DEVELOPMENT OF ALOS/PALSAR DATA
ON-DEMAND PROCESSING AND PROVIDING SYSTEM ON GEO GRID

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1. INTRODUCTION

National Institute of Advanced Industrial Science and Technology (AIST) has proposed Global Earth Observation Grid (GEO Grid). The GEO Grid is an e-science infrastructure, which allows users to process and acquire huge data related to the earth science [1]. Over the past few years, the GEO Grid has been providing several services for processing and providing some data to science communities. The ASTER data service and a Digital Elevation Model (DEM) generation service [1] is one of the major GEO Grid application services. Recently, the GEO Grid has also developed PALSAR data on-demand processing and providing service system for the Phased Array type L-band Synthetic Aperture Radar (PALSAR) onboard Advanced Land Observing Satellite (ALOS). The PALSAR data has been utilized in the field of disaster mitigation, environmental monitoring and natural resource exploration. This paper describes the overview and advantages of the ALOS/PALSAR data processing and providing system.

2. OVERVIEW OF THE SYSTEM

The ALOS/PALSAR data processing and providing system is composed three processes: data search, data processing, and data providing (Fig. 1). In the preparation step, user needs to resister and receive his/her own account for GEO Grid portal because of consideration with data owners' licensing policies. The user account is
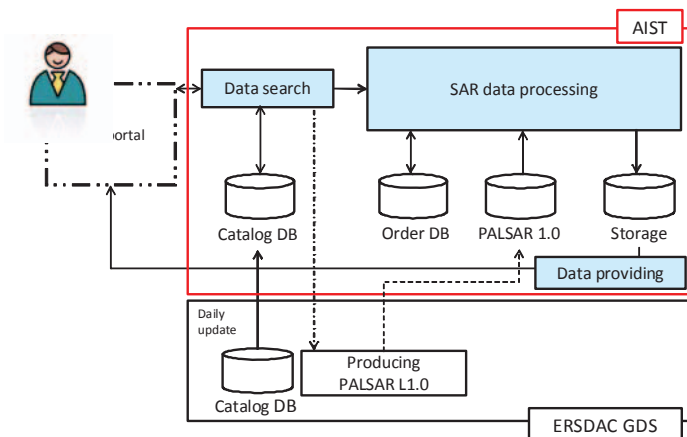

Fig. 1 Schematic flow of the PALSAR data on-demand processing and providing service system.
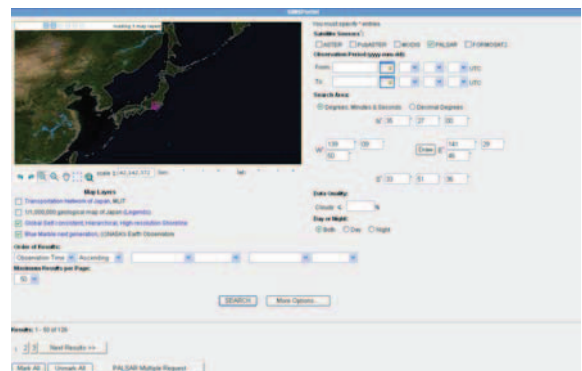

Fig.2 Satellite Imagery Management System (SIMS).

principally provided for research purposes of PALSAR data. GEO Grid has adopted Virtual Organization (VO) in order to administrate user's authorities [2]. After logging in the portal, in the first step, the user can search PALSAR data from large archive through Satellite Imagery Management System (SIMS) (Fig. 2). The SIMS enables users to search easily for multiple data. Then, search results are showed as browse images on the SIMS (fig.3). In the next step, when the user selects the images, product level and processing option window is displayed (Table1). The product level is selectable from five levels, SSC (Single-look Slant Range Complex), MSA (Multi-look Slant Range Amplitude), MGA (Multi-look Grand Range Amplitude), MGG (Multi-look Grand Range Geocode), and MGO (Multi-look Grand Range Ortho). The user request is registered in the data base for management of this system. In the final step, PALSAR products generated in a short period of time are provided for users through the storage service.

3. SEAMLESS CONNECTION WITH THE EXTERNAL ARCHIVE SYSTEM

About 40,000 PALSAR Level 1.0 CEOS scenes are in a part of GEO Grid storage at AIST. Unfortunately, these data account for only 4 % of the total PALSAR scenes, and the other data are archived in Earth Remote Sensing Data Analysis Center (ERSDAC). Commonly, users are forced to search and order data for different organizations when users would like to take data sets archived by each organization. This system automatically obtains the daily ERSDAC PALSAR catalog information and enables users to search and select PALSAR data archived in both AIST and ERSDAC. Then, High value added products are made from Level 1.0 CEOS in AIST when user-selected data is in AIST, while PALSAR Level 1.0 CEOS data is produced in ERSDAC before SAR data processing when user-selected data is archived in ERSDAC. It takes about 1 hour to generate a product when a user select data archived in AIST, whereas it takes few days when a user select archived in ERSDAC. This system allows users to easily search and receive PALSAR data without careful considerations and advanced skills even though PALSAR data is archived in anywhere.
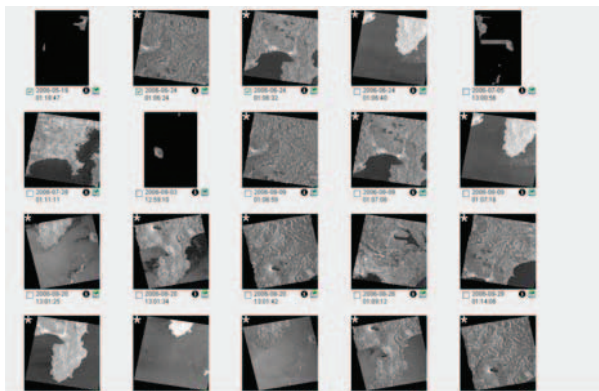

Fig. 3 Search results of archived PALSAR scenes.

Table1 Selectable options for data processing in the PALSAR data on-demand processing and providing service system.

Radiometric calibration	None, AIST
Polarimetric calibration	None, AIST
Unit	Digital Number, dB
Map Projection	UTM, EQA
Pixel Spacing	12.5, 15m, 30m, 90m
Interpolation Method	Nearest Neighbor, 1/dist, SQR (1/dist), Constant, Gaussian
Output Format	Flat binary, GeoTIFF
Data Type	Float, 2 byte Integer

4. DATA CALIBRATION

We need to monitor its performance for the future sustainable operation in order to evaluate the temporal sensitivity variations of the PALSAR sensor, and keep the calibration coefficient quality and its improvement for GEO Grid users. Since the calibration coefficient quality should be controlled during the mission, we, in AIST, started the PALSAR calibration and validation (Cal/Val) campaign [3]. The PALSAR Cal/Val campaign has been performed using the following Corner Reflectors (CRs), 2 m triangular trihedral CR, 3 m triangular trihedral CR, non-rotated 2 m square dihedral CR and 45º rotated 2 m square dihedral CR. The two triangular trihedral CRs of size 2 m and 3 m are used for the like-polarization and rotatable rectangular dihedral CR is used for the cross-polarization. In the PALSAR data on-demand processing and providing service system, we have provided calibrated PALSAR products using calibration coefficients calculated through the PALSAR Cal/Val campaign.

5. CONCLUSION AND FUTURE PLANS

We have developed ALOS PALSAR data on-demand processing and providing system on GEO Grid for research purposes. The system allows users to easily search and receive calibrated PALSAR data without careful considerations and advanced skills even though PALSAR data is archived in anywhere.

As the next step, the search PALSAR data through metadata based on the Open Geospatial Consortium Catalog Services for the Web (OGC-CSW) is currently under design.

6 ACKNOWLEDGEMENTS

7. REFERENCES

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