Aircraft and Ship Velocity Determination in Sentinel-2 Multispectral Images

The Sentinel-2 satellites in the Copernicus program provide high resolution multispectral images, which are recorded with temporal offsets up to 2.6 s. Moving aircrafts and ships are therefore observed at different positions due to the multispectral band offsets, from which velocities can be determined. We describe an algorithm for detecting aircrafts and ships, and determining their speed, heading, position, length, etc. Aircraft velocities are also affected by the parallax effect and jet streams, and we show how the altitude and the jet stream speed can be determined from the geometry of the aircraft and/or contrail heading. Ship speeds are more difficult to determine as wakes affect the average ship positions differently in the various multispectral bands, and more advanced corrections methods are shown to improve the velocity determination.

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