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The Skimsat concept is based upon the core idea of that the closer you are to a target, the smaller an imaging payload can be; leading to reductions in overall satellite size and cost. Skimsats are small satellites designed to operate in Very Low Earth Orbits (VLEO), with perigees as low as 160km, which would place them closer to the ground than all past and present operational satellites.

The Skimsat concept has been developed to meet the challenge of Unmanned Ariel Vehicles (UAVs) to the satellite Earth Observation (EO) industry. UAVs have very high persistence over a target and can achieve spatial resolutions better than all but the very largest instruments found on current EO satellites. EO satellites have several advantages over UAVs including lower vulnerability, intrusiveness and a significantly larger daily area coverage. However to match the persistence and resolution of a UAV requires constellations of expensive satellites; out of reach of all but the largest defence budgets.

High resolution EO satellites can be provided at costs at least an order of magnitude lower than the current state of the art by a single change; significant reduction in orbital altitude. By operating at down to 160km altitude the Skimsat platform can provide SAR and optical imagery at 1m GSD with a launch mass of <75kg, which is more than four times less than the current smallest 1m GSD capable EO satellite (SSTL 300 S1).

The decrease of altitude, with respect to a 650km orbit, by a factor of four leads to a 64x reduction in radar RF power, 16x reduction in communications RF power and 4x reduction in optical aperture diameter to achieve the same performance.

The comparatively large drag forces due to increased air density at these low altitudes would normally cause a small satellite (<100Kg) to de-orbit within 1-2 months. However, Skimsats are intended to use a combination of low cross-sectional drag area and a novel air-breathing drag-compensating propulsion system to increase the operational lifetime to 24 months or more. This has the added benefit of a guaranteed propellantless de-orbit shortly after the end of the operational mission, generating no debris and clearing the orbit for follow-on missions.

Additional challenges for Skimsats include increased damage on optical surfaces from higher atomic oxygen densities found at low altitudes and the higher rates of orbital drift. Both of these can be somewhat countered by improved materials, positioning and maneuvering technology but will ultimately limit the lifetime to approximately 24 months. This will give Skimsats a higher turnaround enabling each successive generation to make use of the latest payload technology; improving performance and services.

The overall aim of developing the Skimsat EO platform is to enhance the capability of the EO sector by providing low-cost access to VLEO and to benefit from the new and enhanced applications that this will offer. The reduced cost of EO will also help bring entities that are currently non-space (e.g. UAV and aircraft operators) together with the space sector to enhance their capability.

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