

## **Data and modeling of discharges containing water vapour**

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Maintaining non-equilibrium becomes more and more difficult as one approaches atmospheric pressure due to excessive electron/ion multiplication. Thus all sources of non-equilibrium plasmas must have some control of multiplication allowing them to limit it. This may be accomplished by interrupting the avalanches by spatial inhomogeneities (coronas), dielectric barriers, temporal interruption or operating at high frequencies. Streamer like ionization fronts provide such environment where space charge provides high field region for self maintenance and self propagation and at the same time limits the growth of the space charge by turning the field off. Diagnostics of atmospheric pressure plasmas is difficult as the dimensions are necessarily small. Coupling of diagnostics and models is on the other hand essential for providing physical understanding.

We will present some of our recent results obtained by electric probes, mass analysis and space/time resolved optical emission spectroscopy and discuss how those may be the foundation for obtaining observables that may be modeled. We will discuss swarm like models and how those may be used, application of global models and the input data, modeling of streamers. Finally we shall address the needed data for water vapour containing gas mixtures including the cross sections and transport data for ions (positive and negative), fast neutrals and electrons.

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