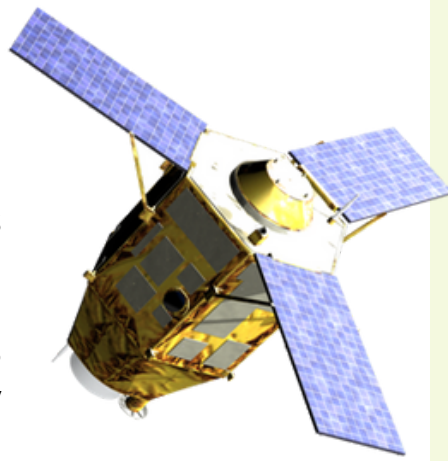


PLÉIADES

The Pléiades constellation is a group of two satellites conceived by Airbus Defence and Space (ADS) and Thales under the supervision of the CNES. Launched respectively in 2011 and 2012, Pléiades 1A and 1B offer very high-resolution optical imagery, daily revisit capability and agile acquisition for diverse applications.



Mission parameters

- **Number of satellites** : 2
- **Launch date** : 17 December 2011
- **Orbit height** : 694 km
- **Revisit rate** : 1 day
- **Number of images** : 500 per satellite per day

[1] "Satellite Pléiades 1Aet 1B". Latitude Geosystems, <https://latitude-geosystems.com/Satellite-3243-Pl%C3%A9iades-1A-et-1B.html>

Sensor description

- **Spectral bands** :
 - Panchromatic (PAN) : PAN = 480-820 nm
 - 4 Multi-Spectral bands (MS) :
 - B0 = 450-530 nm (blue)
 - B1 = 510-590 nm (green)
 - B2 = 620-700 nm (red)
 - B3 = 775-915 nm (NIR)
- **Resolution** : 0.5m for the PAN band and 2m for the MS bands
- **Swath** : 20km
- **Image location accuracy** : 1m

[2] "Earth Online - Pléiades". European Space Agency, <https://earth.esa.int/eogateway/missions/pleiades>

[3] "Pléiades 1A Satellite Imagery Specifications". Global Scan Technologies LCC, <https://www.gstdubai.com/satelliteimagery/pleiades-1a.html>

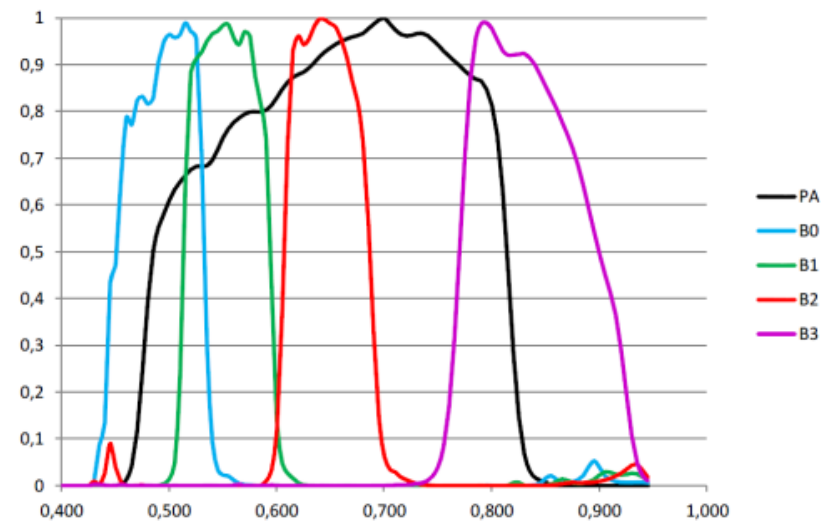


FIGURE 50: SPECTRAL NORMALIZED SENSITIVITIES OF THE PLÉIADES SENSORS

Spectral response of the Pléiades MS and PAN sensors

Applications in object recognition

Combining wide coverage, high resolution and rapid revisit, Pléiades are particularly suited for applications such as :

- **Defense** - surveillance, intelligence gathering and strategic planning
- **Agriculture** - monitoring field parcels
- **Urban mapping** - recognizing buildings, roads and construction changes
- **Marine Surveillance** - ship detection and pollution monitoring
- **Environmental monitoring** - detecting pollution and illegal waste dumping

[4] "Pléiades (satellite)". Wikipedia, [https://fr.wikipedia.org/wiki/Pl%C3%A9iades_\(satellite\)](https://fr.wikipedia.org/wiki/Pl%C3%A9iades_(satellite))

[5] "Pléiades Imagery User Guide". Satellite Imaging Coporation, https://content.satimagingcorp.com/media/pdf/User_Guide_Pleiades.pdf

Challenges

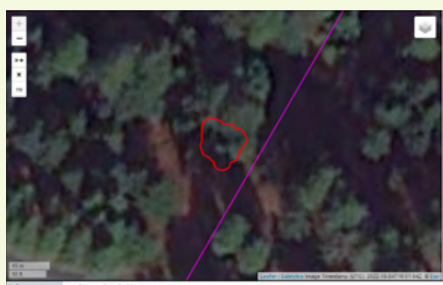
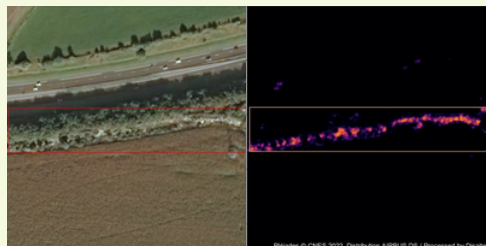
With only two satellites, the Pléiades constellation struggles to cover vast areas frequently. The spatial coverage is also limited by the size of the pictures taken. Moreover, the camera's small number of bands makes it sensitive to atmospheric conditions. All of these factors reduce the flexibility and reliability of Pléiades imagery for continuous, large-area monitoring.

Examples



In 2017, the Aris 13 oil tanker and its crew were seized by pirates. The hijackers turned off the ship's positioning equipment. The Pleiades satellites were used in order to localize the missing ship. By taking images of the different ports of the Somali coast, the Aris 13 was located in less than two days, using object recognition.

The company Disaitek created an algorithm detecting littering and illegal trash dumping using Pleiades imagery. Disaitek offers their clients to scan and analyse up to 2000km² areas.



Another company, Satelytics, uses satellites imagery from the Pléiades to detect unhealthy vegetation next to power lines in order to avoid trees falling on them. Using stereo imaging, the company can measure the height of the trees and power lines and estimates which trees represent a danger.

[6] "Hijacked Oil Tanker found with the Help of Pléiades". Airbus Defence and Space, <https://space-solutions.airbus.com/resources/case-studies/defence/hijacked-tanker-ar13-located-with-the-help-of-pleiades/>

[7] "Littering and illegal dumping detection and monitoring". Disaitek, <https://www.disaitek.ai/illegal-dumping>

[8] "Vegetation Management Algorithms Keep Utility Infrastructure Safe". Airbus Defence and Space, <https://space-solutions.airbus.com/resources/case-studies/pleiades/vegetation-management-algorithms/>

Replacement - Pléiades Neo



The Pléiades constellation is set to be retired in 2026, and replaced by a new generation called **Pléiades Neo**.

Pléiades Neo started being launched in 2021, four satellites were planned but the last two satellites were destroyed during a failed launch in 2022.

This new constellation embarks more modern technologies and sensors, allowing the precision to be increased to 30 cm in PAN. Moreover, it includes 2 additional spectral bands : Deep Blue and Red Edge, improving water, atmospheric and vegetation analysis.

[9] "Pléiades Neo". eoPortal, <https://www.eoportal.org/satellite-missions/pleiades-neo#technical-specifications>

[10] "Pléiades Neo". Wikipedia, https://fr.wikipedia.org/wiki/Pl%C3%A9iades_Neo

[11] "Pléiades Neo User Guide". Apollo Mapping, https://wp-cdn.apollomapping.com/web_assets/user_uploads/2021/11/08103301/2021.10_PleiadesNeo_UserGuide_EarlyRelease_20211015.pdf

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