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GPS network observation of travelling ionospheric disturbances following the Chelyabinsk meteorite blast

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We use the GPS network in Northwest China and central Asia to monitor travelling ionospheric disturbances (TIDs), which were possibly excited by the large meteorite blast over Chelyabinsk, Russia, on 15 February 2013. Two TIDs were observed. The first TID was observed 13 min after the blast within a range of 270–600 km from the blast site. It propagated radially from the blast site with a mean velocity and period of 369 m/s and 12 min, respectively. The second TID was found in Northwest China, 1.5 hours after the time of the blast, at ∼2500–3100 km from the blast site. This latter TID propagated south-eastward with a velocity and period of 410 m/s and 23 min, respectively. Severe dissipation of the perturbation TEC amplitude was observed. We didn't found any TIDs propagating in a global range after the meteorite blast. Features of TIDs were compared with those excited by early nuclear explosion tests. It is inferred from our analysis that the energy release of the Chelyabinsk meteorite blast may be not large enough to excite such ionospheric disturbances in a global range as some nuclear explosions did.