Measuring Weather in Cold Climates

Observing in Harsh Environments Requires Innovative & Intelligent Technologies
Observations collected from cold climates and locations with harsh winters allows us to better understand these environments. The meteorological data are used for research and in our daily life. Researchers study cold climates in order to learn how these environments operate, how they impact their surroundings, how they might change in the future, and how those changes may affect us globally. Cold climate measurements have allowed societies to improve travel during winter conditions, study winds for potential renewable wind energy sites, and learn how storms develop and move. Observations from remote, hard-to-reach locations, such as those in the arctic, also provide additional data for numerical weather prediction models. These models help meteorologists create forecasts. Comprehensive and high-quality data is essential because starting with accurate data results in better forecast models and better forecasts.

At Vaisala, we believe in a world where environmental measurements and observations improve every aspect of daily life. The technologies we create contribute to improved societies and environment, and we are committed to studying, understanding, and providing weather solutions that make our world a better place.

Vaisala has been measuring weather in all types of environments for over 80 years. Our expertise in key weather sciences and experience in weather measurement technology give you the confidence to make better decisions, as well as improve safety and efficiency. Learn more about Vaisala and our commitment to providing observations for a better life.

Watch: Vaisala - Future Positive
When you have to collect observations in harsh environments, the measurement equipment you select needs to withstand these conditions and provide quality, reliable data every day. Many of our customers have shared their experiences with Vaisala sensors in harsh climates. Vaisala has worked with customers from a broad range of industries and applications, including meteorology, roadways, energy and scientific research. The following pages highlight a few of these stories.
Throughout the year, 1000 to 5000 people are living at various research stations on Antarctica. The Korea Polar Research Institute, in collaboration with the Korea Meteorological Administration, set up a station in Antarctica to conduct upper air observations and analysis for the World Meteorological Organization’s Global Telecommunication System. Click to read the full story about how they used Vaisala instruments in the harsh cold climate.

“The KOPRI staff in Antarctica is very satisfied with the performance of the [Vaisala] AUTOSONDE in such a demanding environment.”

Chanseok Park, Korea Sales Manager, Vaisala
Experience

Even after winter storms have passed, sometimes hazards can remain. Read how the Colorado Department of Transportation is using Vaisala non-intrusive sensors, along with a dynamic message sign, to reduce accidents at a trouble spot, and keep drivers safe.

“CDOT chose the non-intrusive sensors because they are easier to maintain and less expensive in the long run.”

Mike Curtis,
PE & Project Manager,
Colorado Department of Transportation,
Region 3
Experience

Renewable energy companies require wind measurements in order to assess the potential energy production at specific sites. Harsh winter weather conditions create technical challenges for measuring wind, including icing events that may interrupt data collection. Read how Puhuri, a developer, builder, and operator of wind parks in Finland, is using the Vaisala Triton® Wind Profiler to collect important wind data for reducing uncertainty in annual energy projections.

“Vaisala’s Triton is the only practical way to reduce the uncertainty in our annual energy projections, allowing us to improve the profitability of our development process.”

Teppo Hilakivi, Technical Expert, Puhuri

READ THE STORY
Experience

With New Zealand’s challenging topography and geographical isolation, forecasting weather is no easy task. Read why the New Zealand MetService chose Vaisala weather radar to help them improve forecasts, protect the country’s residents, tourists, and businesses, and keep their economy moving.

“The dual polarization capability of the new Vaisala radars provides us with a lot more detail. We can now distinguish between precipitation types in clouds, analyze raindrop size, and identify the presence of supercooled water droplets, which can cause icing problems for aircraft.”

John Crouch, New Zealand MetService Radar Meteorologist
Climate research involves collecting valuable observations in some of the most remote locations on Earth. Sodankylä, Finland has one of the longest records of upper air measurements of temperature and ozone in the European sector of the Arctic. Click to read how radiosondes have been an important part of climate research for over six decades.

The Sodankylä station has performed soundings with Vaisala manufactured equipment ever since the upper air measurements began, building up a six decade long time series of continuous observations.
Road maintenance operations requires a great deal of knowledge about local weather conditions and the routes that need to be kept clear of ice and snow during winter months. Learn how Vaisala is helping roadway maintenance crews identify potential trouble spots and develop strategies for keeping routes clear and drivers safe.

Vaisala’s service doesn’t just stop at knowing where the cold spots are – we can provide a fully automated solution for warning the travelling public that the road ahead may have become dangerous.
Experience

Weather observers can face some interesting challenges during the launch of a radiosonde to collect upper-air measurements, especially in an arctic climate. Extreme temperatures, wind, snow, tripping over seals – these are all part of the data collection job. Meteorologists working with the British Antarctic Survey operating on the Antarctic Peninsula shared their experiences and interesting stories with Vaisala.

“Sometimes we had to battle against the blowing snow in high winds. Some days you would not even be able to see beyond the end of your arm.”

Cathy Moore, Meteorologist/Physicist with the British Antarctic Survey
Vaisala measurement technologies are designed and built for accuracy and reliability. These values, along with scientific integrity, are core components of our brand and bring you the highest-quality weather sensors and systems in the world. Accuracy of sensing technology is important because the observation data are used in daily forecasts, research analysis, and critical decisions that are made in a wide variety of industries, such as aviation, energy, maritime and roadway maintenance.

Vaisala offers a broad product portfolio and our sensors are renowned for measurement performance, reliability and regulatory conformance.
Collecting data over oceans and polar regions involves more than just weather instruments. The research vessel and supply icebreaker, POLARSTERN, is one of the infrastructural pillars of German Antarctic research. Learn how this vessel collects important observations, which are used by researchers and weather forecast services.

Over 30 years of upper air soundings have been collected from the vessel, which are crucial for weather forecast quality, for detecting changes in climate, and for the validation of modelling and satellite products.
Maximizing roadway safety, mobility and efficiency, while minimizing maintenance-related costs, is the common goal of winter maintenance engineers around the world. Road Weather Information Systems (RWIS) have a proven track record in enabling road authorities to meet the aforementioned goals. Learn how the Idaho Transportation Department achieved a reduction in the overall national accident figures using RWIS.

“The confidence in the RWIS system has also had a positive and definitive impact on the [Idaho Transportation Department] 511 system. RWIS data is now being utilized by the general public for planning purposes, allowing them to delay journeys due to inclement weather or to re-route their journeys.”

Conclusions from, “A study to determine the effects of employing a well maintained RWIS network on accident rates on major highways in the US state of Idaho”, by Katie Greening, et. al.
Science

Scientific research and integrity are at the core of Vaisala’s product development. Vaisala continually improves its measurement technologies based on scientific research and new understanding that develops as our world evolves. Third party comparisons of Vaisala radiosonde products have been published to assess differences and confirm performance specifications.

“Our results showed that measurements with the RS41 radiosonde satisfied the performance specifications of the manufacturer in most cases over both the tropical and polar oceans.”

Conclusions from Comparison of Vaisala radiosondes RS41 and RS92 launched over the oceans from the Arctic to the tropics by Yoshimi Kawai, et al.
For over 80 years Vaisala sensors have been helping scientists gain insight about the atmosphere, study extreme climates and climate change, and provide data that improves our daily life. Vaisala weather technologies are extremely stable, they are able to withstand extreme temperatures, and are highly tolerant in rugged conditions. With a high level of quality, stability, and reliability, Vaisala sensors deliver accurate readings of the environment. The data collected provides input for weather models, forecasts, and decision tools used by numerous industries around the world where weather affects operations.

Keep reading to learn more about Vaisala weather sensing technologies.
Measurement Systems & Solutions

Click on the icons below for information about weather solutions.

- Radiosondes and Sounding Systems
- Road Weather Information Systems
- Wind Measurement
- Weather Radar
- Meteorological Weather Stations
Radiosondes and Sounding Systems

Vaisala radiosondes and sounding systems are designed to streamline launch preparation, provide error-free performance, and lower operational costs of upper-air weather observations. Our commitment to quality, along with our expertise and innovation, means that you are receiving industry-leading data accuracy. Discover how Vaisala products reduce failure rates, provide reliable performance, and help you produce better forecasts.
Monitoring conditions on roadways is critical to performing winter maintenance operations. Decisions about how to manage roadways before, during, and after a storm, are made using weather data that is collected from a Road Weather Information System (RWIS). The information must be trustworthy, otherwise time, materials, and costs may be wasted. Vaisala road weather sensors and weather stations are used around the world in the most demanding climates, and provide road and highway agencies with accurate readings in any location.
Wind Measurement

Wind speed and direction data are used in a wide variety of industries - from collecting data for renewable energy to detecting high winds near roadways. Vaisala manufactures wind and weather instruments for different applications, requirements and budgets. Our wind sensor portfolio includes both mechanical and ultrasonic sensors, and sensors with heating elements for operations in cold climates. View the complete range of wind products at the link below.
In the face of the climate change, the role of weather radar has become even more important. Natural hazards triggered by heavy rains, blizzards, and other high-impact phenomena have increased rapidly. Weather radar is an instrument used to locate precipitation, calculate its motion, intensity, and determine the type (rain, snow, hail, etc.). Vaisala has delivered more than 130 weather radar systems to 27 meteorological institutes to help them improve forecasts, warnings and provide weather support for aviation, defense and community events.
Meteorological Weather Systems

Vaisala weather stations gather high quality, real-time data that are used in a variety of weather observation activities, ranging from forecasting to hydrology. The weather stations include a suite of sensors that can be mixed and matched for a variety of applications, and they are fully compliant with World Meteorological Organization guidelines. Vaisala weather stations are field-proven, with over 20,000 installations worldwide.
Watch

These short videos will show you an overview of Vaisala instruments and technology in the weather industry.

Scroll to the next page to watch our videos.
Introduction to DIGICORA® Sounding System MW41
The Newest Generation of Vaisala Sounding Systems

Vaisala Weather Radar – A Better Way to Measure
Advantages to Using Vaisala’s C-Band Dual Polarization Radar

Puhuri and Vaisala - Bringing Wind Energy to the Coldest Places on Earth
Webinars

Our free on-demand webinars are a great way to gain valuable knowledge.

Accurate Radiosonde Observations
Examples of Radiosonde Data and its Impact on the Application

Road Weather Information – Taking Action
Using Road Weather Information to Notify Drivers about Conditions

Value from Your Weather Radar
Get More from Your Weather Radar with the Right Software Tool

Vaisala Automatic Weather Station AWS310
Reliable, Accurate Environmental Measurements in all Weather Conditions

Friction vs. Freeze Point
Understand How Freeze Point and Friction are measured by Road Weather Sensors

MORE WEBINARSS
Inquire

At Vaisala, we believe in a world where environmental observations improve daily life. Our goal is to provide weather information that helps you make decisions that save lives, streamline operations, and save costs.

Vaisala experts are on hand to assist you with your weather measurement questions.
Observations for a Better World