



Extreme narrow-band radio emission associated with a moderate X-ray flare

Nicole Vilmer⁽¹⁾, Eoin Carley⁽²⁾

(1) LESIA, Observatoire de Paris, PSL Research University, CNRS, Sorbonne Universités, UPMC Univ. Paris 06, Univ. Paris Diderot,

Sorbonne Paris Cité, 5 place Jules Janssen, 92195 Meudon, France.; nicole.vilmer@obspm.fr

(2) Astrophysics Research Group, School of Physics, Trinity College Dublin, Dublin 2, Ireland. e-mail: eoin.carley@tcd.ie

Very strong narrow-band radio emissions ($>10^4$ sfu) are sometimes observed in the 1GHz-2GHz range in association with moderate X-ray class flares. One of these extreme events (with a flux $>10^5$ sfu) has been shown recently to be responsible for a disturbance of aeronautical radio navigation (see Marqué et al., 2018)

We shall present in this paper another example of a GOES M-class flare (18 November 2003) producing an episode (around 10 minutes) of very strong ($>10^4$ sfu) narrow-band emission around 1GHz. We use combined spectral X-ray measurements from RHESSI and spectral flux density measurements obtained from 300 MHz to 5 GHz with the Radio Solar Telescope Network (RSTN) together with full gyrosynchrotron numerical calculations developed by Simoes and Costa (2006) and Costa et al. (2013) to investigate the relative contribution of gyrosynchrotron emissions associated with the X-ray emitting electrons in the late part of the event. Based on this estimation, we shall further examine the characteristics of the additional narrow-band radio component and investigate the possible emission mechanisms leading to the extreme narrow-band emissions. We shall also examine the conditions in the flaring active region which could lead to these strong radio enhancements.

Marqué, C.; Klein, K.-L.; Monstein, C.; Opgenoorth, H.; Pulkkinen, A.; Buchert, S.; Krucker, S.; Van Hoof, R.; Thulesen, “Solar radio emission as a disturbance of aeronautical radionavigation”, *J. Space Weather Space Clim.*, Volume 8, A42, 2018, doi: 10.1051/swsc/2018029

Simões, P. J. A. & Costa, J. E. R., “Solar bursts gyrosynchrotron emission from three-dimensional sources,” *A&A*, 453, 729C, 2006, doi: 10.1051/0004-6361:20054665

Costa, J. E. R., Simões, P. J. d. A., Pinto, T. S. N., & Melnikov, V. F., Solar Burst Analysis with 3D Loop Models “, *Publications of the Astronomical Society of Japan*, Vol.65, 65, 5, 2013, doi: 10.1093/pasj/65.sp1.S5