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Geomagnetic reversals, atmospheric escape and mass extinctions

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It has been known that the geomagnetic reversal rate is closely correlated with the mass extinction rate during the Phanerozoic era. In the past 50 years, many efforts were devoted to building up causal relations between them, but no consensus has been reached. On the other hand, in the last decade, it was realized that global hypoxia could be a dominant driver of mass extinctions. Here we propose that geomagnetic reversal could result in global hypoxia, because oxygen atoms will be seriously ablated by solar wind when Earth's dipole collapses during geomagnetic reversals. Based on the knowledge of atmospheric escape acquired from the research results for Mars and Venus, we have built a model to simulate atmospheric oxygen loss into interplanetary space during geomagnetic reversals. It turns out that, when the geomagnetic dipole collapses, cumulative oxygen loss could significantly contribute to the global hypoxia, which might eventually cause mass extinctions.