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Surface Wave Driven Air-Water Plasmas[1] ELENA TATAROVA, JULIO HENRIQUES, CARLOS FERREIRA, Institute of Plasmas and Nuclear Fusion, Instituto Superior Tecnico, Technical University of Lisbon, Portugal — The performance of a surface wave driven air-water plasma source operating at atmospheric pressure and 2.45 GHz has been analyzed. A 1D model has been developed in order to describe in detail the creation and loss processes of active species of interest and to provide a complete characterization of the axial structure of the source, including the discharge and the afterglow zones. The main electron creation channel was found to be the associative ionization process $N+O \rightarrow NO^+ + e$. The NO(X) relative density in the afterglow plasma jet ranges from 1.2% to 1.6% depending on power and water percentage according to the model predictions and the measurements. Other types of species such as NO_2 and nitrous acid HNO_2 have also been detected by mass and FT-IR spectroscopy. Furthermore, high densities of $O_2(a^1\Delta_g)$ singlet delta oxygen molecules and OH radicals (1% and 5 %, respectively) can be achieved in the discharge zone. In the late afterglow the $O_2(a^1\Delta_g)$ density is about 0.1 % of the total density. The plasma source has a flexible operation and potential for channeling the energy in ways that maximize the density of active species of interest.

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