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Fluctuations on timescales of minutes to hours are common in the solar wind. When the fluctuations encounter the Earth, they could induce impulsive auroral intensification, which, in turn, excite gravity waves in the auroral regions. These gravity waves, particularly large-scale (>~1000 km) gravity waves, will give rise to traveling atmospheric disturbances with typical amplitudes of 20~40% in the upper thermosphere. We report here the detection of full constructive interference between two large-scale gravity waves excited in northern and southern auroral regions by an interplanetary shock, and the detection of extremely efficient multiple excitation of large-scale gravity waves by a long-duration Alfvén wave train carried by a high-speed stream.

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