ที่ ดศ ๐๔๐๗/ว๖๔๗

สำนักงานคณะกรรมการดิจิทัลเพื่อเศรษฐกิจ
และสังคมแห่งชาติ
ศูนย์ราชการเฉลิมพระเกียรติ ๘๐ พรรษาฯ
อาคารรัฐประศาสนภักดี ถนนแจ้งวัฒนะ
เขตหลักสี่ กรุงเทพฯ ๑๐๒๑๐

๒๒ มีนาคม ๒๕๖๑

เรื่อง ขอเชิญชวนส่งข้อเสนอโครงการที่เกี่ยวข้องกับการประยุกต์ใช้ประโยชน์จากเทคโนโลยีอวกาศ ภายใต้
ความร่วมมือองค์การความร่วมมือด้านอวกาศแห่งเอเชียแปซิฟิก (APSCO)

เรียน อธิการบดีมหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา

สิ่งที่ส่งมาด้วย สำเนาหนังสือ APSCO/2018/SP&PM/008g ลงวันที่ ๒๖ กุมภาพันธ์ ๒๕๖๑

ด้วยสำนักงานเลขาธิการองค์การความร่วมมือด้านอวกาศแห่งเอเชียแปซิฟิก (Asia Pacific and Space Cooperation Organization : APSCO) ได้มีหนังสือถึงประเทศไทยเพื่อขอให้พิจารณาจัดส่งข้อเสนอโครงการที่เกี่ยวข้องกับการประยุกต์ใช้ประโยชน์จากเทคโนโลยีอวกาศ เพื่อเป็นแนวทางในการพัฒนาเศรษฐกิจและสังคมให้กับประเทศสมาชิก โดยมีรายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย

สำนักงานคณะกรรมการดิจิทัลเพื่อเศรษฐกิจและสังคมแห่งชาติ (สดช.) พิจารณาแล้วเห็นว่าหน่วยงานของท่านมีภารกิจ/การสอนหลักสูตรที่เกี่ยวข้องกับเทคโนโลยีอวกาศที่สามารถเข้าร่วมเป็นส่วนหนึ่งของแผนพัฒนากิจกรรมด้านอวกาศขององค์การความร่วมมือด้านอวกาศแห่งเอเชียแปซิฟิก (APSCO) จึงขอประชาสัมพันธ์และเชิญชวนบุคลากรที่สนใจส่งข้อเสนอโครงการที่เกี่ยวข้องกับการประยุกต์ใช้ประโยชน์จากเทคโนโลยีอวกาศเพื่อการพัฒนาเศรษฐกิจและสังคม และโปรดส่งข้อเสนอโครงการเป็นภาษาอังกฤษ ไปถึง กองกิจการอวกาศแห่งชาติ สำนักงานคณะกรรมการดิจิทัลเพื่อเศรษฐกิจและสังคมแห่งชาติ กระทรวงดิจิทัลเพื่อเศรษฐกิจและสังคม เลขที่ ๑๒๐ หมู่ที่ ๓ ศูนย์ราชการเฉลิมพระเกียรติ ๘๐ พรรษาฯ อาคารรัฐประศาสนภักดี ชั้น ๗ ถนนแจ้งวัฒนะ แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพฯ ๑๐๒๑๐ ทั้งนี้ สดช. มอบหมายให้นางสาววิลาวัณย์ พิพัฒน์จิรฐิติกาล นักวิเคราะห์นโยบายและแผนชำนาญการ โทรศัพท์ ๐ ๒๑๔๑ ๖๘๘๑ ไปรษณีย์อิเล็กทรอนิกส์ space@onde.go.th เป็นผู้ประสานงาน และโปรดส่งข้อเสนอโครงการให้ สดช. ภายในวันที่ ๒๕ เมษายน ๒๕๖๑ เพื่อดำเนินการในส่วนที่เกี่ยวข้องต่อไป

จึงเรียนมาเพื่อโปรดพิจารณา

ขอแสดงความนับถือ

(นางวรรณพร เทพหัสดิน ณ อยุธยา)
เลขาธิการคณะกรรมการดิจิทัลเพื่อเศรษฐกิจและสังคมแห่งชาติ

กองกิจการอวกาศแห่งชาติ
โทร. ๐ ๒๑๔๑ ๖๘๘๑ , ๐ ๒๑๔๒ ๓๓๓๐
โทรสาร ๐ ๒๑๔๓ ๘๐๒๖ - ๗

เรียน รองอธิบดีกรมฯ ดังหัวเรื่อง หนังสือ
– เพื่อโปรดทราม และมอบ สสว.
ดำเนินการ

(นายดิลก ประสานวรกิจกุล)
รักษาราชการแทน ผู้อำนวยการกองกลาง
27 มี.ค. 2561

จัดทำเสนอ

ฦ. โกฑฑฑศ
28 มี.ค. 61

เรียน ผู้อำนวยการสถาบันวิจัยและพัฒนา
✓ ๑.เพื่อโปรดทราบ
๒.เพื่อโปรดพิจารณา
๓.เพื่อตรวจสอบ ฯลฯ

4 เม.ย. 2561

จัดดังเสนอ

ฦ. โกฑฑฑศ
4 เม.ย. 61

APSCO

ASIA-PACIFIC SPACE COOPERATION ORGANIZATION

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APSCO/2018/SP&PM/008g   **NOTE VERBALE**

The Asia-Pacific Space Cooperation Organization (APSCO) presents its compliments to the Ministry of Digital Economy and Society (MDE), Kingdom of Thailand and has the honor to inform as follows:

Pursuant to the Development Plan of Space Activities of APSCO updated in 2017 and approved by the 11th Council Meeting, any new proposal relating to Spatial Data Sharing Service Platform (DSSP) and its Application Pilot Project may be submitted to the Secretariat at any time, and in order to promote the utilization of the platform for socio-economic development of our Member States, the Secretariat shall support projects under this category to be promptly implemented at least one project for each country.

In this regards, APSCO Secretariat would like to call for project proposal for DSSP Application from all Member States. So far, there are three projects sustaining in the list, namely

1) Dust Storm Monitoring
2) Crop Monitoring
3) Building Coastal Resilience through Geospatial Techniques using DSSP for the Protection of Coastal Livelihood along the Sindh Coast

Your confirmation of the above mentioned projects/ new project proposal submitted to the Secretariat before 30th April, 2018, would be highly appreciated.

Contact Information: Ms. Pei Qin, Department of Strategic Planning and Program Management, Tel: +86 10 6370 2677 ext 311, Fax: +86 10 6370 2286, E-mail: peiqin@apsco.int

APSCO would like to avail itself of this opportunity to renew to the Ministry of Digital Economy and Society (MDE), Thailand the assurances of its highest considerations.

February 26, 2018

Mrs. Vunnaporn Devahastin, Secretary General
Office of the National Digital Economy and Society Commission
Ministry of Digital Economy and Society (MDE), Bangkok, THAILAND
Fax: 662 143 8027

Cc: Royal Thai Embassy, Beijing, China
Ms. Pichayaninw, First Secretary. Email: Pichayaninw@mfa.go.th
Fax: 6532 1748

http://www.apsco.int

ตัวอย่าง

A project proposal submitted to the Asia Pacific Cooperation Organization (APSCO)

Estimation of Rice Field using Multiple Satellite Sensors

Submitted by

Ministry of Information and Communication Technology (MICT), Thailand

August 30th, 2012

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Introduction

Agriculture is an essential part of human civilization. Lacking dependable sources of food is a risk of malnutrition and starvation. The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life". Unfortunately, food insecurity is one of globally important problems caused by many interrelated factors such as population growth, climate change, urban development, struggles for natural resources and many issues related to consumers.

To achieve food security, agricultural production is necessary. Agricultural information management (AIM) was recently used to improve agricultural development and food security. Crop field is one of the important information for AIM which can be used to analyze crop production. Together with the fact that rice is unquestionably the most important staple food for a large part of the world, estimating rice field is chosen to be the topic of this study. The basic idea of this proposed project is to estimate rice field using images from remote-sensing satellites because of their wide coverage, fast acquisition time and less human efforts.

In Thailand, images from Small Multi-Mission Satellite (SMMS) were recently used by Office of Agricultural Economics to forecast rice production, based on estimating rice field, which will be used for analysis, planning and policy making by other Thai government agencies. This project was cooperated, through APSCO, with Institute of Remote Sensing Applications (IRSA), People's Republic of China. Although the preliminary results from this project are quite promising, there are a number of issues needed to be resolved, partly due to limitation of available resources from SMMS. Particularly, the current method of estimating rice field, during transplanting and harvesting periods of rice season, was found to be inaccurate due to limitation of medium-pixel resolution images from passive sensors of SMMS (i.e., coupled-charge device, or CCD, in this case) to identify rice field in these periods. Nevertheless, it was also found that the area of these two periods could possibly be identified by combining the current available resources with images from different types of satellite sensors such as high-pixel resolution sensors and/or active sensors like Synthetic Aperture Radar (SAR).

In this project, the method of estimating rice field will be developed based on images from multiple satellite sensors through APSCO Data Sharing Service Platform. This includes medium-resolution (passive-sensor) images from SMMS (HJ-1A satellite), high-resolution (passive-sensor) images from ZY-02 satellite (or equivalent, e.g., CEBER-02) and high-resolution SAR (active-sensor) images from HJ-1C satellite (or equivalent). The results will be compared with the current method which is based only on images from HJ-1A satellite. The target areas of this study are in Sing Buri and Ang Thong provinces, Thailand, in year 2011-2013.

Objectives

The objective of the project is to develop method to estimate rice field based on data from various types of satellite sensors and compare it with existing method which is based only on medium-resolution passive-sensor images from HJ-1A satellite (SMMS).

Scope of Work

To meet the objectives, the scope of this work is organized as follows.

1. Study and understand the latest methods of estimating rice field and how to apply SAR satellite images for the problem of interest from literature search and short-course training programs through cooperation with APSCO.

2. Select satellite images from

   a. HJ-1A satellite (SMMS) for medium-resolution images,
   b. ZY-02 satellite (or equivalent) for high-resolution images.
   c. HJ-1C satellite (or equivalent) for high-resolution SAR images.

   For medium- and high- resolution images, only images with quality at least level 7[1] will be chosen. The target areas in this project are the areas in Sing Buri and Ang Thong provinces, Thailand, in year 2011-2013. These images will be divided into 2 sets, depending on the date of each image comparing with the reference date (date-R), as follows.

   • First set: The dates of images in this set are before (older than) date-R. This set of images will be used to create a Normal Difference Vegetation Index (NDVI) profile.
   • Second set: The dates of images in this set are on or after the date-R. This set of images will be used to estimate the rice field based on NDVI profile (from the 1st set of images or the 1st data set).

   The date-R will be selected according to the available data, the starting date of this project and the rice production cycle (which has a schedule with one cycle, on average, around 4 months).

3. Perform corrections on all selected images such as geometric correction with ground control point, orthorectification and radiometric correction.

4. Create NDVI profile from images in the 1st data set by processing medium-resolution images using time-series NDVI technique to create NDVI profile (see Figure 1) and then enhancing the NDVI profile through the use of

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[1] Note that image with quality level 10 means an image with 0% cloud cover and image with quality level 0 means an image with 100% cloud cover.

a. High-resolution images to increase the resolution of rice field,
b. High-resolution SAR images to enhance the decision on rice field during the initial growing stage which is the limitation of SMMS images.
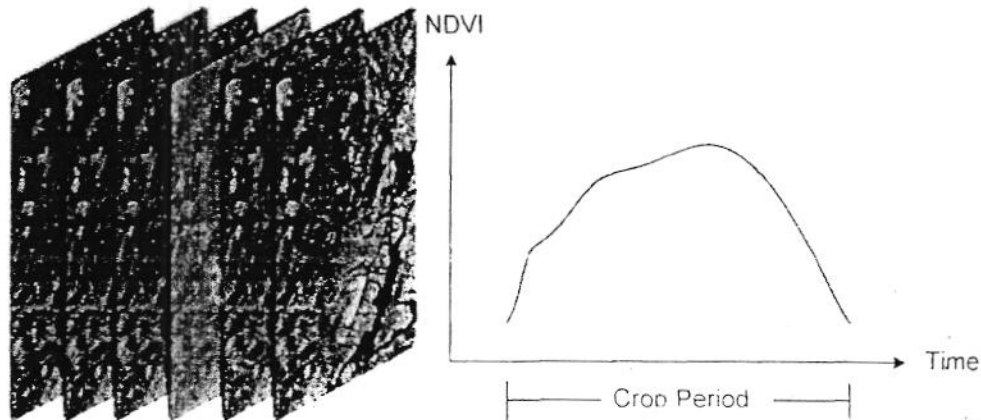

Figure ⅰ NDVI profile

5. Estimate the rice field by

   a. Perform the profile matching^2 between the profile from images in the 2nd data set and the NDVI profile.
   b. Create rice field maps for all (five) periods of rice season including transplanting. growing. reproducing. mellowing and harvesting.

6. Evaluate performance of the method of estimating rice field by

   a. Compute estimation errors for each period of rice season by performing ground check (at least 80% accuracy).
   b. Determine improvement relative to the existing method which is based only on medium-resolution satellite (SMMS) images.

7. Share knowledge of rice-field estimation using APSCO Data Sharing Service Platform through

   a. Arrange a one-day seminar in Thailand to share knowledge from this project to related Thai organizations.
   b. Arrange a one-week short course training program in Thailand regarding the rice-field estimation for APSCO Member States.
   c. Final report and all documents from a seminar and a short course training program prepared by Thailand.

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^{2} Y.H. Tseng, P. H. Hsu, and I. H. Chen, "Automatic Recognition of Rice Fields from Multitemporal Satellite Images." ISPRS Commission III Symposium on Object Recognition and Scene Classification from Multispectral and Multisensor Pixels. pp.479-484, 1998.

Deliverables

- Final report: 10 copies of the document and 1 copy of CD/DVD
- All documents from a seminar and a short course training program prepared by Thailand: 1 copy of all documents with 1 copy of CD/DVD

Data Specifications

Remote Sensing Satellite Data

1. Medium-resolution passive-sensor images from SMSS (HJ1A satellite) received at Chulabhorn receiving satellite station under APSCO cooperation.

2. High-resolution passive-sensor images from ZY-02 satellite (or equivalent such as CEBER-02. etc.). with resolution of 5 or 10 meters per one pixel. through APSCO Data Sharing Service Platform.

3. High-resolution active-sensor (SAR) images from HJ-1C satellite (or equivalent). with resolution of less than 30 meters per one pixel. through APSCO Data Sharing Service Platform..

   The target areas are the areas in Sing Buri and Ang Thong provinces. Thailand, in year 2011-2013.

Required Technical Supports from APSCO

1. Short Course Training Programs

   a. A one-week short course training program on application of satellite images for estimating rice field in People's Republic of China (PRC).

   b. A one-week short course training program on application and utilization of SAR satellite images.

Licensing

The right of satellite data and results from this project will be based on the regulations under APSCO data sharing project.

Schedule

The estimated duration of this project is 9 months with the following implementation plan.

Task Name	Month								
	1	2	3	4	5	6	7	8	9
Preparation									
Set up hardware and software	→								
Satellite image acquisition	——	——	——	——	—→				
Literature search and study									
Literature search	——	——	——	——	——	—→			
A one-week short course training program by APSCO on estimating rice field in PRC using remote-sensing satellite images	—								
A one-week short course training program by APSCO on application and utilization of SAR satellite images	—								
Estimate rice field									
Select and correct satellite images for creating NDVI profile	—								
Create NDVI profile with enhancement from multiple satellite sensors									
Select and correct satellite images from the 2nd data set for estimating rice field	—	—							
Estimate rice field monthly for one rice season[3] (i.e., 4 set of monthly results)		—	—						
Re-estimate rice field during performance evaluation if accuracy is less than 80%					—	—			
Performance Evaluation									
Evaluate improvement relative to the existing method					—	——			
Performing ground check to determine accuracy (at least 80% accuracy)						——			
Share knowledge									
A one-day seminar for related Thai organization									
A one-week short course training program for APSCO Member States									
Progress monitoring and deliverables									
Progress report to APSCO					—				
All documents from a seminar and a short course training program prepared by Thailand						—	—		
Final report to APSCO									

[3] There are 4 months for one rice season

Estimate Budget

Items	Estimated Budget (k USD)	Percentage
Labor	18.60	74.85%
Field Survey (excluding labor)	1.00	4.02%
Publication (reports, training documents. etc.)	4.00	16.10%
Miscellaneous	1.25	5.03%
Total	24.85	100%

Note that the above budget excludes

- Costs related to data (e.g.. images) from remote-sensing satellites which is expected to be financially supported by APSCO.
- Costs related to all short course training programs by APSCO which is expected to be financially supported by APSCO.
- Travel and accommodation costs related to a one-week short course training programs by Thailand which is expected to be financially supported by APSCO.
- Costs related to a one-day seminar in Thailand for Thai organizations which will be financially supported by Thailand.

Benefit

The success of this project will bring great social. economic and technology benefits. The knowledge and ability to estimate rice field through multiple satellite sensors could play an important role for the problem of food insecurity through agricultural information management especially in analysis of rice production. Specifically. such knowledge and tools could be developed through the use of APSCO Data Sharing Service Platform. This is because the advantage of remote-sensing satellite images and the lack of information of each individual satellite sensor. Food is an essential part of human life and the effect of food insecurity can be tremendous. an ability to perform effective agricultural information management will provide substantial improvement on people's quality of life and economics through food security. economic opportunity and environment sustainability. The technological development in this project will enhance technology learning. exchange and promote technology applications and transfer among APSCO Member States which will eventually enhance users and applications of APSCO Data Sharing Service Platform.