Access to TerraSAR-X/TanDEM-X as ESA's Third Party Mission

Terms of Applicability

Date:	18 January 2022
Rev. 1 Iss. 5	
Document type: Technical Note	

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1 General

Within the Third Party Mission scheme, ESA provides to Earth Observation users data from non-ESA missions, so-called Third Party Missions, to complement the data from ESA EO missions and to support and build up the scientific user community for those data in Europe.

Since 2015, the Terra-SAR-X/TanDEM-X Satellite Systems are part of the Third Party Missions Program.

Within the ESA CAT-1 TPM Scheme, ESA offers to the CAT-1 user community the following service provided by Airbus DS:

- Delivery to Category-1 Users located in the territory of ESA Member States (including Canada), in the European Commission Member States, in Africa and in China as part of the Dragon cooperation programme of on-demand TerraSAR-X products (archiving and/or new acquisition products, WorldDEM products) for category-1 use
- Tasking option for the submission of new acquisition order

2 Data Accessibility Conditions

The data available as part of the ESA TPM are the following:

- Basic products:
    - Staring Spotlight (ST)
    - High Resolution SpotLight (HS)
    - SpotLight (SL)
    - StripMap (SM)
    - ScanSAR (SC)
    - Wide ScanSAR (WS)
- Packages:
    - Interferometry (ST, HS, SL, SM)
    - Maritime monitoring (SM, SC, WS, ST, HS, SL)
- WorldDem products:
    - WorldDEM core
    - WorldDEM
    - WorldDEM DTM
    - WorldDEM Bundle

Basic products

Products are available as archive and new acquisition data

Mode	ID	Scene Size (W x L)	Resolution (up to)	Polarisation
Staring Spotlight	ST	4 x 3.7 km^2	0.25 m	Single
High Resolution SpotLight	HS	10 x 5 km^2	1 m	Single
SpotLight	SL	10 x 10 km^2	2 m	Single or Double
StripMap	SM	30 x 50 km^2	3 m	Single or Double
ScanSAR	SC	100 x 150 km^2	18 m	Single
Wide ScanSAR	WS	270 x 200 km^2	40 m	Single

➢ Available geometric projections:
- Single Look Slant Range Complex (SSC) : azimuth – slant range (time domain).
- Multi Look Ground Range Detected (MGD): azimuth – ground range (without terrain correction)
- Geocoded Ellipsoid Corrected (GEC): map geometry with ellipsoidal corrections only (no terrain correction performed)
- Enhanced Ellipsoid Corrected (EEC): map geometry with terrain correction, using a DEM

➢ Products are considered "archive data" only if the data is in the archive for more than 30 days after the acquisitions date. Recent products (within 30 days after the acquisition) are recognized as "new acquisition products": if a user intends to ask for recent products, the order consumes the quota for new acquisition products.

➢ The archive of available products is accessible at https://terrasar-x-archive.terrasar.com

➢ Order for new acquisition to be finalized and sent at least 3 days before submission deadline: two submission deadlines every day at 8:30h and 21:30h UTC

➢ In case of new tasking data, two different options can be selected

- Regular- Science orbit: delivery 7 days after the acquisition, the absolute product location along track is 20 cm
- Regular - Rapid orbit: delivery 1 or 2 days after the acquisition, the absolute product location along track of 2m
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> Delivery of archive products is done with 'Standard' priority: within a maximum of 5 calendar days from the date of order submission

Interferometry (InSAR) data packages

Staring Spotlight, High Resolution Spotlight, Spotlight and StripMap products are also available as "InSAR data packages". Suitable for surface movement monitoring and amplitude / coherence change detection. This package is characterized by the following:

- Minimum order volume of 5 scenes within 6 months from the 1st order data
- All data with identical acquisition geometry and coverage of one defined location dedicated to InSAR applications
- Image delivery in SSC format
- Data tasking delivery option: Regular with science orbit

Maritime Monitoring data packages

All basic products are also available as "Maritime Monitoring packages". This package is characterized by the following:

- Minimum order volume of 5 scenes within 3 months from the 1st order data
- At least 75% of each scene area is water
- AOI of maximum 500.000km^2

WorldDEM products

Product	Description	Vertical accuracy	Grid spacing	AOI size
WorldDEM$_{core}$	WorldDEM$_{core}$ is output of interferometric processing of StripMap data pairs without any post-processing	Rel.: 2m Abs.: 4m	12 m	Min AOI: 100 km^2 Min. width: 1 km
WorldDEM^{TM}	WorldDEM^{TM} is produced based on WorldDEM$_{core}$, representing the surface of the Earth (including buildings, infrastructure and vegetation). Hydrological consistency is ensured	Rel.: 2m Abs.: 4m	12 m	Min AOI: 100 km^2 Min. width: 1 km
WorldDEM DTM	In additional editing steps, WorldDEM^{TM} is transformed into a Digital Terrain Model (DTM) representing bare Earth elevation	Rel.: 2m Abs.: 4m	12 m	Min AOI: 100 km^2 Min. width: 1 km
WorldDEM Bundle	Includes WorldDEM^{TM}, WorldDEM DTM and Quality layers	Rel.: 2m Abs.: 4m	24 m	Min AOI: 100 km^2 Min. width: 1 km

These are the main specifications of the WorldDEM products

> Horizontal Coordinate Reference System: World Geodetic System 1984 (WGS84-G1150)
> Vertical Coordinate Reference System: Earth Gravitational Model 2008 (EGM2008)
> Absolute Horizontal Accuracy: <6m
> Quality Layers (including water body mask) can be requested as an option with the WorldDEM and WorldDEM DTM
> Auxiliary Layers are delivered together with the WorldDEM core product
> WorldDEM database viewer is available at https://worlddem-database.terrasar.com

3 Data users

> Access to data can be provided by ESA to users located in the territory of ESA Member States (including Canada), in the European Commission Member States, in Africa and in China as part of the Dragon cooperation programme , but the German Satellite Data Security Law (SatDSiG) can introduce further limitation or even rejection of the order (In this case Airbus DS will interact with users to find the best possible solution)

- No geographic restrictions on Area of Interests (AOI) unless ESA defines otherwise. But the German Satellite Data Security Law (SatDSiG) can introduce further limitation or even rejection of the order (In this case Airbus DS will interact with users to find the best possible solution)

4 Assignment and usage of quota

Project proposal submission and evaluation

During the project proposal submission, the user shall specify his need as product type:

- X-Band SAR (Basic Products) Products
    - Starring SpotLight
    - High Resolution SpotLight
    - SpotLight
    - StripMap
    - ScanSAR or Wide ScanSAR
- X-Band SAR (InSAR and Maritime Packages)
    - Interferometry package - Starring SpotLight
    - Interferometry package - High Resolution SpotLight
    - Interferometry package – SpotLight
    - Interferometry package - StripMap
    - Maritime package – StripMap, ScanSAR or Wide ScanSAR
    - Maritime package - Staring Spotlight, High Resolution SpoLlight or SpotLight
- WorldDEM
    - WorldDEM core
    - WorldDEM
    - WorldDEM DTM
    - WorldDEM Bundle
    - For WorldDEM and WorldDEM DTM, the user can select the Quality Layers option if interested in.

For Basic products and Packages, the user has to specify the number of products (split in archive and new acquisitions); for the WorldDEM it is requested to define the amount of sqkm (the request has to adhere to the minimum order size described in above table).

For evaluation of the project, the provision of Time of Interest and Area of Interest are not mandatory but encouraged, especially for new acquisition data, to allow a preliminary feasibility analysis of the order request.

During the evaluation process, the scientific content of a submitted project proposal is evaluated by ESA and Airbus against the data requirements of the PI and a respective quota will be assigned to the project.

Order submission and data delivery

Upon acceptance of the project proposal, the PI (and Co-PIs if any) is allowed to order the products corresponding to the quota.

The user shall order archive/new acquisition products by sending a mail with order details to TSXX_CS_ESA_TPM@astrium.eads.net.

The mail for basic products or packages should contain a providing at least:

- acquisition modes
- AOI (shape file, kmz, …)
- processing parameters (MGD, GEC, EEC or SSC and SE/RE)
- polarization
- time frame

For WorldDEM products, the email should specify

- products type
- AOI (shape file, kmz, …)
- Optionally the Quality Layers

The quota is valid for one year after reception of the Final acceptance mail. This validity period can be superseded

if clearly specified to the user.

Products are delivered via FTP pickup. As soon as the requested data is available, the PI is notified by email about the data availability and instructed on the data download procedure. The retention time for data download is 5 days after reception of the delivery notification.