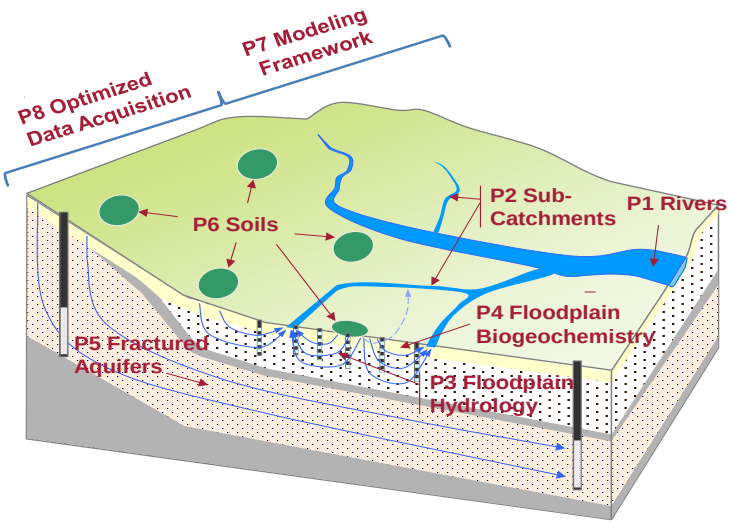
CRC 1253 Catchments as Reactors: Metabolism of Pollutants on the Landscape Scale (CAMPOS)

The newly established CRC "Catchments as Reactors: Metabolism of Pollutants on the Landscape Scale (CAMPOS)", starting in January 2017, addresses diffuse pollution of soils, surface waters, and groundwater by anthropogenic organic and inorganic compounds. CAMPOS is funded by the German Research Foundation (DFG) for four years and may be extended to twelve years in total upon positive evaluation.

The aims of CAMPOS are to identify landscape elements controlling storage, biogeochemical transformation, or elimination of pollutants, to identify the respective processes and their dynamics responsible for relevant pollutant transformations in the environment, and to develop a new modeling framework to simulate and predict reactive transport and pollutant behavior on the landscape scale.

Researchers from the Universities of Tübingen, Hohenheim, and Stuttgart, as well as from the Helmholtz Centers for Environmental Research in Leipzig (UFZ) and for Environment & Health in Munich (HMGU) will work together in eight collaborative projects to close the gap between relevant processes identified in the laboratory and mechanisms of mass transfer and metabolic transformations on the landscape scale. The CAMPOS research addresses pollutant turnover and reactive zones within the most relevant landscape elements and compartments aligned along the reversed water flow from rivers as integrators of pollutant fluxes in landscapes (project P1), nested and contrasting low-order sub-catchments including the groundwater/surface-water interface (P2), hillslopes and floodplains (P3-P4), the underlying fractured/karstic aquifer system (P5), and finally, soils (P6). Within these compartments, we will identify and quantify the most relevant transport and transformation processes, i.e. biodegradation in biofilms (P1), turnover at steep redox gradients (P2-P4), diffusion-controlled slow turnover in the rock matrix (P5), and limitations of pollutant turnover in soil compartments (P6).



We develop a stochastic modeling framework (P7-P8) addressing the conceptual and parametric uncertainty of reactive transport on the catchment scale and in the interpretation of the monitoring data, in predicting the development of water quality, and in designing experiments to reduce uncertainty. Supporting projects of CAMPOS provide laboratory analysis and maintenance of field sites (S1), central modeling support (S2), and data infrastructure (INF). Research focusses on shared study sites in the catchment of River Ammer, a tributary of River Neckar in SW-Germany, in close vicinity to the City of Tübingen. In a first phase a set of lead substances such as nitrate, persistent organic pollutants (POPs), herbicides, pharmaceuticals, personal care products and their respective metabolites have been selected.

Research in CAMPOS builds upon a well-structured collaboration of scientists from diverse backgrounds such as environmental microbiology and chemistry, soil science, and (stochastic) hydrogeology, as developed, for instance, in the former research cluster WESS (“Water & Earth System Science”). Founded in 2009, WESS focused on the long-term development of water quality at the catchment scale as a function of changes in land use, climate, and water management. Apart from that, CAMPOS is also closely linked to the Research Training Group 1829 “Integrated Hydrosystem Modelling” (p 58), a cooperation of the Universities of Tübingen, Stuttgart, and Hohenheim with Canadian partner universities.

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