

Measuring climate change

Vaisala collaborates with international scientific community to develop an instrument that will provide high-precision data to shed light on the dynamics of climate change - the reference radiosonde.

While climate change is a well accepted phenomenon, its study has challenged scientists for many decades now. Encompassing temperature, humidity, atmospheric pressure, winds, rainfall, atmospheric particle count and numerous other meteorological elements in a particular region, scientists depend upon different instruments for measurement, in addition to a vast number of empirical indicators to quantify the changes observed.

Each passing year has improved the tools to enable ever more sophisticated readings; however the search for a high-precision upper-atmosphere instrument to improve long-term research on climate change remains.

Evolution of the study of climate change

The study of climate change started as a long term, comparative study of changes occurring in the earth's natural resources. Today it has evolved into a much more scientific process of deploying tools such as radiosondes, surface weather stations and satellites – together with sophisticated computer models – to evaluate and project the changes in atmospheric temperature and composition.

In fact, to ensure that national and international needs for climatological information were addressed as efficiently as possible, a globally coor-



dinated monitoring system for the climate, the Global Climate Observing System (GCOS) was set up in 1992.

Information obtained through the GCOS network is currently used for climatological observations by countries across the world, and also as an input for climatological models that help estimate how the climate will change in the future.

In keeping with GCOS' mission, i.e. to produce the highest quality long-term climatological data as well as calibrate data from other global systems such as satellites and existing radiosonde networks, the GCOS Reference Upper Air Network (GRUAN) was set up.

The relevance of an operational reference radiosonde

While the current radiosonde networks support normal weather observation needs rather well, they do not provide accurate enough information for climate change observations. This is the case especially with upper-air measurement of humidity levels.

Humidity is the most abundant and subsequently the most important greenhouse gas in the earth's atmosphere. Understanding the changes in its concentration are imperative to facilitate a better understanding of global warming. However, it is also one of the most difficult parameters to measure with high precision and accuracy, especially in the upper troposphere and stratosphere where conditions are extremely cold and dry.

Supported by the World Meteorological Organization (WMO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), the GRUAN project started to take shape to deliver to scientists a high-precision instrument that would provide superior-quality climatological data on the upper parts of the atmosphere.

Vaisala decided to step forward to take on this important devel-

opment challenge. Scientific evaluation started early this year in January, with the intention that after piloting, the instrument will be further developed according to the experiences gained from the international scientific community.

Deployment of the 'new age' radiosonde

The initial parameter that the Vaisala reference radiosonde will help measure is humidity. Specifically, it will provide high-quality measurements high up at over 30 km above the earth's surface. Field testing will begin later this year in cooperation with the research partners.

Scientists will be able to provide initial feedback to Vaisala on the radiosonde's performance. In parallel, Vaisala will continue its development to provide even more precise measurements. The feedback will help enhance the radiosonde's functionality until such a time that the final product will be useful for the climate scientists.

A global community project, the benefits of this development will be shared equally with all countries. Vaisala has kept aside commercial gain and is driving the project forward as a key Corporate Social Responsibility Program.

The overall goal of GRUAN is to establish 30-40 stations which will use the operational reference radiosonde in addition to other instrumentation, representing different climatological conditions around the world.

Demanding long-term commitment, resources and cooperation with the scientific community, the program will not change things overnight. But the journey has definitely begun – we are on the threshold of ground breaking research that can help illuminate the dynamics of climate change, and hopefully put a stop to its progress.



Radiosondes are meteorological devices that are launched from the ground and used to measure temperature, humidity, pressure, wind speed and direction in the upper atmosphere. The radiosonde transmits atmospheric data as a balloon filled with hydrogen or helium gas carries the radiosonde into the upper atmosphere.