

A global analysis of seasonal total ozone trend for the CFC increase period using TOMS data and the MIROC3.2 nudged Chemistry-Climate Model

Risa Obama¹, *Hideharu Akiyoshi¹, Yousuke Yamashita¹, Masanao Kadowaki¹

1.National Institute for Environmental Studies

In this study, we globally analyzed seasonal total column ozone trends for the period 1979-1993 and 1979-1997. We compared the total ozone trends of a nudged CCM with those of TOMS. The nudged CCM is the MIROC3.2 Chemistry-Climate Model nudged toward ERA-Interim reanalysis data. The comparison showed that the model simulation reproduced well the trends globally. In order to separate the effects of ozone changes due to the chemical reactions and the transport on the trends, we performed a 1979-ODS experiment, in which ODS concentration was fixed to the 1979 value. The results indicate that chemical ozone loss is more dominant as a driver of the trends than ozone transport change at the mid-latitudes in the Southern Hemisphere, whilst at the mid-latitudes in the Northern Hemisphere ozone transport is more dominant than the chemical loss in the winter and spring, and both the effects are comparable in the summer and autumn. From a global ozone trend map, we show significant negative trends over the Pacific Ocean in the east of Japan, around the east coast of the North America, and over Europe. These trend distributions suggest some effect of planetary scale wave activity change in the Northern Hemisphere winter and spring for the CFC increase period.

Keywords: total ozone, long-term trend, nudged Chemistry-Climate Model, TOMS, ERA-Interim