



## **First in-situ observations of strong ionospheric perturbations generated by a powerful VLF ground-based transmitter**

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This paper is related to the first in-situ observations of strong ionospheric perturbations close to the VLF transmitter NWC in Australia. NWC is one of the most powerful VLF transmitters in the world and it is located at a low L-shell value ( $L=1.49$ ). Waves and plasma parameters are recorded by the low orbiting satellite DEMETER. Electrostatic waves from HF to ELF ranges are generated and strong turbulence appears. Fluctuations of electron and ion densities are observed as well as increase of temperature. The perturbations are well located to the geographic North of the transmitter and cover a surface of  $\sim 500,000 \text{ km}^2$ . This area is centred at the altitude of the satellite (700 km) around the magnetic field line which has a foot at the location of the transmitter. This phenomenon is due to the electron and ion heating of the ionosphere induced by the powerful transmitter VLF wave. A much smaller effect is also observed in the Northern hemisphere at the conjugated location. This ionospheric perturbation observed for the first time is in addition to the already known precipitation of the energetic particles which interact with the VLF wave of the transmitter through a cyclotron resonance mechanism. The particle precipitation zone is located south of the transmitter at a slightly larger L value (1.9).