

Department Seminar

Presented by

Prof. Frank Keutsch

“Elucidating Fundamental Chemical Processes in the Atmosphere”

TROPOSPHERIC OZONE AND SECONDARY ORGANIC AEROSOL (SOA) CONTRIBUTE TO POOR AIR QUALITY AND PARTICIPATE IN IMPORTANT ECOSYSTEM-ATMOSPHERE-CLIMATE FEEDBACKS. WE STUDY THE COMPLEX ATMOSPHERIC MULTI-PHASE CHEMISTRY CONTROLLING THESE POLLUTANTS IN ORDER TO IMPROVE AND VALIDATE COMPUTER MODELS USED TO MAKE FUTURE POLICY DECISIONS. THIS REQUIRES AN APPROACH THAT DISREGARDS TRADITIONAL BOUNDARIES BETWEEN DISCIPLINES RANGING FROM PHYSICAL, ANALYTICAL, AND SYNTHETIC CHEMISTRY, THROUGH LASER TECHNOLOGY AND OPTICAL ENGINEERING, TO ATMOSPHERIC DYNAMICS AND METEOROLOGY. IN THIS TALK I WILL PRESENT TWO ASPECTS OF OUR OVERALL RESEARCH:

OXIDATION OF VOLATILE ORGANIC COMPOUNDS, ESPECIALLY VIA THE OH RADICAL, IS CENTRAL TO FORMATION OF SECONDARY POLLUTANTS. MODELS UNDERPREDICT OH RADICAL CONCENTRATIONS BY UP TO A FACTOR OF TEN IN RURAL AREAS, IMPLYING A PROFOUND GAP IN OUR UNDERSTANDING OF THIS CHEMISTRY. ENABLED BY NOVEL INSTRUMENTATION, WE HAVE

DEVELOPED A NEW APPROACH TO CONSTRAIN OH CONCENTRATIONS VIA IN SITU MEASUREMENTS OF GLYOXAL. RESULTS SUGGEST THAT OH OBSERVATIONS MAY BE SUBJECT TO A SUBSTANTIAL POSITIVE BIAS. LABORATORY STUDIES OF A NEW MECHANISM THAT HAS BEEN PROPOSED TO INCREASE OH PRODUCTION REVEALS THAT THIS MECHANISM DOES NOT MARKEDLY ENHANCE OH BUT MAY BE IMPORTANT FOR THE GLOBAL CARBON BUDGET.

