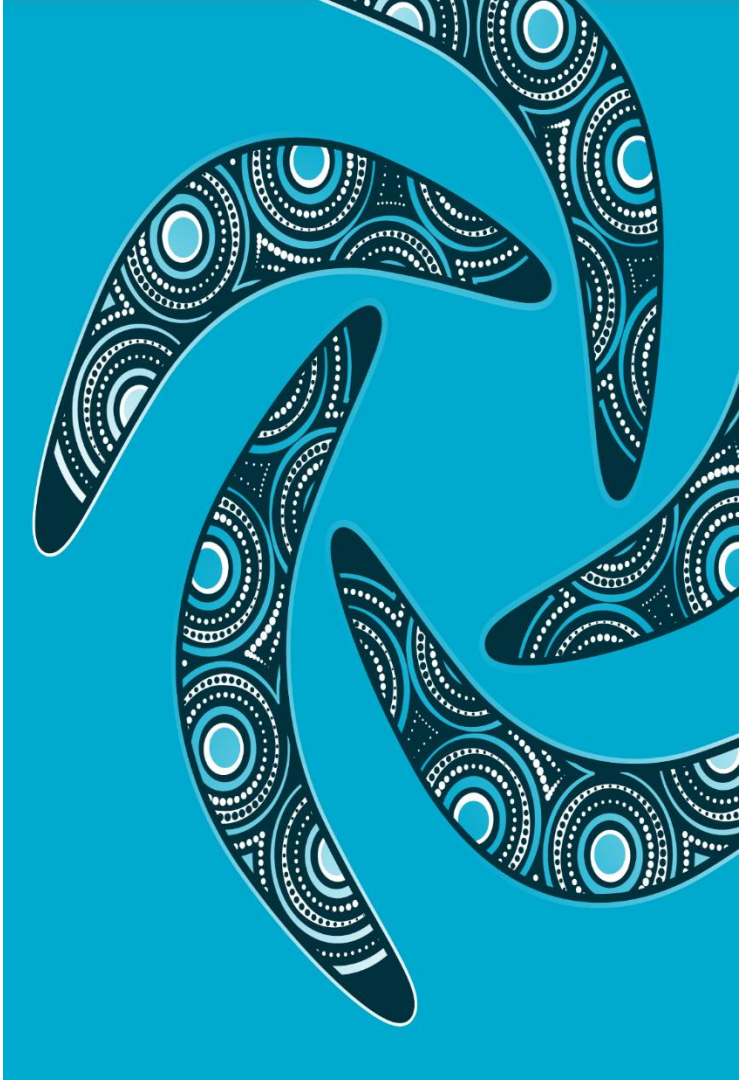
I would like to begin by acknowledging the Traditional Owners of the land that we're meeting on today, and pay my respect to their Elders past, present and emerging



Our research and development

We are one of the largest and most diverse scientific research organisations in the world. Our research focuses on providing solutions in nine core areas.

Key areas of research

- Animals
- Environmental Impact
- Health and Medical
- Indigenous Science
- Natural Disasters
- Natural Environment
- Plants
- Production
- Technology and Space

Education & Outreach programs

For nearly 40 years, CSIRO Education & Outreach have been developing and delivering high-quality STEM education programs for Australian teachers, students and the community.

Explore our programs

Our programs connect a network of more than 300 industry partners with Australia's education leaders, and together they bring STEM to life for more than 150,000 students each year. We offer a range of programs nationally, all designed to bring real science to life in our classrooms and communities. All our resources are curriculum aligned and use best practice STEM teaching methods, catering for primary to secondary schooling, and on to tertiary education and early career opportunities.

BHP Foundation Science and Engineering Awards →

The BHP Foundation Science and Engineering Awards are Australia's most prestigious school science and engineering awards. The Awards are a partnership between the BHP Foundation, CSIRO and the Australian Science Teachers Association and have been running since 1981.

Generation STEM →

Generation STEM is a 10 year initiative to attract, support, retain and train NSW students in STEM and school, into further education and into employment.

STEM Professionals in Schools →

STEM Professionals in Schools is a national volunteer program that facilitates partnerships between schools and industry to [illegible] Technology, Engineering and Maths) into the classroom.

Digital Careers →

Digital Careers supports teachers and encourages students' understanding of digital technologies and the foundational skills they require in an ever-changing workforce.

Indigenous STEM Education Project →

The Indigenous STEM Education Project aims to increase participation of Aboriginal and/or Torres Strait Islander students in science, technology, engineering and mathematics (STEM).

GLOBE →

A NASA sponsored international science and education program providing students and the public worldwide with opportunities to participate in data collection and the scientific process, and contribute to our understanding of the Earth system and global environment.

Programs for students

Young Indigenous Women's STEM Academy →

The Young Indigenous Women's STEM Academy gives young Indigenous women the tools and support they need to succeed in an exciting career in science, technology, engineering and mathematics (STEM).

Work experience →

Are you a high school student in Year 10 or 11? You can gain experience of CSIRO's research in science or engineering by doing virtual work experience with CSIRO.

Programs for teachers

Teacher Researcher in Partnership →

The Teacher Researcher in Partnership Program (TRIPP) offers teachers hands-on experience in emerging and innovative science, by undertaking a short research project alongside a CSIRO researcher.

Educator on Board →

Educator on Board is a professional learning program offering Australian science, technology, engineering and mathematics (STEM) school teachers the opportunity to join a voyage on board CSIRO's marine research vessel the RV Investigator.

THE GLOBE PROGRAM

Incorporate GLOBE in your classroom in 2021

Activities such as timing your run to improve your personal best time, retrieving the distance and elevation from your latest epic mountain ride, or viewing the energy being produced by your solar panels, each require access to the relevant data.

Using the GLOBE program, students can collect environmental data for use in the classroom as well as providing valuable information for scientists, research organisations and other citizen scientists. Whether your preference involves microcontrollers, wet chemistry, digital, analogue, or good old fashioned manual reading and recording, GLOBE has an activity for almost all classroom projects. In fact the GLOBE program, or GLOBE Observer app, featured in the Top 20 Citizen Science Projects for 2020 in five areas, as reported by internationally acclaimed online citizen science hub SciStarter.

In 2021, through the generosity of the Australian Space Agency, CSIRO Education and Outreach can provide you and your students with the tools to collect, upload and analyse local, relevant environmental data. To obtain several ideas for using GLOBE with your students, and for an expressions of interest form for data logging equipment, please email William.flynn@csiro.au with the subject heading 'GLOBE' to receive both via return email.

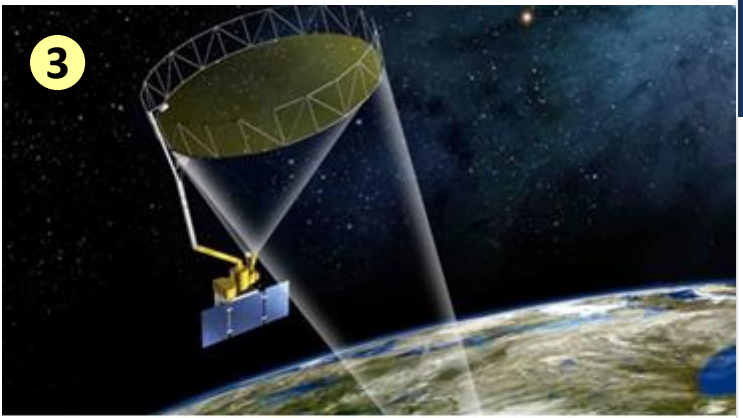
1

Bill Flynn ▸ STEM X Academy Alumni
April 20 at 11:54 AM ·

Looking for a way of celebrating Earth Day 2021?
Here's a great way of getting your students collecting local environmental data and help improve our understanding of the global environment.
Join other citizen scientists from 15 April to 15 May for the Community Trees Challenge using the GLOBE program and GLOBE Observer app. https://www.globe.gov/
Join us later today to see how you could use GLOBE to celebrate Earth Day.
https://www.csiro.au/en/education/Programs/GLOBE

2

3



NASA's Soil Moisture Active Passive Mission

Earth's climate has changed throughout history. Scientists, research organisations, citizen scientists and others continue to collect essential weather and climate related information. The more information we have, the better our understanding of the global environment and the likely impact climate change may have on these environments.

NASA's Soil Moisture Active Passive (SMAP) Mission is just one of the ways scientists are collecting important soil moisture data from space. The SMAP Mission should improve our understanding of the processes that link the water, carbon, and energy cycles to improving weather and climate prediction models.

NASA need your help in ground truthing the data collected from space using the measurements your students can make here on Earth!

Join our upcoming CSIRO Education and Outreach webinar on the **2nd December** to see how you and your students can help improve our understanding of the Earth systems.

THE GLOBE PROGRAM

A Worldwide Science and Education Program

The GLOBE Program

The Global Learning and Observations to Benefit the Environment (GLOBE) Program is a NASA sponsored science and education program providing students and the community with opportunities to participate in data collection, scientific process, and make meaningful contributions to our understanding of Earth systems and the global environment.

As an international science and education program, GLOBE is dedicated to supplying the STEM professionals of tomorrow with the scientific knowledge necessary to tackle Earth's biggest mysteries.

Through interdisciplinary activities and inquiries into the various Earth spheres, GLOBE gives students a hands-on approach to the scientific method. Our protocols are developed by the scientific community and validated by teachers, so you can be sure our lesson objectives are scientifically verified.

GLOBE also works to build a collaborative, worldwide community of students, teachers, scientists, and citizens to conduct real-world research. Through the data collected by our community members, researchers gain invaluable insight into local environments around the globe and more of the world is able to significantly contribute to scientific discovery.

If you have been contemplating using the GLOBE program or would just like to know more, please register for one of our upcoming webinars:

25th November: Introduction to GLOBE and completing the online assessment

9th December: Introduction to Atmosphere and completing the online assessment

13th January: Introduction to Hydrosphere and completing the online assessment

15th January: Introduction to Biosphere and completing the online activity

4

CSIRO

- Bill Flynn - CSIRO

Sustainable futures and
GLOBE citizen science program

6

City of Ryde

OPEN ACCESS AUSTRALASIA

OPEN ACCESS WEEK 2021

5

Welcome to
How to Address Global Challenges with Open Science

The session will begin at 2pm AEDT

THE GLOBE PROGRAM

An international science and education program delivered in Australia through a partnership between CSIRO and the Australian Space Agency

Increase environmental awar
and understanding.

Through real hands-on science, collecting analysing and uploading data from 4 Earth Spheres:

5

CitSciOZ21

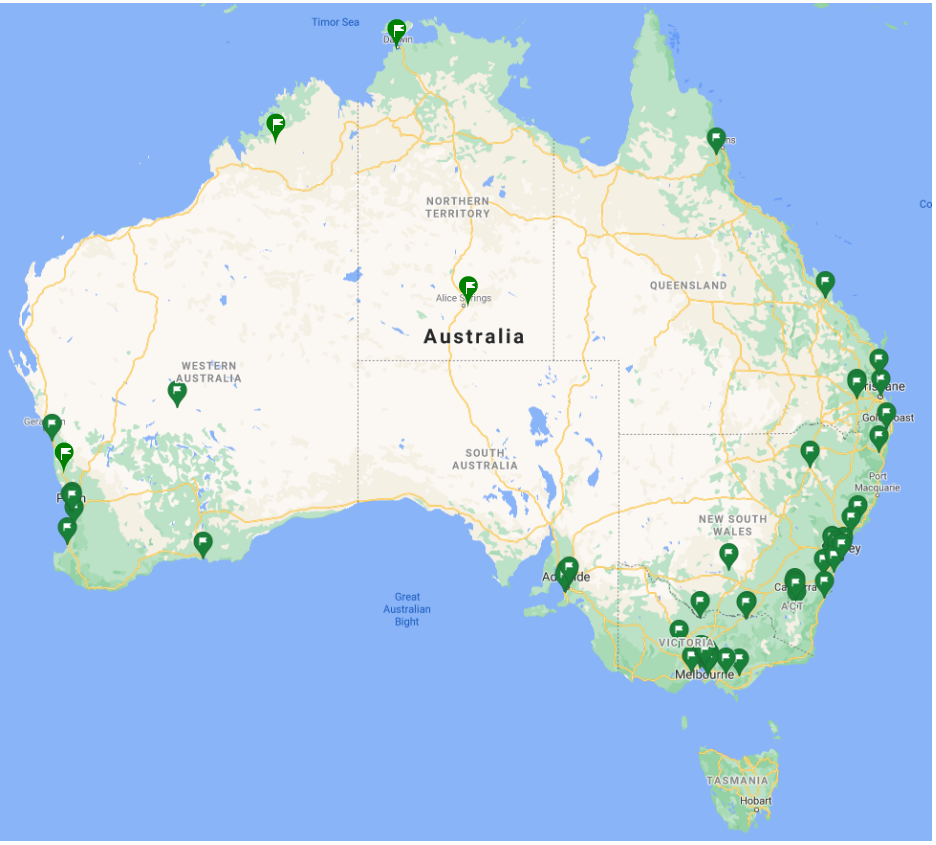
Celebrate, Communicate, Co-Create

7

If you are fortunate to be travelling this festive season remember to use the opportunity to add more of your valuable environmental data to the GLOBE database, and safe travels! If you're not venturing beyond your backyard your local collected data is just as valuable. Whether it be a clouds or mosquito habitat every observation helps.

11 webinars from 1 January 2021 to 31 December 2021
202 attendees in total

1 face to face conference session 1 January 2021 to 31 December 2021
22 attendees in session



- 126 Teacher/Educator approved accounts

- 51 GLOBE Members Including 6 eTrained, 1 Jan 2021-31 Dec 2021
- 1 Candidate Trainer
- 4 Schools reporting GLOBE data

2764 Untrained GLOBE Observers

Teacher/Educator approved accounts

		Year 4 Science Strands			Year 4 Maths Content Descriptions			Year 4 HASS Content Descriptions	
GLOBE Protocol		SU	SHU	SIS	N&A	M&G	S&P	I&S	K&U
ATMOSPHERE									
Aerosols	N/A								
Air Temperature Current				Q&P-ACSIS064 P&C-ACSIS065 P&AD&I-ACSIS068, ACSIS216 E-ACSIS069 C-ACSIS071		Using units of measurement-ACMMG084	Data representation & interpretation-ACMSP096, ACMSP097	Questioning-ACHASSI073 Researching-ACHASSI074, ACHASSI075 Analysing-ACHASSI078 Evaluating & Reflecting-ACHASSI079, ACHASSI081 Communicating-ACHASSI082	
Air Temperature Current/Max/Min				Q&P-ACSIS064 P&C-ACSIS065 P&AD&I-ACSIS068, ACSIS216 E-ACSIS069 C-ACSIS071		Using units of measurement-ACMMG084	Data representation & interpretation-ACMSP096, ACMSP097	Questioning-ACHASSI073 Researching-ACHASSI074, ACHASSI075 Analysing-ACHASSI078 Evaluating & Reflecting-ACHASSI079, ACHASSI081 Communicating-ACHASSI082	
Barometric Pressure				Q&P-ACSIS064 P&C-ACSIS065 P&AD&I-ACSIS068, ACSIS216 E-ACSIS069 C-ACSIS071		Using units of measurement-ACMMG084	Data representation & interpretation-ACMSP096, ACMSP097		
Clouds							Data representation & interpretation-ACMSP096, ACMSP097		
Precipitation						Using units of measurement-ACMMG084	Data representation & interpretation-ACMSP096, ACMSP097	Questioning-ACHASSI073 Researching-ACHASSI074, ACHASSI075 Analysing-ACHASSI078 Evaluating & Reflecting-ACHASSI079, ACHASSI081 Communicating-ACHASSI082	
Relative Humidity						Using units of measurement-ACMMG084	Data representation & interpretation-ACMSP096, ACMSP097		
Surface Ozone	N/A					Using units of measurement-ACMMG084	Data representation & interpretation-ACMSP096, ACMSP097		
Surface Temperature						Using units of measurement-ACMMG084	Data representation & interpretation-ACMSP096, ACMSP097		
water Vapour	N/A								
Wind	N/A								
BIOSPHERE									
Biometry - measure and classify plant life		Biological Sci ACSSU072, ACSSU073	Nature & develoment-ACSHE061						GEOGRAPHY-ACHASSK087, ACHASSK088
Carbon Cycle	N/A								
Fire Fuel									
Green Up/Green Down		Biological Sci ACSSU072, ACSSU073		Q&P-ACSIS064 P&C-ACSIS065 P&AD&I-ACSIS068 E-ACSIS069 C-ACSIS071		Using units of measurement-ACMMG084, Location & Transformation-ACMMG090, ACMMG091	Data representation & interpretation-ACMSP096, ACMSP097	Questioning-ACHASSI073 Researching-ACHASSI074, ACHASSI075 Analysing-ACHASSI078 Evaluating & Reflecting-ACHASSI079, ACHASSI081 Communicating-ACHASSI082	GEOGRAPHY-ACHASSK087, ACHASSK088
Land Cover Classification		Biological Sci ACSSU072, ACSSU073				Using units of measurement-ACMMG084. Location & Transformation-ACMMG090, ACMMG091	Data representation & interpretation-ACMSP096, ACMSP097	Questioning-ACHASSI073 Researching-ACHASSI074, ACHASSI075 Analysing-ACHASSI078 Evaluating & Reflecting-ACHASSI079, ACHASSI081 Communicating-ACHASSI082	GEOGRAPHY-ACHASSK087, ACHASSK088
HYDROSHPERE									
Alkalinity	N/A								
Conductivity	N/A								
Dissolved Oxygen	N/A								
Freshwater Macroinverts								Questioning-ACHASSI073 Researching-ACHASSI074, ACHASSI075 Analysing-ACHASSI078 Evaluating & Reflecting-ACHASSI079, ACHASSI081 Communicating-ACHASSI082	GEOGRAPHY-ACHASSK087, ACHASSK088
Mosquitos		Biological Sci ACSSU072, ACSSU073	Use & influence of Sci-ACSHE062	P&AD&I-ACSIS068 C-ACSIS071		Using units of measurement-ACMMG084. Location & Transformation-ACMMG090, ACMMG091		Questioning-ACHASSI073 Researching-ACHASSI074, ACHASSI075 Analysing-ACHASSI078 Evaluating & Reflecting-ACHASSI079, ACHASSI081 Communicating-ACHASSI082	GEOGRAPHY-ACHASSK087, ACHASSK088
Nitrates	N/A								
Salinity	N/A								
Water Temperature		Biological Sci ACSSU072, ACSSU073	Use & influence of Sci-ACSHE062	P&AD&I-ACSIS068 C-ACSIS071		Using units of measurement-ACMMG084. Location & Transformation-ACMMG090, ACMMG091			
Water Transparency		Biological Sci ACSSU072, ACSSU073	Use & influence of Sci-ACSHE062	P&AD&I-ACSIS068 C-ACSIS071		Using units of measurement-ACMMG084. Location & Transformation-ACMMG090, ACMMG091			
pH		Biological Sci ACSSU072, ACSSU073	Use & influence of Sci-ACSHE062	P&AD&I-ACSIS068 C-ACSIS071		Using units of measurement-ACMMG084. Location & Transformation-ACMMG090, ACMMG091			

Green Up/Green Down

Purpose

To observe plant green-up and report data that will be used by scientists to validate satellite estimates of the beginning of the plant growing season

Callistemon

Image: David Sando

Banksia

Image: Gunther

Acacia

Image: Geoffrey Cox

Eucalyptus

Image: Reiner Richter

Red Cedar

Image: Martin Bennett

Illawarra Fire tree

Image: ClimateWatch

Grevillea

Image: ClimateWatch

White Elderberry

Image: vagabondvoyager

Yr5	Science	Green up/Green down

Science Understanding	Science as a Human Endeavour	Science Inquiry Skills
Biological sciences Living things have structural features and adaptations that help them to survive in their environment (ACSSU043) • describing and listing adaptations of living things suited for particular Australian environments	**Use and influence of science** Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083) • considering how best to ensure growth of plants • considering how decisions are made to grow particular plants and crops depending on environmental conditions	**Processing and analysing data and information** Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate (ACSIS090) Compare data with predictions and use as evidence in developing explanations (ACSIS218) **Communicating** Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts (ACSIS093)
Activity	**Learning outcomes**	**Resources**
• survey of trees and plants growing in area • compare leaf growth rates between different plants • investigate relationship between budburst, leaf growth and temperature/climate • submit data to GLOBE database	• identification of trees and plants growing in the area • relationship between green-up, green-down and temperature/climate • predict green-up, green-down • reliable data collection • upload data to GLOBE database • access green-up, green-down data on GLOBE database	A Sneak-Preview of Budburst https://www.globe.gov/documents/355050/5fa93edf-852a-43f0-8ef9-44300e5a2fc6 Green-Up Protocol https://www.globe.gov/documents/355050/ac287b49-8559-4f98-b9e5-a1421f5ae336 Green-Down protocol https://www.globe.gov/documents/355050/849d4a1a-96dd-4965-ab36-0ae77a447cd9 A First Look at Phenology https://www.globe.gov/documents/355050/fa49c394-2f14-410e-abb8-6d73d329df64

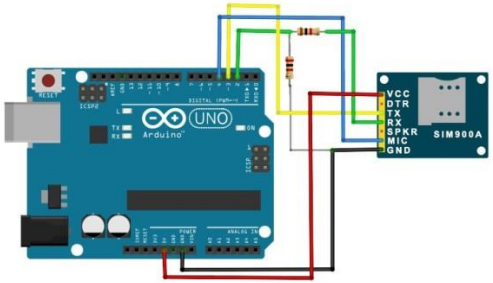
Yr6		
Biological sciences The growth and survival of living things are affected by physical conditions of their environment (ACSSU094) • investigating how changing the physical conditions for plants impacts on their growth and survival such as saltwater, use of fertilizers and soil types		**Processing and analysing data and information** Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate (ACSIS107 - Scootle) Compare data with predictions and use as evidence in developing explanations (ACSIS221 - Scootle) **Communicating** Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts (ACSIS110)
Activity	**Learning outcomes**	**Resources**
• survey of trees and plants growing in area • compare leaf growth rates between different plants • investigate relationship between budburst, leaf growth and temperature/climate • submit data to GLOBE database	• identification of trees and plants growing in the area • relationship between green-up, green-down and temperature/climate • predict green-up, green-down • reliable data collection • upload data to GLOBE database • access green-up, green-down data on GLOBE database	A Sneak-Preview of Budburst https://www.globe.gov/documents/355050/5fa93edf-852a-43f0-8ef9-44300e5a2fc6 Green-Up Protocol https://www.globe.gov/documents/355050/ac287b49-8559-4f98-b9e5-a1421f5ae336 Green-Down protocol https://www.globe.gov/documents/355050/849d4a1a-96dd-4965-ab36-0ae77a447cd9 A First Look at Phenology https://www.globe.gov/documents/355050/fa49c394-2f14-410e-abb8-6d73d329df64

Yr7		
	Use and influence of science Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations (ACSHE120) • considering how human activity in the community can have positive and negative effects on the sustainability of ecosystems People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE121)	**Processing and analysing data and information** Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships in data using digital technologies as appropriate (ACSIS129) **Communicating** Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate (ACSIS133)

Priorities 2022:

- Recruit more schools to GLOBE
- Present GLOBE at conferences!
- Develop communications plan for GLOBE
- Develop data collection kits
- Deliver more teacher PL
- Explore other GLOBE user possibilities
- Develop a particulates protocol

Collecting data



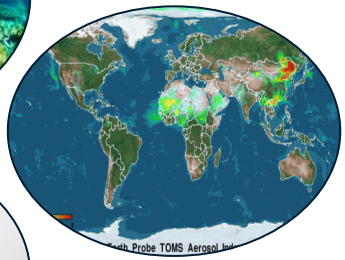
Microcontrollers

‘Stand-alone’ sensors

Weather Station

Manual collection

Why do GLOBE?



- ✓ Advance environmental awareness
- ✓ Contribute to scientific understanding of the Earth
- ✓ Help students reach higher levels of achievement in science and mathematics
- ✓ Experiential hands-on learning
- ✓ ‘Real world’ data collection for use in science research

Thank you

Education and Outreach
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Education Specialist

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GLOBE is sponsored by the US National Aeronautics and Space Administration (NASA) and is delivered in Australia through a partnership between the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Space Agency.