

Dear Committee,

**Submission by Earth Observation Australia Inc. (EOA) to the House of Representatives Standing Committee on Industry, Innovation, Science and Resources - inquiry into the development of Australia's space industry.**

Earth Observation Australia Inc. (EOA), represents Australia's diverse "Earth Observation Communities" which collect and use information from satellites, and are key components of Australia's Space Capabilities in industry, all levels of government, defence and education. The response below summarises key positions of this critical, large and diverse community that is part of Australia's Space Capabilities.

EOA is half way into a 10 year mission to deliver its member driven national plan: 'By 2026, the Australian Earth Observation sector will develop and deliver high-quality Earth Observation information, infrastructure, and services that are used widely by government, industry, research and the community in Australia and internationally.'

Our submission is structured in three parts:

- **Part 1:** Summarises the Australian Earth Observation community's responses to each of the Terms of Reference.
- **Part 2:** Australian Earth Observation community's detailed responses to the Terms of Reference by highlighting the major achievements and progress that the Australian Space Agency (ASA) has made since forming in 2018 and critically, the limitations and/or future needs.
- **Part 3:** Provides a brief overview of **Earth Observation Australia Inc.'s** activities and roles in the Australian space community.

**To conclude our introduction, we wish to highlight some key achievements, limitations, and future opportunities for the Australian Space Agency in support of Earth observation (EO).**

**Our submission expands on these.**

- 1) **Achievements:** The formation of the ASA, and subsequent activities undertaken by the ASA since 2018, have galvanised the Australian Space Industry and given Australia credibility in the global space sector. Major achievements of the ASA that benefit the national EO community include:
  - Formalising international relationships
  - Communication between and engagement with universities and research institutes, state, territory and federal governments, industries, and non-government groups.
  - Effective engagement with the Australian EO community by working through Earth Observation Australia Inc. as the communication and coordination link to a well-established and highly diverse community across all states and territories, and industry, government, and education sectors. For example, using this link to communicate ASA strategies and plans through EOA Whole of Community meetings to build relationships with the EO sector and share the ASA's strategy with the EO community.
  - Establishing task force/collaboration opportunities that are relevant to the Australian environment

**All of these impacts have been achieved on extremely limited resources.**

- 2) **Limitations** - The ASA has operated with relatively limited resourcing considering the scale(s) of their objectives, and intended goals, and this has restricted what has been addressed, including:
- Development of more effective coordination and collaboration across all sectors of the Australian space industry
  - Tackling areas of government-industry duplication, especially for Earth observation, which limit EO development and private industry delivery of services
  - Most importantly, provision of appropriate funding and intellectual property arrangements to enable development of Australian capabilities (including skilled personnel) to design, build, launch and operate Australian satellites, complemented by EO application experts to maximise the value of the satellite data and deliver downstream value-added services

Australian-led satellite Earth Observation missions will not occur without backing and funding at appropriate levels. Funding and intellectual property (IP) constraints to industry-focused research programs, such as Cooperative Research Centres and CSIRO are not enabling the diverse, flexible, agile, and high level of activities that Australia needs. Our industry, economy, and communities have progressed significantly beyond the conditions in which these programs were established.

- 3) **Opportunities** - EOA unites the national EO community and provides a network for collaboration, communication, and engagement within that community. The ASA can build collaborative relationships nationally and internationally by leveraging networks like EOA, and by supporting other existing, long standing partnerships between Australian scientists (in research, government, and industry), international space agencies, research organisations, and industry. There is a great opportunity to fund and support organisations such as EOA in their activities.

EOA supports the ASA and recognises the urgent need for ASA to be funded at the appropriate level if it is ever to enable the design, build, and launch of Australian-led satellite EO missions, and support the growth of other EO activities and jobs in the space industry. The funding to do this to-date has been insufficient and limited.

Thank you for this opportunity, and please contact us if you require more details.

Professor Stuart Phinn  
President

Dr Amy Parker  
Vice President

On behalf of the Australian Earth Observation community and Earth Observation Australia Inc.

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## PART 1 - SUMMARY OF RESPONSES TO TERMS OF REFERENCE

### Development of space satellites, technology and equipment

#### Current status

- Australia has unique marine, coastal, terrestrial and atmospheric environments, and the monitoring, management and sustainable use of these are driven at all levels of government and industry by Earth observation satellite information. It is essential we significantly increase Australia's application and technological expertise in EO, and our ability to collect the data, through growth and development in Australia's EO (and space industry) capability, development, and skilled workforce.
- The ASA has leveraged national expertise and created avenues for collaboration and communication between EO groups in Australia.
- The ASA has also supported avenues for collaboration with international satellite missions, which will assist in the development of our own space missions.
- Australia has world leading expertise and reputation in the calibration of space EO missions before and after launch, and in validation of their data and information products.

#### Limitations/future needs

- To achieve self-sufficiency and sovereign EO data capabilities for our defence, industries and governments, Australia requires certainty and sustained investment for the development of EO missions. Without this, Australia is unable to move forward in the design, development and operation of space EO satellite missions.
- Australia is uniquely positioned to offer EO satellite calibration and validation (cal/val) as an essential national and international service due to its geography, landscapes and world-leading expertise. This opportunity is currently being missed due to the absence of support to 1) establish formal "calibration infrastructure" sites with adequate facilities, and 2) cohesively connect cal/val research, practices, and commercial applications in Australia.

### International collaboration, engagement, and missions

#### Current status

- The ASA has formalised relationships with international space agencies e.g. through signing of Memoranda of Understanding (MOUs).
- For decades, Australia has relied entirely upon international agencies to collect and provide EO data for the country. This has occurred successfully due, in a large part, to the national EO community who have built long and lasting relationships with the international community.
- Australia can leverage the long-standing relationships and collaborations that exist between other Australian organisations/individuals and international space agencies, research institutions and industry.

#### Limitations and future needs

- Australia's ability to leverage well-established international relationships is essential to progressively build our space industry capabilities and would be significantly enhanced by a consistent and collaborative backing achieved by endorsement and support from the Commonwealth government through the ASA.

- The ASA should provide pathways for Australian research and industry to leverage relationships now in place with international space agencies, ensuring that these relationships reach and benefit the whole Australian space sector, and are not just a PR exercise.

## **Commercialisation of research and development, including flow on benefits to other industry sectors**

### **Current status**

- Australia's EO and data analytics value chain is not cohesive but scattered amongst pockets of niche capability, a large portion of which is in the research sector with minimal commercial application.
- Collaboration and growth in Australia's EO and data analytics value chain will not only assist these activities but will also drive the development and manufacture of satellite systems and satellite ground stations to provide data and information that is relevant to the Australian EO industry and to Australian applications.

### **Limitations and future needs**

- To fill capability gaps and grow market demand the EO industry requires more research-to-business<sup>1</sup> and business-to-business collaboration and effective government mechanisms to enable this. Australia's EO industry would benefit from a coordinated approach to bringing the nation's cutting-edge research capabilities in to support the capabilities of the EO industry.

## **Future research capacity, workforce development and job creation**

### **Current status**

- Approximately 44% of EOA's membership comprises representatives of the research community. EO higher degree research projects are offered at tertiary education institutions in all states, the CSIRO, the SmartSat CRC, and state, territory, and federal government departments. Research for specific associated industries, such as agriculture, mining, etc., also frequently utilise EO applications and therefore greatly benefit from fundamental, targeted, and/or applied EO research.

### **Limitations and future needs**

- Retaining the expertise developed in Australian research institutions, and attracting international talent, relies upon the existence of a thriving space industry and research ecosystem with robust opportunities for employment.
- Australian-led EO satellite missions have the potential to activate and stimulate multiple factions of the national space industry but require federal support to proceed.
- There is grossly insufficient research funding available to keep our research and commercial talent in Australia, with our best being enticed to study and work overseas. Generally, research funding is short term and quick-results focused which may not be optimum to creating and developing innovative solutions that are relevant to Australian applications and interests.

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<sup>1</sup> Business in this context refers to both industry business and government business.

## Other related matters – Education

### Current status

- EO is utilised in most government and commercial applications, including geoscience and mining, agriculture, urban development and planning, environmental and biodiversity studies, transport infrastructure placement and maintenance, above and below ground water applications, and marine applications, to name a few.

Most Australian tertiary education institutions include EO subjects in degrees in Geographic Information and Technology, Surveying, and Spatial Science, however few institutions offer comprehensive EO courses along with the data analysis and specialised expertise required in other applications, such as those listed above.

### Limitations and future needs

- Limiting EO studies to only spatial science degrees restricts potential innovation in EO research and applications which may arise from the needs of and collaboration with other applications, whether they be in Science, Technology, Business, or Politics. In addition, EO information is now widespread in technology that supports everyday life and activities and an understanding of this information, its limitations and benefits should be encouraged at an early age, such as during secondary education.

## PART 2: DETAILS OF RESPONSES TO TERMS OF REFERENCE

### Development of space satellites, technology and equipment

#### Current status

- Australia has unique marine, coastal, terrestrial and atmospheric environments, and faces unique challenges in the monitoring, management, and sustainable use of its natural resources and the monitoring and management of its disasters. This necessitates the use of EO sensors, processing infrastructure, products, and applications that may not be available from, or applicable to, our international EO partners and collaborators. Hence, the continued development of these facilities nationally, with a focus on Australia's needs and using Australian application and technological expertise, is paramount to an increase in Australia's EO (and space industry) capability, development, and skilled workforce.
- The ASA has leveraged national expertise and created avenues for collaboration and communication between EO groups in Australia. For example, the ASA established the Bushfire Earth Observation Taskforce, which connected Australian expertise and local knowledge from government, research, and industry participants to produce a report that is relevant and specific to Australia. The report identified pathways that will benefit decision making for future bushfire risk management.
- The development of Australian satellite missions may be expected to occur, at least in part, in conjunction with other nations that have more mature space industries and common objectives. The ASA has acted to support avenues for such collaboration, for example with the Canadian Space Agency around Canada's fire-dedicated mission WildFireSat. However, ASA has not been provided with (or provided the national community via its grants programs with) the scale of funding required. Nor has it been able to leverage partnerships that establish the scale of funding required for Australia to actually participate, build capacity, and complete these activities.
- Australia's world-leading expertise in EO science enables national science teams to identify gaps in global EO satellite offerings that could be filled by Australian-led missions. The AquaWatch water-quality monitoring mission is a significant example that has attracted international interest.

Australian-led missions may be expected to involve networks/constellations of smaller satellites, taking advantage of lower cost, incremental development, and faster deployment. These missions will also leverage national experience and expertise in the internet of things (IoT) networks and in situ sensors to create integrated space and ground based EO monitoring systems.

- Australia has world leading expertise and reputation in the calibration and validation (cal/val) of space EO missions. Australian cal/val technology and equipment has played a vital role in securing EO data for the nation from international space agencies.

#### Limitations/future needs

- The enthusiasm garnered by the ASA has enabled Australia to collaborate and begin to define new EO satellite missions with key global partners (Japan, Europe, North America) that address gaps (e.g. AquaWatch) and provide a real opportunity to raise the credibility of our national industry. However, to achieve impact and become a global player, Australia requires certainty and sustained investment for the development of missions. Without this, Australia is unable to move forward in the design, development, and operation of space EO satellite missions.
- Australia is uniquely positioned to offer EO satellite cal/val as an essential national and international service due to its geography, landscapes and world-leading expertise. This opportunity is currently being missed due to the absence of support to 1) establish formal



“calibration infrastructure” sites with adequate facilities, and 2) cohesively connect cal/val research, practices, and commercial applications in Australia. As well as supporting Australian EO cal/val research and business, the establishment of a formal calibration infrastructure would lead to the increased engagement of international partners, many of whom have already expressed interest in using Australian cal/val sites and experience to calibrate new and existing satellite missions.

## International collaboration, engagement, and missions

### Current status

- The ASA has formalised relationships with international space agencies e.g. through signing of Memoranda of Understanding (MOUs). This acts to add credibility to the Australian space sector, positions the ASA as a point of contact for all matters on space, opens new doors for collaboration, and will further support the Australian EO community in securing continued access to satellite technology and data that those nations have provided and will continue to provide.
- For decades, Australia has relied entirely upon international agencies to collect and provide EO data for the country. This has occurred successfully due, in a large part, to the national EO community - scientists who have built long lasting relationships with international partners over many years, industry in their commercial dealings with international imagery and data vendors, international educational institutions that engage in higher degree exchange programs with our educational institutions, and collaborations between national and international governments.
- In addition to the ASA's role in building international relationships, Australia can leverage the long-standing relationships and collaborations that exist between Australian organisations and individuals, and international space agencies, research institutions and industry.

Numerous members of the Australian EO community (and of EOA) are recognised and highly respected in the international EO arena. Individuals and companies represent Australia on working groups and committees of international renown and regard, including:

- The Committee on Earth Observation Satellites (CEOS) including:
  - Strategic Implementation Team Chair
  - Chair of the Working Group on Calibration and Validation
  - Chair of the Working Group on Information Systems and Services
  - Member of the Working Group on Disasters
- The Group on Earth Observations (GEO) including:
  - GEO Programme Board
  - Establishment and lead of the GEO Week 2019 Industry Track
- The International Ocean-Colour Coordinating Group (IOCCG)
- The European Space Agency (ESA) Sentinel 3 Validation Team
- The National Aeronautics and Space Administration (NASA) Geosynchronous Littoral Imaging and Monitoring Radiometer (GLIMR) Science Team
- The World Meteorological Organisation (WMO)
- Future Earth's Global Land Programme Scientific Steering Committee
- Institute of Electrical and Electronics Engineers (IEEE) Geoscience Remote Sensing Society Geoscience Spaceborne Imaging Spectroscopy Technical Committee



- NovaSAR-1 S-band Synthetic Aperture Radar (SAR) partnership with (UK-based) Surrey Satellite Technology Ltd
- The Science Advisory Committee for the European Space Agency Hyperspectral Copernicus Hyperspectral Imaging Mission for the Environment (CHIME) Satellite

to name a few. In many cases this is done on a best-efforts, voluntary basis with limited coordination or support.

#### Limitations and future needs

- Australia's ability to leverage the well-established and potentially lucrative relationships established through the above groups, plus other high-profile international committees and working groups, would be significantly enhanced by a consistent and collaborative backing achieved by endorsement and support from the Commonwealth government through the ASA.
- The ASA should provide pathways for Australian research and industry to leverage the partnerships and relationships that we now have with international space agencies and ensure that these engagements reach and benefit the whole Australian EO and space sector and are not just seen as a PR exercise.

### Commercialisation of research and development, including flow on benefits to other industry sectors

#### Current status

- Australia's EO and data analytics value chain<sup>2</sup> is not cohesive but scattered amongst pockets of niche capability, a large portion of which is in the research sector with minimal commercial application. While there are a number of skilled SMEs (including start-ups) servicing targeted application industries (such as agriculture, mining, disaster management, environmental sciences, and marine applications), many of these businesses do not have access to sufficient market demand or the diverse capabilities required to expand their service offerings.
- Collaboration and growth in downstream EO activities will not only assist these activities but will also drive the development and manufacture of satellite systems and satellite ground stations that provide data and information relevant to the industry and specific to the Australian environment. This in turn will strengthen and expand the knowledge and expertise of the Australian EO community.

#### Limitations and future needs

- To fill capability gaps and grow market demand the EO industry requires more research-to-business and business-to-business collaboration<sup>3</sup> and effective government mechanisms to enable this. Australia's EO industry would benefit from a coordinated approach to bring the nation's cutting-edge research in to support the capabilities of the EO industry. This would create joint capability across the industry and enable industry to create new products and services to sell to new markets, and would also support research organisations in making their research have real-world impact.

<sup>2</sup> Referred to herein as "downstream" activities.

<sup>3</sup> Business in this context refers to both industry business and government business.

## Future research capacity, workforce development and job creation

### Current status

- Approximately 44% of EOA's membership is represented by members of the research community. EO higher degree research projects are offered at tertiary education institutions in all states, the CSIRO, the SmartSat CRC, and state, territory, and federal government departments. Research for specific associated industries, such as agriculture, mining, etc., also frequently utilise EO applications and therefore greatly benefit from fundamental, targeted, and/or applied EO research.

EOA and the ASA are in discussions about the role that SMEs in EO currently have and in the future will have in the Australian space industry. These discussions and outcomes will lead to pathways for SMEs to access and contribute to Australia's space industry development by promoting Australia's EO capabilities nationally and internationally, providing employment opportunities for our increased skilled workforce, and assisting in the definition of projects relevant to Australian applications.

### Limitations and future needs

- Retaining the expertise developed in Australian research institutions, and attracting international talent, relies upon the existence of a thriving space industry and research ecosystem with robust opportunities for employment.

There is currently a skilled technical workforce shortage in EO and the wider spatial community. This is potentially due to the lack of awareness of tertiary EO education offerings across the country, the application of EO to related studies such as mining, agriculture, engineering, data science, etc., and in the scarcity of EO positions in both government and industry businesses.

- Australian-led EO satellite missions have the potential to activate and stimulate multiple factions of the national space industry but require federal support to proceed.
- There is grossly insufficient research funding available to keep our research and commercial talent in Australia, with our best being enticed to study and work overseas. Generally, research funding is short term and quick-results focused which may not be optimum to creating and developing innovative solutions that are relevant to Australian applications and interests.

## Other related matters - Education

### Current status

- EO is utilised in most government and commercial applications, including geoscience and mining, agriculture, urban development and planning, environmental and biodiversity studies, transport infrastructure placement and maintenance, above and below ground water applications, and marine applications, to name a few.
- Most Australian tertiary education institutions include EO subjects in degrees in Geographic Information and Technology, Surveying, and Spatial Science, however few institutions offer comprehensive EO courses along with the data analysis and specialised expertise required in other applications, such as those listed above.
- Furthermore, few secondary education institutions teach EO subjects in any of their science, technology, or other courses.

### Limitations and future needs

- Limiting EO studies to only spatial science degrees restricts potential innovation in EO research and applications which may arise from the needs of and collaboration with other applications, whether they be in Science, Technology, Business, or Politics. In addition, EO information is now widespread in technology that supports everyday life and activities and an understanding of this information, its limitations and benefits should be encouraged at an early age, such as during secondary education. This early education contact with EO principals and applications would also increase awareness in students as a potential career choice, which in turn could lead to an increase in Australia's skilled EO workforce.

## PART 3: Earth Observation Australia Inc.

Earth observation (EO) is a keystone of Australia's Space Industry, listed as a Space sector activity and one of the Australian Space Agency's National Civil Space Priority Areas: *"Earth observation has untapped potential to grow Australia's economy, for example, by improving agricultural monitoring, water management, and monitoring shipping routes... Australia is world-leading in this field. Australia will continue to focus on and develop this priority area to grow Australia's broader economy."*

Globally, EO has an ever-increasing reach into diverse industries and applications, underpinning decision-making and demanding rapidly evolving data analytics, sensor and satellite technologies. This is driving the expansion of the number and variety of research, processing, innovation, and collection bodies who service industries that utilise EO.

Earth Observation Australia Inc. (EOA) ([www.eoa.org.au](http://www.eoa.org.au)) is a not-for-profit organisation that acts as Australia's leading cross-sector, independent, national Earth observation (EO) community association. EOA currently represents 570 members who reflect the diversity and ubiquitous nature of EO information in Australia, with representatives from research, education, all levels of government, professional organisations, media and publications, non-government organisations, not for profit organisations, defence, interest groups, large business, start-ups, and small and medium enterprises.

Furthermore, EOA collaborates with its members and other groups to establish projects that will benefit diverse groups with the EO community. For example, EOA has established working groups to support and promote EO Small and Medium Enterprises (SMEs<sup>4</sup>) and to coordinate Australian calibration and validation (cal/val) activities.

Another of these projects is the Earth Observation for Government Network (EOGN). This group is dedicated to making available fit-for-purpose, validated and authoritative EO data and its derived products and services to support decision-making, management and other activities by governments, private industry, research and non-government organisations. A key activity of this group is to host topic specific workshops where EO data and product and service providers, researchers, and end users come together to build a collective understanding of existing and future EO capabilities, how EO products and services are applied, and emerging unmet needs. Workshop outcomes are shared to inform the prioritisation of the transition of research activities to products and services that are available on government infrastructure as well as to inform future research activities.

EOA is guided by five priority actions:

1. Connection and Coordination,
2. Securing Australia's Role in the International Earth Observation Community,
3. Infrastructure and People,
4. Access to Earth Observation Data and Services, and
5. Generating Value

which were defined in the Australian Earth Observation Community Plan 2026 ([the Plan](#)). That Plan is directly linked to the Australian Space Agency's Civil Space Priority Roadmap for EO, in that adjusted versions of EOA's 10 year priorities were used to assist with defining the "targets and drivers" for the forthcoming ASA Earth Observation Roadmap.

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<sup>4</sup> SMEs are defined herein as commercial businesses of <200 employees, consultants, micro-businesses, and start-ups.

The Terms of Reference for this inquiry are in direct alignment with the priority actions of EOA as follows:

- Development of space satellites, technology and equipment - aligns with priority actions 3 to 5;
- International collaboration, engagement and missions - aligns with all 5 priority actions;
- Commercialisation of research and development, including flow on benefits to other industry sectors - aligns with priority actions 3 to 5;
- Future research capacity, workforce development and job creation - aligns with priority actions 3 to 5; and
- Other related matters (Education) – aligns with 3 and 5.

## References:

Australian Earth Observation Community Plan 2026 - <https://www.eoa.org.au/aeocp-the-plan>

Australian Space Agency Civil Space Strategy - <https://www.industry.gov.au/data-and-publications/australian-civil-space-strategy-2019-2028>

Earth Observation Australia Inc. 2019/20 Annual Report - <https://www.eoa.org.au/policies-reports#eoa-annual-reports>

Earth Observation Australia Inc. Mission - <https://www.eoa.org.au/our-mission>