e-geos

AN ASI / TELESPAZIO COMPANY

COSMO-SkyMed

FAQ

Contents

1. Am I allowed to register on www.cosmo-skymed.it?

- Only registered Institutional users can enter the **www.cosmo-skymed.it** website with ASI authorization. Other users should contact e-GEOS (**info.cosmo@e-geos.it**) to gain access to COSMO-SkyMed data and services.

2. How can I consult the COSMO-SkyMed catalogue and order a product (archived or new acquisition)?

- At the moment, COSMO-SkyMed users can contact e-GEOS (**info.cosmo@e-geos.it**) to gain access to data and services. The on-line COSMO-SkyMed catalogue is available at www.e-geos.it, where is possible to register and browse archived images.

3. How much time should I wait for a new acquisition?

- The maximum response time from order submission to product delivery is 72 hours with the 4 satellite configuration and no constraints related to the acquisition geometry. This implies the planning of the first available opportunity of acquisition.

  In the case of orders with geometric constraints such as a limited range of look angles, the acquisition can be performed only in correspondence with the required opportunity causing delays of the product higher than 72 hours.

  The delay also increases beyond 72 hours in case of complex orders, such as for instance wide areas of interest, where coverage requires more than one acquisition.

  In case of emergency, the system is currently able to accept simple requests (for single images) till 16:30 UTC for images acquisition in the first semi-horizon of the acquisition time-window. Under these exceptional cases, the minimum response time is 26 hours (Routine Mode) for actually planned and acquired DTO(s).

4. What should I do if I'm having a problem ordering/using COSMO-SkyMed products?

- Users of COSMO-SkyMed are invited to contact e-GEOS Technical Support through Customer Service or sending an e-mail to: **info.cosmo@e-geos.it**.

5. If I open a problem ticket (by sending a User Anomaly Form), what is the expected time to receive an official answer to my problem?

- Once e-GEOS Technical Support has verified the existence of a real technical problem (within 1–2 working days from receipt of the User Anomaly Form), they will submit an official Trouble Ticket to the COSMO-SkyMed Support Engineering Team.

  The acknowledgement from the Support Engineering Team with the anomaly confirmation/refusal shall be usually provided within one working week from notification by e-GEOS Technical Support.

6. What is the difference between SCS_B and SCS_U products (for SAR experts)?

- The processing of the SCS_U product differs from that one of the SCS_B product for the following features:

– a non-weighted processing is performed, that is windowing isn't applied on the processed bandwidth;

– radiometric equalization (in terms of compensation of the range antenna pattern and incidence angle) is not performed; hence only compensation of the antenna transmitter gain and receiver attenuation and range spreading loss is applied.

SCS (Level 1A) products must be considered as products for SAR expert users; other users should request COSMO-SkyMed products with a processing level 1B (non geo-referenced products), 1C (geo-referenced products) or 1D (terrain corrected).

7. How can I order a higher level product?

- Registered Institutional Users can order High Level Services byaccessing the web site www.Cosmo-SkyMed.it and selecting the required service from the COSMO-SkyMed Services list.
- Commercial Customers can request High Level Service from Customer Service or by e-mail to **info.cosmo@e-geos.it**

In any case, before ordering High Level services, Customers are recommended to read section 2.0.2 ("Services for the generation of SAR high level and speckle filtered products") of the help on-line available at **www.Cosmo-SkyMed.it**, where technical constraints of each High Level service are reported.

8. What is the maximum size of my Area of Interest that I can order and be sure that it will be acquired with only one image?

- The maximum size of an Area of Interest that the user can order and be sure that it will be acquired with only one SPOTLIGHT-2 image is 600 meters, e.g. defining a circle with 300 m radius.

As the COSMO-SkyMed system uses discrete beams, sufficient conditions to acquire the Area of Interest with a single image are the following:

– Availability of at least one coverage of this area exists within the validity interval of the request;
– the size of the Area of Interest is less than or equal to the minimum overlap between all the consecutive beam couples. In detail, minimum overlap depends on the satellite sensor mode, and its value for each sensor mode can be summarized in the following table, in the case of nominal swath parameters:

Sensor Mode	Minimum overlap (Km)
SPOTLIGHT -2	0.6
HIMAGE	1.3
WIDEREGION	1.0
HUGEREGION	1.0
PINGPONG	0.7

If a customer needs an area greater (i.e. a SPOTLIGHT-2 with radius 3 km), it is possible that there are not beams able to guarantee the coverage with a single product. In this case, it is better to ask for feasibility from Customer Service.

Of course, orders with sizes greater than nominal limits (i.e SPOTLIGHT-2 with radius 7 km) need more than 1 scene to be completed.

9. What are the formats available for COSMO-SkyMed products (standard and higher)?

- COSMO-SkyMed products are available in the following formats:
  - HDF5 (Level 1A, 1B, 1C, 1D)
  - TIFF (Level 1B)
  - GEOTIFF (Level 1C e 1D)
  - JPEG (Level 1B, 1C, 1D)

10. What Image Processing software is able to read COSMO-SkyMed products?

- The standard format of COSMO-SkyMed products is HDF5; to open this format it is necessary to have Image Processing software which is compatible with this format.

  A non-exhaustive list of these IP software includes:
  - hdf5 viewer, available at **http://hdf.ncsa.uiuc.edu/**
  - ENVI 4.4 and higher versions
  - SARScape
  - Erdas Image 9.3.2 and higher versions
  - SocetSet 5.5
  - Photomod
  - Gamma software
  - ESA's NEST 3C and Derby 3.0

  Level 1B-1C-1D products are also available in TIFF/GeoTIFF formats, which can be read by almost any IP software that can handle 16 bit files (e.g. Photoshop).

11. What is the price of a COSMO-SkyMed product?

- COSMO-SkyMed data access is regulated by the COSMO-SkyMed data distribution policy, in which civilian users (institutional and commercial) and military users share the resources of the system by following the appropriate rules.

  ASI administers and supports use for scientific and institutional users, while e-GEOS has the exclusive worldwide sales of data services and COSMO-SkyMed.

- INSTITUTIONAL USERS

  The COSMO-SkyMed website (**www.cosmo-skymed.it**) for scientific and institutional users lists services for new acquisitions, product orders.
  The list of products is available on both the COSMO-SkyMed website, and the ASI website (**www.asi.it**).

- COMMERCIAL USERS

  e-GEOS is the exclusive worldwide reseller of COSMO-SkyMed data and services. On its web site (www.e-geos.it) there is a product Price List in pdf format. Special conditions for large order volumes or other ad-hoc requirements are available on a case-by-case basis through the e-GEOS Commercial Team. Please, contact the e-GEOS Customer Service at **info.cosmo@e-geos.it** to get more details.

12. Why, if I order a COSMO-SkyMed StripMap HIMAGE over an area which is 80 Km long, I am receiving 3 products? How many images will I pay for such an order?

- COSMO-SkyMed products are sold calculating the number of "equivalent scenes". For instance a StripMap HIMAGE is nominally 40 km x 40 Km, and therefore an 80 km x 40 Km strip is composed of 2 equivalent scenes. The Customer will be charged the price of 2 scenes. It has been noticed that the COSMO-SkyMed production system can generate 3 products to deliver the 80 Km long strip, to guarantee the total coverage of the area of interest (the produced scenes should have a sufficient overlap between them). In this case (80 km x 40 Km strip) 3 overlapping scenes will be delivered, but the Customer will pay for only 2 scenes.

13. What is the maximum area covered by a Mosaicked product? What are the system requirements for Mosaicked product?

- Mosaicking of SAR products is allowed for the maximum coverage defined listed in the following table:

Acquisition mode	Maximum coverage (Km^2)	Geometric resolution (m x m)	Pixel Spacing (m x m)
Enhanced Spotlight	≤ 20 x 20	1.0 x 1.0	0.5 x 0.5
Himage	≤ 300 x 300	5.0 x 5.0	2.5 x 2.5
PingPong (Not applicable to DEM)	≤ 300 x 300	20.0 x 20.0	10.0 x 10.0
WideRegion	≤ 300 x 300	30 x 30	15 x 15
HugeRegion	≤ 400 x 400	100 x 100	50 x 50

The Mosaicked Products are generated by assembling level 1B, 1C or 1D products or strips into a common grid.

Mosaicked Products are generated from data acquired in all the COSMO-SkyMed acquisition modes, assembling images acquired by homogeneous modes. Mosaicking of images acquired by heterogeneous modes is allowed too, with the exception of PingPong images

It is possible to produce mosaicked products according to the following policy:

Instrument Mode	Product Type	Spacing	Resolution	Geometric accuracy
Homogeneous	SAR Image	As for input	As for input	The same accuracy of the single product less accurate in input
Mixed	SAR Image	The same as the product with minor resolution	The same as the single product with less Resolution. Images with high resolution are degraded by a mean filter in order to avoid image non-homogeneities	The same accuracy of the single product less accurate in input

The following constraints must be considered for mosaicked product requests:

Area	Constraint
Polarization	Mosaicked products from images acquired with different Tx/Rx polarization (or different pairs of Tx/Rx polarization in the case of mosaicking of PingPong products) cannot be requested. In the case of products obtained by mosaicking of Ping Pong tiles, layers with the same polarization are mosaicked separately in two different images.
Subswath	Mosaicked products from images acquired at different sub swath (off-nadir angles) can be requested
Look Side	Mosaicked products from images acquired at different look side (Left/Right) can be requested
Orbit Direction	Mosaicked products from images acquired at different Orbit Direction (Ascending/Descending) can be requested

14. What are the geometric characteristics (e.g. orbit type, beams) of COSMO-SkyMed acquisitions?

orbit type: sun synchronous
revolution/day: 14 + 13/16
revolution/cycle: 237
orbit characteristics:
- inclination: 97.86°
- eccentricity 0.001185
- argument of perigee: +90°
- reference height 619.6 km
- LTAN 6:00 a.m.

COSMO-SkyMed SAR supports the following imaging modes:

- SPOTLIGHT-2 (ENHANCED_SPOTLIGHT)
- STRIPMAP HIMAGE
- STRIPMAP PINGPONG
- SCANSAR WIDE REGION
- SCANSAR HUGEREGION

Details of single beams are in the following tables. These beams are available for both Right-looking and Left-looking mode. Numbers are given for off-nadir angles.

SPOTLIGHT-2

BEAM	NEAR	FAR
ES-0A	18.170	19.970
ES-0B	19.520	20.860
ES-0C	20.600	21.940
ES-0D	21.580	22.930
ES-1	22.570	23.910
ES-2	23.730	25.070
ES-3	24.360	25.690
ES-4	25.490	26.830
ES-5	26.500	28.140
ES-6	27.980	29.080
ES-7	28.880	30.220
ES-8	30.180	31.520
ES-9	31.440	32.770
ES-10	32.310	33.650
ES-11	33.330	34.530
ES-12	34.470	35.680
ES-13	35.150	36.370
ES-14	35.930	37.240
ES-15	36.870	38.180
ES-16	38.000	39.110
ES-17	39.020	40.040
ES-18	39.970	41.090
ES-19	41.060	42.000
ES-20	41.650	42.590
ES-21	42.540	43.620
ES-22	43.570	44.400
ES-23	44.360	45.140
ES-24	45.050	45.940
ES-25	45.830	46.500
ES-26	46.460	47.130
ES-27	47.030	47.760
ES-28	47.700	48.380
ES-29	48.350	48.880
ES-30	48.860	49.410
ES-31	49.330	49.950
ES-32	49.920	50.390
ES-33	50.230	50.910
ES-34	50.790	51.300
ES-35	51.240	51.740

StripMap HIMAGE

BEAM	NEAR	FAR
H4-0A	16.360	20.150
H4-0B	20.050	23.500
H4-1	22.600	25.660
H4-2	23.130	26.210
H4-3	25.100	28.000
H4-4	27.710	30.470
H4-5	29.270	31.960
H4-6	30.600	33.380
H4-7	32.430	34.830
H4-8	33.600	36.000
H4-9	34.600	37.200
H4-10	35.900	38.150
H4-11	37.510	39.600
H4-12	38.560	40.670
H4-13	39.340	41.390
H4-14	40.000	42.000
H4-15	41.790	43.620
H4-16	43.100	44.800
H4-17	44.490	45.920
H4-18	45.690	46.850
H4-19	46.800	47.990
H4-20	47.690	48.700
H4-21	48.640	49.800
H4-22	49.660	50.640
H4-23	50.520	51.370
H4-24	51.150	51.980

StripMap PINGPONG

BEAM	NEAR	FAR
PP-A	17.140	20.300
PP-B	20.100	22.570
PP-1	22.070	24.760
PP-2	23.550	26.230
PP-3	24.450	27.110
PP-4	26.010	28.670
PP-5	28.440	30.650
PP-6	29.850	32.050
PP-7	31.000	33.180
PP-8	32.310	34.310
PP-9	33.970	35.950
PP-10	35.440	37.330
PP-11	36.880	38.670
PP-12	37.930	39.710
PP-13	39.630	41.740
PP-14	41.700	43.280
PP-15	42.970	44.530
PP-16	44.500	45.930
PP-17	45.750	47.100
PP-18	46.810	47.980
PP-19	47.900	49.000
PP-20	48.800	49.750
PP-21	49.700	50.620
PP-22	50.490	51.360
PP-23	50.920	51.750

ScanSAR WIDEREGION

SWATH	NEAR	FAR
WR-00	16.720	28.740
WR-01	21.850	33.010
WR-02	30.120	38.670
WR-03	36.800	43.500
WR-04	40.400	45.920
WR-05	45.710	50.100
WR-06	48.020	51.370
WR-07	49.150	52.060

NB: currently the beam WR-00 is not available

ScanSAR HUGEREGION

SWATH	NEAR	FAR
HG-00	16.720	33.970
HG-01	21.850	37.070
HG-02	30.120	41.880
HG-03	36.800	45.920
HG-04	43.400	50.100
HG-05	46.930	52.060

NB: currently the beam HG-00 is not available

15. How do COSMO-SkyMed acquisitions for the DEM product generation work?

- COSMO-SkyMed provides two constellation configurations according to different angular separations between a pair of satellites: Tandem and Tandem-Like.

  The Tandem-Like Configuration is also known as "one-day" interferometry, it achieves the interferometric acquisitions in 24h time delay by placing two satellites with a relative phase of 67.5°.

  The Tandem Configuration is achieved when two satellites fly in close proximity for interferometric acquisitions in near-real time. These satellites fly in different orbital planes having Ascending Node separation as large as 0.08° and True Anomaly phasing of 1.22°, corresponding to an along-track separation of 150 km.

  In a Tandem-Like Configuration no specific strategy for orbit keeping is applied and standard manoeuvres are performed in order to maintain the orbit within 1 km.

  Currently satellites SAR 2 and SAR 3 are in Tandem-like configuration.

  It is possible to perform Interferometric Campaigns in both the Tandem and Tandem-like configurations. During an Interferometric Campaign, a reference baseline over a specific area of interest is maintained with a specific orbit-keeping strategy of the satellites involved, with more frequent manoeuvres.

  Only the owner of the COSMO-SkyMed System, ASI and AD, can decide to start an Interferometric Campaign. Currently there is no on going Interferometric Campaign and there are none scheduled.

  The DEM products of the COSMO-SkyMed system can be generated from a pair of interferometric images (the same acquisition geometry) in the same acquisition mode (Spotlight-2 or StripMap HIMAGE).

  In Tandem interferometric configuration (based on different orbit planes, with 20" of separation, corresponding to an along-track separation of 151 km, and a plane separation of 0.08 deg) the DEM Products have the following specifications:

  DEM Products originated from data acquired in Enhanced Spotlight mode:

  – Absolute vertical accuracy = 50m
  – Relative vertical accuracy = 6m
  – Absolute horizontal accuracy = 50m
  – Relative horizontal accuracy = 4m
  – Posting = 3m x 3m

  To be satisfied at least under the following conditions:

  – Orthogonal baseline in the range [400m–600m]
  – Incidence angle in the range [50°–60°]
  – Maximum surface slope of 30° and minimum coherence of 0.6 (for 95% of points)
  – Availability of a reference DEM (for calibration) fulfilling at least DTED1 specifications (posting 90 x 90 m^2, abs. vert. acc. 30 m, rel. vert. acc. 20 m, abs. horiz. acc. 50 m).

  The DEM Products originated from data acquired in Himage mode:

  – Absolute vertical accuracy = 55m
  – Relative vertical accuracy = 10m
  – Absolute horizontal accuracy = 50m
  – Relative horizontal accuracy = 7m
  – Posting = 10mx10m

To be satisfied at least under the following conditions:

- Orthogonal baseline in the range [200m, 300m]
- Incidence angle in the range [50°–60°]
- Maximum surface slope of 25° and minimum coherence of 0.6 (for 95% of points)
- Availability of a reference DEM (for calibration) fulfilling at least DTED1 specifications (posting 90 x 90 m2, abs. vert. acc. 30 m, rel. vert. acc. 20 m, abs. horiz. acc. 50 m).

In Tandem-Like configuration, DEM product generation is not assured. The quality of the product will depend on several parameters, such as the perpendicular baseline between acquired data and coherence between the images.

Currently, with the Tandem-like configuration, to generate DEM products, it is recommended to order images with 1 day of time distance (SAR2-SAR3) with incidence angles which lie in the range 50°–60°.