

What is Humansphere?

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We can measure air temperature, water vapor, wind, clouds and even yellow sand. Another lidar can detect the amount of CO₂!

This is called a "lidar". Instead of using radio waves like radar, lidar uses laser light to observe. Like radar, lidar does detect faint reflections bounced back from the atmosphere. But we use telescopes instead of antennas.

Let's eat!! After dinner...
Huh!
What's that?
and outside

Lidar: Light Detection and Ranging
Radar: Radio Detection and Ranging

How can we know that the atmosphere reflects radio waves and light?

Wait wait!
Aha! convinced.

Radio wave reflects at fluctuations of air temperature or water vapor, and light does the same when it comes across molecules in the air (such as Nitrogen and Oxygen), dust, or clouds. We can measure the atmosphere by the reflected radio wave and light.

Fluctuations of the atmosphere

Scattered wave Transmitted wave Receiving scattered wave

Dust Atmospheric molecule Cloud particle

Scattered light Laser light

Laser Telescope Lidar

How can you measure the atmosphere using light or radio waves...?

ah! Stars... hmm umm.

As we know the nature of light and radio waves, we can use it to measure many things.

Fluctuations of the air

Hot air! Heat haze

Air fluctuations let the light refract and scatters.

Transmits almost straight

Look blurry Looks normal

Heat haze seen near the ground on hot summer days, too.

People in the past were puzzled, and they found out why from studies.

That's right.

Stars shimmer when the air density fluctuates.

It definitely looked like a secret lab.

Truly

I would've loved to tell them about observing the atmosphere using GPS...

Thank you so much, it got so late...

Oh, it's mom's car!

I handed you the cell-phone this morning. It has GPS.

no problem

The End

What's "measure the atmosphere using radio waves and light"?



Hello! What is this sound?

Hello When we got closer,

What is this sound? A sudden rumbling!

Vmmmm...

Oh, a turtle

While counting raccoons in the mountains of Shigaraki, Masao and Moe got lost in what seemed like a secret laboratory.

Wanna actually see it? Yes!

Why do you want to measure the speed of sound? Isn't the sound speed always the same??

But, wait! Aha! convinced.

Front of sound wave

Sound wave

Radio wave

RASS: Radio Acoustic Sounding System

haha Here here... Oh...it's a person

We're actually measuring the speed of emitted sounds using radar.

Sound travels faster when the air is warm, and slower when it's cold. Therefore by measuring the speed of sound, you find distribution of warm and cold air.

warm ⇄ cold

... and are measured by radar over here.

Sounds are generated over there,

Vmmmmmm...

Wind?

You there,

Aha! Good guess! You're correct.

Radar...? This one looks like the one on my roof! T.V. antenna?

The Yagi antennas used here for our MU radar are the same as T.V. antennas. We connect 475 of them to work as one antenna. But unlike T.V. antennas they transmit as well as receive.

We use them to measure winds, too. Changing timing of wave transmission, The surface of observation can be slanted.

MU: Middle and Upper Atmosphere (10~100km) (100~500km or more)