

## **Integration of an active remote sensing system in the surveillance of traces gases in the maritime environment**

**Kai Krause**  
(IUP)

### **Abstract**

Ship emissions are an important source for particles and trace gases like CO, CO<sub>2</sub>, NO<sub>x</sub> (NO + NO<sub>2</sub>), SO<sub>2</sub>, VOCs, PM and black carbon. Most emissions are found within 400 km of the coast line and substantially contribute to air pollution within these regions. Some of these pollutants can be observed by differential optical absorption spectroscopy (DOAS). The DOAS method can be used in two basic ways, the first one is to measure passively, e.g. using scattered sunlight, the second one is to use an artificial light source which allows to measure during night and in UV wavelength regions.

To monitor ship emissions on the Elbe river several instruments have been set up in Wedel, in the area of the Yacht harbour of Hamburg. Monitoring instruments include two in situ-measurement systems, a MAX-DOAS (passive DOAS) system and two different Long-Path DOAS (active DOAS).

One of the Open-Path DOAS systems is a newly developed prototype, specifically designed to monitor ship emissions and will be tested for suitability as a long-time observation tool. All other instruments are used for validation and comparison with the new system.

An introduction into the technical details of the new system will be given and first results of the other instruments will be shown.