

Study of electrons in space could help weather forecasting

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Researchers have discovered a formerly undetected impact of space weather on the polar atmosphere, which may explain some previously unexplained variations in winter weather patterns. Their results, published today (Tuesday 14 October), in the journal *Nature Communications* could have important implications for seasonal weather forecasting.

The international team from the Finnish Meteorological Institute, Otago University and British Antarctic Survey (BAS) studied data from three different satellites over an 11 year period. They found that energetic electrons (highly charged particles created by the sun) from the [outer radiation belt](#) hitting the Earth's atmosphere cause ozone loss high above the Earth.

Vast quantities of [energetic electrons](#) are found in the Earth's radiation belts, trapped there by the Earth's magnetic field. During magnetic storms, which are driven by the solar wind, the electrons accelerate to high speeds and 'rain' into the atmosphere at the poles. The temporary, but frequent, [ozone loss](#) occurring as a result of these 'rains' may explain changes in wind patterns which affect regional winter temperatures in the Northern Hemisphere by a maximum of plus or minus 5 degrees centigrade. The variation in temperature is only seen during winter because of the complex linkages from space through to the Earth's surface.

BAS co-author Dr Mark Clilverd says, "This is an exciting piece of

research because it shows us a key part of the chain-reaction of how electrons affect ozone at higher latitudes and can ultimately affect weather systems – a link that we didn't truly understand before. It could contribute to data for weather forecasting, for instance to show us when Europe is likely to experience an especially cold winter."

Provided by British Antarctic Survey

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