Geophysical Research Abstracts
Vol. 17, EGU2015-5591, 2015
EGU General Assembly 2015

Evaluation and Application of Inexpensive Gas Sensors in Wireless Sensor Networks for Greenhouse Gas Monitoring

René Misterek, Hannes Mollenhauer, Robert Schima, Peter Dietrich, and Jan Bumberger

Helmholtz Centre for Environmental Research - UFZ, Department Monitoring and Exploration Technologies, Leipzig, Germany (rene.misterek@ufz.de)

Measurements at high temporal and spatial scales are essential for understanding and monitoring of spatially heterogeneous natural environments or urban areas with complex and highly variable emission sources. The continuously decreased price of electrochemical gas sensors allows the application in numerous devices for a high spatial resolution. Thus, in combination with the detection of meteorological parameters, could improve the understanding of the generation and transport of greenhouse gas emissions. Furthermore, multi-year data sets can built a basis to assess the impact of climate change on gas emissions from natural sources such as perma-frost soils or wetlands, which represent the largest natural single source according to IPCC report 2007. Possible measurement applications are besides the monitoring and documentation of recreated wetlands, the supervision of industrial plants, pipelines, waste dumps or sewage treatment plants as well as agricultural applications. With regard to the high greenhouse effect of gases like methane or nitrous oxide, a more detailed investigation of sources is indispensible. Furthermore, the supervision of air pollutants in urban areas with impact on the human health of their inhabitants could be easily managed by inexpensive wireless sensor networks. To this end, the aim of this work is focused on creating a simple wireless, inexpensive, energy-efficient and for the application in rough environmental areas suitable sensor network for the detection of greenhouse gases, primarily methane. The networks could be used to measure low atmospheric methane concentrations in order to detect hot-spots in natural areas with low financial and methodological effort. Therefore, different electrochemical gas sensors are used and characterized under field conditions in order to evaluate them for their feasibility in inexpensive sensor networks. Especially relative humidity and air temperature are parameters to consider carefully during the measurement with electrochemical sensors. However, the long-term stability of the used sensors remains to be a challenging issue. Therefore, long-term field experiments may serve to draw a conclusion about a suitable application of such sensors for environmental monitoring purposes.