

EARTH OBSERVATION SYMPOSIUM (B1)  
Earth Observation Sensors and Technology (3)

Author: Dr. Manfredi Porfilio  
Italian Space Agency (ASI), Italy, manfredi\_porfilio@hotmail.com

Dr. Francesco Caltagirone  
Agenzia Spaziale Italiana (ASI), Italy, francesco.caltagirone@asi.it

Dr. Giuseppe Francesco De Luca  
Italian Space Agency (ASI), Italy, giuseppefrancesco.deluca@asi.it

Dr. Fabio D'Amico  
Italian Space Agency (ASI), Italy, fabio.damico@asi.it

Mr. Andrea Cecchini  
Italian Ministry of Defense, Italy, andrea1.cecchini@gmail.com

Mr. Franco Nardone  
Italian Ministry of Defense, Italy, ris.cits.cutecnico@smd.difesa.it

Mr. Davide Di Domizio  
Italian Ministry of Defense, Italy, davide.didomizio@am.difesa.it

Dr. Daniele Brotto  
IAC Congress 2011, Italy, daniele.brotto@aeronautica.difesa.it

Mr. VALERIO GRIMANI  
Thales Alenia Space Italia, Italy, valerio.grimani@thalesalieniaspace.com

Mr. Ignazio Rana  
Thales Alenia Space Italia, Italy, ignazio.rana@thalesalieniaspace.com

Mr. Daniele Scaranari  
Thales Alenia Space Italia, Italy, daniele.scaranari@thalesalieniaspace.com

Dr. giovanni celidonio  
Telespazio S.p.A., Italy, giovanni.celidonio@telespazio.com

Mr. Paolo Inversi  
Telespazio S.p.A., Italy, paolo.inversi@telespazio.com

Ms. maria grieco  
Italy, maria.grieco@telespazio.com

COSMO-SKYMED FULL CONSTELLATION ORBITAL FLEXIBILITY AND INTERFEROMETRIC  
CAPABILITIES

**Abstract**

COSMO-SkyMed is an Earth Observation space program funded by the Italian Ministry of Research and Italian Ministry of Defence (It-MoD) and conducted by the Italian Space Agency (ASI) in conjunction with It-MoD. In November 2010 the fourth and last COSMO-SkyMed satellite was successfully launched and integrated into the constellation after the positive conclusion of the commissioning phase in January 2011. The four satellites are placed in the same sun-synchronous dawn-dusk frozen orbit, designed in such a way to fulfill dual needs and to optimize the performances for a wide range of Civilian applications (e.g. risks management, agriculture/forestry, marine/coastal, geology) and Defence applications (surveillance, intelligence, crisis management, mission planning). Currently the orbital configuration is

composed of three satellites (namely PFM, FM#2 and FM#4) with a difference of 90 deg in their respective anomalies, and a fourth satellite (namely FM#3) in tandem-like configuration with FM#2 (i.e. one-day temporal decorrelation). The aim of this paper is to analyze the orbital flexibility of COSMO-SkyMed constellation by performing a survey of the possible orbital interferometric configurations which could be achieved by the full COSMO-SkyMed constellation (e.g. tandem, tandem-like, double one-day tandem configuration, etc), focusing on their main features (e.g. interferometric data takes opportunities, temporal decorrelation, degradation of the temporal performances respect to the nominal equi-phased configuration, etc), highlighting the propellant required for orbital configuration changes and the ways to minimize it, associating them with the main state-of-the-art Civilian and Defence applications that would benefit from them and providing a preliminary quantitative assessment of the interferometric products quality improvement for each orbital configuration.