

US satellite protection scheme could affect global communications

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A proposed US system to protect satellites from solar storms or high-altitude nuclear detonations could cause side-effects that lead to radio communication blackouts, according to new research. If activated, the "radiation belt remediation" (RBR) system could significantly alter the upper atmosphere, seriously disrupting high frequency (HF) radio wave transmissions and GPS navigation around the world.

The remediation system aims to protect hundreds of low earth-orbiting satellites from having their onboard electronics ruined by charged particles in unusually intense Van Allen radiation belts "pumped up" by high-altitude nuclear explosions or powerful solar storms.

The approach, which is being pursued by the US Air Force and the US Defense Advanced Research Projects Agency, involves the generation of very low frequency radio waves to flush particles from the radiation belts and dump them into the upper atmosphere over one or several days.

The scientific team from New Zealand, UK and Finland calculate that Earth's upper atmosphere could be dramatically affected by such a system, causing unusually intense HF blackouts around most of the world.

Dr Mark Clilverd from British Antarctic Survey says, "Some planes and ships that rely on HF communications could lose radio contact, and some remote communities that also depend on HF could be isolated for as long as six to seven days, depending on the system's design and how it was

operated. GPS signals between ground users and satellites would also be disrupted as they pass through the disturbed ionosphere."

The disruptions result from a deluge of dumped charged particles temporarily changing the ionosphere from a "mirror" that bounces high frequency radio waves around the planet to a "sponge " that soaks them up.

The research is published in the August edition of the international journal *Annales Geophysicae*. The researchers suggest that policymakers need to carefully consider the implications of remediation.

If the intense radiation belts resulted from a rogue state detonating a nuclear-tipped missile in the upper atmosphere, using such remediation technology would probably be acceptable to the international community, regardless of any side effects. However, using the system to mitigate the lesser risk to satellites from charged particles injected by naturally occurring solar storms should be considered more closely. The impact of the disruption to global communications needs to be weighed carefully against the potential gains.

Source: British Antarctic Survey

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