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Variations of ULF wave power throughout the Halloween 2003 superstorm

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Focused on the exceptional 2003 Halloween geospace magnetic storm, when Dst reached a minimum of -383 nT, we examine data from topside ionosphere and two magnetospheric missions (CHAMP, Cluster, and Geotail) for signatures of ULF waves. We present the overall ULF wave activity through the six-day interval from 27 October to 1 November 2003 as observed by the three spacecraft and by the Andenes ground magnetic station of the IMAGE magnetometerer array in terms of time variations of the ULF wave power. The ULF wave activity is divided upon Pc3 and Pc5 wave power. Thus, we provide different ULF wave activity indices according to the wave frequency (Pc3 and Pc5) and location of observation (Earth's magnetosphere, topside ionosphere and surface). We also look at three specific intervals during different phases of the storm when at least two of the satellites are in good local time (LT) conjunction and examine separately Pc3 and Pc4-5 ULF wave activity and its concurrence in the different regions of the magnetosphere and down to the topside ionosphere and on the ground. This work has received support from the European Community's Seventh Framework Programme under grant agreement no. 284520 for the MAARBLE (Monitoring, Analyzing and Assessing Radiation Belt Energization and Loss) collaborative research project.