Surface Wave Driven Air-Water Plasmas\textsuperscript{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 \( \text{N} + \text{O} \rightarrow \text{NO}^+ + e \). 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 \( \text{O}_2(a^1\Delta_g) \) singlet delta oxygen molecules and OH radicals (1\% and 5\%, respectively) can be achieved in the discharge zone. In the late afterglow the \( \text{O}_2(a^1\Delta_g) \) 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.

\textsuperscript{1}This study was funded by the Foundation for Science and Technology, Portuguese Ministry of Education and Science, under the research contract PTDC/FIS/108411/2008.