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HUYGENS in-situ observations of Titan's atmospheric electricity

K. Schwingenschuh (1), B.P.Besser (1), R. Hofe (2), T. Tokano (3), J.J. Lopez-Moreno (7), R. Grard (4), P. Falkner (5), R. Trautner (4), M. Hamelin (6), F. Simoes (6), I. Jernej (1), G. Jaffer (2), G.J. Molina-Cuberos (8), M. Fulchignoni (9), F. Ferri (10)

(1) Space Research Institute, Austrian Academy of Sciences, Schmiedlstrasse 6, A-8042 Graz, Austria, (2) Fachbereich für Nachrichtentechnik und Wellenausbreitung, Technische Universität Graz, A-8010 Graz, Austria (3) IGM Universität zu Köln, Albertus-Magnus-Platz, 550923, Köln, Germany (4) Research and Scientific Support Department (RSSD), ESA/ESTEC, Post Bus 299, NL-2000 AG, Noordwijk, The Netherlands (5) Science Payload and Advanced Concepts Office, ESA/ESTEC, Post Bus 299, NL-2000 AG, Noordwijk, The Netherlands (6) Centre d'Etude des Environnements Terrestre et Planétaires (CETP), CNRS, 4 Avenue de Neptune, F-94107 Saint Maur Cedex, France (7) Instituto de Astrofísica de Andalucía (IAA), CSIC, P.O. Box 3004, E-18080 Granada, Spain (8) Applied Electromagnetic Group, Department of Physics, University of Murcia, E-30100 Murcia, Spain (9) Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique (LESIA), Observatoire de Paris – Meudon 5, place Jules Janssen, 92195 Meudon CEDEX, France (10) Centro Interdipartimentale Studi ed Attività Spaziali 'G. Colombo' Via Venezia 15, 35131 Padova, Italy

There is a long lasting debate about lightning on Titan. The existence of lightning or other discharge phenomena like corona discharges can help to understand the origin of life on Earth because it connects the complex organic chemistry on Titan with the prebiotic environment on early Earth. The CASSINI/HUYGENS mission provided for the first time the opportunity to investigate in-situ electrical phenomena in the atmosphere of Titan. During the descent of the HUYGENS probe the electric and acoustic sensors of the Permittivity, Wave and Altimetry experiment (PWA) as part of the Huygens Atmospheric Structure Instrument (HASI) observed fluctuations of the electric field up to 10 kHz between 140 km and the surface. The observed electric field fluctuations and impulsive events have been compared with terrestrial atmospheric electricity

phenomena and are most likely caused by electric discharges in the atmosphere of Titan. In order to differentiate artefacts and natural electric field fluctuations laboratory experiments of corona discharges have been compared with HUYGENS data. The ELF electric field fluctuations are compared with terrestrial Schumann observations and model results from simulations of the Titan atmospheric environment.