

## PRELIMINARY ANALYSIS OF TWO YEARS OF THE MASSIVE COLLISION MONITORING ACTIVITY

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It is hypothesized that the interactions between many of the most massive derelicts in low Earth orbit are more frequent than modelled by the traditional combination of kinetic theory of gases and Poisson probability distribution function. This is suggested by the fact that there are clusters of derelicts where members' inclinations are nearly identical and their apogees/perigees overlap significantly resulting in periodic synchronization of the objects' orbits. In order to address this proposition, an experiment was designed and conducted over the last two years. Results from this monitoring and characterization experiment are presented with implications for proposed debris remediation strategies. Four separate clusters of massive derelicts were examined that are centered around 775km, 850km, 975km, and 1500km, respectively. In aggregate, the constituents of these clusters contain around 500 objects and about 800,000kg of mass; this equates to a third of all derelict mass in LEO. Preliminary analysis indicates that encounter rates over this time period for these objects are greater than is estimated by traditional techniques. Hypothesized dependencies between latitude of encounter, relative velocity, frequency of encounters, inclination, and differential semi-major axis were established and verified. This experiment also identified specific repeatable cluster dynamics that may reduce the cost/risk and enhance the effectiveness of debris remediation activities and also enable new operational debris remediation options.