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What threat do turbidity currents and submarine landslides pose to submarine telecommunications cable infrastructure?

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The global economy relies on uninterrupted usage of a network of telecommunication cables on the seafloor. These submarine cables carry ∼99% of all trans-oceanic digital data and voice communications traffic worldwide, as they have far greater bandwidth than satellites. Over 9 million SWIFT banks transfers alone were made using these cables in 2004, totalling $7.4 trillion of transactions per day between 208 countries, which grew to 15 million SWIFT bank transactions last year. We outline the challenge of why, how often, and where seafloor cables are broken by natural causes; primarily subsea landslides and sediment flows (turbidity currents and also debris flows and hyperpycnal flows). These slides and flows can be very destructive. As an example, a sediment flow in 1929 travelled up to 19 m/s and broke 11 cables in the NE Atlantic, running out for ∼800 km to the abyssal ocean. The 2006 Pingtung earthquake triggered a sediment flow that broke 22 cables offshore Taiwan over a distance of 450 km.

Here, we present initial results from the first statistical analysis of a global database of cable breaks and causes. We first investigate the controls on frequency of submarine cable breaks in different environmental and geological settings worldwide. We assess which types of earthquake pose a significant threat to submarine cable networks. Meteorological events, such as hurricanes and typhoons, pose a significant threat to submarine cable networks, so we also discuss the potential impacts of future climate change on the frequency of such hazards. We then go on to ask what are the physical impacts of submarine sediment flows on submerged cables? A striking observation from past cable breaks is sometimes cables remain unbroken, whilst adjacent cables are severed (and record powerful flows travelling at up to 6 m/s). Why are some cables broken, but neighbouring cables remain intact? We provide some explanations for this question, and outline the need for future in-situ monitoring of flow-structure interaction. There is a pressing need to better understand the hazards that can disrupt submarine telecommunication networks as our reliance on them grows.