III. NATURAL AND ANTHROPOGENIC INFLUENCES

1. Ozone Depletion

The dispute about the natural, non-human, contribution to the thinning of the ozone layer has a long history.¹ The basic argument was that any detrimental impact on the ozone layer was more likely caused by non-human natural sources than anthropogenic causes. This is not an outrageous suggestion, for as the Vienna Convention, noted, ‘chemical substances of natural and anthropogenic origin . . . are thought to have potential to modify the chemical and physical properties of the ozone layer’.² There were two basic arguments in this debate. The first argument tried to negate the role of anthropogenic emissions at the expense of natural ones. The second argument suggested that Nature was much more resilient than commonly believed.

The first argument that attempted to negate the human contribution of damage to the ozone layer suggested that a number of chemicals, already naturally present in the atmosphere, affect the ozone layer to a much greater degree than humanity does. NASA was the first organization to use this argument in the mid 1970s, when they tried to downplay the influence of the chlorine coming from the space shuttle, as opposed to the influence of volcanoes.³ This identification of volcanoes as a source of ozone depleting gases was correct, as later research clearly demonstrated that when Mount Pinatubo erupted in 1991, the ozone in the lower stratosphere over the tropics reduced by 30 per cent over the Antarctic and 20 per cent over the Arctic. However, although volcanoes were shown to be a source of ozone damaging chemicals, their impact did not eclipse the anthropogenic impact. Rather, it supplemented it.⁴ Natural sources of methyl chloride, methyl bromide and chloromethane) were also identified as a

² Annex 1. (4).
threat to the ozone layer. However, once more, the natural contribution of these chemicals was found to be substantially less than the anthropogenic ones. Finally, solar cycles and the flux of radiation from the sun was suggested, from the mid 1970s until the late 1980s, as being the primary cause of the depleted ozone layer. Later research demonstrated that although the solar cycle has an influence on the ozone layer, it does not cancel out the human contribution of ODS.

The second argument originally suggested, that one of the reasons why there was no evidence of ozone depletion, was due to the possibility that a natural sink for ODS was beneficially soaking up the ODS and thus negating any detrimental effect inflicted on the ozone layer. This view was quickly dismissed when it was discovered that the Polar regions that were acting as the sinks for ODS, and the impact of ODS was not being negated, but concentrated in detrimentally catalytic areas. In this instance, Nature behaved in a completely unexpected way. This unpredictability was such that even fundamental chemical equations were thrown into doubt. In this context, the unpredictability was caused by the uplifting of air currents after the Polar winter whereby ozone-poor air from lower altitudes is drawn into the stratosphere via a ‘polar vortex’. This process then links into extremely cold temperatures and stable air masses. These conditions form the perfect platform for ODS destruction of the ozone layer.

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