Measuring the height of the cloud by an earhole thermometer.

Kyoto Univ. Earth Science Craftspeople

[HOT! Analogue technology]

The IT technology is rapidly changing our life. The leading factor of the IT technology is the digital technology hiding the analogue technology behind it. The anologue technology is essencial to the digital because digital world only get information from the real world through the analogue technology. We can see many application of the cutting edge of analogue technic in our life. The earhole thermometer is a good example.

The earhole thermometer is a kind of precision infrared thermometer, which uses two cutting edge technic. One technic is a sensor called thermopile and another is an OP amplifier that amplify weak signal from the sensor. Both technology have been existed for log time, but recent technology has made them much cheaper than before, and made possible to use for unexpected application.

[Measuring the temperature of cloud]

Falling down in price is a good news. You can try many experiment without writing many foolish papers. I bought one infrared thermometer and mesured the temprature of the cloud. It was not the main purpose, but the cloud was there when I opened up the package on the road, because I could not wait until home.

It was obvious that the thermometer can detect the cloud. So, I made a sensor which mesures the difference of the temperature between the cloud and the ground and started continuous observation.

The result shows that the temperature difference between cloud and the ground is small when it rains. It is also shown that a preferable height for the cloud is about 1km.

[Measuring the height of the cloud]

The preferable height was obtained with an assumption of the constant adiabat, although it is not sure at near the ground. I was curious to know whether the cloud height is realy 1km. So, the height was measured using triangular surveying.

Shoot the cloud with movie camera at the an angle of elevation of 45 degree, and send the picture to the web server. You can see it with portable phone (i-mode) and go to just beneth the cloud. The horizontal distance between you and the camera gives the height of the cloud. With this method, the cloud height was measured at 1km, although the this method is not always aplicable.

[Who has measured this?]

Very expensive equipment is used to measure the cloud height at airports. It measures the distance to the cloud with leaser light. Our equipment is 1/1000 in expense but it does fairly good job. Suppose you are measureing something that anyone else have never measured outside airports, it is great fun.