

BARREL Observations of a Solar Storm: The Flare, The SEP, and the CME arrival at Earth
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The Balloon Array for Radiation belt Relativistic Electron Losses (BARREL) mission of opportunity working in tandem with the Van Allen Probes was designed to study the loss of radiation belt electrons to the ionosphere and upper atmosphere. However BARREL is able to see x-rays from a multitude of sources. During the second campaign the Sun produced a X-class flare observed by BARREL, followed by x-rays, gamma-rays, and direct injection of protons from the solar energetic particle (SEP) event associated with the same solar active region as the X-class flare, also observed by BARREL. Two days later the coronal mass ejection (CME) originating from the solar active region hit the Earth while BARREL was in a conjunction with the Van Allen Probes and GOES. The solar interplanetary magnetic field (IMF) B_z was not ideally situated to cause a geomagnetic storm, but the compression led to the formation of drift echoes, ultra low frequency (ULF) waves, electromagnetic ion cyclotron (EMIC) waves, and very low frequency (VLF) whistler mode waves all near the noon-dusk sector. The combination of these waves and the enhancement of the local particle population led to precipitation of electrons remotely observed by BARREL. This is a unique event as BARREL saw portions of the entire solar storm process.