

Meteorological Institute of  
the University of Munich (MIM),  
German Antarctic Receiving  
Station O'Higgins/Antarctica  
(GARS)



MOBOTIX ... the new face of IP video

# MOBOTIX

## C A S E S T U D Y

## Network Video – Reliability Under Extreme Conditions

### Creating Knowledge

When and under what conditions do banner clouds occur? How high is the snow at the Zugspitze peak/Germany? What is the resulting reflection rate of the Zugspitze plateau needed for evaluating the measured ultra-violet radiation? How much have the European and American continental plates moved away from each other last year?

These are some of the questions that keep the scientists at the meteorological institute of the Ludwig-Maximilian Uni-

versity in Munich (MIM) and at the German Federal Agency for Cartography and Geodesy (BKG) busy. The answers to these questions provide important hints on the development of our climate and the weather as well as on events and movements within the earth's core.

### Far Below Freezing

When searching for answers, the scientists frequently have to cope with extreme conditions. The MIM, for example, uses a weather station at an elevation of 2,965m (9,728ft) on Germany's highest peak, the Zug-

spitze mountain. The BKG, in turn, is one of the participants in the German Antarctic Receiving Station (GARS) project in O'Higgins/Antarctica. At the GARS site, a radio telescope permanently collects data on plate tectonics, i.e. the continental drift.

While temperatures on the Zugspitze may drop below  $-25^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$ ), they may be as low as  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) in Antarctica – accompanied by winds of up to 200km/h (130mph).

### Images From the Cold

No scientist can be forced to permanently work under these conditions. However, since the clouds and the weather conditions as well as the telescope's position need to be monitored permanently, the researchers rely on video technology for digital image recording. The only problem is – where to find a video camera that operates reliably under such conditions?



Security Vision Systems





MOBOTIX cameras at work: UFS Schneefernerhaus (left), DWD weather station at the peak of the Zugspitze mountain (center and right), GARS radio telescope (below right).



## Sturdy and Absolutely Weatherproof

### Movie Maker and Sun Lover

The Meteorological Institute in Munich uses a total of three Mobotix network cameras for continuously documenting the weather conditions, for supplementing meteorological routine measurements and for gaining additional information in the course of various research projects.

One camera is installed on the institute's roof so that the visitors of the MIM website can check not only the current weather data but also view the resulting images ([www.meteo.physik.uni-muenchen.de/mesomikro/stadt/camera.jpg](http://www.meteo.physik.uni-muenchen.de/mesomikro/stadt/camera.jpg)). Every day, mpeg films are generated from the numerous individual images, which are then used to demonstrate the dynamics of atmospheric processes to MIM students.

"Previously, we were working with a different web cam," tells meteorologist Heinz Lösslein. "But after some time, this camera had burnt areas on its image sensor that were caused by exposure to direct sunlight. And weather cameras are frequently exposed to direct sunlight," he states. The scientist searched the Internet for an alternative and finally came across the Mobotix solution. "Astoni-

shingly, this camera has proven to be 'sun-proof' and, thus, is a very good choice for us," Heinz Lösslein continues.

### At the Top

The second camera is located at the environmental research station Schneefernerhaus (UFS) at an altitude of 2,650m (8,694ft) on the South slope of the Zugspitze mountain. The images recorded there are used to evaluate the measured ultra-violet light. For a breathtaking view from the Zugspitze peak, go to [www.schneefernerhaus.de/camera.jpg](http://www.schneefernerhaus.de/camera.jpg).

And finally, another Mobotix solution can be found on the German weather service (DWD) observation platform at the Zugspitze peak, a location where an online connection is not possible. Therefore, a mini network consisting of a Linux computer and the camera has been installed. This setting is used for continuously observing a certain portion of the peak towards the West in order to document banner cloud development. During the day, the camera records a jpg image every five seconds. At night, the computer generates an mpeg film from the individual images, which is then sent to the Meteorological Institute in Munich for evaluation.



Mobotix camera in Antarctica.



Mobotix camera images (from left to right): GARS, MIM, Schneefernerhaus, Zugspitze peak.

### Deep-Frozen Operation

“For location at the Zugspitze peak it was a prerequisite that the camera resists temperatures below  $-25^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$ ),” explains meteorologist Mario Mech. “For this reason, we tested the camera at the institute prior to its installation for an entire week at  $-35^{\circ}\text{C}$  ( $-31^{\circ}\text{F}$ ) and it worked perfectly,” he adds. Sturdiness is one of the core design principles of Mobotix cameras. To achieve this, the cameras do not have any moving parts such as zoom, pan or tilt mechanisms.

“Also, Linux as the camera’s operating system is very much appreciated by the university environment,” emphasizes Dr. Joachim Reuder who is in charge of the UFS project. “On top of this, no other camera features such a wide range of networking possibilities, such as ftp, email and nfs. No other camera system that I know of is better suited for our needs,” he summarizes.

### In the Picture All the Time

At the beginning, an analog video camera was supposed to monitor the radio telescope 24/7 through a window of the German Antarctic Receiving Station (GARS). “Unfortunately, the camera only worked to our expectations when there was enough light outside and

when the window was not snowed in,” remembers information scientist Reiner Wojdziak who spends several months each year in Antarctica. As this was unsatisfactory, he collected information on high-quality outdoor cameras and came up with three manufacturers. “The MOBOTIX camera left the best impression,” explains the scientist. Thus, it was installed at a sheltered spot of the station’s outside wall where it has to resist temperatures of as low as  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ).

The camera is integrated into the station’s LAN and provides real-time images on this subnet. In order to save transfer capacity, current images to the Internet are sent only about every 10 minutes via satellite (<http://vlbi.leipzig.ifag.de/ohiggins/ohig-web.jpg>).

“Since the Mobotix camera has been installed, we have permanent first class eye contact with the radio telescope and, thus, can monitor its position continuously,” reports Reiner Wojdziak. “We are absolutely satisfied with this solution,” he emphasizes.

