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Time varying cloud cover contributes to global and local earthquake risk

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The ability to rapidly view the ground using satellite imagery is now an intrinsic component of managing disaster response, particularly after earthquakes. Recent improvements in the quality and quantity of optical-satellites mean this imagery is now a core component of many earthquake disaster responses. Such imagery provides timely information on the impacts, extent, and intensity of damage, which is essential for mitigating further losses. However, when cloud cover limits image quality and availability the efficiency and effectiveness of the response can be hampered, yet the effect of cloud cover has never been quantified for disaster response. Using previously published MODIS data on monthly cloud frequencies we assess how variations in cloud cover affect our capacity to respond to earthquake disasters rapidly throughout the year. We find that on a global scale when accounting for cloud, the worst time of year for an earthquake disaster is in June or August, when up to 40% of the global population at risk of earthquakes are obscured from satellite view for > 3 consecutive days. Southeastern Asia is particularly strongly affected, accounting for the majority of the population at risk from these 'obscured earthquakes' in every month. By ranking nations in terms of their total population at-risk of obscured earthquakes in each month, we find large variations in each country's global rank throughout the year, highlighting that cloud cover affects both local and global earthquake risk. Our results demonstrate the importance of the timing of earthquakes in terms of our capacity to respond effectively, highlighting the need for more intelligent design of disaster response that considers the possibility of obscured imagery and is not overly reliant on optical satellite imagery.