Earth's Speeded Rotation Puzzles Scientists

Earth by NASA.

January 2, 2004 Boulder, Colorado - In 1949, the U. S. Bureau of Standards produced the world's first atomic clock which counted the rates of vibration in cesium atoms. Then in 1972, the world adopted an international time keeping system based on atomic clocks. That's when it became necessary to synchronize the resonance of the cesium atom and earth time as measured by the earth's spin. After 1972, the Bureau of Standards had to insert what are called 'leap seconds' into the atomic time keeping system because the earth's rotation slowed a little bit each year.

But starting five years ago, for the first time, leap second additions have not been necessary because something unknown has increased the Earth's spin. I talked about this phenomenon this week with Fred McGehan at the National Institute of Standards and Technology Laboratory in Boulder, Colorado.

Interview:

Fred McGehan, Public Affairs Officer, National Institute of Standards and Technology Laboratory, Boulder, Colorado: "The reason we have not had to insert a leap second for the past five years is that the rate of the earth's spin on its own axis has actually sped up a bit. Scientists are not exactly sure why. Some of the speculation has to do with there might be some shifts in the earth's molten core; it could be some tidal changes that can effect the earth; or it could be the earth's weather, such as warming of the earth where you might have a melting of glaciers. No one is absolutely sure why, but there is an agency in Paris the International Earth Rotation Service that measures the rate of the Earth's rotation. When they see that rate is out getting out of sync with atomic time keeping, they order the insertion of the so-called 'leap seconds.' But they have not had to do that for the past five years. That's what we've been reporting this year.

SO, WHAT BAFFLES SCIENTISTS IS WHAT COULD BE CAUSING THE EARTH TO SPEED UP JUST ENOUGH SO THEY DON'T HAVE TO ADD THIS LEAP SECOND.

Exactly. I'm sure some people would say it could be caused by global warming. But no one knows absolutely for sure.

COULD YOU EXPLAIN THAT A LITTLE BIT MORE? WHEN I THINK OF

GLOBAL WARMING AND OUR HAVING A THICKER ATMOSPHERE OF CARBON DIOXIDE, YOU WOULD THINK THAT WOULD BE A BIGGER DRAG ON THE EARTH'S ROTATION AND NOT SPEED IT UP.

Take the example say of a skater, an ice skater, who spins on their own axis. When they extend their arms, they slow a bit. Then when they pull their arms into their body, that spin speeds up. For instance, if there is not as much ice and snow on our mountain peaks in the glaciers, you are in effect changing the shape of the Earth. Then you could have the effect of speeding up.

IF THIS SPEEDING UP CONTINUES AND IT BEGINS TO BE THAT WE WOULD HAVE TO SUBTRACT A LEAP SECOND IN ORDER TO STAY IN TIME WITH THE CESIUM CLOCK, WHAT ARE THE IMPLICATIONS?

I don't think anyone has postulated that we might need to do that. Right now, in effect, the Earth is behaving very well as a clock. I haven't heard any speculation as to what might happen if we needed to subtract a second."

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