

Atmospheric Chemistry

Lecture 8

Simple Solutions of the Continuity Equation

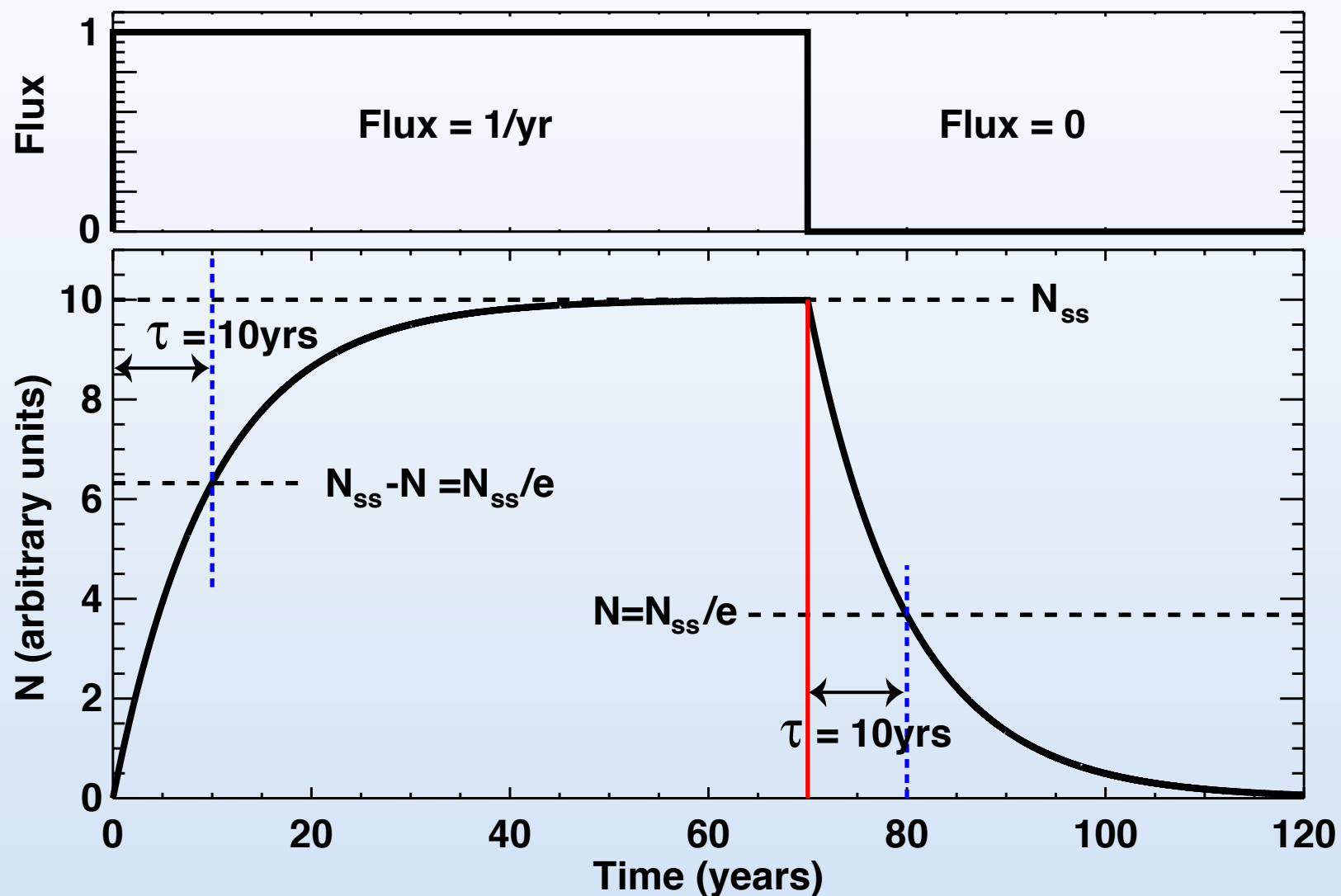
Steady-state; $dN/dt = 0$; $N_{ss} = F_0 \cdot \frac{1}{l_f} = F_0 \cdot \tau$

Defines lifetime, τ ; $\tau = \frac{N_{ss}}{F_0}$

Set flux to zero ; $\frac{dN(t)}{dt} = -l_f \cdot N(t)$

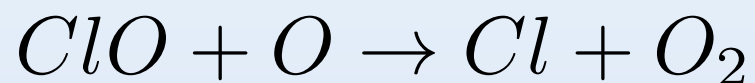
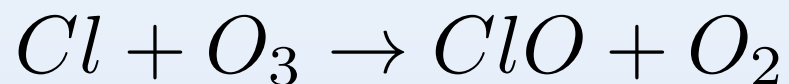
Solution ; $N(t) = N_{ss}e^{-l_f \cdot t} = N_{ss}e^{-t/\tau}$

The Atmosphere as a Simple Box Model



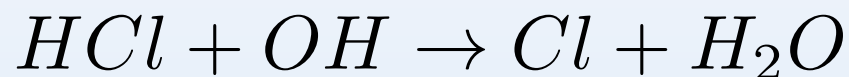
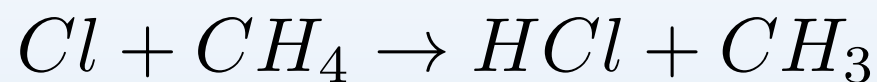
Stratospheric Chlorine and the Chlorofluorocarbon-Ozone Problem

Chlorine Catalytic Cycle for Ozone Loss



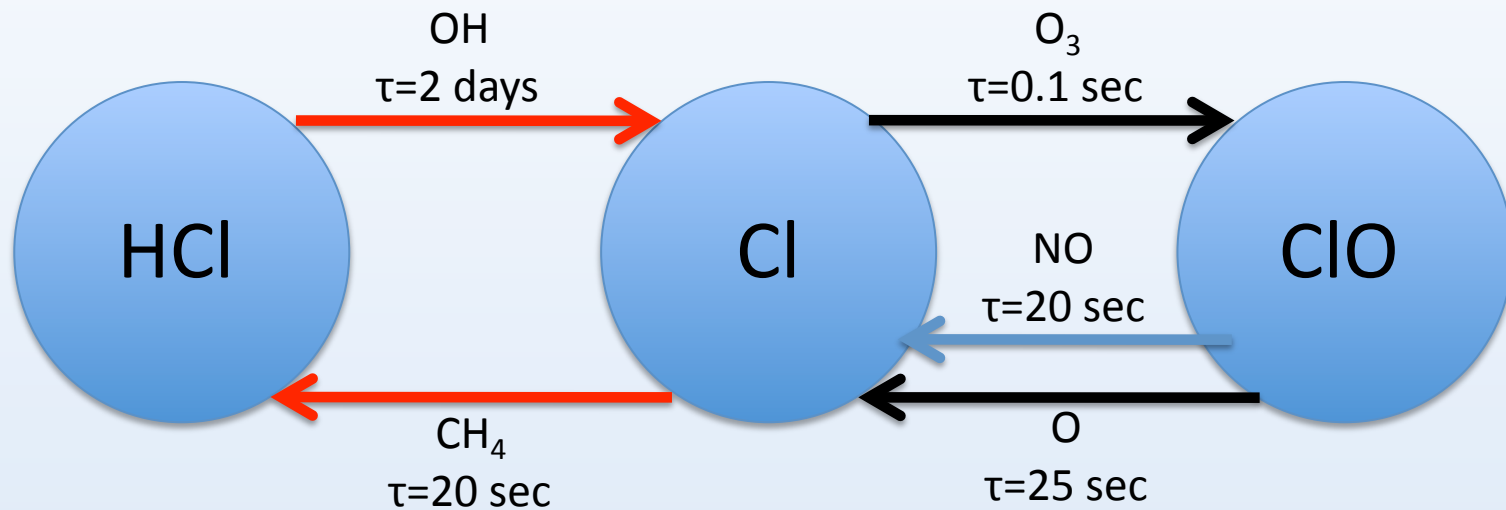


HCl as a temporary reservoir for catalytically-active chlorine





Stratospheric Chlorine Chemistry



*Temporary
Reservoir*

Active Chlorine