

Press release

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EGU Journal Highlight - US satellite protection scheme poses global communications threat

A proposed US system to protect satellites from solar storms or high-altitude nuclear detonations would cause worldwide radio communications blackouts, according to new research by a group of scientists from New Zealand, Finland and the UK. <http://www.egu-media.net/content/view/99/47/>

If activated, the envisaged "radiation belt remediation" system would significantly alter the upper atmosphere in the short term, seriously disrupting high frequency (HF) radio wave transmissions and GPS navigation around the globe, says the group's lead researcher, Dr Craig Rodger of the University of Otago Physics Department.

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

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

"We've calculated that Earth's upper atmosphere would be dramatically affected by such a system, causing unusually intense HF blackouts around most of the world," he says.

"Airplane pilots and ships would lose radio contact and some Pacific Island nations could be isolated for as long as six to seven days, depending on the system's design and how it was operated."

"GPS would likely also suffer large-scale disruptions, as signals between ground users and satellites were scrambled by the ionosphere, he added. 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," Dr Rodger says.

In their paper, just published in the August edition of the international journal *Annales Geophysicae*, the Otago researchers and UK and Finnish colleagues suggest that policymakers need to carefully consider the implications of remediation.

The researchers also calculated the likely effect of remediation on the ozone layer, but found that ozone depletion would be short-lived and similar to that resulting from natural processes such as large solar storms and volcanic eruptions.

The paper, titled: The atmospheric implications of radiation belt remediation was co-authored with Otago colleague Associate Professor Neil Thomson and researchers from the British Antarctic Survey, and the Sodankylä Geophysical Observatory in Finland and the Finnish Meteorological Institute.

The full paper reference: The atmospheric implications of radiation belt remediation. Rodger, C. J. , Clilverd, M. A., Ulich, Th., Verronen, P. T., Turunen, E., and Thomson, N. R., Annales Geophysicae, Page(s) 2025-2041. SRef-ID: 1432-0576/ag/2006-24-2025, Volume 24, Number 7, 2006.

Link to article: <http://www.copernicus.org/EGU/annales/24/7/2025.htm>

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URL for press release: http://www.physics.otago.ac.nz/research/space/RBR_Media_release_8Aug06.htm



Dr Craig Rodger of the University of Otago Physics Department.



From left to right: Dr. William H. Pickering, Director of JPL; Dr. James Van Allen (after whom the Van Allen Belt was named; recently deceased); and Dr. Wernher von Braun raise a full-size model of America's first satellite, Explorer I, above their heads following a successful launch on January 31, 1958. This satellite discovered the radiation belts - it was a long time ago, but we still have some significant unknowns still!