

The conversion from chlorine reservoir species hydrogen chloride (HCl) and chlorine nitrate (ClONO₂) to easily photolyzable chlorine compounds on polar stratospheric clouds (PSCs) is directly connected to ozone-depletion in spring above the poles. Especially the direct reaction between the two reservoir species to molecular chlorine (Cl₂) and nitric acid (HNO₃) is very important in this connection.

In particular, the question on the mechanism of this reaction and on the influence of the clouds, which are prevalent at temperatures around 200 K and basically consist of ice, is not answered fully at the present moment. One hypothesis is the "quasi liquid like" mechanism presumed to occur on the ice-surface in a liquid-like layer. This hypothesis is in contrast to the hypotheses, which have been assumed to be possible, namely a physical adsorption of HCl without ionization and incorporation of HCl in the bulk accompanied by ionization.

In order to distinguish between these three mechanisms, I plan to do ellipsometric measurements in the laboratory of Prof. Molina at M.I.T. These measurements will be done on an ice crystal with and without the presence of HCl. The obtained result is the refractive index of the surface layer and the thickness of the liquid-like layer, which directly allows to identify the reaction mechanism on the ice surface. In addition it is possible to study the influence of the morphology of the ice crystal (hexagonal, cubic, porous, less porous) and the influence of nitric or sulfuric acid.