

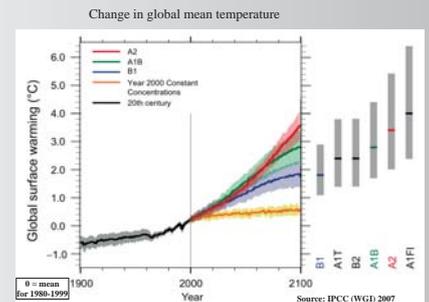
Future IDF curves for regional planning in Europe - a SUDPLAN result

Introduction

Urban and regional developers often face the following problem: "We have to build a new infrastructure today. This infrastructure is expensive to build, and should be used for many decades." Optimal infrastructure design often depends on the climate, especially on the probability of extreme climate events such as storms, droughts or extreme temperatures. The infrastructure designers therefore take into account the long-term climate statistics in their planning.

Unfortunately, the past climate may not be representative for the future due to ongoing climate change. Moreover, these changes could be very different from one region to another.

The web-based planning, prediction and training tool developed by SUDPLAN (Sustainable Urban Development Planner for Climate Change Adaptation) will aid the decision makers through provision of the local climate model for the next 50-100 years. Rain patterns, air quality including temperature and PM as well as hydrological forecasts can be easily generated for any region within Europe and provided in a form suitable for direct inclusion in existing planning tools.

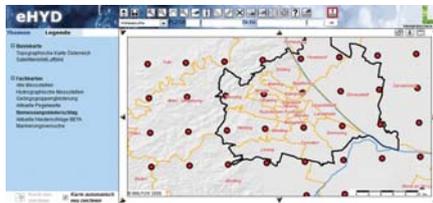


Current situation

Many aspects of the regional planning are directly related to climate, especially to rain patterns.

Rain patterns can be represented as IDF (Intensity, Duration, Frequency) curves. These curves express statistic on reoccurrence frequency (once per year, every 5 years, every 50 years) of a rain with a given intensity and duration.

In Austria we are in the lucky position that one of our ministries provides this information free of charge for the whole country. IDF data is available in most EU countries, although not always free of charge.



IDF Curves are needed for:

The precipitation patterns greatly influence the regional urban planning. For instance, the rainfall statistics is crucial for the design and hydraulic dimensioning of sewerage systems and stormwater facilities. These systems are expensive to build, and typically used for many decades before re-designing. The regional planners therefore need to minimize the overall costs of building a system today and risking lives, property and early rebuilding later.



For this planning task, IDF curves are often fed into hydraulic models and used to figure out optimal pipe diameters. Thus, the IDF curves aid urban planners in designing the urban infrastructure resilient to heavy storm events, for the benefit of the nature and the citizens.

Projection to the future

Due to climate change, the rainfall statistics for the last N years, may not be representative for the future climate. Unfortunately, the "projected" IDF curves representing the future rainfall statistics cannot be easily obtained today.

The SUDPLAN project partners have therefore designed a system that produces local IDF curves representative for the various future climate scenarios. The system takes the "current" IDF curve, location, and the climate scenario as input; feeds this information to the "IDF downscaling service"; and returns the downscaled IDF curve representative for the local climate in 50-100 years according to the scenario used.

The downscaling is based on the concept of Delta Change where the change is estimated from extreme value analysis of 30-min precipitation in Regional Climate Model scenarios. Analysis is done for 30-year periods which the user can select. In the final SUDPLAN tool, an ensemble of future scenarios will be available representing different global models and greenhouse gas emissions/concentrations.

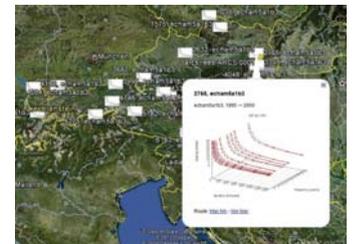
Usage of future IDF data

"Projected" IDF data has the same format as the original IDF data and can be used in existing planning and assessment applications. This possibility to improve the regional planning with minimal training and no changes to the existing software is the unique selling proposition of the SUDPLAN.

The graph on the right compares actual and projected rain patterns for 30 years around 2050 here at the EGU location in Vienna, Austria.



Follow the link on the left side to see some more examples comparing current and future conditions.



Model as an OGC service

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.
- **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 (TS-TB)** framework <http://ts-toolbox.ait.ac.at/SUDPLAN/>

Kutschera et al. (2011)

ACKNOWLEDGEMENT

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PROJECT COORDINATES

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More Information: www.sudplan.eu

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