VI. STRATOSPHERIC OZONE IN THE FUTURE

Q19: How will recovery of the ozone layer be detected?

Scientists expect to detect the recovery of the ozone layer with careful comparisons of the latest ozone measurements with past values. Changes in total overhead ozone at various locations and in the extent and severity of the Antarctic "ozone hole" will be important factors in gauging ozone recovery. Natural variations in ozone amounts will limit how soon recovery can be detected with future ozone measurements.

Recovery factors. Detecting the recovery of the ozone layer will rely on comparisons of the latest ozone values with values measured in the past. Because of its importance, ozone likely will be measured continuously in the future using a variety of techniques and measurement platforms (see *Q5*). In the ozone comparisons, scientists will look for improvements in certain factors related to the distribution of ozone. These factors include the following:

- A lessening of the decline in global ozone, either in total ozone or ozone at specific altitudes in the stratosphere.
- An increase in global total ozone amounts toward values found before 1980 when halogen source gas abundances in the atmosphere were much lower than today.
- A sustained reduction in the maximum size of the Antarctic "ozone hole."
- A sustained increase in the minimum value of ozone found in the Antarctic ozone hole.
- Less ozone depletion in Arctic winters during which temperatures are below polar stratospheric cloud (PSC) formation temperatures.

As the ozone layer approaches full recovery, scientists expect to observe improvements in all these factors.

Natural factors. Global total ozone is influenced by two important natural factors, namely, changes in the output of the Sun and volcanic eruptions (see *Q14*). The evaluation of ozone recovery must include the effects of these natural factors. The solar effect on ozone is expected to be predictable based on the well-established 11-year cycle of solar output. Volcanic eruptions are particularly important because they increase ozone depletion caused by reactive halogen gases, but cannot be predicted. The occurrence of a large volcanic eruption in the next decades when effective stratospheric chlorine levels are still high (see ***Figure Q16-1***) may obscure progress in overall ozone recovery by temporarily increasing ozone depletion. The natural variation of ozone amounts will also limit how easily small improvements in ozone abundances can be detected.