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Author: Mr. Vincenzo Stanzione  
Sitael Spa, Italy

ALL-ELECTRIC MINI-PLATFORM AND VERY-LEO HI-RES CONSTELLATION

**Abstract**

The paper presents the advanced technologies under development by SITAEL (and also other Italian industrial Partners, in the frame of an ASI National Project) for small satellite platforms. The main focus is on newest small platform product in the mini-satellites class with total mass in the range of 150-200 kg (launch mass), so-called S-200, and its possible space applications and targeted (sizing) mission. The platform design requirements and technological solutions are strictly linked to the multi-purpose high level requirement for this product, aimed to serve EO (Optical, SAR), Telecom (VDES, HTS), Small Scientific missions, mainly deployed in medium/large constellations ( $\geq 10$  mini-satellites).

The mini-platform design features and mission enabling technologies will be depicted and will provide the mini-platform current design status:

1-Low power electric propulsion (150-300W, 8-14 mN) Flight at 300-350 km for over 3 years and deployment in constellation (Delta-V up to 1 km/s); 2-State-of-art AOCS with mini-CMG (Control Moment Gyro) agility ( $5/s^2$ ) for target re-pointing; 3-High power generation (peak power up to 1 kW) with multiple solar array configuration; 4-Advanced (integrated) communication S/S, with P/L data downlink up to 500 Mbps (electronic steering and ISL features P/L); 5-Use of COTS for high product competitiveness; 6-Large constellation feasibility; 7-Platform efficient structural concept (low mass).

The paper will also introduce the mission concept of a very-Low Earth Orbit small-sat constellation (i.e. 300-350 km), deployed with particular orbital geometries, to provide at the same time:

1-Hi-res image looking (Panchromatic + RGB and NIR)  $\leq 1$  m (GSD) 2-High frequency of revisit/access (4-5 times/day) over dedicated areas (i.e. Italy and Mediterranean area)

The mission analysis presented will show the overall EO performances, based on state-of-art compact optical systems, whose performances (as GSD) are enhanced thanks to flight in low altitudes (300/350 km wrt typical 500/600 LEO S/C, same instrument half GSD). The constellation design (with different orbital planes/S/C distribution scenario) will provide the high frequency revisit feature, aiming specifically the rapid- on demand access over a certain area in NRT (Near-Real Time).