PHOTOMOD Radar software supports GaoFen-3 SAR images

Remote Sensing Data Group, RACURS, Moscow, Russia, 2022

On August 10, 2016, the China National Space Administration (CNSA) and Chinese Academy of Space Technology (CAST) launched GaoFen-3, a high-resolution SAR satellite with 12 imaging modes in C-band. The second satellite of the series was launched on November 22, 2021

The main fields of application are meteorology, protection of water resources, monitoring of natural disasters, land and ocean. The main characteristics of the GaoFen-3 system are described in Table 1.

Table 1. GaoFen-3 system characteristics

Central frequency	C band/5.4GHz
Signal bandwidth	0 - 240 MHz
Orbit, altitude	Sun-synchronous orbit, 755km
Imaging Mode	Sliding Spotlight | Ultra-Fine Strip | Fine Strip 1&2| Standart Strip| Narrow/Wide/ Global ScanSAR | Quarter-Polarization Strip1&2| Wave| Extended
Polarization	Single/Dual/Quar-polarization
Incidence angle	10° - 60°
Spacecraft mass	2779 kg
Antenna size	15 m x 1.5 m

The GaoFen-3 satellite supports a wide range of look angles and can collect data in 12 different imaging modes. All these 12 imaging modes are actually fallen into 5 categories in terms of SAR working mechanism, which namely are Spotlight (SL), Strip-Map (FSI,FSII,SS,QPSI,QPSII,EXT), dual-channel DPCA (UFS), Scan-SAR (NSC, WSC) and Wave-mode (WAV). Imaging mode parameters and products specifications are in Table 2.

Table 2. Specification of the GF-3 SAR imaging mode

Beam Mode	Incidence Angle	Number of looks A×E	Nominal resolution (m)	Swath（km）	Polarization
Sliding Spotlight (SL)	20° - 50°	1×1	1	10×10	HH or VV
Ultra-Fine Strip (UFS)	20° - 50°	1×1	3	30	HH or VV
Fine Strip1 (FSI)	19° - 50°	1×1	5	50	HH+HV or VV+VH
Fine Strip2 (FSII)	19° - 50°	1×2	10	100	HH+HV or VV+VH
Standard Strip (SS)	17° - 50°	3×2	25	130	HH+HV or VV+VH
Narrow ScanSAR (NSC)	17° - 50°	1×6	50	300	HH+HV or VV+VH
Wide ScanSAR (WSC)	17° - 50°	1×8	100	500	HH+HV or VV+VH
Global ScanSAR (GLO)	17° - 53°	2×(2~4)	500	650	HH+HV or VV+VH
Quarter-Polarization Strip1 (QPSI)	20° - 41°	1×1	8	30	HH+HV+VV +VH
Quarter-Polarization Strip2 (QPSII)	20° - 38°	3×2	25	40	HH+HV+VV +VH

Wave (WAV)		20° - 41°	1×2	10	5×5	HH+HV+VV +VH
Extended (EXT)	Extended Low	10° - 20°	3×2	25	130	HH+HV or VV+VH
	Extended High	50° - 60°	3×2	25	80	HH+HV или VV+VH

The **PHOTOMOD Radar** software is intended for full-scale processing of Earth remote sensing data acquired by spaceborne radars with synthesized antenna aperture (SAR) such as KOMPSAT-5, Sentinel, ERS-1/2, Radarsat, SIR-C/X, ENVISAT ASAR, TerraSAR-X, ALOS, COSMO-SkyMed, etc., and generation secondary information products

The process of importing GaoFen-3 data from .XML format into the internal PHOTOMOD Radar .rdp format:

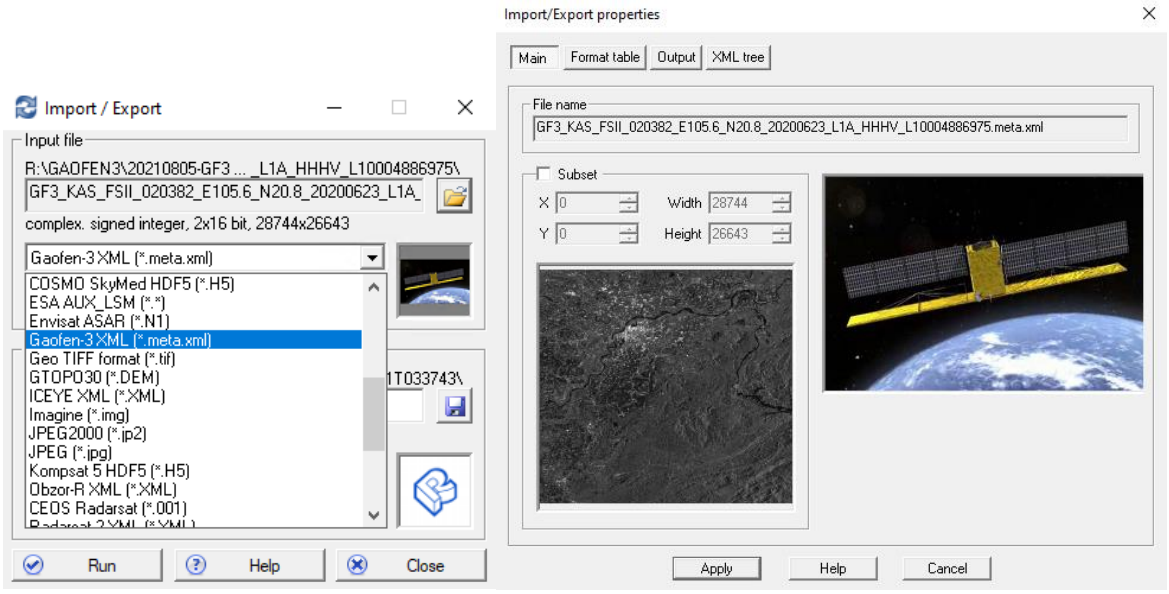

Fig.1 Dialog box for selecting the format and fragment of the image

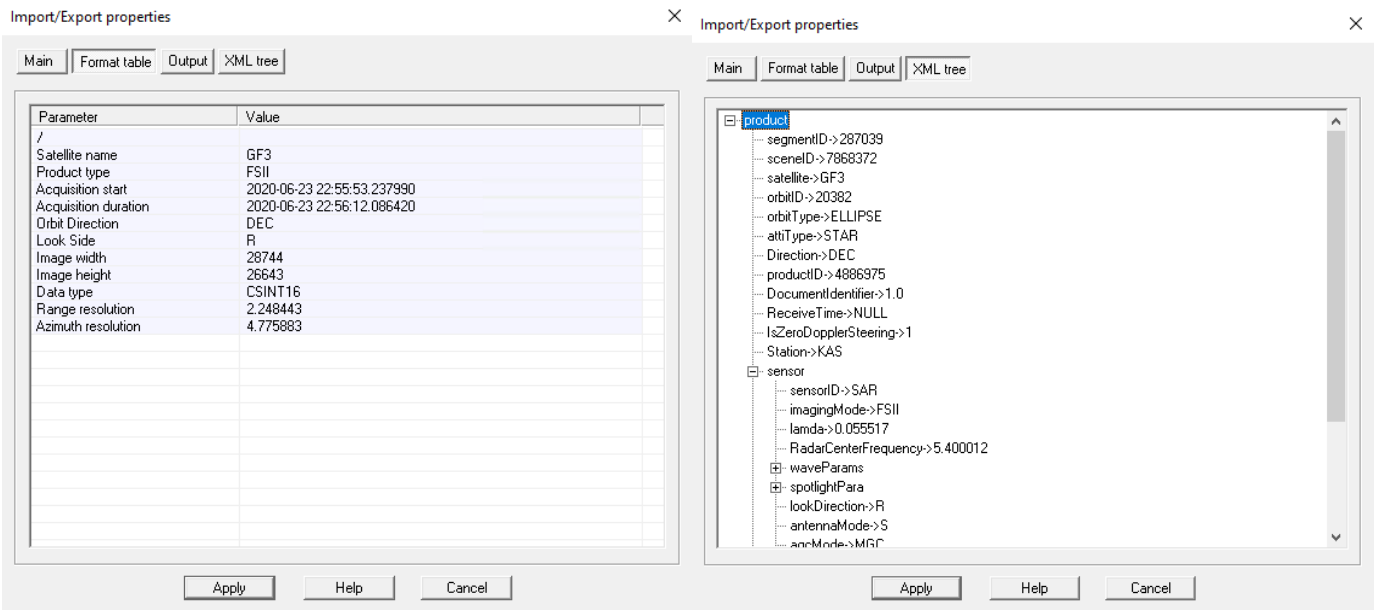

Fig.2. Information box and GaoFen-3 images metadata

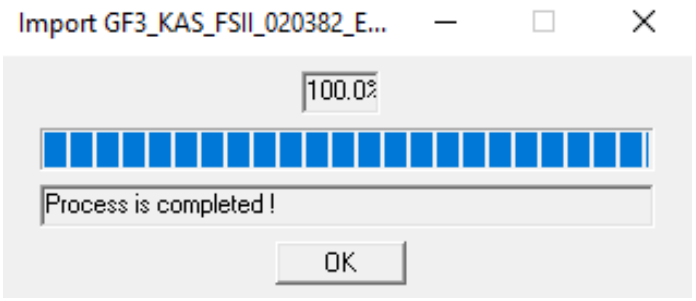

Fig.3. Process of exporting GaoFen-3 data to RDP format

The geocoding process is designed to transform the image from the time-slant range radar coordinate system into the geographic coordinate system on the latitude-longitude grid of the WGS-84 ellipsoid.

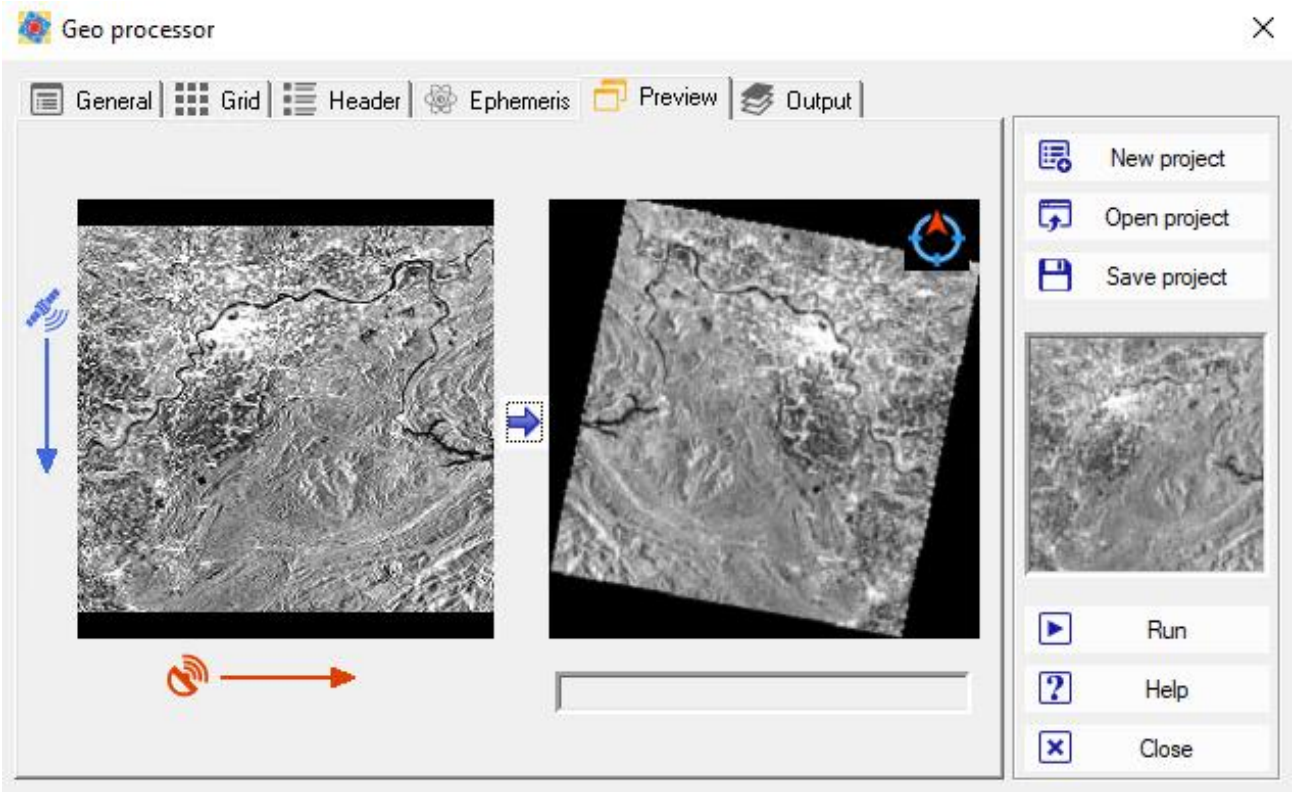

Fig 4. Displaying the geocoding processor

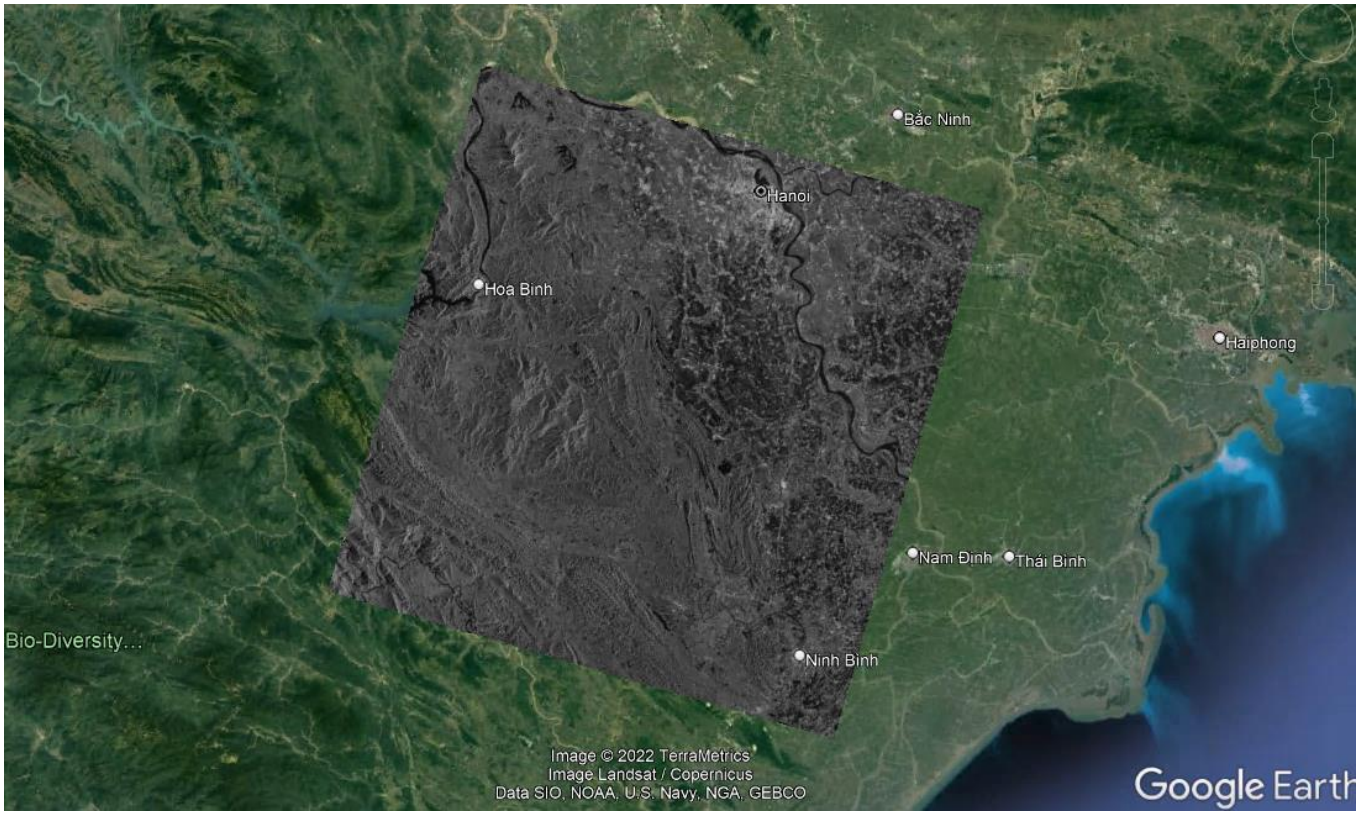

Fig 5. Displaying a fragment of a geocoded GaoFen-3 image on a Google Earth background

As an example, we used the radar image from 01/29/2021 on the territory near the city of Hanoi, Vietnam. Processing level - SLC (single look complex), mode - Fine Strip2 (Wide stripmap) resolution 10m, polarization - HH.

Information materials can be requested on the official website of Head Aerospace Group. Test data is available upon request. The official website of the company https://www.head-aerospace.eu/.

The RACURS company is the official partner of Head Aerospace Group.