



## **Monitoring shipping fuel sulfur content regulations with in-situ measurements of shipping emissions**

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Air pollution from shipping emissions contributes to overall air quality problems and has direct health effects on the population especially in coastal regions and harbor cities. In order to reduce these emissions the International Maritime Organisation (IMO) has tightened the regulations for air pollution from ships. Since January 1st 2015, the allowed amount of sulfur in shipping fuel which is responsible for SO<sub>2</sub> emissions, has dropped from 1% to 0,1% in the Emission Control area (ECA) that combines the North Sea and Baltic Sea. This effectively excludes the use of heavy fuel oils by ships in this area. However, until now there is no regular monitoring system available to verify that ships are complying with these new regulations.

The project MeSMarT (Measurements of shipping emissions in the marine troposphere) has been established as a cooperation between the University of Bremen and the German Bundesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency) with the support of the Helmholtz-Zentrum Geesthacht to estimate the influence of shipping emissions on the chemistry of the atmospheric boundary layer and to establish a monitoring system for main shipping routes. Within the project, several hundred ships have been monitored with focus on their sulfur fuel content, which is estimated by the ratio of SO<sub>2</sub> and CO<sub>2</sub>, both measured with in-situ instruments from measurement stations near the passing ships. It is shown how well ships have been complying to the sulfur content regulation so far and which ships and how many are affected by the new regulations. Three different measurement sites, ranging from measurements near the Elbe River to open sea measurements from a research vessel are compared to show if the distance to the coast has an effect on the fuel quality. First results from very recent measurements of 2015 will be presented to show how the new regulations are implemented and how this will result in reduced SO<sub>2</sub> and thus better air quality.