

**(1) Enviro-HIRLAM** - Environment High Resolution Limited Area Model: on-line integrated coupled meteorology-chemistry-aerosols downscaling modeling system for weather and environmental applications

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**(3) Available modes for the model runs:** Research and Operational

**(4) Components & processes:** Atmosphere & Physical, Chemical

### **(5) Brief model description**

The Enviro-HIRLAM is a fully online-coupled ACT-NWP (Atmospheric Chemistry Transport – Numerical Weather Prediction) modeling system for regional-, meso- and urban scale different environmental applications. The NWP part developed by HIRLAM consortium (Unden et al, 2002) is used for operational weather forecasting. The Enviro-components were mainly developed in a close collaboration with the Universities from different countries (Korsholm, et al., 2008; Baklanov, et al., 2008; Baklanov et al., 2017). It consists of gas-phase chemistry CBMZ (Zaveri & Peters, 1999) and aerosol microphysics M7 (Vignati et al., 2004), which includes sulfate, mineral dust, sea-salt, black and organic carbon (Nuterman et al. 2013). There are modules of urbanization for land surface scheme, natural and anthropogenic emissions, nucleation, coagulation, condensation, dry and wet deposition, and sedimentation of aerosols. The Savijarvi radiation scheme (Savijaervi, 1990) has been improved to account explicitly for aerosol radiation interactions for 10 aerosol subtypes. The aerosol activation scheme (Abdul-Razzak & Ghan, 2000) was also implemented in STRACO condensation-convection scheme. The nucleation is dependent on aerosol properties and the ice-phase processes are reformulated in terms of classical nucleation theory.

The operational runs of the Enviro-HIRLAM model are performed (until end Dec 2017) for the FP7 EU MarcoPolo project and available at <http://www.marcopolo-panda.eu/products/regional-air-quality-forecasts/enviro-hirlam/>. See more details on the Enviro-HIRLAM model in the latest publication Baklanov et al., 2017 in the *Geosci. Model Dev journal*.

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