EO4NT Challenges

The Northern Territory (NT) Department of Industry, Tourism and Trade (DITT) has partnered with Geoscience Australian to deliver the Earth Observation for the NT (EO4NT) grant program.

EO4NT aims to spur development of EO-powered solutions to NT problems from a total funding pool of $200,000. Applicants can use EO data from any source in the development of their solution and successful applicants will be eligible for training and support from Geoscience Australia to use their EO data platform, Digital Earth Australia.

Applicants can develop a solution for any NT industry, using any combination of data, provided some of that data is EO-derived.

To make it easier to apply, the Department of Industry, Tourism and Trade has worked with NT Police, Fire and Emergency Services and Bushfires NT to identify some challenges that applicants could solve with EO-derived data. Applicants are encouraged to contact these organisations on the details below should further information about these challenges be required.

NT Police, Fire and Emergency Services (PFES)

NT POLICE, FIRE & EMERGENCY SERVICES

NT Police, Fire and Emergency Services prioritises proactive fire hazard reduction to eliminate or reduce danger to life, property and the environment. The agency engages with communities through education and enforcement of hazard reduction on private land.

NT Fire and Rescue Service, a division of NT Police, Fire and Emergency Services, protects Territorians from emergencies involving fires, motor vehicle accidents and other dangerous situations, including hazard abatement and building collapse. NT Fire and Rescue Service delivers emergency services, awareness programs, response capability and preparedness and incident response and recovery.

If you are interested in submitting an application to EO4NT targeting one of these challenges, and would like to discuss your idea with NT Police, Fire and Emergency Services first, please reach out via the following:

NT Police, Fire and Emergency Services
Alex Godfrey, Capability and Command
Ph. 0438 557 057 | Alex.Godfrey@pfes.nt.gov.au

NORTHERN TERRITORY GOVERNMENT
Australian Government Geoscience Australia
Digital Earth AUSTRALIA

NT Police, Fire and Emergency Services Challenges

Disaster monitoring

Develop a tool that provides discovery and analysis of accurate, high frequency temporal remote sensing data to assist with disaster mapping, monitoring, and damage assessment.

The NT has an aerial imagery program across minor and major centres, the frequency of this program is every three to four years in remote areas, and extents are limited.

A solution could provide frequently (weekly) updated remote sensing data enabling fire/flood mapping and monitoring to complement NT Police, Fire and Emergency Services response to Natural Disasters, whilst supporting damage assessments. For example, being able to identify the water level following a flood event. Or reviewing historic flood extents to understand likely impact.

Emergency Response Area monitoring

Develop a solution that can automatically monitor the Emergency Response Areas (ERA's) of the NT's urban centres for changes in the environment (e.g. buildings and development).

NT Police, Fire and Emergency Services manually monitor key population centres to review Fire Risks in urban centres. Monitoring is currently undertaken manually, and is expensive. An automated or semi-automated monitoring tool would enhance PFES' ability to respond efficiently to risks within the Emergency Response Area (ERA). An example might be change detection of buildings, or land.

Vegetation monitoring for fire break compliance

Develop a tool that automatically assesses and flags firebreak risks at appropriate times in the season (with reference to historical data).

NT Police, Fire and Emergency Services currently have to undertake a manual assessment of over 3000 rural properties that are in a fire protection zone[1] to ensure fire breaks of at least 4 metres are installed between the house and bushland. This process is undertaken manually, and is time consuming and expensive. It is very difficult to assess whether there is an appropriate firebreak when viewing a property from the street. An EO-powered solution that could assess and flag firebreak risks and fuel loads at appropriate times would limit the need for manual in-person assessments, increasing productivity and efficiency and reducing costs.

[1] https://depws.nt.gov.au/bushfire-information-and-management/planning-for-a-bushfire/firebreaks

Bushfires NT

Bushfires NT works with landowners and the wider community to manage and prevent bushfires by providing support for mitigation, management and suppression activities; and coordinating landowner and volunteer participation in response to significant fires.

Bushfires NT supports 500 active volunteers in 20 volunteer fire brigades by providing training, vehicles and operational funding. In many remote communities across the NT, volunteer firefighters respond to all types of incidents as the nearest career firefighters are often hundreds of kilometres away.

Bushfires NT is a division of the Department of Environment, Parks and Water Security.

If you are interested in submitting an application to EO4NT targeting one of these challenges, and would like to discuss your idea with Bushfires NT first, please reach out via the following:

Bushfires NT
Kelly Benham, Project Officer, Australian Fire Danger Rating System Implementation
Ph. 08 8922 0846 | Kelly-Marie.Benham@nt.gov.au.

Bushfires NT Challenges

Improved fire mapping for the Australian Fire Danger Rating System (AFDRS)

Develop an improved method of vegetation mapping for input into the Australian Fire Danger Rating System (AFDRS).

The current data that feeds into the AFDRS fire danger rating modelling is coarse (large pixel size, grouping vegetation into one category, often incorrect category). It also does not include the extent and occurrence of buffel grass (a major fire weed in Central Australia) and gamba grass (a major fire weed in the Top End).

Development of an improved method of vegetation mapping that addresses the aforementioned shortcomings would lead to improved fire danger forecasting and community safety.

Remotely sensing infrastructure in the landscape

Develop a model using sentinel to identify infrastructure in the landscape and compile into one single database that can be accessed via feature service or webmap.

It's difficult to know where all infrastructure is in the landscape. When responding to a dynamic, fast moving fire, firefighters must investigate by driving or flying around to ensure that they are aware of all infrastructure in the landscape so that they can develop strategies and tactics to protect them where possible. A model using sentinel to identify infrastructure in the landscape and compile into one single database that could then be ingested into fire agencies' emergency management applications including FireMapper and WebEOC.

You could do this by using existing government datasets (combining together to form one dataset). However, this data is not always current. By developing this solution the model could be ran annually or bi-annually.

Weed detection – buffel grass

Develop a remote sensing method to process and map buffel grass.

Buffel grass in Central Australia is one of the most problematic issues for fire management. Buffel grass increases fire risk, increases fuel load and fire intensity, and connects fire across landscape barriers such as rivers and ranges. The density and distribution of buffel grass is not mapped and is poorly understood. The response to rainfall of buffel grass differs from other species in the landscape and this response would allow a remote sensing approach to provide basic mapping. The improved understanding of buffel grass distribution would assist wildfire response and strategic fire planning.

Gamba grass standing fuel load risk

Develop a remote sensing method to process current fuel load risk posed by gamba grass areas.

Gamba grass is a widespread environmental issue in the Top End. Unmanaged gamba grass greatly increases fire risk by increasing fuel load and intensity of fire, putting community and first responders' lives at risk, and has increased the costs of wildfire. The location of dense gamba grass areas are mapped and well understood by fire authorities. However, the risk posed by those areas is often unknown as the fuel hazard may vary from cleared flat ground a few centimetres high to full biomass at over 4 metres tall. This can result in an error in reported fuel loads of up to 20 t/ha, effectively rendering forecasts inaccurate in gamba grass areas.

Established remote sensing methods can be applied to determine the standing dry mass of gamba grass where it is known to occur at density. The development and verification of an algorithm to derive regularly updated fuel risk of known gamba grass in a data layer format would provide greatly improve AFDRS forecasting and risk assessment for wildfire response in gamba grass areas.

Other challenges

The challenges above are not definitive – grant applicants are welcome to propose solutions to problems not listed in this document. The Department of Industry, Tourism and Trade may be able to assist with introductions to industry associations and other end users as appropriate.

The Northern Territory Government and Geoscience Australia may update this document with additional challenges as they arise.

If you are an NT-based organisation with a challenge that could be solved using earth observation, and would like to see it included here, please contact EO4.NT@nt.gov.au.

Geoscience Australia's Digital Earth Australia

The Digital Earth Australia (DEA) Open Data Cube (ODC) allows any public or private project to utilise petabytes of pre-processed satellite imagery and analysis for free.

The data can be viewed on a map or downloaded for use on other platforms and can be run on installations including Linux, MacOS and Windows. Its information is calibrated and validated according to international standards.

Geoscience Australia provides an extensive learning centre with guides, tutorials and useful information for users to create their own data cube.

DEA data products:

- track drought conditions, vegetation, water quality and availability;
- map flood and bushfire patterns over time;
- support research into canopy cover, wetlands ecosystems, coastal environments, biodiversity and the impacts of sea level rise and climate change;
- contribute to weather observations and forecasts;
- map land cover types; and
- support hazard planning, response and recovery efforts.

While not a requirement of EO4NT, grant applicants are encouraged to use DEA data products in combination with other data sources for the development of their solution.

Successful grant applicants will be provided with the opportunity to take a short training course on DEA, an initial meeting with Geoscience Australia to discuss their project, and approximately 40 hours of technical support and guidance for DEA products, to be used as needed over the project's duration.

If you have any questions specific to DEA products, please contact Geoscience Australia at earth.observation@ga.gov.au.