

DRAGON SAR

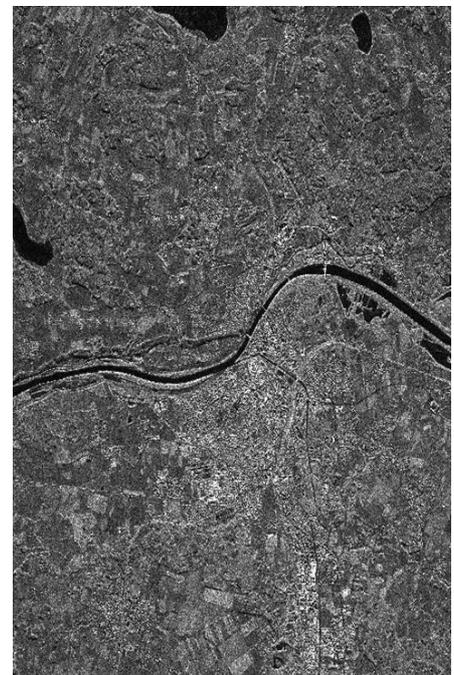
DragonSAR is a novel modular Synthetic Aperture Radar (SAR) satellite solution in collaboration with SSBV that can satisfy the demanding needs of current and future earth observation missions. Employing lightweight, small satellite design techniques and components to realise a cost effective system that is designed to operate in isolation or within a constellation. Due to its competitive low cost, the opportunity to establish a constellation becomes a reality, ensuring that revisit times are substantially shortened and flexibility increased.

The overall design is driven by a low-cost to launch. The DragonSAR makes use of the PanelSAR Frequency Modulated Continuous Wave (FMCW) technology that is different from the more traditional pulsed systems. The major benefit of this technology is the reduction in weight of the satellite due to the reduced requirements placed on the power systems on board of the satellite.

Infrastructure and Asset Monitoring – No matter where in the world, the wealth of infrastructure that is essential to everyday life, is increasing each day. Solid infrastructure such as roads, railways, airports, bridges, pipelines, dams and antennas are exposed to weather and overuse, ultimately resulting in accelerated degradation. These structures are also subject to subsidence especially with the growth in both horizontal and vertical structures.

Effective monitoring is required to identify structural problems or ground deformations. Making use of interferometric SAR (InSAR) changes of a few millimetres over time can be exposed through a process of taking multiple images over the same region over a period of time. Making use of persistent scatters within these images and the combination of these multiple images, slight and subtle changes can be detected. From this data, mitigation strategies can be put in place saving human lives, protecting biodiversity and reducing maintenance costs.

Disaster monitoring – Earthquakes, floods, severe storms and fires are only a small sample of the natural disasters that occur everyday. These can trigger national emergencies and the cost incurred are calculated in billions of dollars each year. The SAR satellite is crucial in assisting with disaster monitoring. Not only can it be used preventatively but also as a sensor that can provide continuous updates over an unfolding disaster area, whether it is day or night, and independent of weather or cloud obscuration.



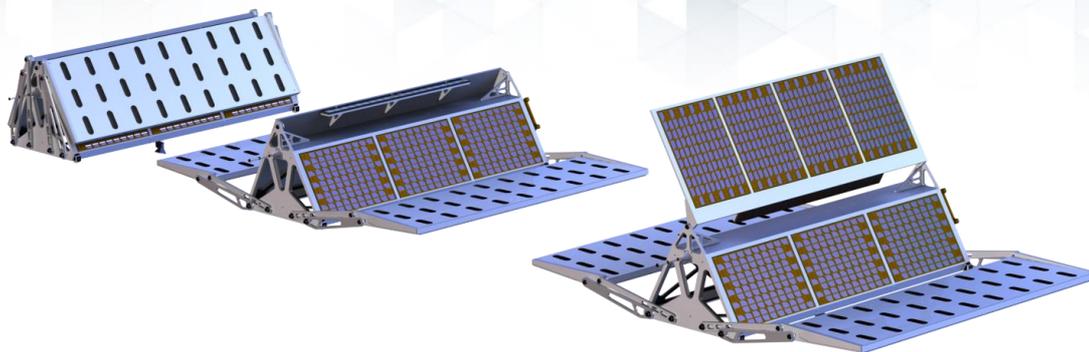
FMCW SAR Image 4m x 4m (4 looks)
(SSBV)



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Constellation

Due to the low cost of the satellite system and its small footprint within the launch vehicle, the option of forming a constellation becomes a reality. The design of the satellite allows for both sun-synchronous or equatorial orbits to be selected, depending on the identified region of interest. A constellation of three satellites drastically increases the revisit times over the interested area. These shorter revisit times not only allow for a richer data set that enhances the quality of the interferometry information that is crucial to infrastructure monitoring, but also provides a constant stream of imagery for use in disaster management and support.

Due to DragonSAR being highly modular, various configurations of the satellite for a single constellation launch are possible. For example, if a three satellite constellation is being considered, then three unique primary missions can be designed for and served by DragonSAR. Varying selections of the number of SAR panels and their associated configurations on the three satellites, a constellation can be created that has the purpose of infrastructure monitoring, maritime surveillance and reconnaissance. These purpose driven satellites can then be harnessed to work together in the constellation, overlaying and integrating captured data to provide a rich and varied fused data product.



Zoomed in FMCW SAR Image 1m x 1m (SSBV)

DRAGON SAR - SPECIFICATIONS

Antenna Size ¹	2x 3 Panels (3m x 1m x 0.1mm)
Design lifetime	> 5 years
Downlink (Steerable)	2 x 300Mbps (X-band)
Imaging duty cycle ¹	> 6 min per orbit
Imaging Frequency	X band
Mass including payload ¹	< 600 kg
Orbit height	500 km - 600 km
Propulsion for constellation phasing	Yes
Resolution (ScanSAR, Stripmap, Spotlight) ^{1,2}	15m, 5m, 1m
Sensitivity (NESZ) ^{1,2}	<-23 dB (nominal power) <-25 dB (high power)
Swath (ScanSAR, Stripmap, Spotlight) ^{1,2}	100km, 20km, 4km
TX Modes (Duty Cycle) ¹	FMCW (95%) Interrupted FMCW (40%)

¹These specifications are dependent on configuration selected

²Orbit height of 580km

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