampff[1] — [1]Helmholtz-Zentrum Dresden-Rossendorf, Institut für Resourcenökologie, Forschungsstelle Leipzig, Deutschland — [2]Nemtics Visualization, Leipzig

For more than a decade a spatiotemporal visualization tool for transport process observations in dense material by means of PET (positron emission tomography) was developed [1-5]. Such quantitative GeoPET images are exceptionally sensitive to displacements of pico molar tracer quantities detected within 1 mm grids on laboratory/drill core scale.

Now we reached a strategic milestone: A custom made image analysis algorithm is capable of quantitatively extracting velocity and porosity fields from such GeoPET image time series, even if the 4D image information includes discontinuous flow patterns (due to bottle neck effect related detection limits) and localized image artifacts. We present our approach with a concrete example: From an observed flow field in a dense core material the effective porosity and velocity field is extracted and this data is used in a finite element based transport simulation.

[1] Richter, M., et al. (2000) Z.angew.Geol. 46(2): 101-109. [2] Gründig, M., et al. (2007) App.Geochem. 22: 2334-2343. [3] Zakhnini, A., et al. (2013) Comp.Geosci. 57 183-196. [4] Kulenkampff, J., et al. (2008) Phys.Chem.Earth 33: 937-942. [5] Kulenkampff, J., et al. (2015) Clay Min. accepted 2015.

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