SUDPLAN – an ICT Planning Tool for Sustainable Urban Development taking into account Climate Change

Lars Gidhagen[1] and Peter Kutschera[2],

[1]Swedish Meteorological and Hydrological Institute
lars.gidhagen@smhi.se

[2]Austrian Institute of Technology
peter.kutschera@ait.ac.au

Presented as a poster – here converted to a Powerpoint presentation

SUDPLAN is an EU FP7 project under the Information Communication Technology Programme (ICT-2009-6.4 ICT for Environmental Services and Climate Change Adaptation). SUDPLAN provides local information and quality services to effectively support urban planners and decision makers in urban areas all over Europe in the areas of how climate change will influence future stormwater rainfall events, river drought and flood risks as well as severe air pollution episodes. The services are offered through a highly interactive, web-based decision support and training tool.

There are four pilots demonstrating the use of the SUDPLAN tool: Stockholm (air quality), Wuppertal (stormwater flooding on streets), Linz (intense rainfall and combined sewer overflow) and the Czech Republic (air quality and soil humidity/fertility in the Prague region). Through dissemination and exploitation efforts, the SUDPLAN tool will be presented and offered to whatever cities in Europe.
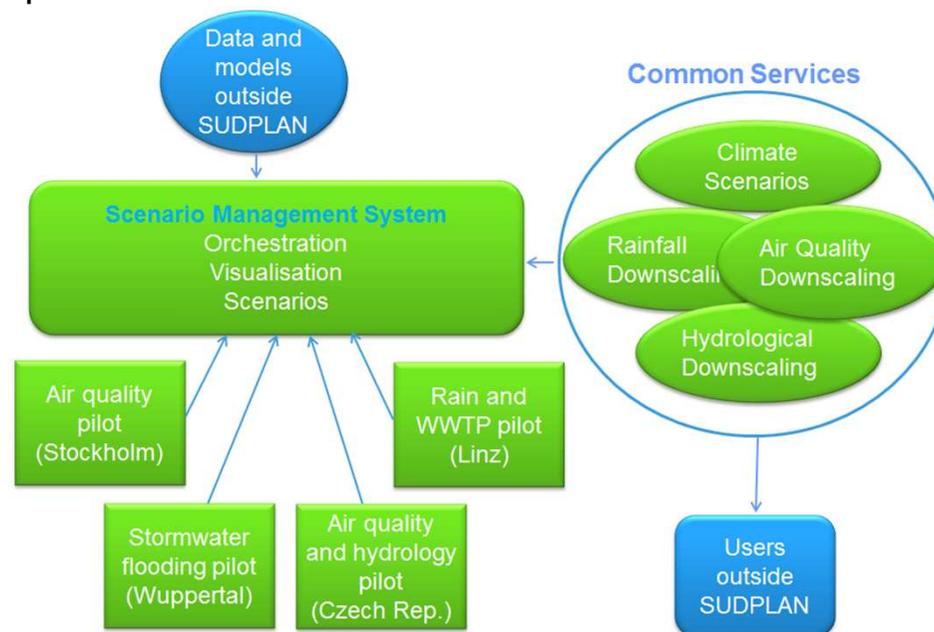
Scenario Management and 3D Visualization

The Scenario Management System provides a common GUI organising and providing all information and models to the user. The user may then compare the impact of different planning scenarios under different future climate change assumptions.
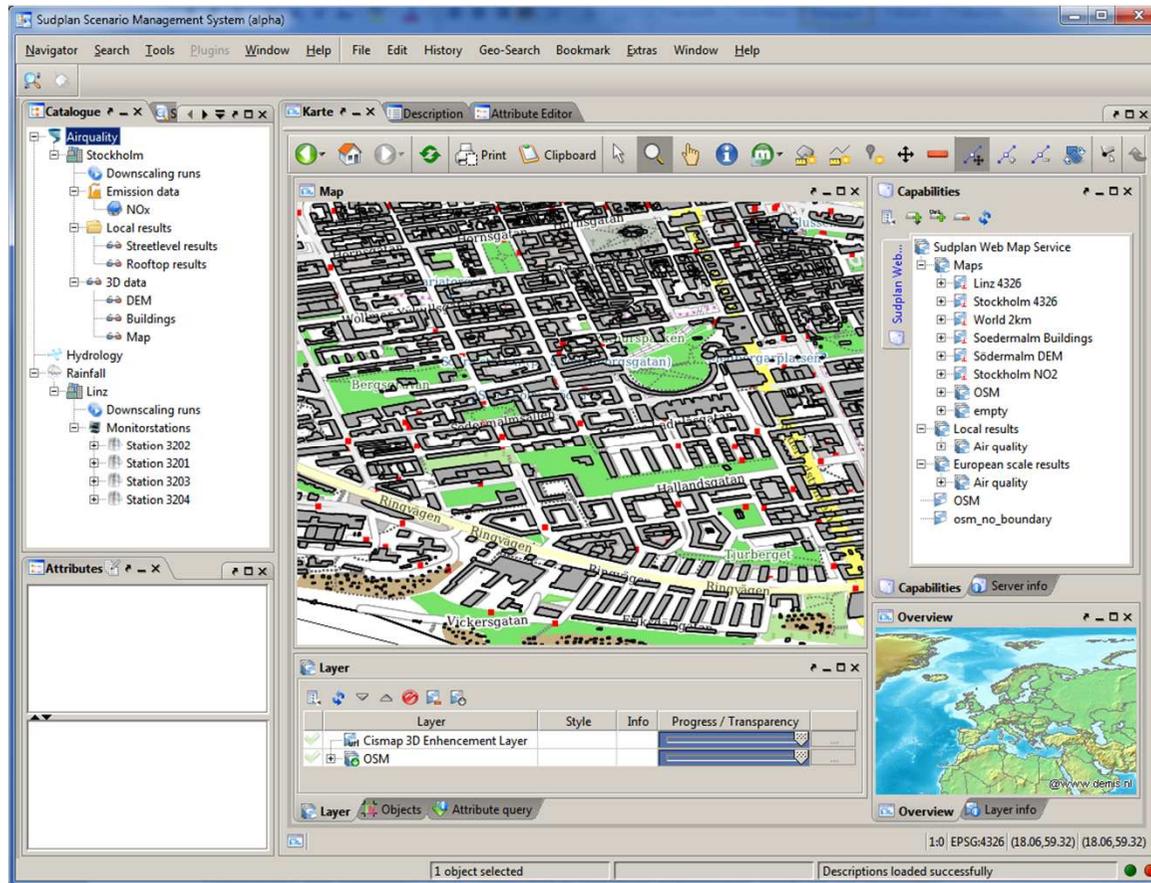
Provide Climate Scenario data (based on global climate model results) on an European scale, together with models capable of downscaling climate and environmental data to whatever European city.
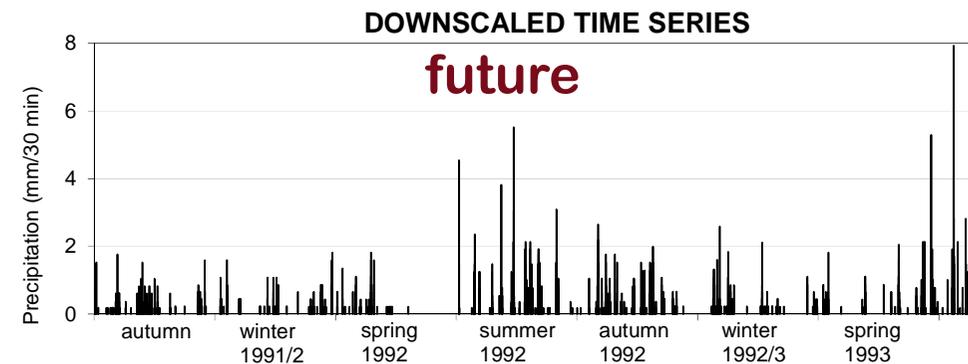- All models and results are accessible through OGC SWE interfaces
- Interactive downscaling where city specific input improve the accuracy of the results

Models provided for:
- Rainfall time series and IDF curves
- Static and dynamic design storms
- River runoff and other hydrological variables
- Air quality
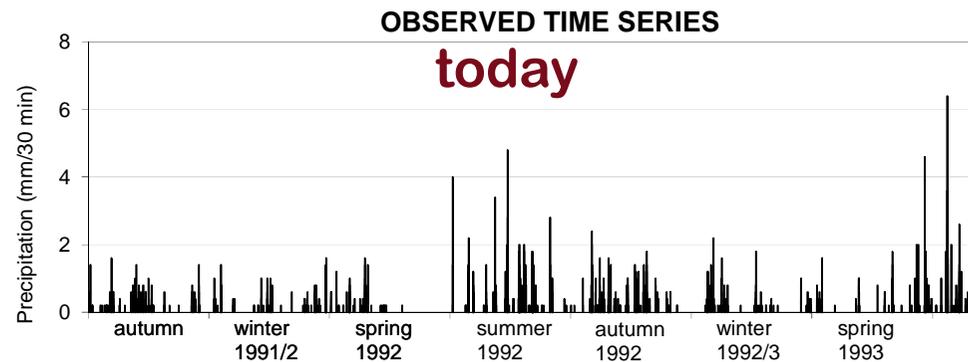
Air Quality in Stockholm, Sweden

The Stockholm pilot simulates the future air pollution in the urban background air as well as close to individual streets. Of special interest is to assess two different traffic solutions providing efficient ways to pass the city from north to south. But background air pollution at year 2030 will also be different from today. SUDPLAN can assess the impact that climate change and regulated trace gas emissions in Europe have on Stockholm background air quality.

The figures show decreased levels of simulated 3-year averaged ozone levels over the Stockholm-Uppsala area, a result of changes in long range transported air pollution levels. Local emissions are kept constant at 2010 year levels, in order to demonstrate the impact of effects of climate change and emission reductions outside the city.
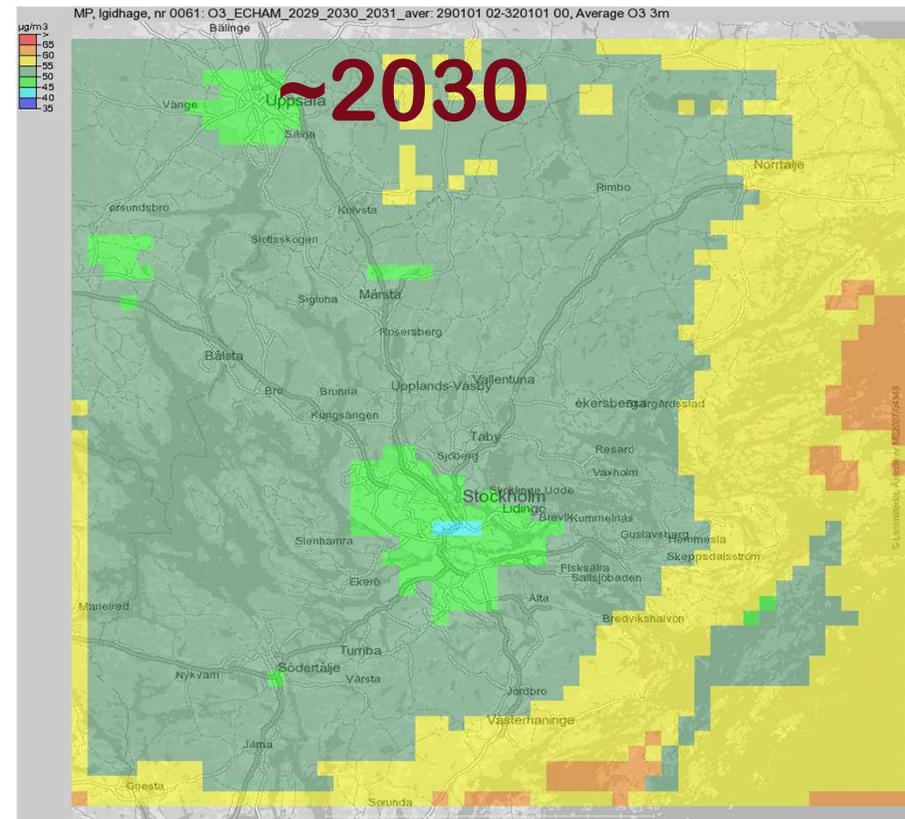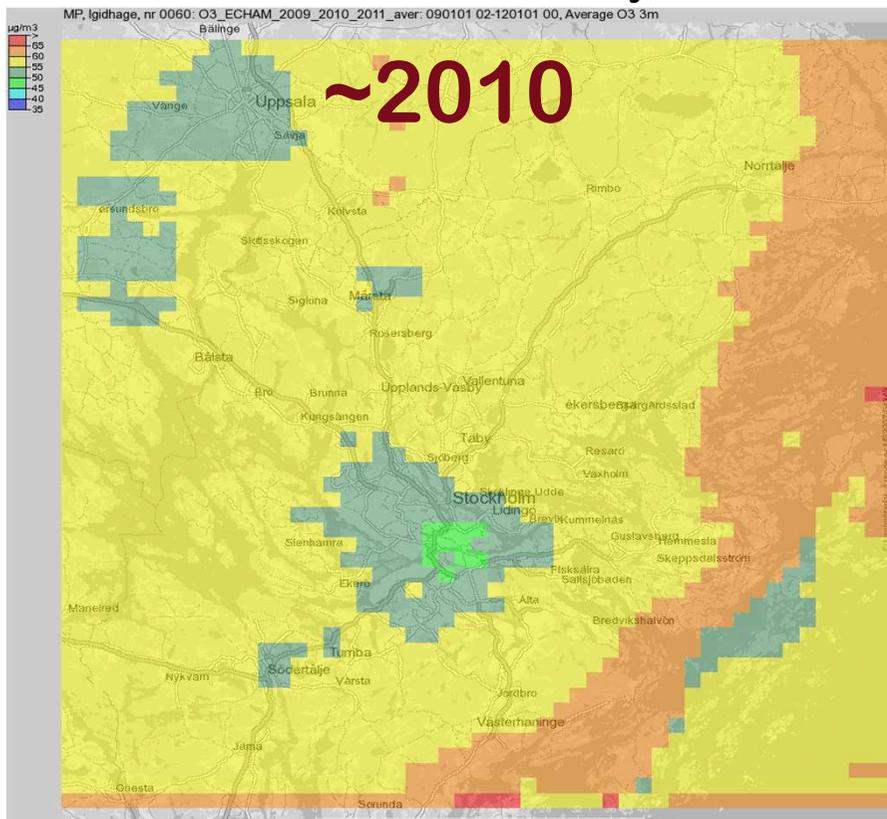
Storm Water Flooding of urban drainage systems in Linz, Austria

Downtown Linz is drained mainly by combined sewers and heavy rainfalls cause spill over of waste water into the Danube river. Austrian regulation puts requirements on the efficiency of the waste water treatment plants during such extreme rainfall events. The SUDPLAN tool is used to assess the need for increased storage tank volumes, as future climate will likely contribute to increased precipitation.

The catchment model SWMM 5 has been executed with a historical and measured precipitation time series and then also with a downscaled climate scenario rainfall prediction from Common Services.

The figure shows residuals between future (2079-2092) and historical (1993-2006) rainfall. The precipitation tends to decrease in summer and increase in other seasons, while short-term intensities show an increase in all seasons.

Residuals of predicted and historical rainfall intensities
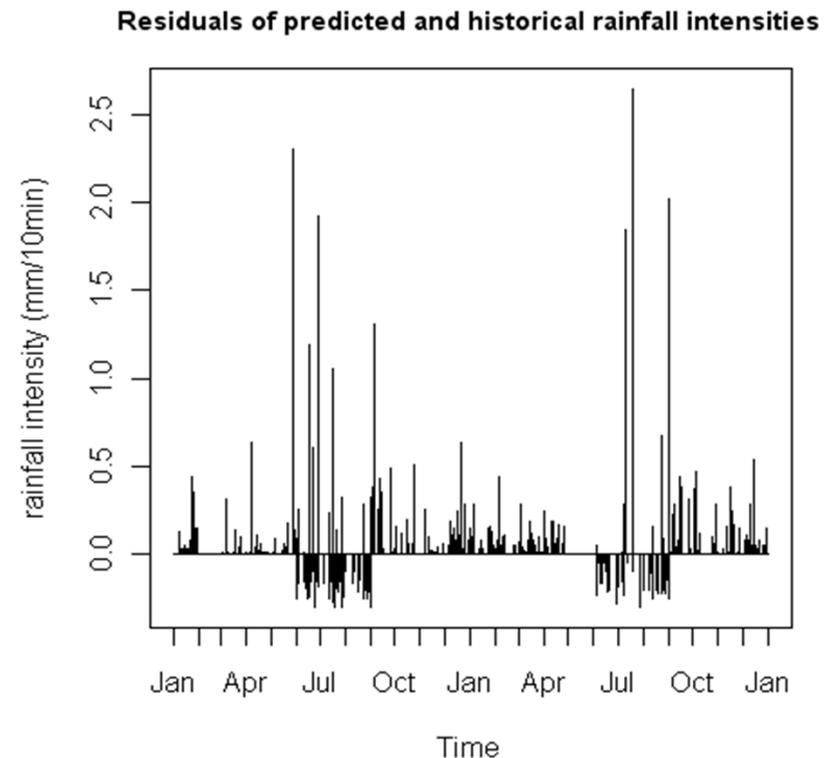
Sudplan uses standardized interfaces and information models of the Open Geospatial Consortium (OGC) to expose models and their results.

- **Sensor Planning Service (SPS)** interface is used for planning, execution and management of models.
- **Sensor Observation Service (SOS)** interface is used for both uploading input time-series and retrieval of the model results (grids, time series).
- **Web Map Service (WMS)** is used for delivering maps to be visualized by the client (Scenario Management System).

SUDPLAN uses **O&M** for encoding model input time-series and results. To improve the representation of continuous coverages, we have developed a **new O&M Sampling Feature** for describing the sampling grid.

OGC SWE interfaces are implemented based on the **AIT Time Series Toolbox (TSTB)** framework http://ts-toolbox.ait.ac.at/SUDPLAN/

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2. Kutschera, P., Bartha, M., Havlik, D. (2011): SUDPLAN's experiences with the OGC-based model web services for the Climate Change usage area, ISESS, Brno, June 27-29 2011, DOI: 10.1007/978-3-642-22285-6_64.

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