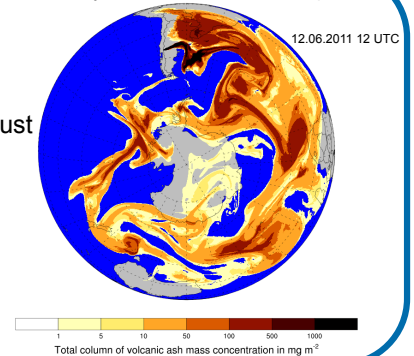


Current and future operational applications:

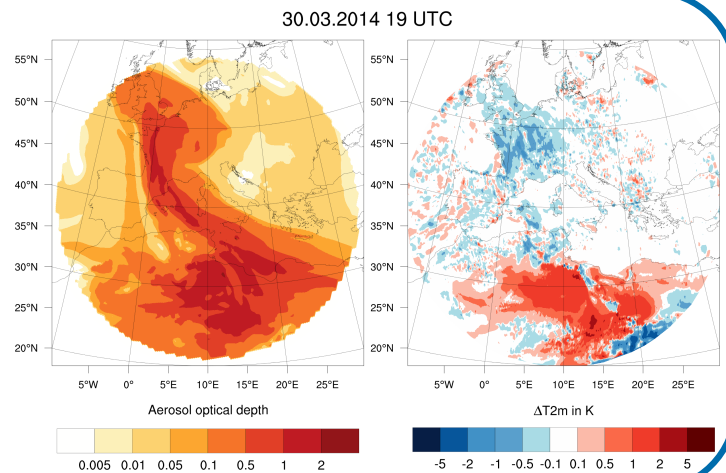
- **Volcanic Ash:** “On-Demand” forecast for the European airspace
apability to run forecasts for any active volcanoes worldwide
- **Mineral Dust:** Reduction of Photovoltaic power generation due to Saharan mineral dust
Global operational forecasts as a new component of the NWP system of DWD
- **Radionuclides:** Implement ICON-ART in addition to Lagrangian offline model LPDM
- **Toxic Chemical Substances:** Implement ICON-ART in very high resolution limited area mode as replacement for Gaussian plume model (e.g. fire brigades)

Puyehue-Cordón Caulle eruption



NWP applications:

A new parametrization for the mineral dust – radiation interaction was developed. From the ART online aerosol concentrations optical properties used in the RRTM (Mlawer et al., 1997) are obtained using Mie-calculations. Varying median diameters during transport are taken into account for the first time, significantly influencing the radiation interaction of the largest mode. Simulation results for a Saharan dust outbreak over Europe can be seen on the right side. A strong night-time warming can only be seen in dust source regions. However, day-time cooling is prominent in all dust-affected regions becoming more pronounced with increasing dust-layer elevation.



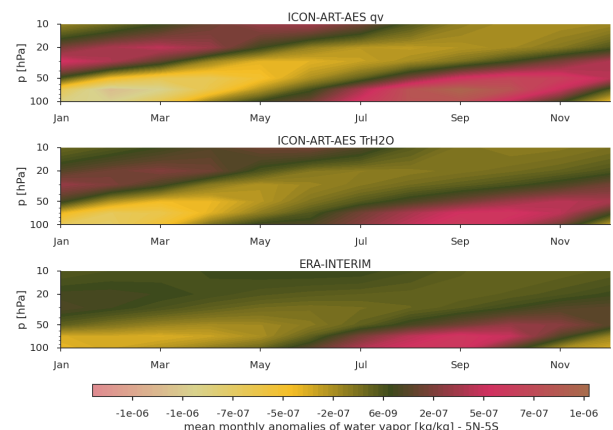
AMIP simulation

ICON-ART can also be coupled to ECHAM physics, used by the climate version of ICON (ICON-AES) developed by MPI-M.

AMIP (Atmospheric Model Intercomparison Project) style experiment boundary conditions:
SST and $SI_{[1]}$, spectral solar irradiation $_{[2]}$, well mixed greenhouse gases CO_2 , CH_4 , N_2O , CFCs (RCP 8.5) $_{[3]}$
 O_3 concentration $_{[4]}$, tropospheric aerosol, and stratospheric volcanic aerosol optical properties $_{[5][6][7]}$.

Initialisation with ECMWF analysis, 1979-01-01T00:00:00Z.
15 years of simulation, R2B4 (160 km) grid, 47 level up to approximately 80 km.

Tape recorder, analysis from 1980 – 1994. The variable qv represents the standard water vapor, TrH2O the ICON-ART tracer.



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