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Uncertainty in solar wind propagation may explain polar cap potential saturation

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The polar cap potential, a measure of the magnetosphere's response to the solar wind, levels off during high solar wind electric field values. Several explanations have been proposed for this saturation effect, but there has been no consensus. We show that the saturation may *merely be a perception* created by uncertainty in the solar wind measurements and its propagation to the polar cap. Correcting this uncertainty reveals a true response that is linear across the full range of the solar wind electric field values. These findings indicate that extreme space weather events can elicit a larger impact on Earth than we'd expect if the polar cap potential were to saturate.