



# GEOMETRIC SELF-CALIBRATION

*Innovative technique for using symmetrical and orthogonal images to calibrate an Earth observation system*

## Technological advantages

### Removes the need for ground-based reference sites

Self-calibration eliminates the need for a super site or ground control points (GPS, maps, etc.).

Possibility of using a lot of sites and thus improving the precision of the geometric calibration.

Possibility of using sites at different latitudes, enabling the monitoring of possible thermo-elastic evolution of alignment biases.

Continually evolving data base of sites

### Autonomous measurement

Ground symmetrising of effects due to rolling and pitching biases by means of symmetrical acquisition.

Separation of static and dynamic effects. Acquisition does not necessarily have to be done in a single pass.

Full use of new agile satellite systems (such as Pleiades).

## Summary of the invention

The technique consists in recording two images of the same scene so that they are either symmetrical (Method 1) or orthogonal (Method 2).

The geometrical alignment of the images means that they can practically be superimposed. The correlation then provides the calibration parameters needed.

Method 1 enables determination of the roll, pitch and yaw biases.

Method 2 enables mapping of the focal plane and measuring of attitude residues.

## Potential applications

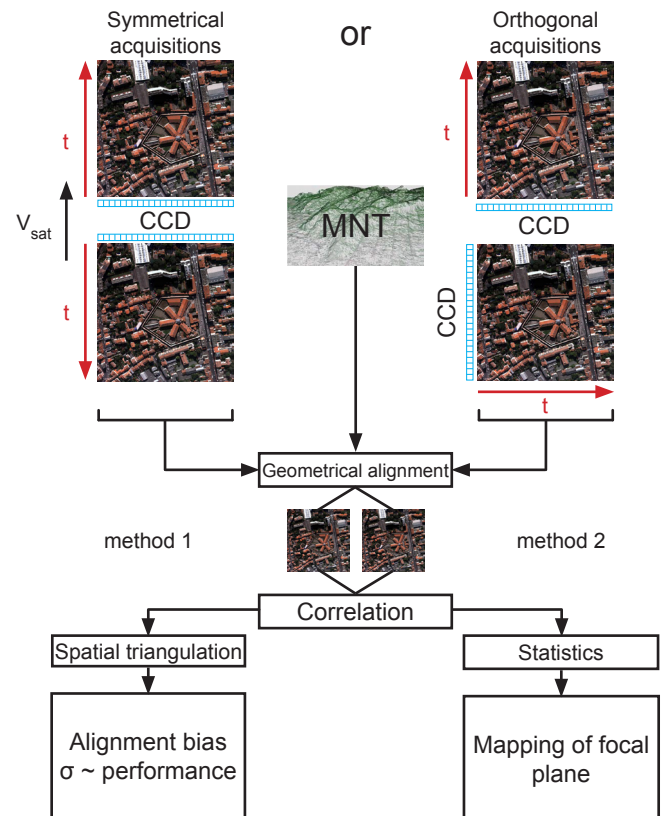
### Precision mapping

Agile satellite or airborne observation systems, security/defence (drones)

Civil cartography

### Calibration of array or matrix sensors

Industrial-grade vision (automatic calibration by simple displacement of the sensor, not requiring target pattern)



Principle of the two calibration methods

## Commercial advantages

### Optimising of observation time

Less dependence on weather conditions

Calibration is adapted to operational constraints

### Fewer ground resources

Fewer installations to be created, operated or maintained (target patterns, ground control points)

*Patented invention available under licence*