

SOIL DEGRADATION AND SUSTAINABLE LAND MANAGEMENT IN THE WESTERN SIBERIAN CORN-BELT



Maria Störrle, Hans-Jörg Brauckmann and Gabriele Broll
Institute of Geography, University of Osnabrueck, Osnabrueck, Germany



SASCHA-Project

Sustainable land management and adaptation strategies to climate change for the Western Siberian corn-belt

The interdisciplinary joint project SASCHA (Sustainable land management and adaptation strategies to climate change for the Western Siberian corn-belt) is part of the BMBF-Research program “Sustainable Land Management“, Module A “Interaction between Land Management, Climate Change and Ecosystem Services“.

The transition zone between the steppe and the northern forests in Western Siberia is of global significance in terms of carbon sequestration, food production and biodiversity. All these subject matters have been and will continue to be affected by climate change and rapid socio-economic development triggering fundamental changes in land use [1].

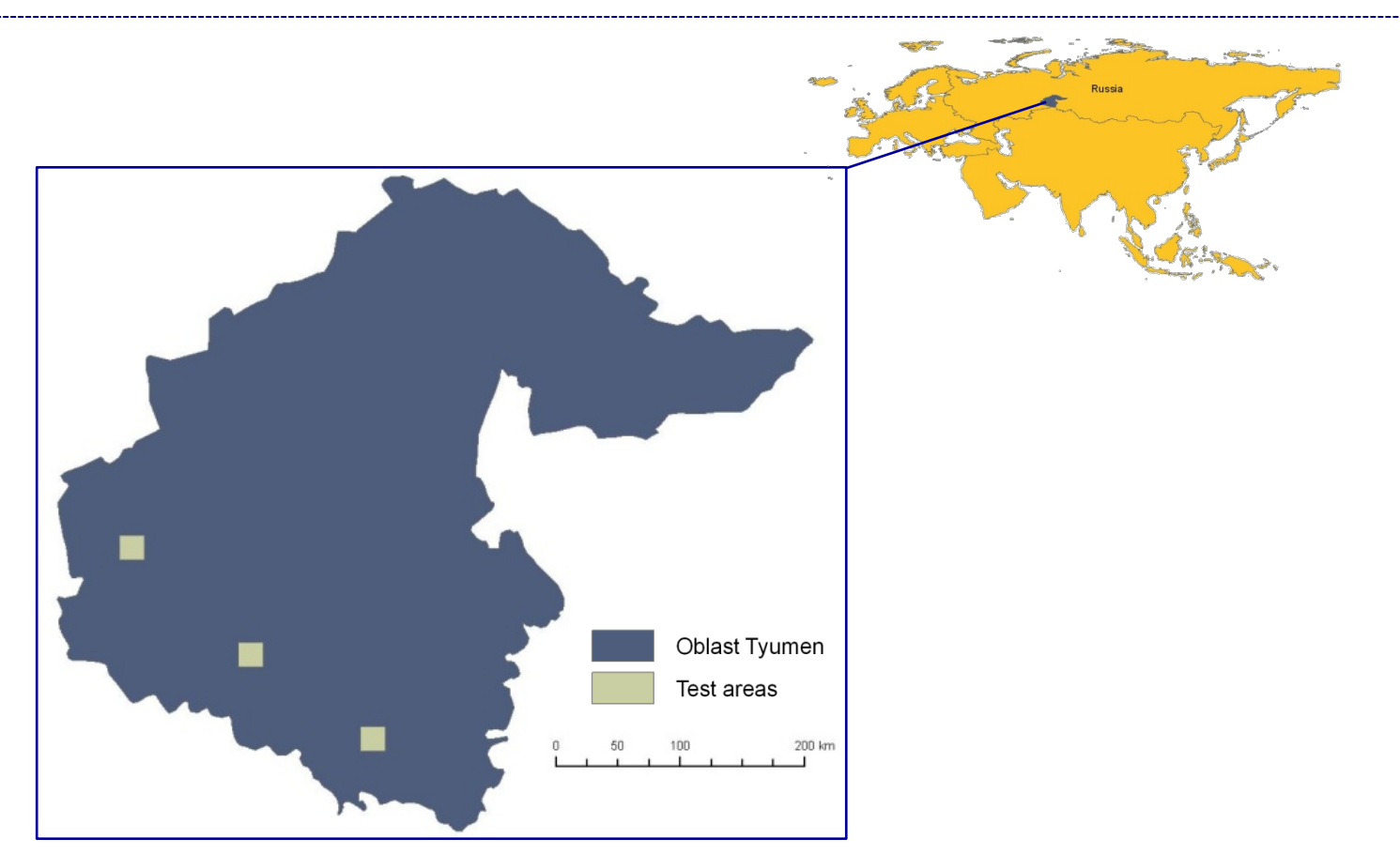


Fig. 1: Province Tyumen South with three test areas

For field surveys, three study areas of 400 km² have been selected (Fig. 1).

The gained information will be used for

- developing optimized, long-term, sustainable agricultural land-use practices at farm level, and
- the definition of priority areas for different land-use types and intensities under various scenarios of climate change at the landscape level.

To translate the project results into an operational planning framework, implementation and monitoring tools will be developed under strict consideration of the existing institutional structures and governance mechanisms [1].

Subprojects

SP 100 Coordination – *University of Muenster*

SP 200 Remote Sensing – *EFTAS Remote Sensing Transfer of Technology, Muenster*

SP 300 Hydrology and Modeling – *University of Kiel*

SP 400 Climatology and GHG-fluxes – *University of Muenster*

SP 500 Agricultural Management – *University of Osnabrueck, University of Applied Science of Osnabrueck*

SP 600 Biodiversity and carbon stocks – *University of Muenster*

SP 700 Landscape Planning – *University of Applied Science of Osnabrueck*

SP 800 Institutions, property rights, governance structures, implementation capacities – *Humboldt University of Berlin*

Subproject 500

Agricultural Management

Aims:

- to develop strategies for a sustainable agriculture and adaptation strategies to current climate change in the Oblast Tyumen, Russia



Fig. 2: Old combines, SP 510, Tyumen 2012

- to analyze the structure and form of agricultural land at farm level (Fig. 2)
- to investigate effects of different forms of land-use on productivity, carbon stocks, material flow and biodiversity
- to analyze long-term experiments on different tillage variants in close cooperation with the Russian partners
- to develop concepts for an optimized management of material flow at regional level
- implementation of concepts for the improvement of sustainable land use practices based on these results



Fig. 3: Topsoil of Luvic Chernozem in Tyumen, 2012

Subproject 500

SP 510 Analysis and optimization of sustainable agricultural management practices on farm level – *University of Applied Science of Osnabrueck*

SP 520 Biodiversity and carbon stocks of arable land at different land-use intensities – *University of Applied Science of Osnabrueck*

SP 530 Regional material-flow management for nutrients and organic carbon – *University of Osnabrueck*

Subproject 530

Regional material-flow management for nutrients and organic carbon

Aims:

- analysis of long-term field experiments on effects of different tillage variants in respect to carbon and nutrient balances and soil quality (Fig. 3)
- regional analysis of livestock breeding and arable farming by-products for organic fertilization (Fig. 4)



Fig. 4: Manure pile, SP 530, Tyumen 2012

- modeling of material-flow management at regional level (Fig. 5) [1]

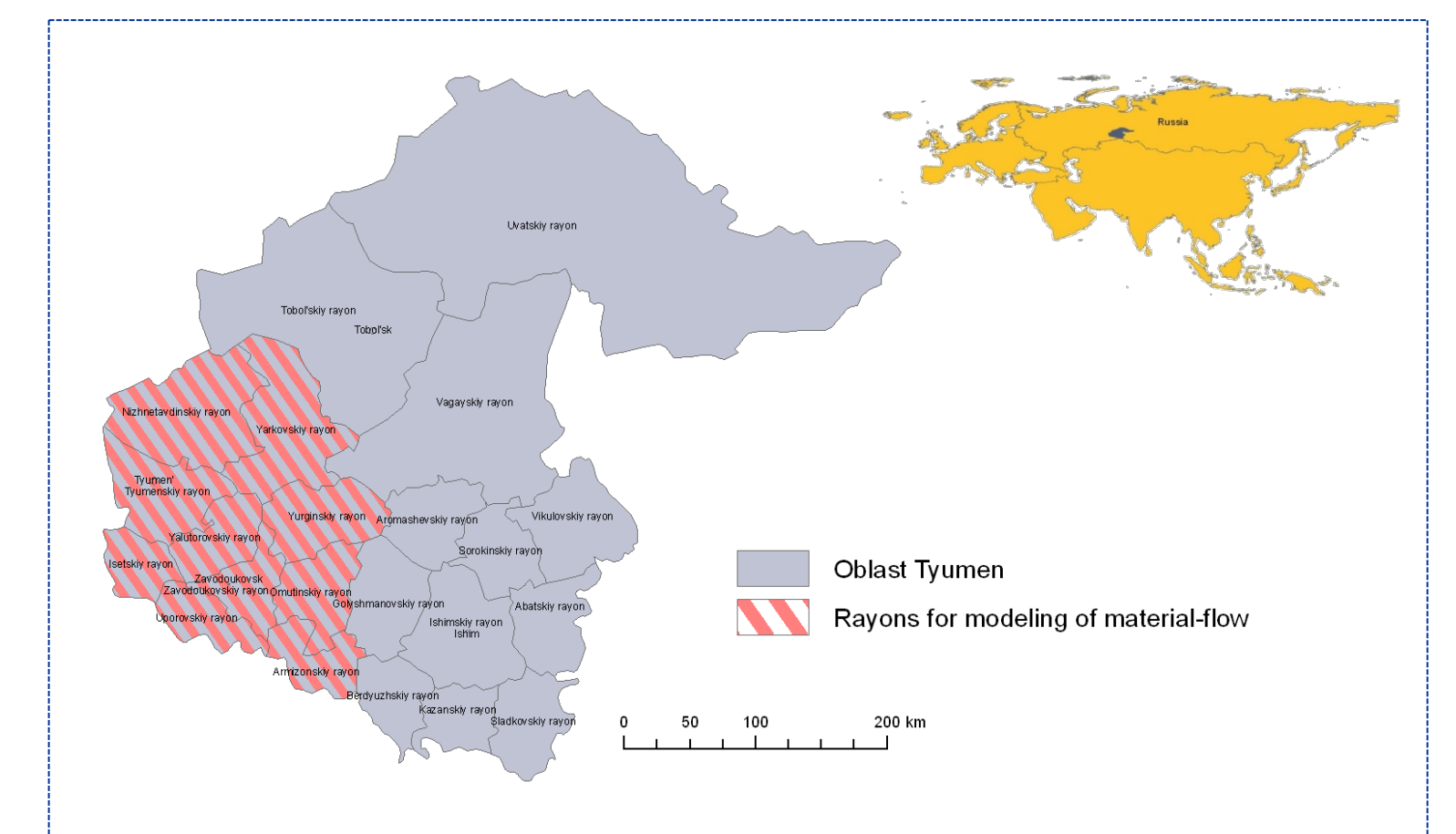


Fig. 5: Province Tyumen-South

- topsoil characterization will be used to assess soil quality (Fig. 3) [2]
- modeling carbon dynamics with CANDY – model, CCB-Software (Fig. 6) [3]

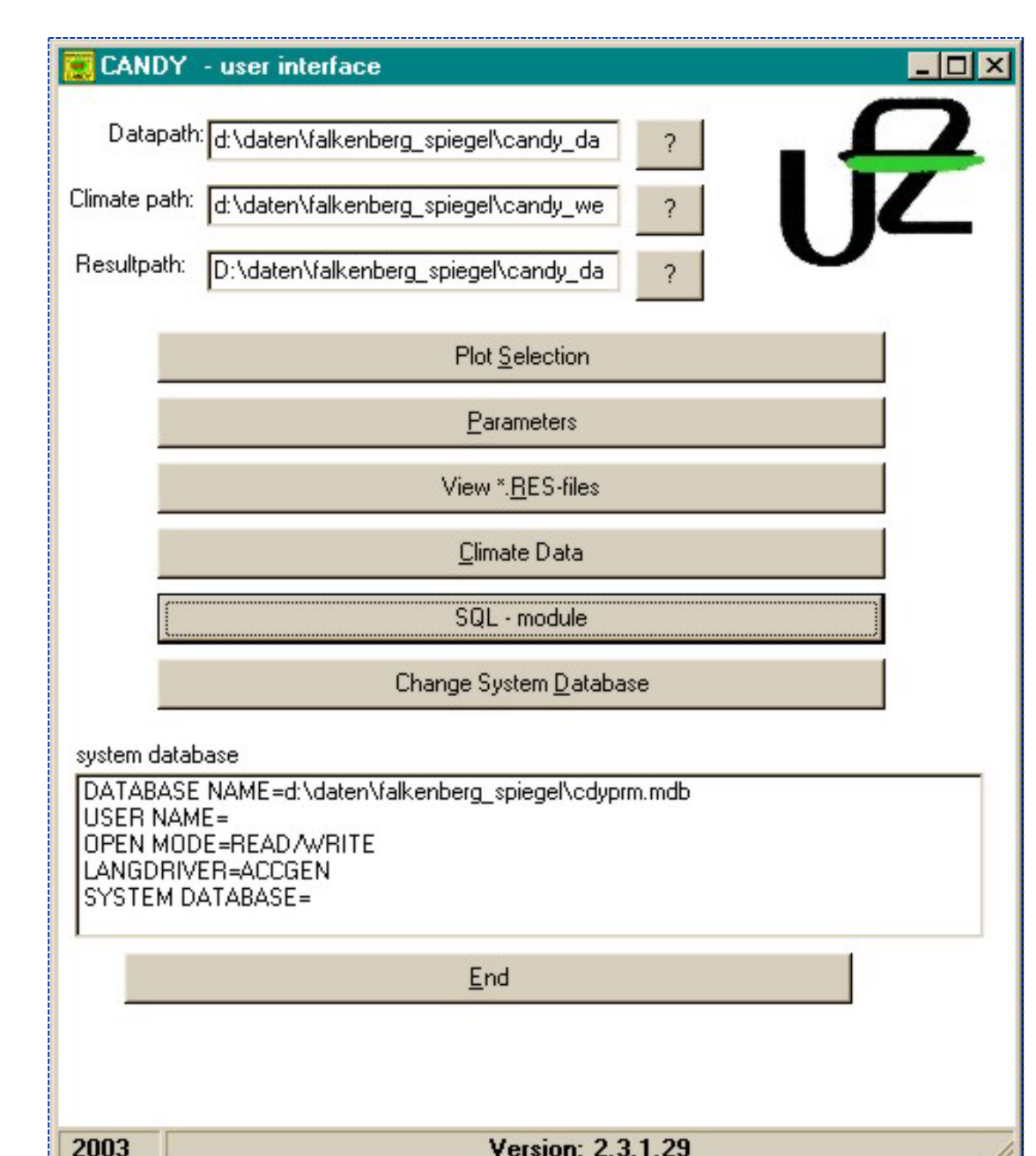


Fig. 6: CCB-Software user interface

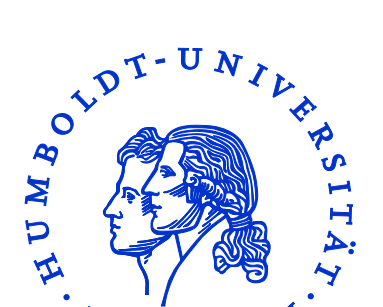
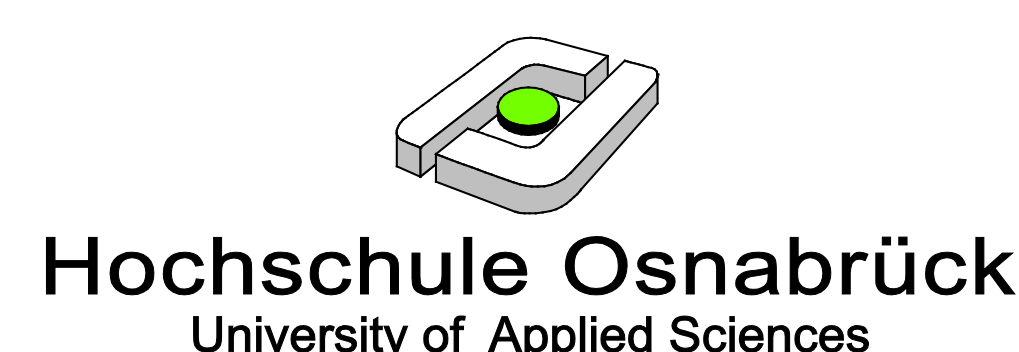
Funded by



Russian Partners



German Partners



References:

- [1] BMBF, PROJECT SASCHA (Sustainable land management and adaptation strategies to climate change for the Western Siberian corn-belt) (2011): <http://modul-a.nachhaltiges-landmanagement.de/en/regional-projects/sascha/> (30.12.11).
- [2] BROLL, G., BRAUCKMANN, H.-J., OVERESCH, M., JUNGE, B., ERBER, C., MILBERT, G., BAIZE, D., NACHTERGAELE, F. (2006): Topsoil characterization - recommendations for revision and expansion of the FAO-Draft (1998) with emphasis on humus forms and biological features. Journal of Plant Nutrition and Soil Science 169, 453-461.
- [3] FRANKO, U., KUKA, K., ROMANENKO, I. A., ROMANENKOV, V. A. (2007): Validation of the Candy model with Russian long-term experiments. Reg. Environmental Change, 79-91