Solar Detoxification of Industrial Waste Water

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Non-concentrating solar reactors are most useful devices for the solar detoxification of waste water. For the comparison of different available technologies different reactors were tested at the German Aerospace Centre (DLR) in Cologne, Germany in cooperation with the Centro Tecnico Aeroespacial (CTA), Brazil. The aim was to find out in which possible application which type of reactor performs optimal. Parameters changed include the radiant power, the type of pollutants ranging from easily degradable hydro-carbons to very stable chlorinated organic substances, and their concentration. Example estimation were carried out to discuss how economical photocatalytic water treatment devices could work today. Therefore weather data from Brazil and Germany were compared to find out the differences in running photocatalytic water detoxification devices in a sunny and a less sunny region.

The conclusion of the project which ended in June 2000 is that the reactor material significantly determines the technical features. Plexiglas" reactors showed significant fouling which inhibits complete mineralization of the pollutants although initial degradation was identical to glass reactors. Photocatalyst coated glass tubes had a distinct self-cleaning effect as opposed to the uncoated tubes, however the overall rate of destruction was lower. They showed a good activity for extremely stable substances like chloroform. But the stability of the coating was not satisfying yet.

The project will be continued together with the Universidad Federal de Uberlândia, Minas Gerais, Brazil. In this forthcoming project tests in Brazil and Germany should be carried out to adjust the technology to special needs in Brazil because the partners believe that it will be one of the most promising regions for applying this modern sustainable technology.

Water Availability in Northeastern Brazil in the Context of Climate Change and Water Management Scenarios

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Scarcity of water resources is a major constraint for agri-cultural production, life quality and development in the semi-arid tropics. Determination of natural water availability on a large spatial scale is an essential-prerequisite to understand and to mitigate economic and social impacts of droughts of regional and state wide extent. Within an interdisciplinary approach, the bilateral Brazilian-German WAVES program (Water Availability, Vulnerability of Ecosystems and Society in the Northeast of Brazil) analyses social and natural systems in the semi-arid Northeast of Brazil, with focus on the Federal States of Piauí and Ceará. A main objective is the development of methods for integrated modeling at a regional scale, which allows to identify possible pathways towards a sustainable common development of nature and society, taking into account future climate change.

Within this framework, a large-scale water balance has been developed to quantify natural water availability, establishing at the same time the link between climate modeling / climate scenarios and the modules of water management and agro-ecosystems. The hydrological model works for the entire WAVES study area ($470,000 \ km^2$) in a spatially distributed mode with a daily time step. It accounts for water availability in terms of river runoff, reservoir storage, soil moisture and groundwater recharge. One model version is based on administrative boundaries (using municipalities as principal discretization units), thus being compatible to be incorporated into the interdisciplinary Integrated Model. Considering the importance of lateral water flow for spatial patterns of soil moisture, modeling units are defined as terrain patches with similar characteri-stics referring to lateral processes based on a toposequence approach. A related hierarchical, geomorphology-based disaggregation scheme links vertical and lateral processes at

Sattler, C. and de Oliveira, L.: Solar Detoxification of Industrial Waste Water
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142