

## Multi-stereo Satellite Images data processing for Digital Surface Modeling

### Duration

Half to one day.

### Proponents:



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**Keywords:** Multi-view Photogrammetry, Rational Polynomial Function Model, High resolution Spaceborne sensors, Bundle Adjustment, Digital Surface Models (DSM), Ortho Rectification.

### Targeted Group (expected: 20-30 persons)

Beginner to intermediate; students, researchers and practitioners interested in mapping using stereo, multi-stereo satellite images, and their applications.

### Course Description

High resolution (High-res) satellite images nowadays can observe ground as small as a 30-cm footprint (e.g. worldview 3/4 sensors), and play an important role for wide-area 3D data generation. Such images possess their unique characteristics due to orbit limitations, thus the photogrammetric processing of such data requires special considerations. In this tutorial, we will address both theoretical and practical aspect of data processing of multi-view satellite images, which includes a theory and a practical hands-on session, content listed as follows:

### *Theory session*

1. A brief introduction to existing satellite sensors.
2. A brief introduction to rational polynomial models, bundle adjustment and surface generation and orthophoto rectification.
3. An introduction to satellite acquisition characteristics and considerations of stereo pair or multi-view image collection and reconstruction

### *Hands on session*

1. How to search for available data, through for example, digital discover portals, and how to select stereo pairs.
2. The participants will learn to perform level-1 geometric correction, pan-sharpening, relative orientation, absolute orientation (and bundle adjustment) and dense matching using RPC stereo processor (RSP) [1], and generate colored point clouds, digital surface models (Raster and textured meshes), and true-orthophoto.
3. The participants will use the RSP-affiliated tools to perform depth fusion for multiple DSMs to generate high-quality DSM.

### **Resource to be distributed**

1. A set of multi-view and stereo-view images for training purposes (under limited use).
2. A test license for RSP and affiliated tools for processing satellite images.

### **Rongjun Qin's Bio**

Rongjun Qin holds a joint associate professorship in Department of Civil, Environmental and Geodetic Engineering, and Department of Electrical and Computer Engineering at The Ohio State University. He earned a B.Sc. in Computational Mathematics from Wuhan University (2009), M. Eng in Photogrammetry and Remote Sensing from Wuhan University (2011), Ph.D. in Photogrammetry and remote sensing from ETH Zurich (2015). He is the author of RSP and has a rich experience in supporting 3D mapping using high resolution satellite images. He serves a few editorial roles including 1) associate editor for PE&RS journal; 2) associate editor for ISPRS Journal. He is an IEEE senior member and serves as the chair of working group 8, commission I of ISPRS.

- [1] R. Qin, "RPC Stereo Processor (RSP) –A software package for digital surface model and orthophoto generation from satellite stereo imagery," *ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences*, vol. (to appear in ISPRS congress July 2016)), 2016.

