WORKING WEEK 2025
AND
Locate25
THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience
Championing a Digital Generation
Brisbane, Australia 6-10 April

Suitcase satellites: The rise of CubeSats and their impact on environment and climate monitoring in Australia

Fabrice Marre

Senior Earth Observation Specialist

SMARTSAT
Cooperative Research Centre

Organised by:
FIG
INTERNATIONAL FEDERATION OF SURVEYORS
Geospatial Council of Australia


KANYINI

Landsat 9 (USGS)
2623kg

LARGE

>1000kg

Pleiades Neo (CNES)
920kg

MEDIUM

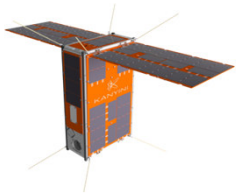
500-1000kg

SkySat (Planet)
110kg

MINI

100-500kg

Kanyini (SA Space Mission)
11kg



MICRO

10-100kg

NANO

CUBESATS

1-10kg

Unicorn (Alba Orbital)
750g

PICO

0.1-1kg

Organised by:

FIG
INTERNATIONAL FEDERATION OF SURVEYORS

Geospatial Council of Australia

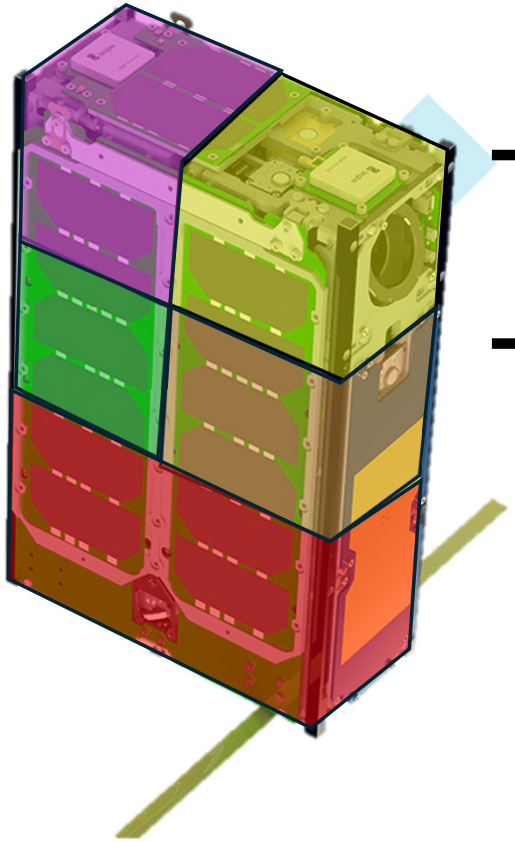
10x10x10 cm

1U accept 5 standard PCB

Electrical Power Supply (EPS): Solar panels, battery charger and batteries

On Board Computer (OBC): CPU, Memory, Command/Data handling

Altitude Determination and Control System (ADCS): Sensors + actuators (wheels & magnetorquers, star tracker)



Payload

Communications Systems (COMS): Transmitters(s)+antennas

WORKING WEEK 2025

AND

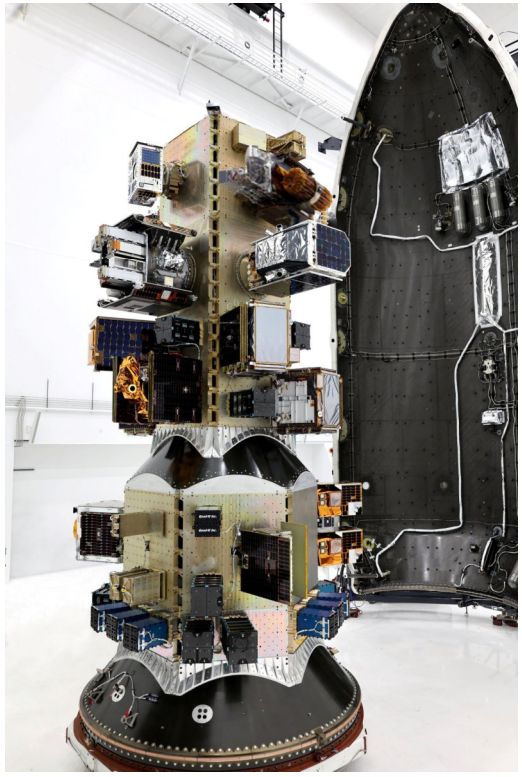
Locate25

THE NATIONAL GEOSPATIAL CONFERENCE

Collaboration, Innovation and Resilience

Championing a Digital Generation

Brisbane, Australia 6-10 April



Organised by:

FIG INTERNATIONAL FEDERATION OF SURVEYORS

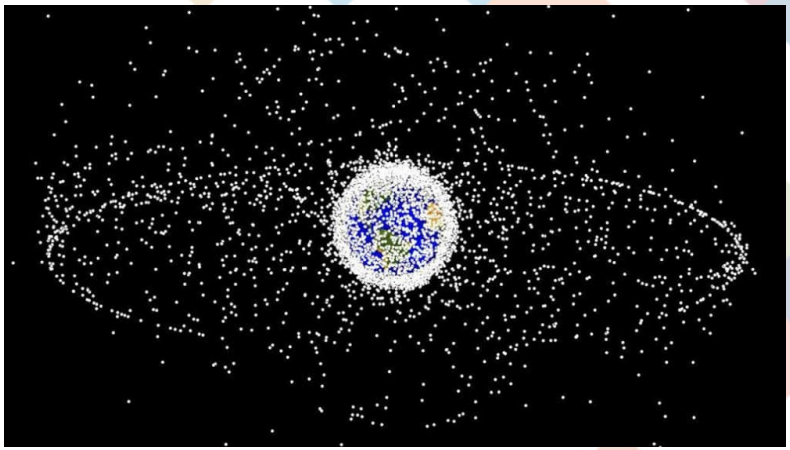
Geospatial Council of Australia

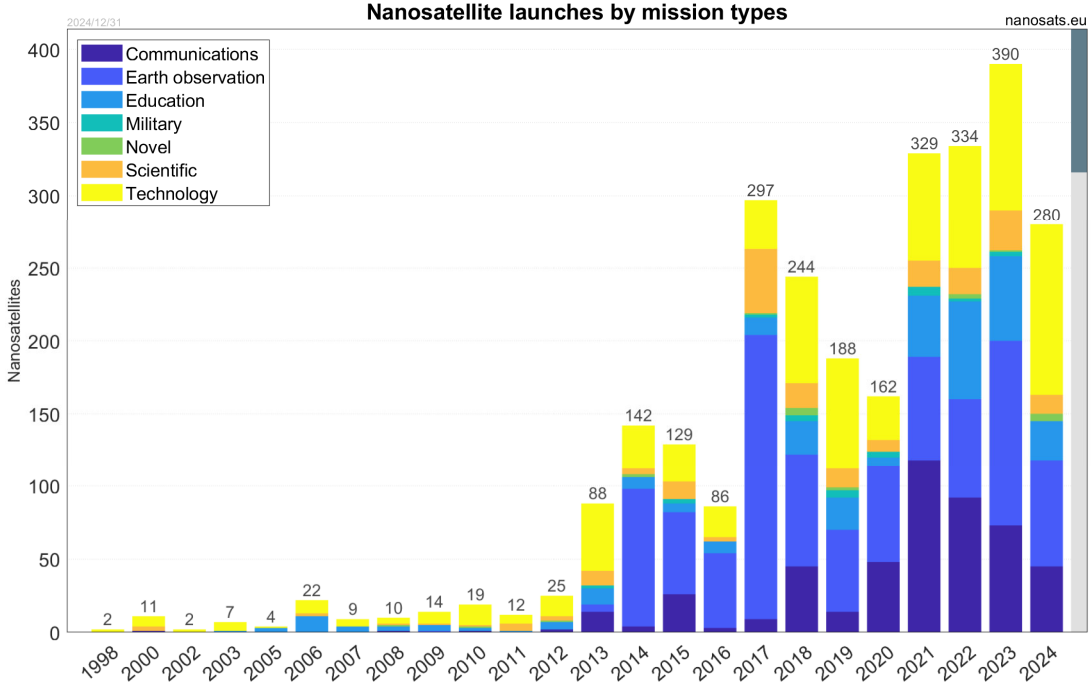
Around 2000 EO satellites launched 1970-2024

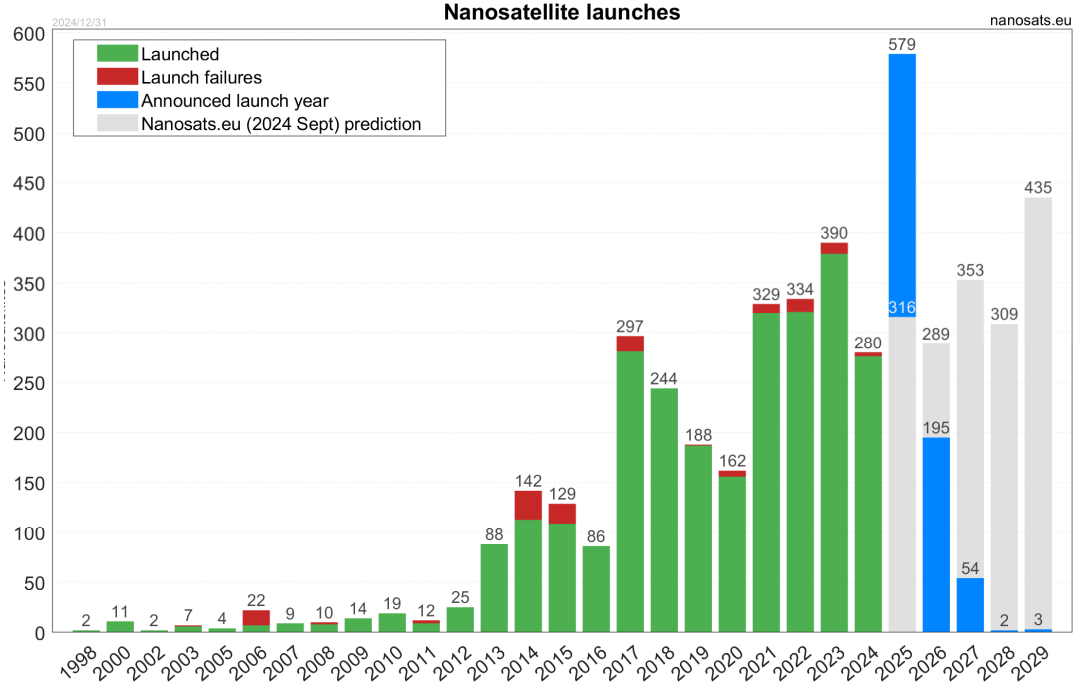
5,400+ EO satellites will be launched between 2024 and 2033 (source NovaSpace)

10500 active satellites in 2024

700-1000 are EO CubeSats




Nanosatellite launches by mission types
2024/12/31
nanosats.eu
Communications
Earth observation
Education
Military
Novel
Scientific
Technology
Nanosatellites
0
50
100
150
200
250
300
350
400
2 11 2 7 4 22 9 10 14 19 12 25 88 142 129 86 297 244 188 162 329 334 390 280
1998 2000 2002 2003 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024


Nanosatellite launches
2024/12/31
nanosats.eu
Launched
Launch failures
Announced launch year
Nanosats.eu (2024 Sept) prediction
0
50
100
150
200
250
300
350
400
450
500
550
600
2 11 2 7 4 22 9 10 14 19 12 25 88 142 129 86 297 244 188 162 329 334 390 280 579 316 289 195 353 54 309 2 435 3
1998 2000 2002 2003 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029

CUBESAT EO CONSTELLATIONS

ORORA TECHNOLOGIES

8 satellites 3 TIR
(100 planned)

Bushfire detection and monitoring

planet.

150-200 SuperDove
and Dove satellites
8 VNIR bands

Bushfire preparation
Flood disaster response
Biodiversity management
Landuse change

WYVERN

3 Dragonette satellites
23 VNIR bands
(2 planned 2025)

Precision agriculture
Forestry

ENVIRONMENTAL APPLICATIONS OF EO

- Biodiversity detection
- Habitat mapping
- Environmental monitoring
- Natural resource management
- Disaster preparedness, response and recovery

- Agriculture and sustainable development
- Human-Environment interactions
- Ecological forecasting
- And more

FIG WORKING WEEK 2025
AND
Locate25
THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience
Championing a Digital Generation
Brisbane, Australia 6-10 April

AUSTRALIA'S CHALLENGES AND OPPORTUNITIES

FACTORS	IMPACT	MITIGATION STRATEGIES
Population growth Economic development Land-use change Climate-change Natural resources depletion Hazards	Heat island, environmental degradation, bushfires, flood, erosion, drought, deforestation, biodiversity loss, etc.	Resources monitoring and assessment Sustainable practices Technological innovation Policy development and regulation Public awareness and community engagement





Organised by:
FIG
INTERNATIONAL FEDERATION OF SURVEYORS
Geospatial Council of Australia

WORKING WEEK 2025 AND Locate25 THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience
Championing a Digital Generation
Brisbane, Australia 6-10 April

KANYINI – SOUTH AUSTRALIA'S SPACE SERVICES MISSION

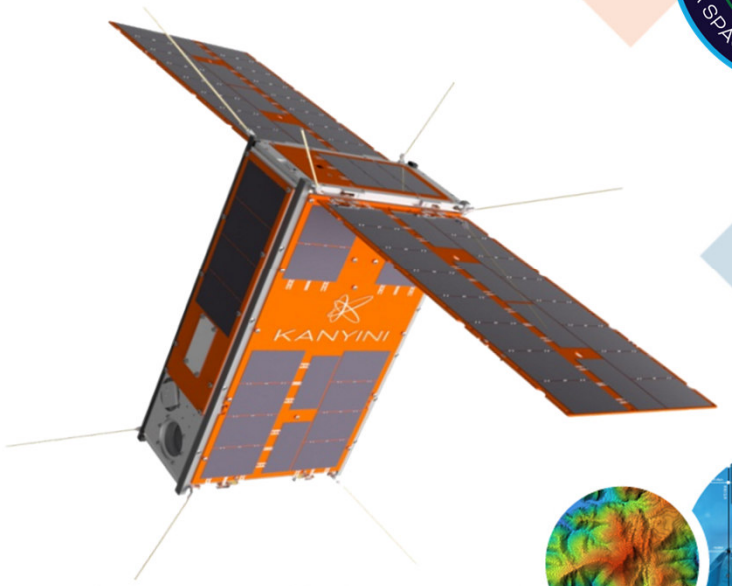
Kanyini means responsibility, care and unconditional love for all of creation

Collaboration between

South Australian Government represented by South Australian Space Industry Centre (SASIC)
SmartSat CRC as mission lead and provider of Hyperspectral/TIR Earth Observation payload and onboard AI computer
Myriota as procurement lead and provider of the IoT payload
Inovor Technologies as satellite manufacturer and operator

About Kanyini

- 6U CubeSat
- Launched on 18th August 2024
- 2-3 years of operations
- 530km altitude
- 16 orbits per day, 90min per orbit
- IoT payload
- Hyperspectral (VNIR) + TIR EO payload



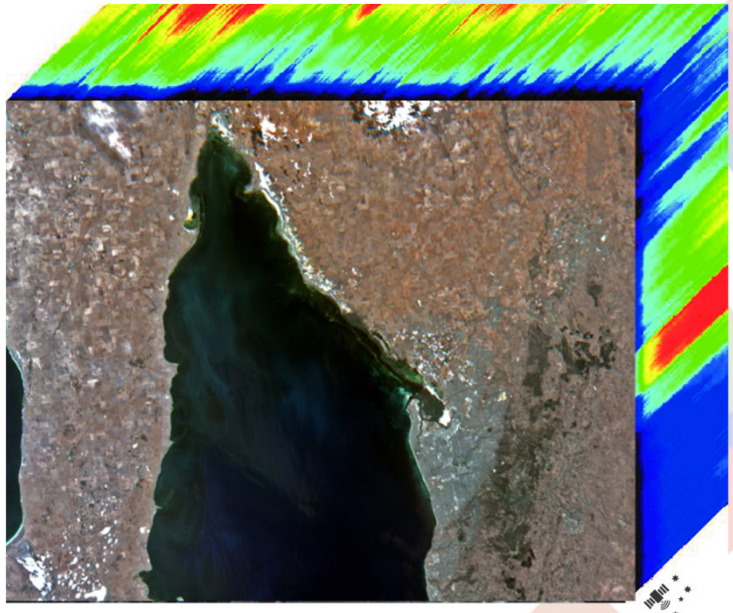
Organised by: FIG International Federation of Surveyors; Geospatial Council of Australia

KANYINI CASE STUDY 1: SAEcoMap

SmartSat CRC, University of Adelaide, SA DEW, PIRSA

Investigate the use of Kanyini hyperspectral data to better understand vegetation communities, potential to discriminate and map key native, invasive tree species

Advance the science of discriminating difficult-to-identify species and enhance ecological biodiversity mapping



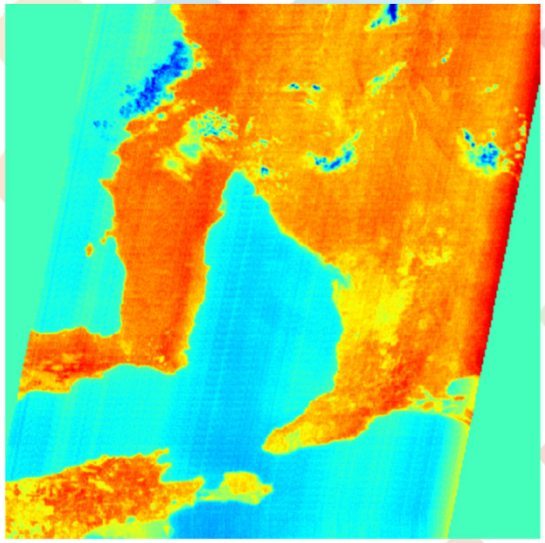
PIRSA
- Carbon farming outreach program with SA Landscape Boards
- Kangaroo Island carbon sequestration baseline mapping
- Water availability impacts on Forestry plantation yields

DEW
- Vegetation community mapping across SA government

KANYINI CASE STUDY 2: HeatWaves

SmartSat CRC, Flinders University, Green Adelaide, DEW

Urban Heat: higher temperatures in urban areas compared to more natural environments
Investigate the potential of Kanyini thermal data to supplement costly aerial thermal imagery



Current thermal aerial imagery limitations.

- Spatially limited – unable to capture entire region in one day
- Temporally limited – high cost means capture every 4 – 5 years.

Understand how urban heat is influenced by the relationships between constructed and green infrastructure

Understand how vulnerable populations are currently impacted by urban heat and likely to be impacted by future heat waves

WORKING WEEK 2025 AND Locate25 THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience
Championing a Digital Generation
Brisbane, Australia 6-10 April

KANYINI CASE STUDY 3: Coral and seagrass mapping using HIS EO

SmartSat CRC, University of Queensland, University of Adelaide, CSIRO,
SA Water, DEW

Healthy coral and seagrass are important to provide habitats for many species, provide natural barriers from erosions and storms and absorb CO2 and produce O.
Current attempts to assess health of coral and seagrass only at local scales.

Assess suitability of Kanyini Hyperspectral data to measure water quality, health and species of coral and seagrass at large scale.

To provide better tools to managers, policy makers, and scientists to make well-informed decisions in shallow marine ecosystems

To inform mapping processes and design workflows that enhance our ability to detect biodiversity, track ecosystem changes in response to climate change

Organised by: FIG International Federation of Surveyors · Geospatial Council of Australia

FIG WORKING WEEK 2025
AND
Locate25
THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience
Championing a Digital Generation
Brisbane, Australia 6-10 April

THE EVOLVING LANDSCAPE OF EO CUBESATS

Reduced cost of launch and manufacturing

Miniaturisation

Constellation

Advances in on-board tech

Rise of AI processing

Better space communications

Better tech innovation and testing

Shift from data to analytics

Organised by:
FIG INTERNATIONAL FEDERATION OF SURVEYORS
Geospatial Council of Australia

Cost-effectiveness and accessibility:

- Significantly lower design, build, and launch costs compared to traditional large satellites.
- Enables more ore missions, deployment by universities, SMEs, and government agencies

Targeted and responsive monitoring:

- Missions can be rapidly developed and deployed with specific sensors tailored to Australian challenges

Improved coverage and temporal resolution for vast and remote areas:

- Constellations can provide comprehensive and regular coverage over Australia's immense landmass and remote regions.

Technological innovation and testing:

- Provides a lower-risk platform for testing and validating new sensor technologies.

Building sovereign capability:

- Develops Australia's independent space-based EO capabilities, reducing reliance on foreign data for critical national environmental intelligence.

WORKING WEEK 2025 AND Locate25 THE NATIONAL GEOSPATIAL CONFERENCE

Collaboration, Innovation and Resilience
Championing a Digital Generation

Brisbane, Australia 6-10 April

Fabrice Marre

Senior Earth Observation Specialist

SMARTSAT Cooperative Research Centre

Organised by: FIG International Federation of Surveyors; Geospatial Council of Australia

FIG WORKING WEEK 2025

AND

Locate25 THE NATIONAL GEOSPATIAL CONFERENCE

Collaboration, Innovation and Resilience
Championing a Digital Generation

Brisbane, Australia 6-10 April

1st relevant SDG

2nd relevant SDG

3rd relevant SDG

SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

Organised by:

FIG INTERNATIONAL FEDERATION OF SURVEYORS

Geospatial Council of Australia

WORKING WEEK 2025

AND

Locate25

THE NATIONAL GEOSPATIAL CONFERENCE

Collaboration, Innovation and Resilience

Championing a Digital Generation

Brisbane, Australia 6-10 April

Thank you!

Destination Partner

Queensland AUSTRALIA

Event Partner

brisbane australia

Event Co-Sponsor

TOURISM AUSTRALIA

INTERNATIONAL FEDERATION OF SURVEYORS

Organised by:

Geospatial Council of Australia