

19th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Modeling and Risk Analysis (2)

Author: Mr. Christopher Kunstadter
United States, chris.kunstadter@axaxl.com

Dr. Darren McKnight
LeoLabs, United States, darren@leolabs.space

Dr. Hugh G. Lewis
University of Southampton, United Kingdom, H.G.Lewis@soton.ac.uk

Mr. Matthew Stevenson
LeoLabs, United States, mstevenson@leolabs.space

LEO RISK CONTINUUM – PROVIDING CONTEXT TO CURRENT AND FUTURE COLLISION
RISK**Abstract**

The mapping of all close approaches in low Earth orbit (LEO) by probability, consequence, and risk provides insight into both the current and future debris collision hazards. Characterizing the ensemble of LeoLabs-collected conjunction data identifies the riskiest events of the last year with two families of events: (1) between operational satellites and debris (includes fragments and intact derelict objects) and (2) between massive derelict objects. The events with operational satellites provide a baseline of potential mission-terminating events (i.e., the current debris collision risk). The collection of potential collisions between massive derelicts indicates potential sources of debris that will drive future mission-terminating debris collision risk. The conjunction data is parsed by object, object type, altitude, risk, and country of origin. The results are compared against the previously identified “top 50 statistically-most-concerning” objects identified in 2020. As LeoLabs works to develop a small debris catalog (i.e., fragments between 2 and 10 cm), the effects of this newly identifiable population is examined relative to the events based on the catalog with only objects larger than 10 cm.