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Chemical ozone loss in the Arctic winter 1991–1992

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Abstract. Chemical ozone loss in winter 1991–1992 is recalculated based on observations of the HALOE satellite instrument, Version 19, ER-2 aircraft measurements and balloon data. HALOE satellite observations are shown to be reliable in the lower stratosphere below 400 K, at altitudes where the measurements are most likely disturbed by the enhanced sulfate aerosol loading, as a result of the Mt. ~Pinatubo eruption in June 1991. Significant chemical ozone loss (13–17 DU) is observed below 380 K from Kiruna balloon observations and HALOE satellite data between December 1991 and March 1992. For the two winters after the Mt. Pinatubo eruption, HALOE satellite observations show a stronger extent of chemical ozone loss towards lower altitudes compared to other Arctic winters between 1991 and 2003. In spite of already occurring deactivation of chlorine in March 1992, MIPAS-B and LPMA balloon observations indicate that chlorine was still activated at lower altitudes, consistent with observed chemical ozone loss occurring between February and March and April. Large chemical ozone loss of more than 70 DU in the Arctic winter 1991–1992 as calculated in earlier studies is corroborated here.

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