Galileo and Space Service Volume

ICG WG-B
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European Space Agency

Relevance of Space Service Volume

- Relevance and added value of a Space Service Volume (SSV) is well noted
- Already today a large number of ESA and EU Member State space missions have GNSS space receivers embarked

GNSS spacecraft navigation applications and missions

Application		Mission Examples	Orbit
Absolute Navigation (Platform Rx)	LEO Orbit	PLEIADES, DMC, Earth Observation, GlobalStar, Proba-2, Demeter, EarthCare	LEO
	GEO/GTO/HEO Orbit	STENTOR, SkyLAN, IntelSat, GMP, SmallGEO, MTG, STE-QUEST	GEO/HEO
	Precise LEO Nav	SWARM, GMES Sentinels	LEO
	Re-entry	ARD, Pre-X	LEO to ground
	Launcher	Evolutions: ARIANE V, VEGA	Ground to GTO
Relative Navigation (Platform Rx)	Rendezvous	ATV	LEO
	FF	GRACE, PRISMA, Proba-3, MMS, TerraSAR-X, FF Xeus, Premier, NGGM	LEO/HEO GEO
EO/Scientific Instruments	POD	GOCE, SWARM, GMES Sentinels, CHAMP, GRACE	LEO
	At. Sounding, Reflectometry	MetOp, CHAMP, PARIS, UK-DMC, PostEPS	LEO HEO
Support to other subsystems	Attitude	PLEIADES, ROCSAT, ALPHABUS	LEO GEO
	Timing	GEO telecom, GlobalStar, Iridum, MTG	LEO GEO

Relevance of Space Service Volume

ESA short and medium term missions with on board GNSS receiver

Missions	N S/Cs	Application		Orbit	Launch
		P/L	GNSS		
GOCE	1	Gravity	POD	LEO	2009
Swarm	3	Magnetosphere	POD	LEO	2012
MetOp	3	Atmospheric sounder	Radio Occultation	LEO	2006/ 12/16
EarthCare	1		Orbit	LEO	2013
BIOMASS	1	SAR			2015
CoRe-H2O	1	SAR			
Premier	1	Atmospheric sounder	FF with MetOp	LEO	
GMES S1	2	SAR	Orbit, POD	LEO	2013
GMES S2	2	Imager	Orbit	LEO	2015
GMES S3	2	Altimetry, Imager	Orbit, POD	LEO	2014
GMES S4	2	UV Spectrometry		LEO	
MTG	1	IR sounder, Imager	Orbit, Time	GEO	2018
NGGM	2	Gravity	FF	LEO	
PostEPS	1	Atmospheric sounder	Orbit, Radio Occultation	LEO	
STE-QUEST	1		Orbit, Time	HEO	
Proba 2	1	Tech Demo	Orbit	LEO	2009
Proba 3	2	FF Demo	FF	HEO	2015
ATV	5	ISS Cargo	Rendezvous	LEO	2009/11/ 12/13/14
Small GEO	1	Telecom	Orbit, Time	GEO	2014
Jason	1	Ocenography		LEO	2013

Galileo 1st Generation and SSV

- Mission requirement for Galileo 1st generation do not foresee the provision of a SSV
- Galileo 1st generation will provide services up to an altitude of 100000 ft.

- Signal emissions originating from the secondary lobes of the Galileo S/C L-band antenna may be exploited by space users
- However
- No min. signal power level for these secondary lobe emissions can be guaranteed for Galileo 1st generation
- No guarantee on the SISA for these secondary lobe emissions can be given

Galileo Future Generations and SSV

- NASA bottom-up approach resulting in the provision of a GPS SSV is considered very appealing
- Definition process of Galileo second generation is presently on-going (signal transmission into space ?)
- Current discussion within ICG WG-B will help to consolidate the mission perspective for a SSV in Galileo 2G
- Before defining
    - a Galileo SSV and
    - an interoperable GNSS SSV in a next step

the **existing** Galileo capabilities in the SSV domain need to be further assessed and be compared against the GPS SSV characteristics.