

LandCaRe-DSS, an interactive, model-based Decision Support System for scenario-driven climate change adaption in agriculture

Michael Berg

General goals

- Assessing the impacts of possible course of actions
- Identifying **cause-effect-relationships** and the sensitivities of varying actions
- Primary focus on **"What if?"** scenario-exploration
- Determining answers to strategic questions of the kind **"Which course of action is better?"**

Implementation

- Realized as **Open Source Project** in C++/QT, using Open Source Software
- Utilizing besides traditional "Windows Icon Menu Pointing" (WIMP) User Interface paradigm, the **Zooming User Interface (ZUI)** paradigm for the GIS based parts
- The ZALF DSS-group implemented the prototype, the realization and support of a web-based version is carried out by the Living-Logic AG
- Prototype in continuous development as the Landscape-Systems-Analysis's DSS, now called **LandCaRe-DSS-LSA**

Specific goals

- Development of a model-based knowledge and decision support platform
- For **agriculture**
- Its associated economic sectors and **further actors** in rural areas
- To **create** and facilitate orientation and **decision knowledge**
- Which yields appropriate adaption strategies to regional climate change

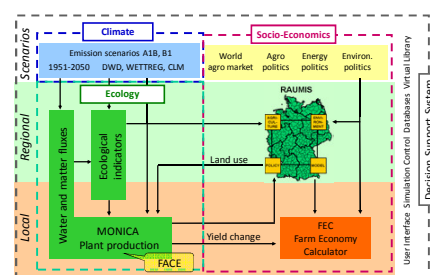
Outlook

- Improving the DSS to ease extension with further models (models as **Plug-Ins**, Proxy-models)
- Adapting the DSS to **other regions** (e.g., Brazil – UI-internationalization, geo-data changes)
- Adapting** the DSS to new emerging stakeholder needs (KLIMZUG/REGKAM)
- Knowledge-transfer** into web-based LandCaRe-DSS (www.landcare-dss.de)

Main-characteristics

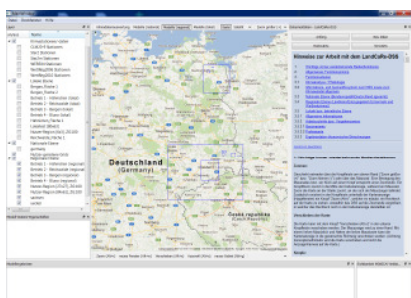
- Interactive:** fast Human-DSS-Human response cycles
- Dynamic:** user initiated model calculations yield new results (no pre-rendered results)
- Spatial:** interaction and result display based on GIS principles
- Open & Extensible:** Open Source, currently extensible at source level, in the future possibly via plugin-in system

Overview



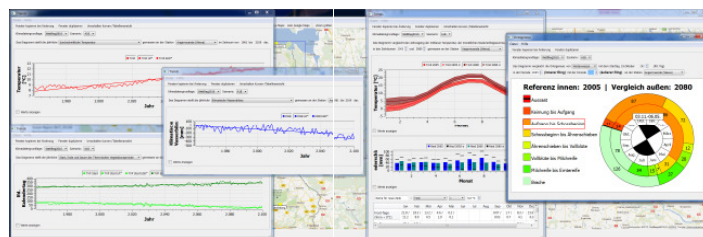
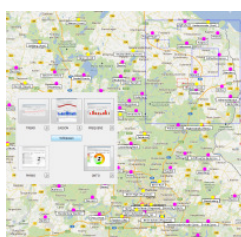
Zoom to bridge scales

Start at the DSS main screen



Understand climate data

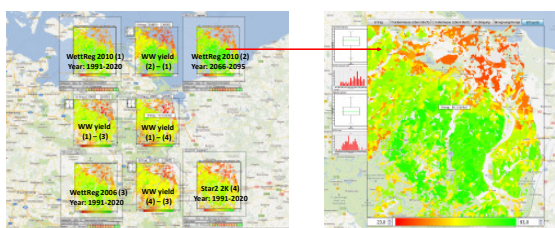
Use climate projections/simulations (WettReg 2006/2010 (magenta), CLM, Star2 (yellow) ...)



Show Trends (Tavg, precip, CWB, div. indicators), compare seasonal cycles, examine crop ontogenesis & phenology of selected indicator plants

Zoom to regional level

Run multi-model, multi-ensemble simulations future winter wheat yield using WettReg 2010 (2066-2095)



Zoom to local/farm level

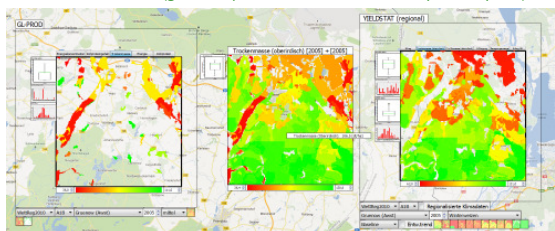
Run models returning many results & use the farm economy calculate (FEC)



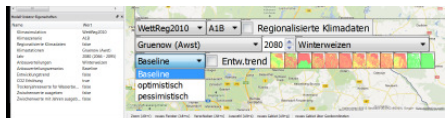
Example diagrams showing soil carbon content top: 0-10 cm, below: 0-30 cm, monthly values for 30 years calculation period

Green: N-leaching, groundwater-recharge, magenta: Economic results (e.g. profit margin), dark magenta: Economic average result for whole crop rotation, yellow: primary & secondary yields, grey: applied fertilizer amounts, blue: applied irrigation water amounts

Combine model results (grassland production & winter wheat dry matter yields)



Easily change input values to facilitate interactive use



Specify detailed farm parameters

(crop-rotations, production parameters, economic values ...)

