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KINEMATICS OF COMPLEX MULTI-FAULT EARTHQUAKE RUPTURE RECORDED BY PSEUDOTACHYLYTES FROM THE IKERTÔQ SHEAR ZONE, GREENLAND: AN NSF REU STUDY

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Flow connectivity between master and relay faults in the Ikertôq shear zone demonstrates that multiple ruptures during ancient earthquakes occurred during a single seismic event. The Ikertôq shear zone (ISZ) is part of the Paleoproterozoic Nagssuqtoqidian orogeny continental collision in West Greenland that includes a > 50 km pseudotachylyte system. As part of an NSF REU, this team mapped various faults throughout a 2 km transect on high-resolution UAV images of exhumed pseudotachylyte vein systems on the western end of Sarfannguit island to investigate the kinematics of multi-fault ruptures during individual seismic events. Pseudotachylyte veins exhibit a complex rupture geometry with linked kinematics between oblique reverse master faults striking approximately 240 and steep east-west relay faults dominated by strike-slip movement. Near complete exposure of veins provide a unique opportunity to document fault linkages and the partitioning of slip, including the interconnectivity of flow patterns of melt in pseudotachylyte veins, as well as angular ladders of melt. We measured the thickness of pseudotachylyte fault veins and injection veins along transects to examine slip partitioning between multiple reverse faults and strike-slip relay faults. Melt thickness is used as a proxy for earthquake slip since the pseudotachylyte melt occurred on faults that exhibit preexisting brittle displacement. The results of preliminary calculations from energy balance equations show that typical slip on some oblique reverse master

faults was on the order of a meter or less, while typical slip on some east-west relay faults was cm scale. Our data clarify that most slip occurred on oblique reverse master faults with subsidiary slip on east-west relay faults.