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ADVANCE -- HOLD UNTIL DELIVERY OF TALK -- APPROX 8 P.M., TUESDAY, JUNE 18, 1968
June 12, 1968 Al Mitchell, Director
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'WE KNOW MORE ABOUT VENUS ATMOSPHERE THAN ANY OTHER PLANET, EXCEPTING EARTH' --

'SOVIET MEASUREMENTS, COMPARED TO OUR PROGRAM, SHOW HOW OURS IS LAGGING' --

-- SCAS DIVISION HEAD TELLS AMERICAN ASTRONAUTICAL SOCIETY'S REGIONAL MEETING

IRVING --

"On the whole, we now know more about the atmosphere of Venus than that of any other planet, excepting only the Earth."

This was one point made by Dr. Francis S. Johnson of Dallas as he addressed the American Astronautical Society's Southwest regional section here Tuesday night.

This knowledge has been gained by data recently obtained from Soviet Spacecraft Venera 4 and American Spacecraft Mariner 5. It is far more complete than could have been developed from either set of measurements alone, Doctor Johnson said. But, he also said:

"The Soviet measurements, when compared to the American planetary program, show how our space program is lagging. Those of us interested in planetary science are faced with the prospect of seeing most of the major new discoveries/come from the Soviet program during the next five or 10 years.

"For example, the Soviets are likely to land a space station on Mars next year; whereas, the earliest this can occur in the American program appears to be 1973, and more probably 1975.

"This is likely a case of false economy, to which Rep. Earle Cabell has referred recently, where the current fiscal savings will result in a requirement

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for much greater future expenditures in order to catch up.

"The intensive space efforts of the Soviets are adding tremendously to their technological and management capabilities; this increased capability must also spread in time through other areas of their economy, especially electronics, computers, and military devices.

"It is not just a matter of space exploration alone; it is the technological and management capability that goes along with space exploration that influences the basic strength of a country."

Doctor Johnson heads the Atmospheric and Space Sciences Division of the Southwest Center for Advanced Studies in Dallas. He also is Director of the recently-formed Space Sciences Center, Institute of Technology, Southern Methodist University. He is a member of the Space Science Board, National Academy of Sciences, and a member of the National Aeronautics and Space Administration's Lunar and Planetary Missions Board.

The Southwest Center, since 1962, has performed and been issued contracts for more than \$12 million in NASA space-related research. Its research volume in physical sciences reached \$4,700,353 in the latest fiscal year, third highest among southwestern education-research institutions spread across five states.

There are several points about the Venus atmosphere on which Soviet and United States scientists don't agree, Doctor Johnson said. But it is clear that Earth's neighbor has an atmosphere that is very dense, dry and hot. The planet is cloud-covered, Doctor Johnson said, but the clouds are relatively thin and very high.

The American studies place clouds about 60 kilometers (33 miles) above the surface. Soviet conclusions put them at about 30 kilometers (19 miles). These heights compare to less than 20 kilometers (12 miles) for the highest clouds above the Earth.

The Soviet Venera 4 space probe flew directly into Venus, Doctor Johnson told the regional meeting. After slowing down to the speed of sound, it ejected an instrument capsule on a parachute. The capsule made its first measurement in an atmospheric region 70 per cent as dense as Earth's, with a temperature of 80 degrees Fahrenheit (300 degrees Kelvin).

These figures sound similar to some in Earth's atmosphere, Doctor Johnson said. "But they really are very different because a radio altimeter indicated an altitude of 26 kilometers, or 16 miles; such conditions near Earth would be found no higher than 3 kilometers, or 2 miles."

Composition measurements indicated 90 per cent carbon dioxide, less than 7 per cent nitrogen, about 0.1 per cent water vapor, and over 0.4 per cent oxygen.

"Just as the descent reached the point where the surface should have been encountered, the transmissions stopped, and the Soviet scientists attribute this to the capsule overturning on landing. The temperature at this point was about 490 degrees Fahrenheit (545 degrees Kelvin), and the pressure 20 atmospheres," said Doctor Johnson.

Twenty atmospheres' pressure equals 280 pounds to a square inch. Earth atmosphere, at the surface, has a pressure of 14 pounds to the square inch.

American scientists doubt that Venera 4 // the surface of Venus. If it did, by landing on a mountain top, the mountain would have to be something more than 100,000 feet tall. No one believes (in the U. S.) that Venus has mountains that high, says Doctor Johnson.

Doctor Johnson said: "It appears that the Soviet capsule failed, by as much as 30 kilometers, from // the surface. The surface pressure therefore must be much greater -- about 100 atmospheres rather than 20 -- and the temperature is more likely near 800 degrees Fahrenheit (700 degrees Kelvin)."

The disagreement on pressure and temperature comes from the American Mariner 5 flight past Venus and behind the planet. Radio signals were refracted by the dense atmosphere. The data agrees well with Soviet measurements where they overlap.

But when the Mariner 5 trajectory results are examined closely and combined with radar measurements on the diameter of Venus, to construct an altitude scale, "it does not support the Soviet claim that their capsule // ^{made measurements on} the surface," says Doctor Johnson.

There are other points of difference on oxygen and water vapor content of the Venus atmosphere, Doctor Johnson said here. Oxygen content does not exceed 1 part in 100,000, and water content 1 part in 1 million according to American data from spectroscopic surveys at ground observatories. Soviet measurements indicate 1 part in 1,000 for both oxygen and water vapor.

The Soviet/^{oxygen} measurement will not likely be accepted unless it is repeated with a very // ^{reliable} instrument, he said, and/^{thus} confirmed.

"On the other hand," Doctor Johnson said, "their water vapor measurement was done twice and is probably correct; the American measurement indicating much less water probably applies only to a higher atmospheric region than was believed to be the case when it was made.

"As with Earth, the atmosphere of Venus is probably much drier above its tropopause (a surface that ~~roughly~~ marks the upper boundary of weather) than below it; the American measurements probably apply only above the tropopause, and the Soviet measurement below."

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EDS: The AAS regional section meeting June 18 will be held in the Tejas room, Irving Bank and Trust Building, beginning at 6:30 p.m. with a business session. Arrangements are being made by John Cook, Geotech-Teledyne (BR1-2561 X220).

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