

TerraSAR-X Applications Guide

Extract: GEO GCPs

April 2015

Ground Control Points: GEO GCPs



Issue

Military, construction or exploration activities on the ground do very often require sound knowledge of the area under investigation. A wealth of information sources is typically consulted including data from spaceborne, airborne or terrestrial sensors. Frequently, the available information has been acquired at different points in time with different geo-location accuracies and sometimes even in different local coordinate systems. In order to merge all relevant information a correct co-registration within a common reference system is required. Ground Control Points (GCPs), which are well visible on the ground but also in all relevant geo-information layers, are needed. Typically, GCP information is acquired by terrestrial surveyors on-site, which could be quite expensive in case of remote areas of investigation. Costs and also health risk is increasing if additionally, the area is subject to wilderness, war, social or political risk.

Markets

Defence, Oil and Gas, Civil Engineering, Aviation

Achievements

Precise geolocation information for selected ground control points, which are visible in TerraSAR-X imagery as well as in other datasets available from the area under investigation. Accuracy: below one meter.

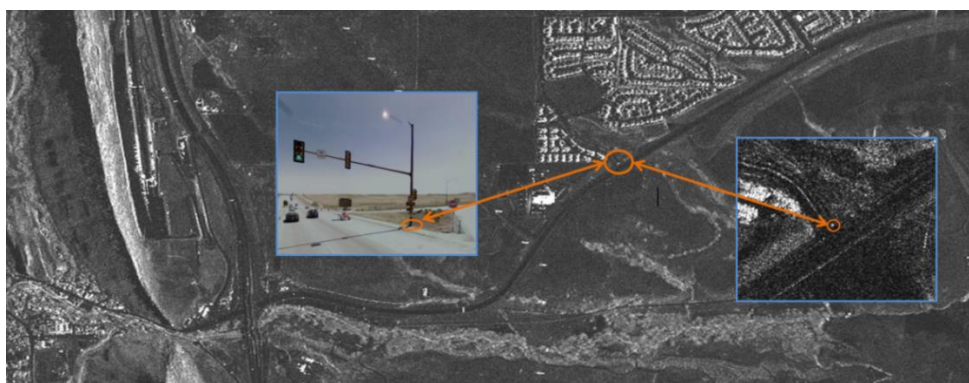


Figure 1: One selected ground control point (traffic light pole); for each GCP, precise geolocation information is provided in individual location sheets.

Benefits of using TerraSAR-X

GEO GCP location information is provided well below one meter – unmatched by any other spaceborne solution.

Acquisition of GEO Ground Control Point information is quickly available due to its independence on weather conditions and illumination - everywhere on earth.

The information is collected without any risk for personal resources and cost-efficient: No costs for staff and equipment mobilization and security need to be considered. This is especially important for inaccessible or denied areas/countries.

Data Specifications

Table 1: Recommended Image Specification

Image Modes:	SpotLight, High Resolution SpotLight, Staring SpotLight	
Number of datasets:	Two with larger disparity angles, three from two different orbit directions preferred	
Assumed Analysis Approach:	<ul style="list-style-type: none"> Ground Control Point Processing (based on radargrammetric methods) 	
System Settings:	Polarization:	HH
	Incidence Angle [Degree]:	One steep, one shallow (disparity angle larger 20°)
	Orbit	Ascending and/or Descending
TerraSAR- Image Product	Basic Image Product:	SSC or MGD
	Resolution Mode:	<ul style="list-style-type: none"> SSC: N/A, MGD: Spatially Enhanced (SE)
	File Format:	COSAR / GEOTIFF

Note: Recommended image specification is an indication only. It may vary depending on the software used. Airbus Defence and Space, Geo-Intelligence does not guarantee relevant capability.

Relevant Products and Services available from Airbus Defence and Space, Geo-Intelligence

- GEO GCP Product

Related Publications

WOLFGANG KOPPE, HENNIG S., HENRICHS, L., 2015: 3D point measurement from space by TerraSAR-X stereo imagery. 35. DGPF Conference and Workshop on Laser Scanning Applications, Cologne, 2015

KOPPE, W.; WENZEL, R.; HENNIG, S.; JANOTH, J.; HUMMEL, P. & RAGGAM, H., 2012: Quality assessment of TerraSAR-X derived ground control points. International Geoscience and Remote Sensing Symposium (IGARSS), 2012 IEEE International.

Related Sample Datasets

- 3 x High Resolution SpotLight Denver, USA (MGD, SE, HH)

Suitable Software

Application	Company Name								
	BAE Systems	Exelis	GAMMA Remote Sensing AG	Hexagon Geospatial/ GEOSYSTEMS GmbH	Joanneum Research	PCI Geomatics	Racurs	Textron Geospatial Solutions	Trimble
	Provided Software								
	SOCET GXP	ENVI SARscape	GAMMA MSP, ISP, DIFF & GE O, LAT, IPTA	ERDAS IMAGINE	RSG- Remote Sensing Software Package Graz	Geomatca and GXL	Photomod Radar	RemoteView, ELT5500, and Global Image Viewer	eCognition
3D Measurement									
•Ground Control Points	X				X	X	X	X	

Note: Information provided by Software Providers, Airbus Defence and Space, Geo-Intelligence does not guarantee relevant capability.

Contact

For feedback or further inquiry please contact the Airbus Defence and Space Customer Service Centre via telephone at +49 7545 8 4344 / eMail: terrasar@astrium-geo.com or visit <http://www.geo-airbusds.com/terrasar-x/>

List of Abbreviations

ACD	Amplitude Change Detection
CCD	Coherence Change Detection
DEM	Digital Elevation Model
DInSAR	Differential Interferometry
DSM	Digital Surface Model
DTM	Digital Terrain Model
EEC	Enhanced Ellipsoid Corrected (Basic Image Product)
EGR	Enhanced Gas Recovery
EMSA	European Maritime Safety Agency
EOR	Enhanced Oil Recovery
EU	European Union
EEZ	Exclusive Economic Zone
GCP	Ground Control Points
GEC	Geocoded Ellipsoid Corrected (Basic Image Product)
GEO	Airbus Defence & Space, Geo-Intelligence
HS	High Resolution SpotLight (imaging mode)
IMINT	Image Intelligence
InSAR	Interferometric SAR
IWS	Interferometric Wide Swath (Sentinel-1 imaging mode)
MGD	Multi Look Ground Range Detected (Basic Image Product)
NRT	Near-Real-Time
PSI	Persistent Scatterer Interferometry (PSI)
RE	Radiometrically Enhanced
REED+	Reducing Emissions from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
SAR	Synthetic Aperture Radar
SBAS	Small Baseline Subset Interferometry
SC	ScanSAR (imaging mode, 4-beam ScanSAR)
SE	Spatially Enhanced
SL	SpotLight (imaging mode)
SM	StripMap (imaging mode)
SSC	Single Look Slant Range Complex (Basic Image Product)

SRTM	Shuttle Radar Topography Mission
ST	Staring SpotLight (imaging mode)
WS	Wide ScanSAR (imaging mode, 6-beam Scan SAR)