



EUROPEAN UNION



Committee of the Regions



Climate Change and its Impact on Air Pollution as a Challenge for Future Investigations

Peter Suppan

Forschungszentrum Karlsruhe GmbH

Institute for Meteorology and Climate Research

Atmospheric Environmental Research Division (IMK-IFU)

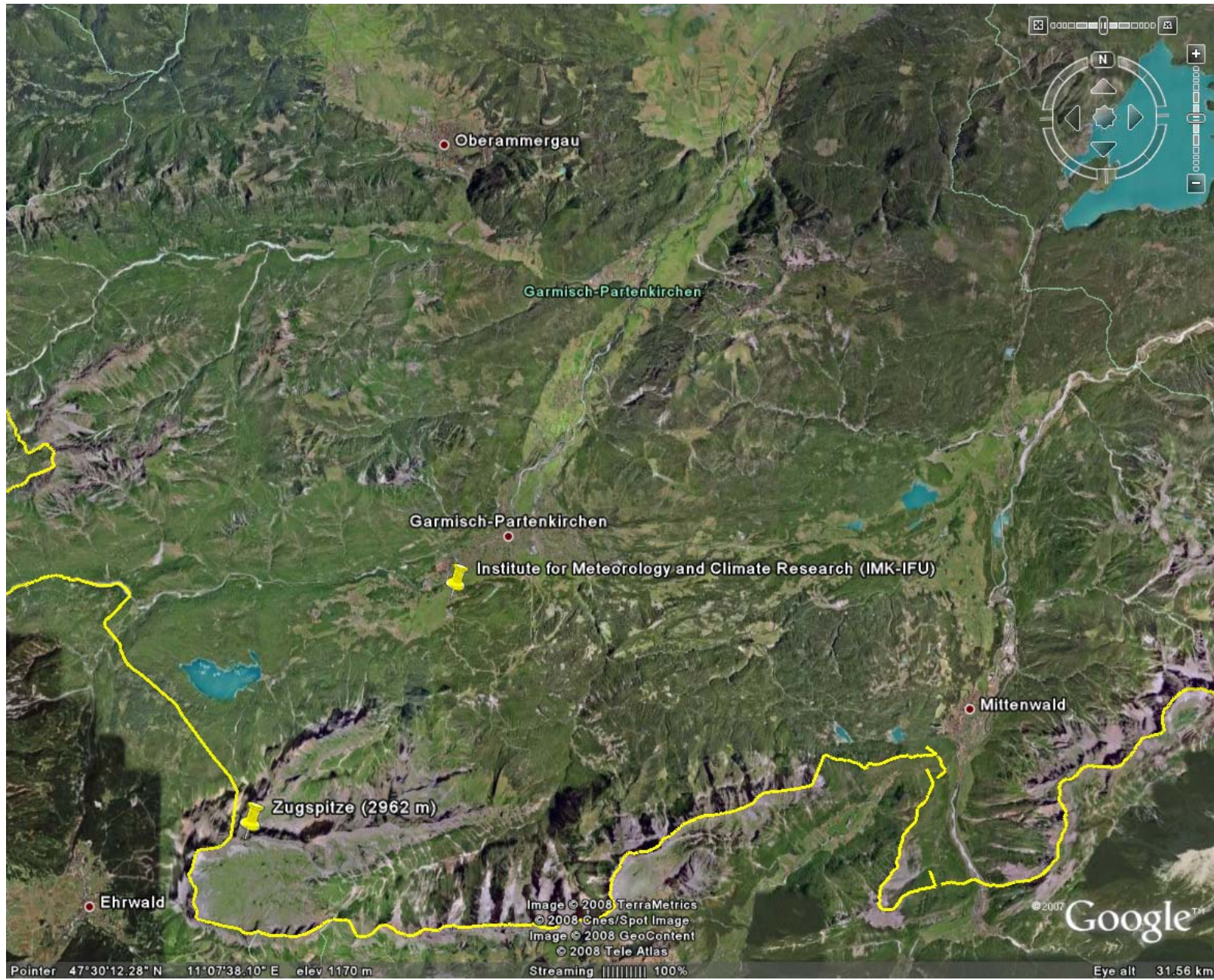
Garmisch-Partenkirchen / Germany



Location:
➤ FZK



Location:
➤ **IMK-IFU**



Research Focus

IMK-IFU is dealing with the *interactions between bio-, hydro- and atmosphere* with the focus on

- Regional climate and land-use changes and resulting impact on atmospheric trace-gas budgets
- Regional climate change and water availability in regions vulnerable to flooding & extensive droughts
- Impact of regional climate change on urban-rural interactions

in order to address environmental research questions & problems of regions vulnerable to climate change

Burkina Faso Savanna



Megacities

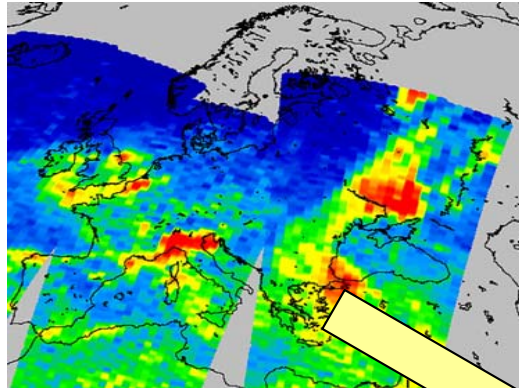


severe flooding

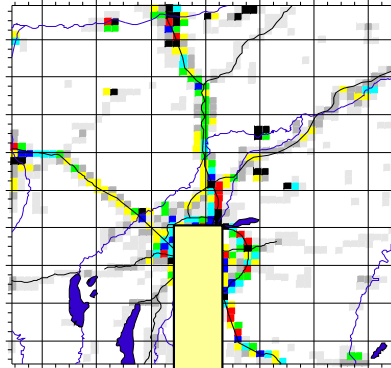


Integration

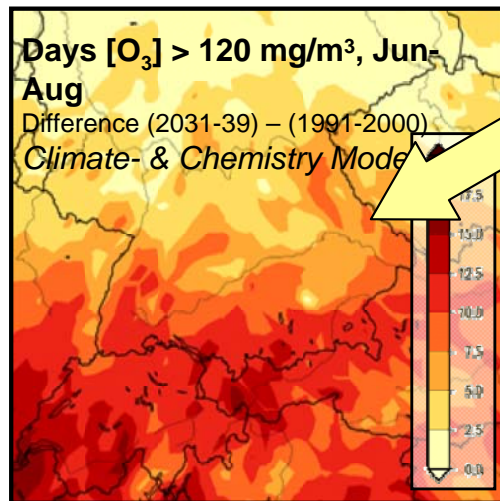
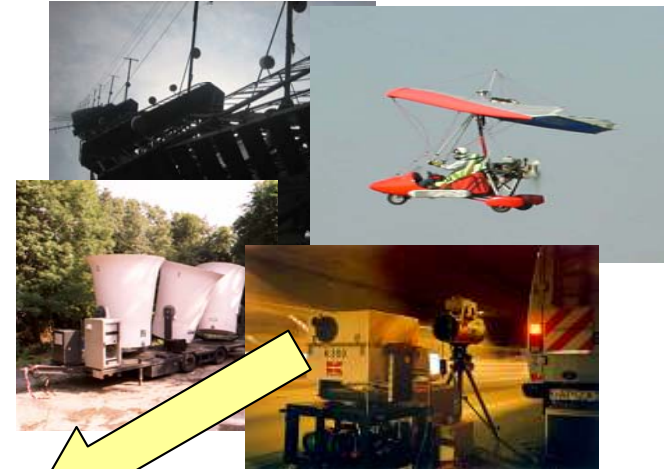
Satellite data



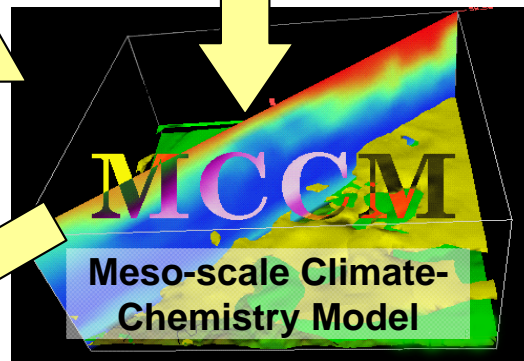
Emission data



Measurement data



Air quality



science based decision support

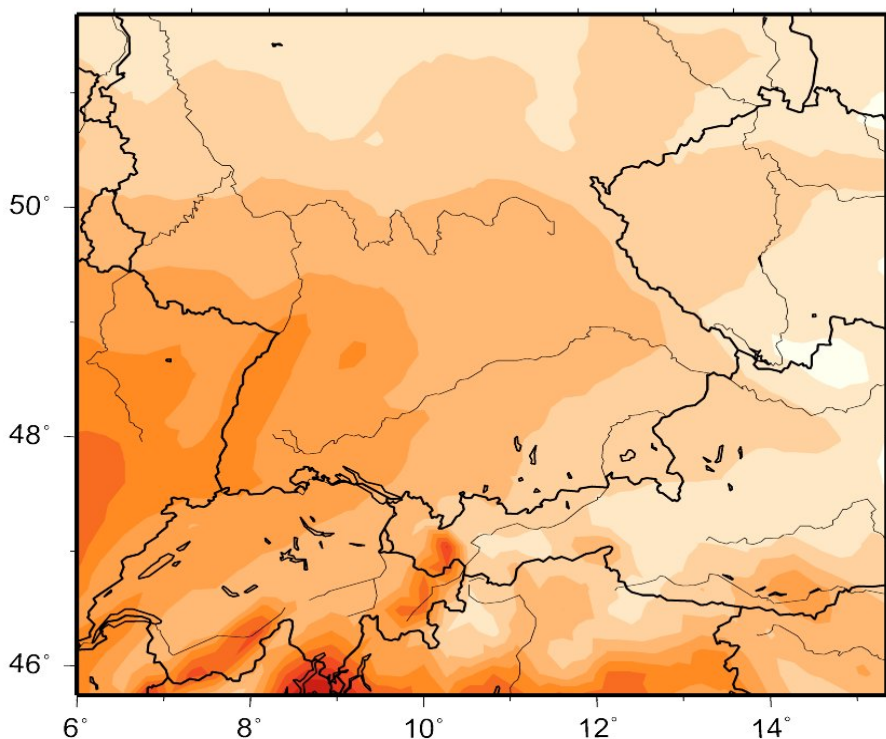


Stakeholders:
e.g., communities, gov. agencies

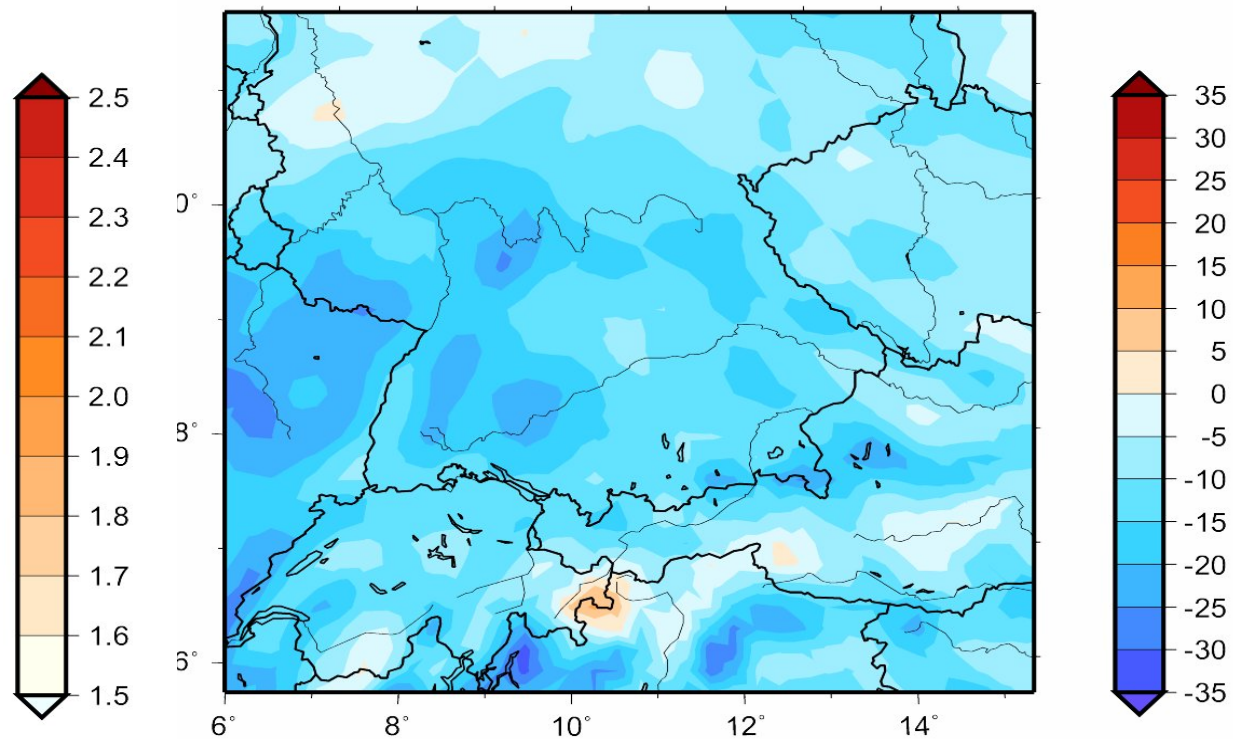
Measures

Regional climate change in Southern Germany

Temperature (°C) Jun-Aug
Difference 2031/2039 - 1991/2000 uv20



Cloud Water Content (g/m²) Jun-Aug
Difference 2031/2039 - 1991/2000 uv20

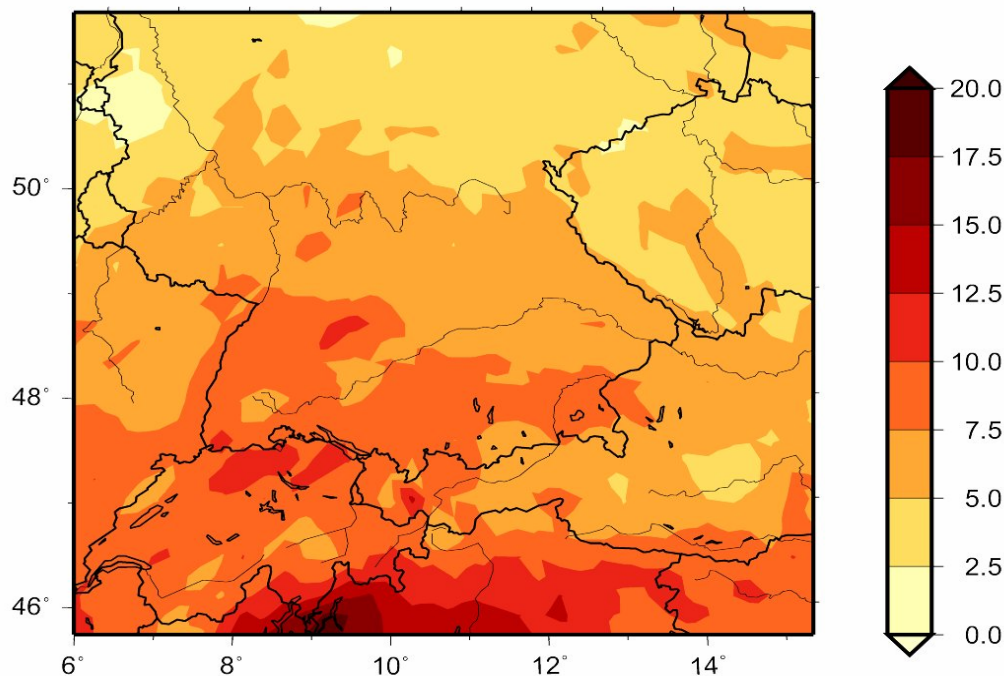


Modelling results

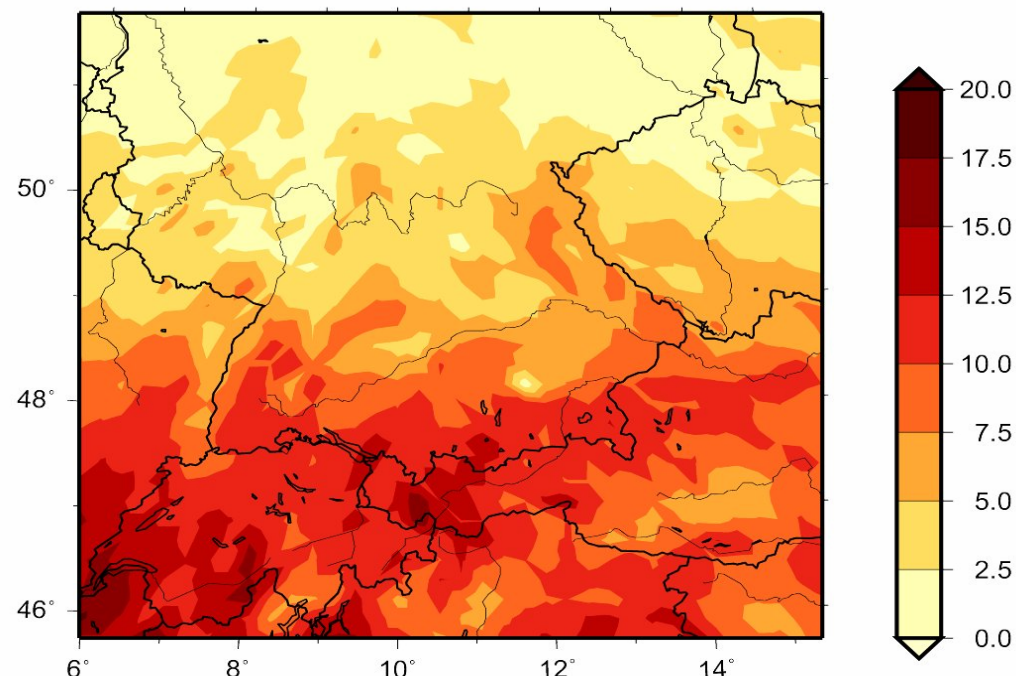


Impact of regional climate change on the air quality in Southern Germany

Daily Ozone Maximum ($\mu\text{g}/\text{m}^3$) Jun-Aug
Difference 2031/2039 - 1991/2000 uv20



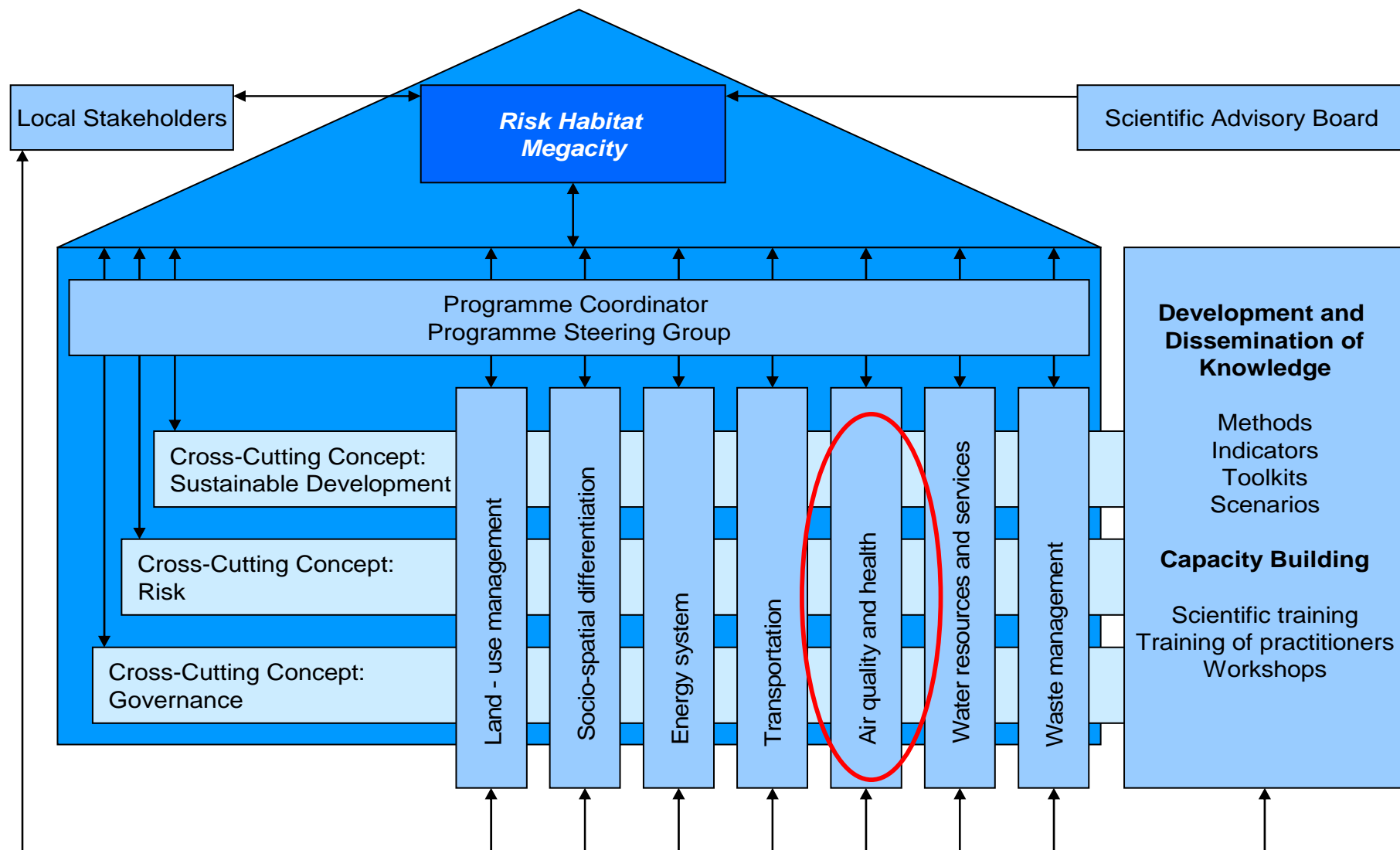
Days with Threshold $> 120 \mu\text{g}/\text{m}^3$ Jun-Aug
Difference 2031/2039 - 1991/2000 uv20



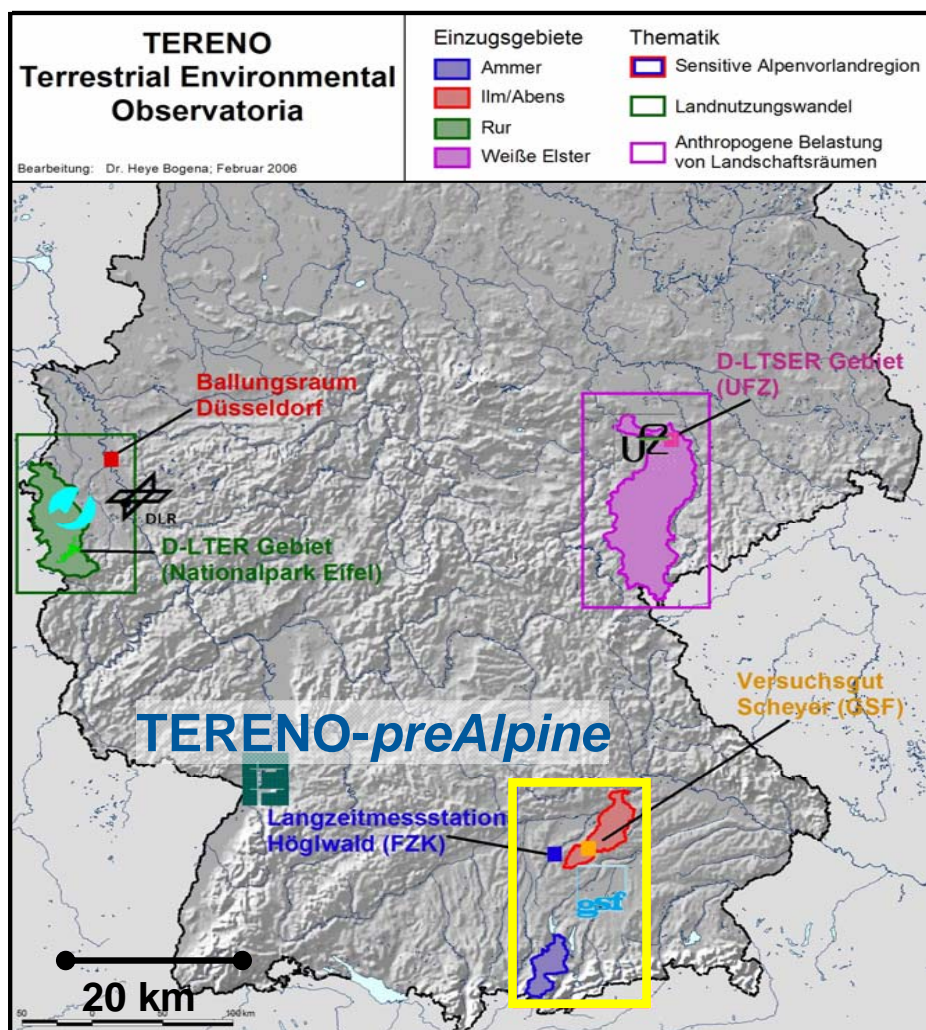
Forkel, R., Knoche, R., 2006: Regional climate change and its impacts on photooxidant concentrations in southern Germany: Simulations with a coupled regional climate-chemistry model, J. Geophys. Res., 111, No. D12



National HGF Initiative: *Risk Habitat Megacity*



National/Regional Initiative: TERENO – Terrestrial Environmental Observatories



Long-term Observations and Regional Earth System Modeling

- Support: HGF Large Infrastructures
- Funding decision in June 2007
- Partners: FZJ, UFZ, HZM, DLR

- 1) Eifel/Lower Rhine Valley with Rur catchment (2,400 km²)
- 2) Metropolitan area Leipzig/Halle with Weiße Elster (5000 km²)

- 3) Northern pre-Alpine region with Ilm & Abens (~ 1,000 km²)
Ammer (~ 700 km²)
Höglwald Forest



TERENO – Longterm Observatory *Alpine Upland*



Main Objectives

Characterization and quantification of climate change effects on

- changes of the coupled C-/N-cycles and C-/N-storage
- biosphere-atmosphere exchange (trace gases/energy flux/albedo)
- vegetation and microbial biodiversity and of the temporal dynamics of matter turnover and exchange associated with this change in biodiversity
- terrestrial hydrology (alpine water budget, precipitation variability, extreme hydrometeorological events (floods/droughts), seepage water quality/quantity, water retention capacity)

in prealpine ecosystems particularly sensitive to changes in climate, nutrient deposition and land use/management (wet grasslands/fens, forests and agricultural systems)

Regional Research projects

Climate change & Air Pollution

- **BMBF-KLIMZUG** (pending), Coordination of Alpine adaptation strategies (2008-2013)
 - delineation of climate change adaptation strategies for flooding, alpine geo-risks, tourism, urban climatology – **jointly with county administrations!**
- **INTERREG IV B: “CLAIR-ALPS”** (Eol), Air pollution and risks for life quality in a changing Alpine climate (2009-2011)
- **INTERREG IV Central: “Rural EcoGrowth”** (Eol), Improve sustainable economic growth in rural tourism areas (2009-2011)

Many ongoing activities and projects are in close context to the Alpine Ski World Championship in Garmisch-Partenkirchen in 2011 and the application for the Olympic winter games in 2018

Thank you very much for your attention

