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Illuminating More of the Earth Via Sensors on Transoceanic Telecommunications Cables

Our work is motivated by a partnership between the International Telecommunication Union (ITU), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO/IOC), and the World Meteorological Organization (WMO) that is working towards integration of seismic sensors into the next generation of trans-oceanic telecommunication cables. These Sensor Enabled Scientific Monitoring And Reliable Telecommunications (SMART) cable systems offer the potential to improve global geophysical models as well as reduce event detection thresholds and location uncertainties. We present a preliminary picture of the improvement to global seismic sampling through SMART cables and their sensors. We present results for forward ray tracing through AK135 for first-arriving P-waves for paths between 0 and 90 degree distances. We have selected earthquakes of magnitude 6 and larger, recorded by current and former seismic receivers around the globe. To reduce raypath redundancy and computational burden we have used only one source and one receiver per 1-degree by 100 km depth cell. Results are presented as a function of ray density, saturating at 100 rays per cell. We compare ray density obtained for current global seismic station distribution to that afforded by the addition of seismic sensors along the first generation of SMART cables.

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