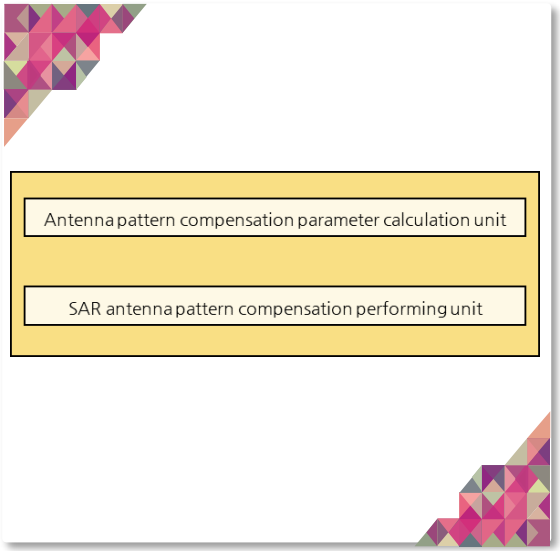
Surveillance

Representative Patent 07

❖ Title of Invention : **Method for sar antenna pattern compensation**
❖ Application Number. : **KR2018-0172211**

Application of Technology and Field of Use

◆ **Synthetic Aperture Radar (SAR) is required to create high-resolution radar images for reconnaissance and surveillance using satellite data.**
◆ **Satellite image information is used in various fields such as land surveillance, reconnaissance, urban planning, water resources, agriculture, marine, forestry, mapping, meteorological and climate monitoring, and geological resource utilization.**



〈Representative drawing〉

Features of Technology

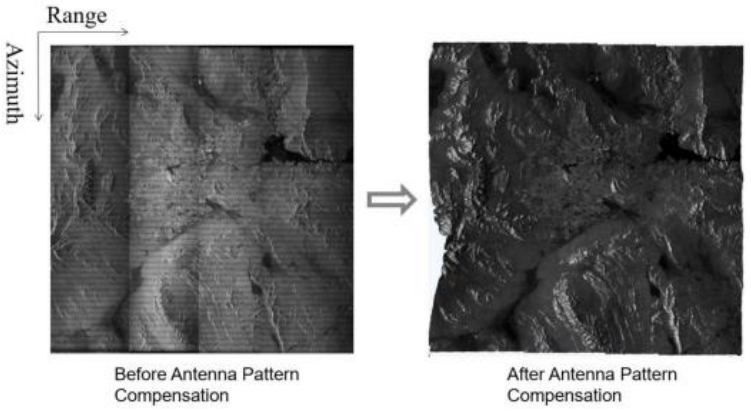
- Receiving SAR antenna pattern information
- Obtaining the maximum antenna pattern value from the SAR antenna pattern information
- Setting a normalized elevation antenna pattern cut from the SAR antenna pattern information
- If there is no electric azimuth steering, setting a normalized azimus antenna pattern cut from the SAR antenna pattern information
- Setting a plurality of sample target points in a footprint to be evenly located on a scene area
- Calculating azimuth time, delay time, and a normalized elevation antenna pattern value at an intermediate time point of observing each of the plurality of set sample target points at the nearest distance for the sample target point
- Obtaining a polynomial parameter in a first two-dimensional domain by fitting the normalized elevation antenna pattern value at the intermediate time point for observing each sample target point with respect to the azimuth time and delay time calculated for the sample target point

Surveillance

Representative Patent 07

Features of Technology

- During dwell time for each sample target point, calculating values obtained by sampling a predetermined number of times (k) and dividing the Doppler frequency, normalized azimuth antenna pattern value, and normalized elevation antenna pattern value by the normalized elevation antenna pattern value at the intermediate time point for observing the sample target point
- Calculating a value obtained by converting k sampled Doppler frequencies for each sample target point into an azimus frequency domain performing azimuth antenna pattern compensation
- Obtaining a polynomial parameter in a second two-dimensional domain by fitting the value obtained by converting the Doppler frequency into the azimuth frequency domain for each sample target point and the azimuth antenna pattern value normalized with respect to the delay time
- Obtaining a polynomial parameter in a third two-dimensional domain by fitting the value to the Doppler frequency and delay time for each sample target point



〈Satellite imagery before and after SAR antenna pattern compensation〉

Technical Effects

◆ **Applicable regardless of SAR operation mode**

- Applicable to any SAR system or any SAR operation mode (stipmap, scan SAR, TOPS, staring spotlight, sliding spotlight, etc.)
- Since it is implemented as one algorithm, development and maintenance costs can be saved.

◆ **Accurate antenna pattern compensation**

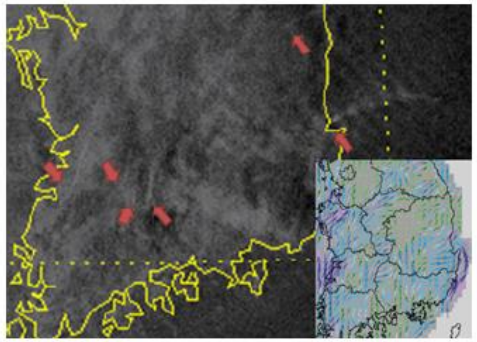
- It is possible to create high-quality SAR imaging products from which unique physical properties of an object for the microwaves used can be obtained.

Surveillance

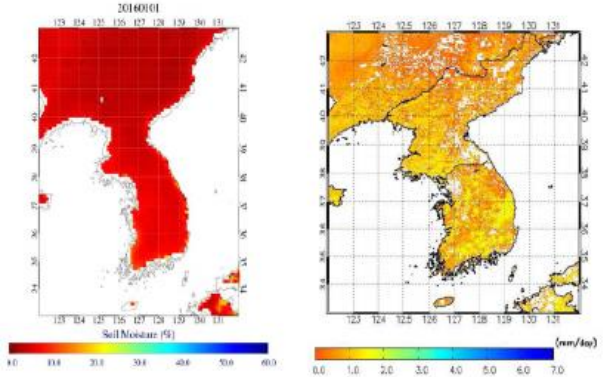
Representative Patent 07

Social, Environmental, Economical Effects

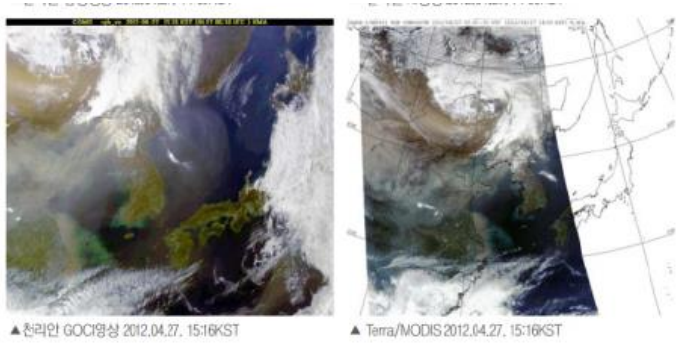
◆ Reconnaissance and surveillance of disaster, agriculture, forestry, marine, and climate environment using high-quality satellite data



〈Wildfire detection image observed through Chollian GOCI〉



〈Chollian satellite-based soil moisture (left) and evapotranspiration (right)〉



〈Image of yellow dust observed by Chollian Ocean Satellite〉