

# Using UAS for Marine Samples



For the first time, a team of scientists from GEOMAR Helmholtz Center for Ocean Research Kiel, Germany, has successfully used a drone to collect marine air and water samples. The objective of the study is to better understand the role of coastal waters as a source of reactive trace gases, which are important for chemical processes in the atmosphere and the climate. The 'LASSO' project is funded by the Kiel Cluster of Excellence 'The Future Ocean'.

Unmanned aerial vehicles (UAS), are used for the production of photos and videos and increasingly for more complex tasks. These mobile platforms are increasingly used in research as well. At the beginning of April, a DJI Matrice 600 drone was used to take samples on the west coast of the island of Sylt. The researchers had very variable weather

conditions with wind speeds of more than 10m/s, where the drone proved to be very good, according to project manager Dr. Birgit Quack from GEOMAR.

## Horizontal and Vertical Profiling

The researchers were able to fly both horizontal and vertical profiles to take samples of atmospheric parameters in the coastal zone, according to Dr. Steffen Fuhlbrügge, meteorologist at GEOMAR and controller of the drone explains. In addition to 120 air samples, 40 water samples were also collected. In addition, the drone recorded images of the sea surface. The gas exchange between ocean and atmosphere is enhanced by wave breaking, which is detectable via whitecap coverage, explains Prof. Dr. Christa Marandino, atmospheric chemist from GEOMAR. The field study facilitates better understanding of the role of coastal waters as a source of reactive trace gases that are important for tropospheric and stratospheric chemistry and the climate.

Now, the investigation of the samples continues. The air samples are analysed by an American scientist at RSMAS, University of Miami. More than 50 trace gases including halocarbons (e.g. bromoform, dimethylbromide, methyl iodide), non-methane hydrocarbons (e.g. isoprene), and sulfur containing compounds (e.g. dimethyl sulfide) will be analysed. At GEOMAR, the scientists are mainly concerned with the analysis of water samples and the interpretation of the aerial photos.

## Optimising Sampling and Adding Sensors

Meanwhile the researchers are already forging new plans. They aim to further optimise air and water sampling in order to be able to cover a larger area with more flexibility, as well as to integrate additional sensors (e.g. for meteorological data) on the drone package. Furthermore, sampling and image recording should be coupled with direct gas-transfer measurements in order to better estimate the gas exchange between the atmosphere and the ocean. In the end, they would like to use this measurement method also for ship expeditions on open ocean, in particular in the tropics and subtropics, as the concentrations of the marine trace gases are often even higher in these regions, according to Birgit Quack.