

mixed gas (80 percent nitrogen and 20 percent oxygen), the Apollo has only one-third of an atmosphere of pure oxygen. Any loss of oxygen or pressure would occur more slowly. For example, if a half-inch hole was created the astronauts would have five minutes to suit up. Apollo also has many redundant systems Soyuz doesn't have.

Despite these differences, NASA was expected to announce soon that the Apollo 15 astronauts due to be launched toward the moon July 26 (SN: 7/10/71, p. 28) will suit up—just to be safe. This change will occur at least once on the mission during the time most comparable to the Soyuz-Salyut separation—the jettisoning of the ascent stage of the lunar module. David Scott, James Irwin and Alfred Worden will put on “soft suits”—the same suits that are worn on the lunar surface, but not pressurized. They can be pressurized within seconds should an emergency arise. No crew has suited up for LM jettisoning since the Apollo 9 crew did in March 1969. □

## DEBATE ON AEROSOLS

### Question for the (ice) ages

The question of the extent to which man may be inadvertently modifying the earth's climate by tampering with the composition of the atmosphere has aroused concern and controversy throughout the scientific community. The concentration of atmospheric carbon dioxide, the agent that slows down surface cooling, has increased by seven percent in the last few decades. At the same time, some meteorologists have blamed an observed cooling of world climate on increases in the amount of fine particles, called aerosols, in the atmosphere (SN: 11/15/69, p. 458).

Drs. S. I. Rasool and S. H. Schneider of the National Aeronautics and Space Administration's Goddard Institute for Space Studies have made separate estimates of the climatic effects of increases in the concentration of carbon dioxide and dust in the atmosphere.

To perform their calculations, they

adopted a model atmosphere that reflects present-day global conditions and then calculated the effects of carbon dioxide increases. A doubling of carbon dioxide produced a temperature increase of 0.8 degrees C. in the troposphere, they report in the July 9 SCIENCE. But as more carbon dioxide is added, the rate of temperature increase declines and eventually levels off. Even an increase by a factor of eight—an increase the researchers believe is highly unlikely in the next several thousand years—produced an increase in surface temperature of less than two degrees.

Calculating the effects of aerosols was much more complicated, since particles, depending on their composition, number, size and shape, will scatter and absorb both radiation from the sun and heat radiated from the earth. Drs. Rasool and Schneider estimated the magnitude of scattering and absorption of visible and infrared radiation by typical atmospheric aerosols. They found that aerosols produced surface cooling, the rate of cooling increasing with greater opacity of the aerosols.

Several recent studies have indicated that the dust content of the atmosphere may have doubled in the last 60 years. The NASA scientists also point to estimates that man's potential to pollute will increase six- to eightfold in the next 50 years. If this increased rate of injection of particulate matter into the atmosphere were to raise the present opacity by a factor of four—an increase that cannot be ruled out as a possibility in the next hundred years—Drs. Rasool and Schneider calculate that the mean surface temperature of the earth could be lowered by as much as 3.5 degrees C.

A temperature decrease of this magnitude, if sustained over a period of several years, might be sufficient to trigger an ice age, the scientists said in their report. In the week since its publication, that statement has received considerable attention, but Dr. Rasool said this week that it was not meant as a prediction of an impending ice age but was intended merely to emphasize the importance of a global change of even a few degrees.

Even with a radical decrease in temperature, points out Dr. J. Murray Mitchell Jr. of the National Oceanic and Atmospheric Administration's Environmental Data Service, an ice age must await cooling of the oceans, a process that would take several centuries. Also, though he agrees with the NASA scientists' calculations on a global scale, Dr. Mitchell says the problem of climatic change as a result of pollutants is much more complex locally, and that the moistness of the underlying surface must be taken into account, (SN: 4/24/71, p. 274). □

### The poetry of plate tectonics

The theory of plate tectonics has revolutionized thinking in all the geological sciences in the last few years, so maybe it's not too surprising that it has also inspired some poetry. It isn't Shakespeare, but then scientific reports in the journal NATURE, where this venture into geo-verse appeared last week, don't usually read like the scripts of Elizabethan plays either. Some excerpts from the “paper” by earth scientists B. C. King of Bedford College in London and G. C. P. King of Cambridge University:

*They put a girdle round the Earth  
And named it the Worldwide Rift;  
It helps explain the ocean floor  
And Continental Drift.*

*Vine and Matthews sailed away  
Exploring the ocean bed;  
It took much longer getting them back;  
They said it was seafloor spread.*

*It appears that the oceans were mostly  
formed  
By Cenozoic streams  
Of mantle flooding up the cracks  
And gumming up the seams.*

\* \* \* \*

*And so the plate has been revived  
In present day tectonics,  
Though sial and sima still remain  
As crustal term mnemonics.*

*Both kinds of crust now constitute  
The grander types of plates  
And as they move upon the Earth  
They suffer subtle fates.*

*The edges which are growing still  
Are hid beneath the oceans,  
While those around the island arcs  
Show self-consuming motions.*

*Yet others seem to hit or slide*

*Performing curious functions,  
And where they can't make up their  
minds  
You there have triple junctions.*

*On continents the crustal plates  
Are edged by earthquake foci,  
And little plates proliferate  
By joining up the loci.*

*As alchemists once sought the stone  
For magic transmutations,  
The motions of the plates are shown  
By seismic computations.*

*Geologists naively thought  
That rifts were due to faulting,  
By subsidence of crustal strips  
Along a pre-rift vaulting.*

*Their evidence was solely based  
On visual observations  
Of structure and stratigraphy  
And such out-moded notions.*

*But others now hold better views  
And think that each “mañana”  
Brings Africa a step more close  
To the fate of old Gondwana.*

*McKenzie sees his moving plates  
Wedging the rift asunder,  
And one day ships will sail the rift  
To maritime Uganda.*