

LUFFT CEILOMETER SERIES CHM 8k AND CHM 15k

 REFERENCE COMPILATION | SCIENCE & AVIATION



RESEARCH

“

One of the most interesting features of Earth, as seen from space, is the ever-changing distribution of clouds. They are as natural as anything we encounter in our daily lives. As they float above us, we hardly give their presence a second thought. And yet, clouds have an enormous influence on Earth's energy balance, climate, and weather.”

”

Source: NASA, Document: The Importance of Understanding Clouds

RESEARCH

Freie Universität Berlin and Max-Planck Institute for Chemistry
Research Vessel 'Sonne' | Lufft CHM 8k

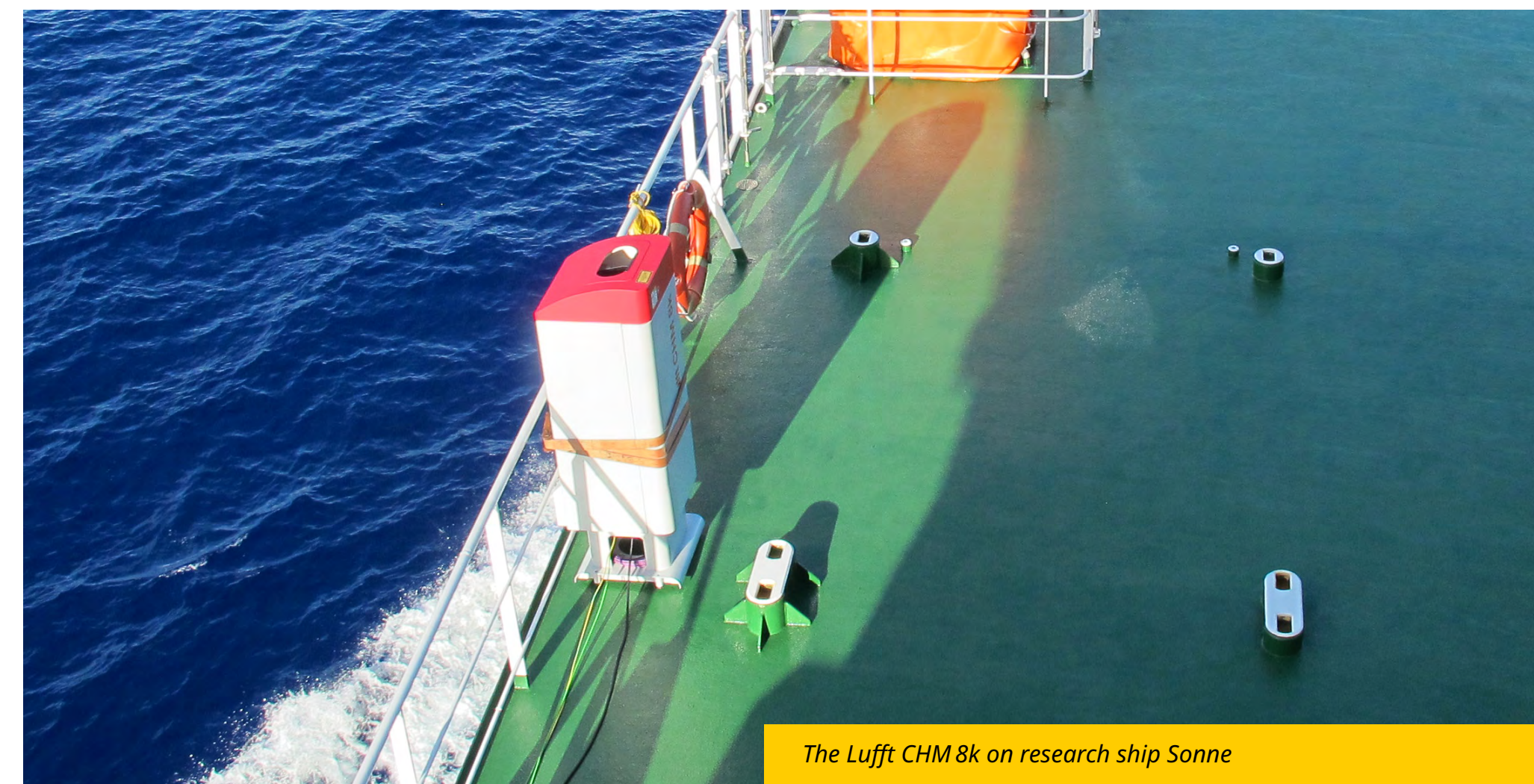
Application description

Cooperation between FU Berlin & Max-Planck Institute for Chemistry, Mainz, Germany, CHM 8k on research ship 'Sonne'.

The ceilometer CHM 8k was used on-board the research vessel Sonne in May - July 2019 to collect atmospheric properties which will serve as calibration data for satellite remote sensing retrievals and as evaluation data for (global) modelling. The measurements were done as part of the MORE-2 (Measuring Ocean References) research project. The ceilometer was used to characterize cloud base heights together with a cloud camera. It also supported the data evaluation of Multi Axis Differential Optical Absorption Spectroscopy (MAX-DOAS) instruments by validating aerosol profile heights.

About the research vessel 'Sonne'

The research vessel (RV) Sonne (German for Sun) is a German deep ocean research vessel. The ship became available for science in December 2014 and it operates mainly in the Pacific and the Indian Oceans. The Sonne is a multipurpose working platform for marine and related disciplines: physical and biological oceanography, marine geology, marine and atmospheric chemistry, marine geophysics and meteorology. It is owned by the German Federal Ministry of Education and Research.





RESEARCH

KNMI – Dutch Weather Service

Automating the visual cloud observations with Lufft ceilometers | Lufft CHM 15k

Application description

In the 1990s, the Royal Netherlands Meteorological Institute (KNMI) started automating the visual observations of present weather, visibility and clouds using automatic weather stations with dedicated optical sensors. For cloud observations, ceilometers were purchased and deployed in the measurement network on a 24/7 operational basis.

The network of around 50 ceilometers serves two different applications and end users:

- One part of the network is dedicated for general meteorology purposes: ground-based observations of clouds are considered primary meteorological data from the meteorological observation network. This information is provided by KNMI to the general public and to professional users on a national as well as an international level;
- A second part of the ceilometers is deployed to serve aviation customers. More about this in the aviation part of this paper.

After 15 years of use, the old ceilometer had reached the end of their service lives. The time had come to look


for a new cloud height sensor replacing the old ones. During the bidding and testing phase, KNMI compared the performance of the Lufft CHM15k and others with their old operational ceilometer, reference LIDARs and visibility measurements in a special 3-month lasting acceptance test. This evaluation took place at the Cabauw Experimental Site for Atmospheric Research of KNMI (CESAR), a unique experimental facility used by the Dutch atmospheric research community. The primary goal of this test period was to verify whether the CHM15k sensor was able to operate in accordance to the specifications provided by Lufft. In 2015, after four months of testing and comparing, the decision fell on the Lufft CHM15k cloud sensors. It stood out due to its good price-performance-ratio, precise

measurements of aerosol layers up to 15 km, the differentiation of multiple cloud layers, easy network integration as well as remote access. By implementing the sensor in its network, KNMI was confident, that it would be able to sustain its duties regarding delivery of cloud information to its users for a period of, at least, 10 years.

About KNMI

The Royal Netherlands Meteorological Institute (Dutch: Koninklijk Nederlands Meteorologisch Instituut or KNMI) is the Dutch national weather forecasting service, which has its headquarters in De Bilt, in the province of Utrecht, Netherlands.

The primary tasks of KNMI are weather forecasting, monitoring of climate changes and monitoring seismic activity. KNMI is also the national research and information center for climate, climate change and seismology.

 [More about this project in the KNMI Case Study](#)



RESEARCH

Ludwig-Maximilians-Universität Munich
Lufft CHM 8k & CHM 15k

Application description

Monitoring of the regional aerosol distribution as part of long term studies for climatology / climate change research.

The Meteorological Institute Munich, based at the Ludwig-Maximilians-Universität (LMU), has a long tradition in working with lidar systems. In a recent project, meteorologists investigated how commercial ceilometers could fill gaps in the measurement network consisting of complex scientific equipment to determine spatial aerosol distribution. Since these instruments are stationary and expensive, the possibility to work with commercial devices would be very welcome. Experiments with the Lufft CHM 15k showed positive results and created a unique data set, that will probably serve as a starting point for exciting research in the future. As a part of further research, the MIM has acquired a Lufft CHM 8k, too.

About Ludwig-Maximilians-Universität München (LMU)

LMU is recognized as one of Europe's premier academic and research institutions. Since founding in 1472, LMU has attracted inspired scholars and talented students from all over the world, keeping the University at the nexus of ideas that challenge and change our complex world. The University is particularly noted for providing excellent conditions for innovative basic research, both within individual disciplines and through inter- and transdisciplinary collaborations across various fields of knowledge.



RESEARCH

Aerosol studies, Stony Brook University and NASA
Rolling out a new mobile weather truck in the USA | Lufft CHM 15k

Application description

Stony Brook University partnered with NASA to break out a new mobile weather truck. The vehicle has a research trailer with radar. Researchers hope the cutting-edge technology will help to better understand storms and to improve future forecasting.

Stony Brook University and NASA are teaming up to research snowstorms for the first time in 32 years. Stony Brook University received \$1.4 million last January from the National Aeronautics and Space Administration (NASA) to aid in ground research that would help to improve East Coast snowstorm forecasting.

About the NASA IMPACTS Program

NASA's project, Investigation of Microphysics and Precipitation for Atlantic Coast Threatening Snowstorms (IMPACTS), collects data on what's happening inside turbulent snow clouds called snow bands as they occur. NASA sends two planes directly into and above

the storm to record how they form and expand, while Stony Brook, with help from the University of Illinois at Urbana-Champaign (UIUC), deploys mobile weather trucks and launches weather balloons into the snow bands to help accurately predict snowfall.



IMPACTS will collect data over six weeks once a year from 2020 to 2022. The first mission began on January 17 and ended March 1. Scientists on the project plan to analyze the information gathered during the summer.

RESEARCH

Other projects around the globe
Lufft CHM 8k & CHM 15k



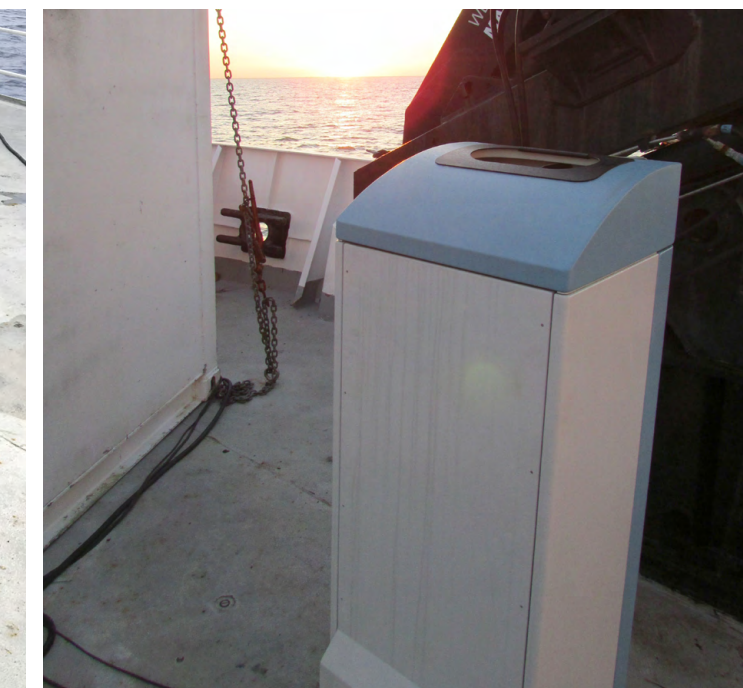
Hach Water Quality Analysis China
Climate change research



Max-Planck Institute for Chemistry, Mainz, Germany
Climate change research in the Amazon forest



Météo Suisse
Research of aerosol distribution



University of North Dakota | A blowing snow study



Max-Planck Institute for Meteorology, Hamburg, Germany
To measure aerosol mixing layers; aerosol/cloud distribution
in Barbados



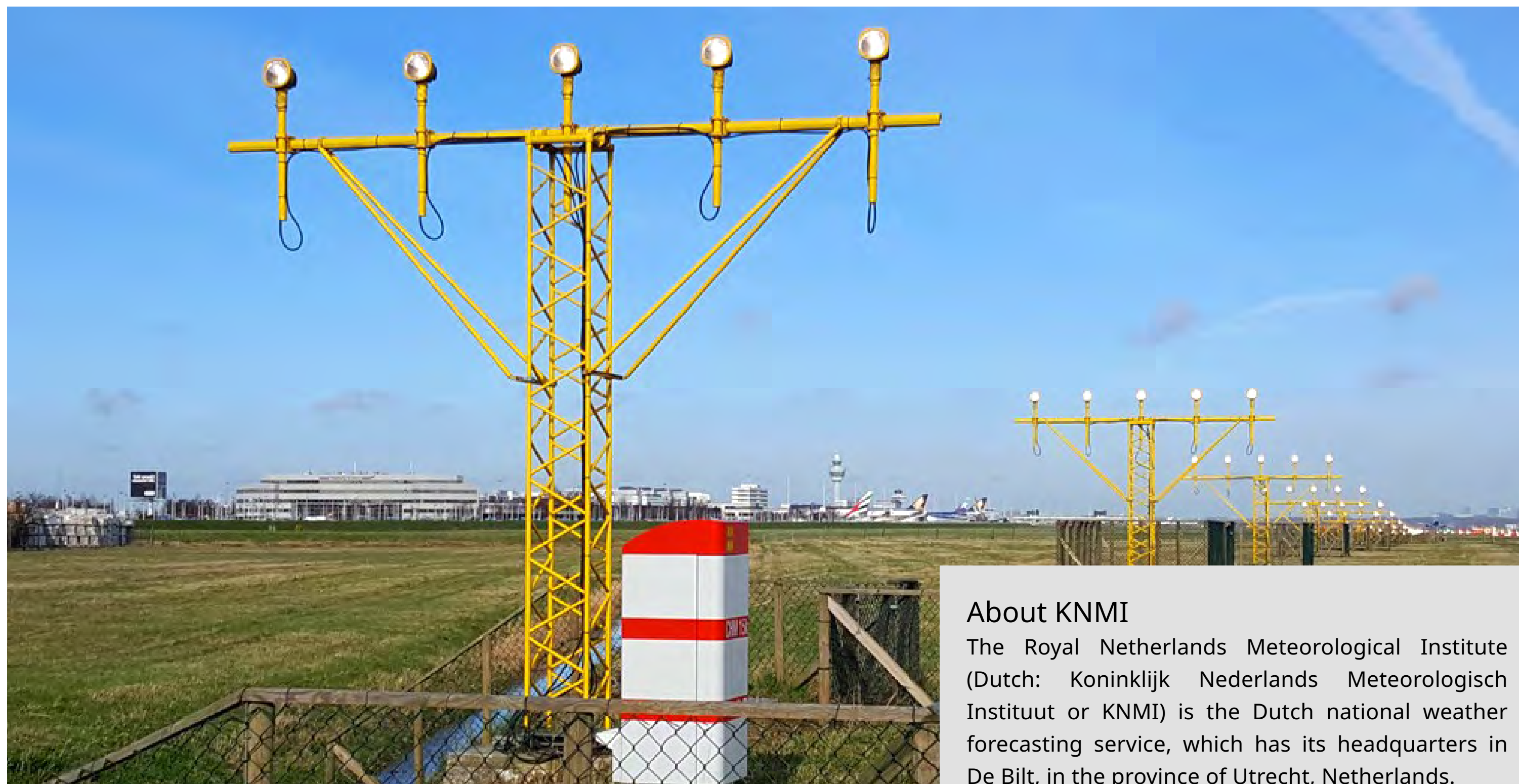
Karlsruhe Institute of Technology (KIT), Germany
Mobile CHM 15k for monitoring of the mixing layer height
and research of aerosol distribution

AVIATION

“

Aviation, probably more than any other mode of transportation, is greatly affected by weather. Lufft ceilometers reliably detect cloud heights, cloud cover, and other essential parameters for support in critical decision-making in aviation operations.

”



About KNMI

The Royal Netherlands Meteorological Institute (Dutch: Koninklijk Nederlands Meteorologisch Instituut or KNMI) is the Dutch national weather forecasting service, which has its headquarters in De Bilt, in the province of Utrecht, Netherlands.

The primary tasks of KNMI are weather forecasting, monitoring of climate changes and monitoring seismic activity. KNMI is also the national research and information center for climate, climate change and seismology.



[More about this project in the KNMI Case Study](#)

AVIATION

KNMI – Dutch Weather Service
Meteorological Aviation Services | Lufft CHM 15k

Application description

KNMI has a network of around 50 ceilometers to serve two different applications, research/meteorological forecasting (addressed earlier in this paper) and aviation.


Accurate and real-time cloud information is an essential part of the meteorological information required for aeronautical applications. In its role as Air Navigation Service Provider for Meteorology (MET ANSP), KNMI continuously measures and distributes cloud base height and cloud cover data for all Dutch (civil and military) airports and helidecks, in accordance with International Civil Aviation Organization (ICAO), World Meteorological Organization (WMO) and European Aviation Safety Agency (EASA) regulations.

AVIATION

Germany's National Meteorological Service (DWD)
Renewing airport weather network | Lufft CHM 8k

Application description

OTT HydroMet has supplied Germany's National Meteorological Service DWD with 97 Lufft CHM 8k ceilometers. The DWD wanted to renew its monitoring network to ensure safe air traffic at 15 international airports in Germany. The tender was awarded after a test phase lasting several months and included modifications developed at the customer's request. After the four-month measurement campaign, the CHM8k became the product of choice due to its reliable results in a broad range of conditions; not just clear skies but also in heavy snowfall and fog.

 [More about this project](#)



About Germany's National Meteorological Service
The Germany's National Meteorological Service (Deutscher Wetterdienst DWD) is a public institution with partial legal capacity under the Federal Ministry for Digital and Transport. Germany's National Meteorological Service, the Deutscher Wetterdienst (DWD), is responsible for meeting meteorological requirements arising from all areas of economy and society in Germany.





*The state aviation administration in Ukraine certified that the Lufft ceilometers comply with the ICAO standards.
Thanks to Lufft partner Dataspektr*

AVIATION

Other projects around the globe
Lufft CHM ceilometers



Cloud interference study with Lufft CHM 15k conducted by the Indian Institut of Tropical Meteorology in Pune, India

Insights for Experts

For more information, please contact

OTT HydroMet Fellbach GmbH
Gutenbergstraße 20
70736 Fellbach | Germany
T +49 711 51822 0
met-info@otthydromet.com
www.lufft.com

OTT HydroMet GmbH
Ludwigstraße 16
87437 Kempten | Germany
T +49 831 5617-0
euinfo@otthydromet.com
www.otthydromet.com

