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### **Photodissociation of water ice and adsorbed molecules**

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The TOF spectra of photofragment hydrogen atoms from the photodissociation of amorphous ice at 193 nm have been measured. The spectra consist of both a fast and a slow components characterized by translational temperatures of 2300 and 120 K, respectively. The photoabsorption of a branched cluster,  $(\text{H}_2\text{O})_{6+1}$  that is a  $(\text{H}_2\text{O})_6$  cyclic cluster attached by a water molecule with the hydrogen bond, is expected to appear at around 200 nm. The source of the hydrogen atoms is attributed to the photodissociation of the ice surface molecules that are attached by the  $(\text{H}_2\text{O})_6$  water structure with the hydrogen bond. Atmospheric implications are estimated for the photodissociation of the ice particles at 190-230 nm in the region between 80 and 85 km altitude. The photodissociation of ice has also performed at 157 nm. Since the bulk ice absorbs vacuum UV light, hydrogen atoms are produced from both the surface and bulk photodissociation processes. A difference in the UV photodissociation dynamics of chlorine and trichlorofluorocarbon has been observed when those molecules were adsorbed on water ice surfaces. In the photodissociation of  $\text{Cl}_2$  at 300 to 414 nm, the branching ratios of the formation of  $\text{Cl}(^2\text{P}_{1/2})$  with respect to  $\text{Cl}(^2\text{P}_{3/2})$  are different from those reported in the gas phase photodissociation. However, in the photodissociation of  $\text{CFCl}_3$  at 193 nm, the ratio is in good agreement with that reported in the gas phase photodissociation. These results are mostly attributable to the difference in the interaction of the adsorbed molecule with surface water molecules of ice. The kinetic energy distributions of the photofragment chlorine atoms reflect the interaction between the adsorbed molecules and the surface water molecules. The photofragment spectroscopy developed by late Prof. Richard Besohn has been used in this work.