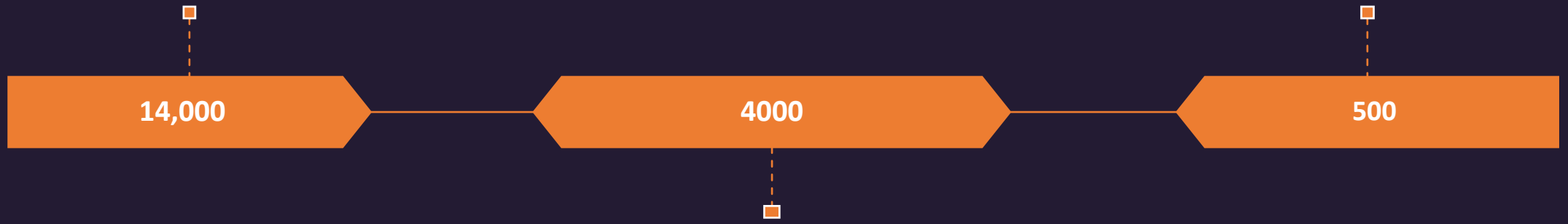

VSSEC
Victorian Space Science Education Centre
ビクトリア宇宙教育センター
VSSEC

ビクトリア州の学生と教員をSTEM教育で支援

年間学生訪問数

現在に至るまで教員研修に参加した教員数

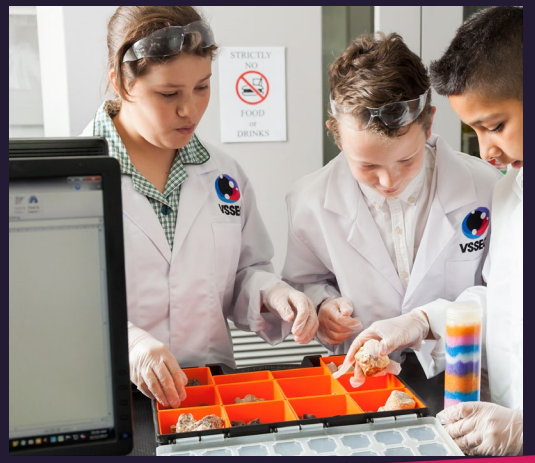


年間アウトリーチ学生訪問数

VSSEC

火星ミッション

- 中学生対象
- シナリオ型のアクティブラーニング



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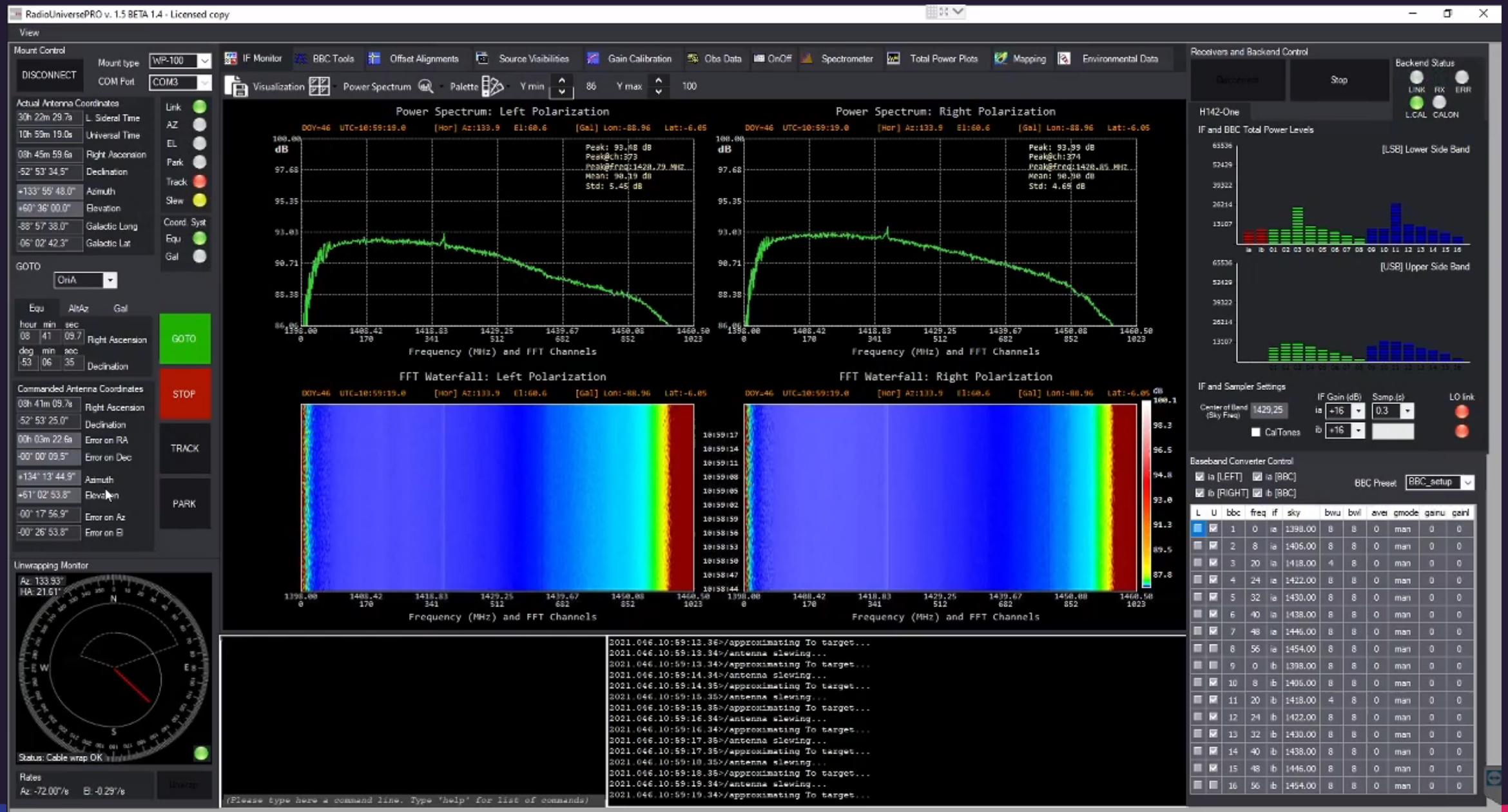
教員研修

- 2000の従来からのプログラム
- 訪問校のすべての教師が対象
- 教育方法を扱う
- 「科学教育のための教育の科学」

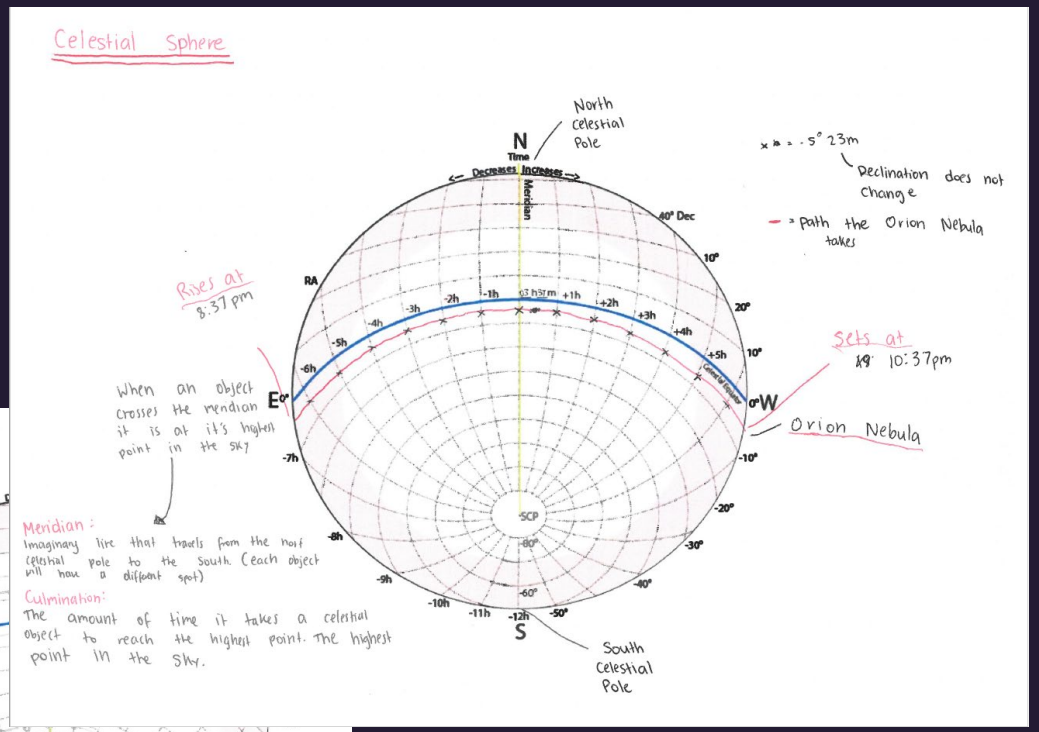
国際パートナーシップ

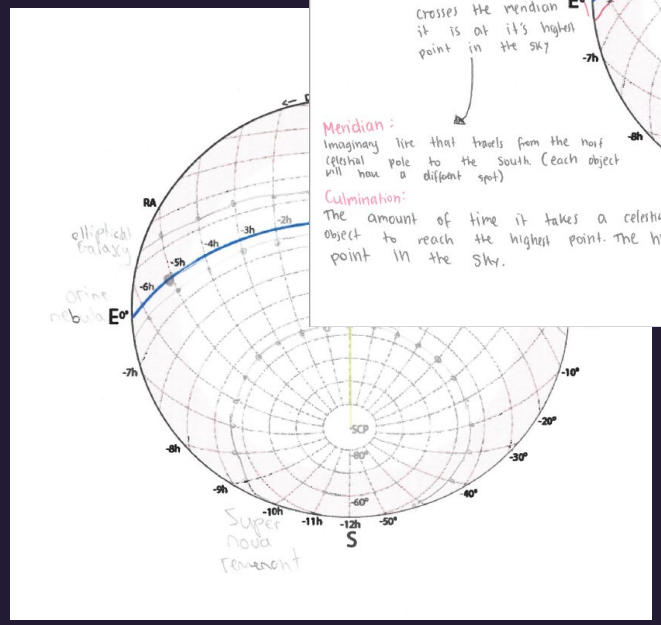
- 国際宇宙教育会議(ISEB)の準会員
- VSSEC は国際宇宙教育コミュニティにおいてオーストラリアを代表
- 国際宇宙会議 (IAC) に参加者及び登壇者として参加

電波天文学：目に見えない宇宙


RadioUniversePRO v. 1.5 BETA 1.4 - Licensed copy
View
Mount Control
DISCONNECT
Mount type
WP-100
COM Port
COM3
Actual Antenna Coordinates
30h 22m 29.7s
L. Sideral Time
10h 59m 19.0s
Universal Time
09h 45m 59.6s
Right Ascension
-52° 53' 34.5"
Declination
+133° 55' 48.0"
Azimuth
+60° 36' 00.0"
Elevation
-88° 57' 38.0"
Galactic Long
-06° 02' 42.3"
Galactic Lat
Link
AZ
EL
Park
Track
Slew
Coord. Syst
Equ
Gal
GOTO
OnA
Equ
AltAz
Gal
hour min sec
08 41 09.7
Right Ascension
deg min sec
-53 06 35
Declination
GOTO
STOP
TRACK
PARK
Commanded Antenna Coordinates
09h 41m 09.7s
Right Ascension
-52° 53' 25.0"
Declination
00h 03m 22.6s
Error on RA
-00° 00' 09.5"
Error on Dec
+134° 13' 44.9"
Azimuth
+61° 02' 53.8"
Elevation
-00° 17' 56.9"
Error on Az
-00° 26' 53.8"
Error on El
Unwrapping Monitor
Az: 133.93°
HA: 21.61°
Status: Cable wrap OK
Rates
Az: -72.00°/s
El: -0.29°/s
IF Monitor
BBC Tools
Offset Alignments
Source Visibilities
Gain Calibration
Obs Data
On/Off
Spectrometer
Total Power Plots
Mapping
Environmental Data
Visualization
Power Spectrum
Palette
Y min
86
Y max
100
Power Spectrum: Left Polarization
Power Spectrum: Right Polarization
Frequency (MHz) and FFT Channels
FFT Waterfall: Left Polarization
FFT Waterfall: Right Polarization
Receivers and Backend Control
Disconnect
Stop
Backend Status
LINK
RX
ERR
L.CAL
CALON
H142-One
IF and BBC Total Power Levels
[LSB] Lower Side Band
[USB] Upper Side Band
IF and Sampler Settings
Center of Band (Sky Freq)
1429.25
CalTones
IF Gain (dB)
Samp.(s)
LO link
Baseband Converter Control
ia [LEFT]
ib [RIGHT]
ia [BBC]
ib [BBC]
BBC Preset
BBC_setup
L U bbc freq if sky bwu bwl aver gmode gainu gainl
2021.046.10:59:13.36>/approximating To target...
2021.046.10:59:13.34>/antenna slewing...
2021.046.10:59:13.34>/approximating To target...
2021.046.10:59:14.34>/antenna slewing...
2021.046.10:59:14.35>/approximating To target...
2021.046.10:59:15.35>/antenna slewing...
2021.046.10:59:15.35>/approximating To target...
2021.046.10:59:16.34>/antenna slewing...
2021.046.10:59:16.34>/approximating To target...
2021.046.10:59:17.35>/antenna slewing...
2021.046.10:59:17.35>/approximating To target...
2021.046.10:59:18.35>/antenna slewing...
2021.046.10:59:18.35>/approximating To target...
2021.046.10:59:19.34>/antenna slewing...
2021.046.10:59:19.34>/approximating To target...
(Please type here a command line. Type 'help' for list of commands)

概要





Tracking objects: *Right Ascension and Declination*

Of the two coordinate systems to track objects Right Ascension and Declination uses **time** to locate objects.
Below is a list of the 10 brightest radio objects from the Parkes Radio Telescope using RA/Dec.
You can use this table, or move to a larger table with more objects here

Note: If you are in a class, choose an object that has not been selected by the majority. We will come together as a class to determine the most ideal object to view.

Name PKS Catalogue Number	Flux	Right Ascension (Time)			Declination (Degrees)			Culmination (Wait Time)			Time of Highest Point		
		h	m	s	d	m	s	h	m	s	h	m	s
Orion Nebula (PKS J0535-0523)	410000	05	35	18.40	-05	23	06.0	16	02		00	37	
RRF 207 (PKS J1847-0202)	330000	18	47	18.10	-02	02	40.0	29	14				
Radio-Source (PKS J0859-4345)	260000	08	59	28.30	-43	45	44.0						
Supernova Remanent (PKS J0859-4731)	250000	08	59	07.30	-47	31	23.0	19	26		06		
Elliptical Galaxy (PKS J1230+1223)	220000	12	30	49.42	+12	23	28.0	22	57		10	32	
NA (PKS J1634-4735)	87000	16	34	36.40	-47	35	56.0	05			14	55	
NA (PKS J1346-6022)	79000	13	46	57.60	-60	22	58.0						
Pictor A (PKS J0519-4546)	66000	05	19	44.30	-45	46	40.0	16	86		4	19	
SNR Milne 23 (PKS J1211-5309)	62000	12	11	56.00	-53	09	37.0						
Active Galactic Nuclei (PKS J1720-0058)	54000	17	20	30.40	-00	58	38.0	3	52		14	22	
NA (PKS J1639-4651)	53000	16	39	48.60	-46	51	01.0						

Preparation (Finding our time and place)

To track an object using time, we must use a fixed reference of time called the **Local Apparent Sidereal Time**. This time is calculated based on the **Longitude** of your position on Earth, and the **First Point of Aries** (Where the Sun crosses the Celestial Equator, historical name).

Tallarook Observatory Longitude: 145.124958 E

DLR Hosted Calculator

Question 1. Determine the Local Sidereal Time (LAST) using the link above, and entering the Longitude

Local Sidereal Time (LAST) = 11 hours 33 minutes 25 seconds

Current Time = 11 hours 33 minutes 25 seconds

Which object is visible during your observation window? *Let's find out...*

For your selected object we will determine the current Right Ascension and Declination to determine its place in the sky

11:33 ' 22 Sec
hr min

Right Ascension

The Culmination of your object is the time it will take to reach the highest point in the sky, the telescope's **meridian**.
Note: If RA < LAST add 24 hours to RA of object.

Remember, RA operates in a Sidereal Day (one rotation of the Earth) in 23 hrs 56 mins 4 secs... not 24 hours...

Question 2: Calculate the Culmination of your chosen object, show your working.
An approximate calculation is good enough!

Culmination = RA (Object) – LAST

29.17 (Pictor A) − 13.38 = 15.85

Orion Nebula: 5:35:18.4 − 13:33:36

Supernova Remnant: 32:34 − 13:33:36 = 19.26 hr

Add your calculated **Culmination** to the previous table, and share with the class

Is your object close to **Culmination** during your observation time?

Time of Highest Point = Current Time + Culmination (24 hour time)

Orion 11.36 + 16.02 = 27.37 → 27.37 − 24 = 3:37

Supernova 11.33 + 19.26 = 30.61 → 30.61 − 24 = 6.61 = 7.01

Pictor A 11.33 + 15.85 = 27.21

Declination

When will the object rise? Will it be high enough above the horizon to be observed?
There is no easy answer..... consider tracking the object in Stellarium with the Equatorial grid to investigate why

Declination	Notes...
-80° > - 90°	These objects are high enough all the time. But there are no interesting objects that close to the South Celestial Pole unfortunately...
-35° > - 80°	These objects will disappear below the horizon at some time but they are always to the south of the telescope.
-34° > + 15°	These objects are observable provided all of the observation is done either before they reach culmination or all is done after culmination because this point passes to the North of the telescope.
DEC > + 15°	These objects are never high enough above the horizon for long enough to be useful targets from the Tallarook Observatory. (View these from the Northern Hemisphere.)

As a class

In the table on the first page, add the classes calculations for Culmination and a Time of Highest Point of each object.

It is **recommended** to observe the object that is the closest to your booked observation session.

Responses cannot be edited

Celestial Object

You have selected an object, you have placed it in the sky, lets conduct some research whilst we're waiting for our Radio Map to be created using the radio telescope

*Required

What object did you choose? *
Write down the type and the name of the object you are observing
Supernova remnant

What is the RA and Declination of your object? *
RA; 08h 59m 07.3s DEC: -47d 31m 23.0s

What is the Culmination of your object? *
You can calculate this again using the Local Sidereal Time and the RA of the object. Remember, Culmination is the time it will take to reach the highest point.
19h 25m 32.3s

What time will it reach the highest point? *
30h 58m 12.3s

Research your chosen object *
You may want to include what the object is, why it is a strong radio source, what we already know about the object itself or the

Responses cannot be edited

Intro to Radio Astronomy

*Required

What is Radio Astronomy?
radio astronomy is a major branch of astronomy and reveals otherwise-hidden characteristics of everything in the universe. It studies celestial objects at radio frequencies.

What are some of the benefits to Radio Astronomy?
large and multiple field-of- views, rapid electronic steering, reliability, flexibility, cost and performance

How are these different to Radio Astronomy and Optical Astronomy?
Radio astronomy has some advantages over optical astronomy. Radio astronomy can be performed any time, day or night, since visible light from the sun does not interfere with radio emissions from other objects in the sky. Optical astronomy can only be done after sundown. Another advantage is that radio astronomy does not depend as much on atmospheric conditions. Radio waves are not blocked by dust or water vapor (clouds) in the atmosphere, so radio astronomy can be done in the rain. Optical astronomy requires a clear night. The only time radio astronomy cannot be performed is when there is lightning.

Why does a Radio Telescope need an Amplifier?
A receiver and amplifier to boost the very weak radio signal to a measurable level. These days the amplifiers are extremely sensitive and are normally cooled to very low temperatures to minimise interference due to the noise generated by the movement of the atoms in the meta

Answer the following True False Questions *

	True	False
Gamma Rays can reach Earth's Surface	☐	☑
All radio waves can reach the Earth's Surface	☐	☑
Satellites can be used to detect visible light	☑	☐

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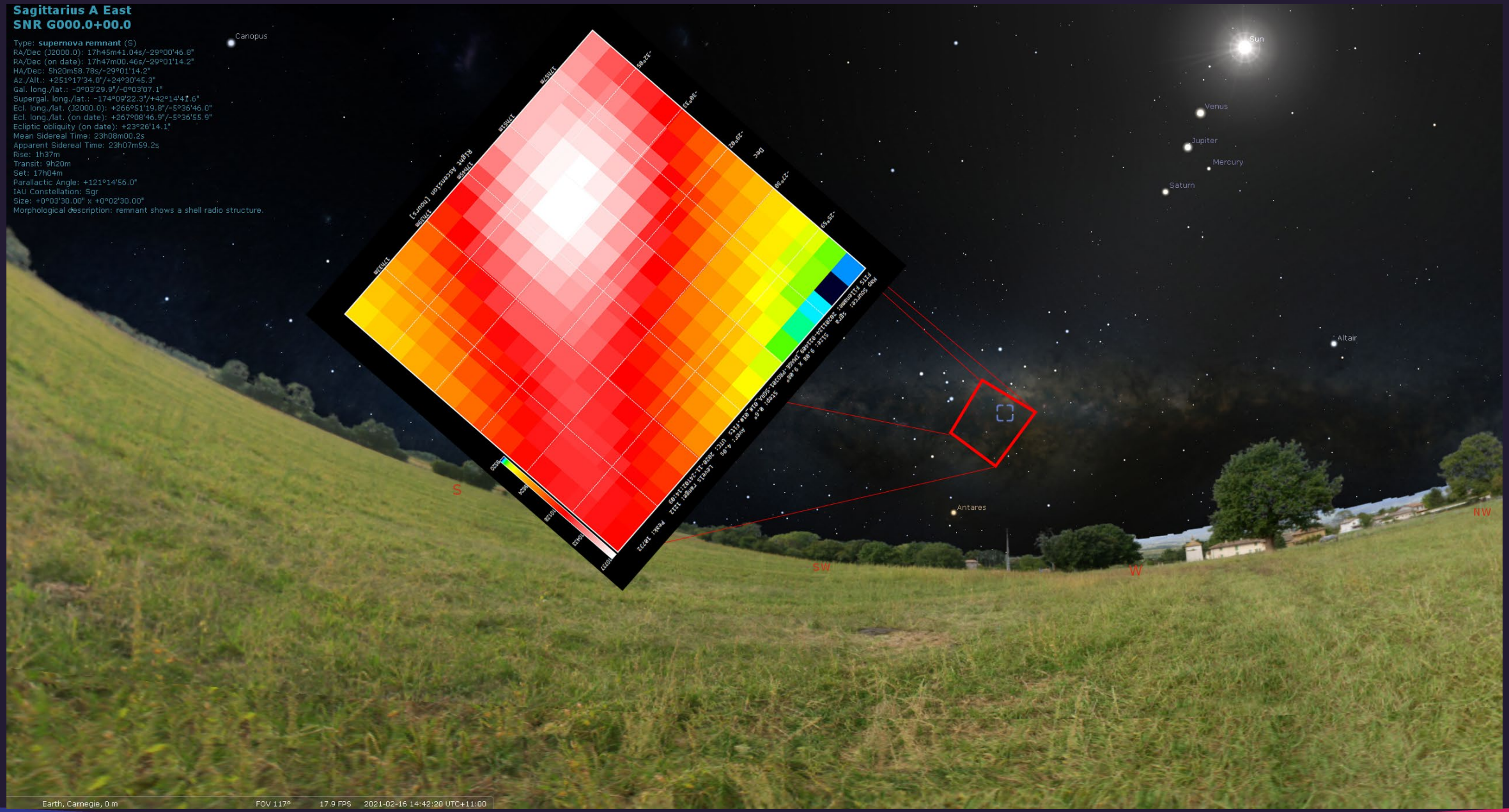
Sagittarius A East
SNR G000.0+00.0
Type: supernova remnant (S)
RA/Dec (J2000.0): 17h45m41.04s/-29°00'46.8"
RA/Dec (on date): 17h47m00.46s/-29°01'14.2"
HA/Dec: 5h20m58.78s/-29°01'14.2"
Az./Alt.: +251°17'34.0"/+24°30'45.3"
Gal. long./lat.: -0°03'29.9"/-0°03'07.1"
Supergal. long./lat.: -174°09'22.3"/+42°14'41.6"
Ecl. long./lat. (J2000.0): +266°51'19.8"/-5°36'46.0"
Ecl. long./lat. (on date): +267°08'46.9"/-5°36'55.9"
Ecliptic obliquity (on date): +23°26'14.1"
Mean Sidereal Time: 23h08m00.2s
Apparent Sidereal Time: 23h07m59.2s
Rise: 1h37m
Transit: 9h20m
Set: 17h04m
Parallactic Angle: +121°14'56.0"
IAU Constellation: Sgr
Size: +0°03'30.00" x +0°02'30.00"
Morphological description: remnant shows a shell radio structure.
Canopus
Sun
Venus
Jupiter
Mercury
Saturn
Altair
Antares
S
SW
W
NW
Earth, Carnegie, 0 m
FOV 117°
17.9 FPS
2021-02-16 14:42:20 UTC+11:00

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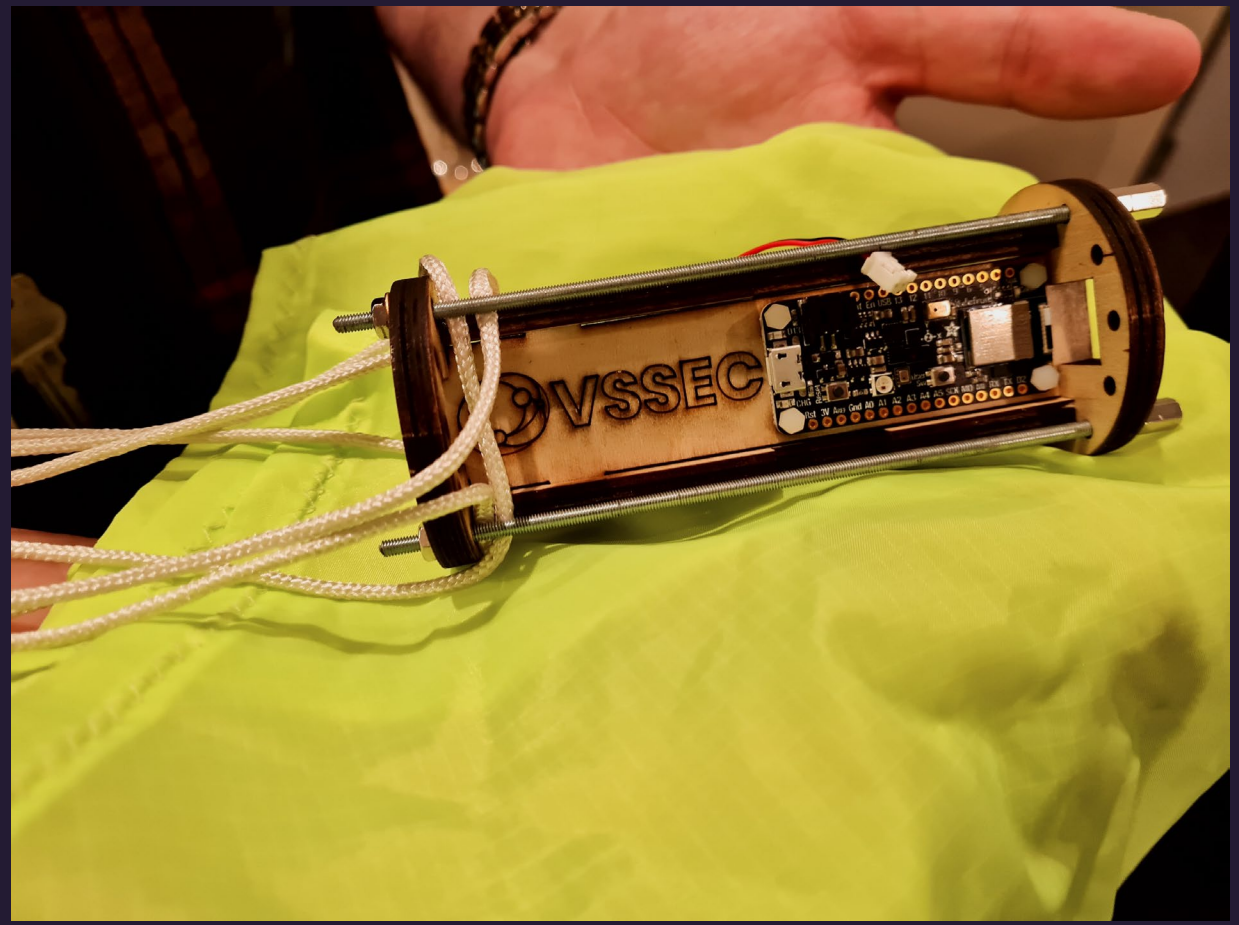
学校でのVSSECの缶サット(CanSat)



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缶サットを用いた教育の流れ

教室の雰囲気づくり

衛星調査・技術の進歩

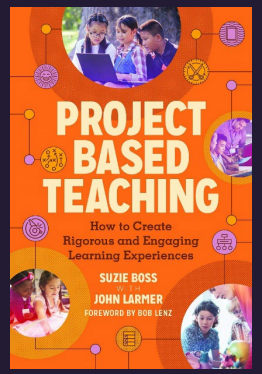
パラシュートの設計と試験

シャーシの設計と試験

プログラミングと電子機器の開発と試験

打ち上げ!

データ解析とプレゼンテーション



esa
European Space Agency
Agence spatiale européenne

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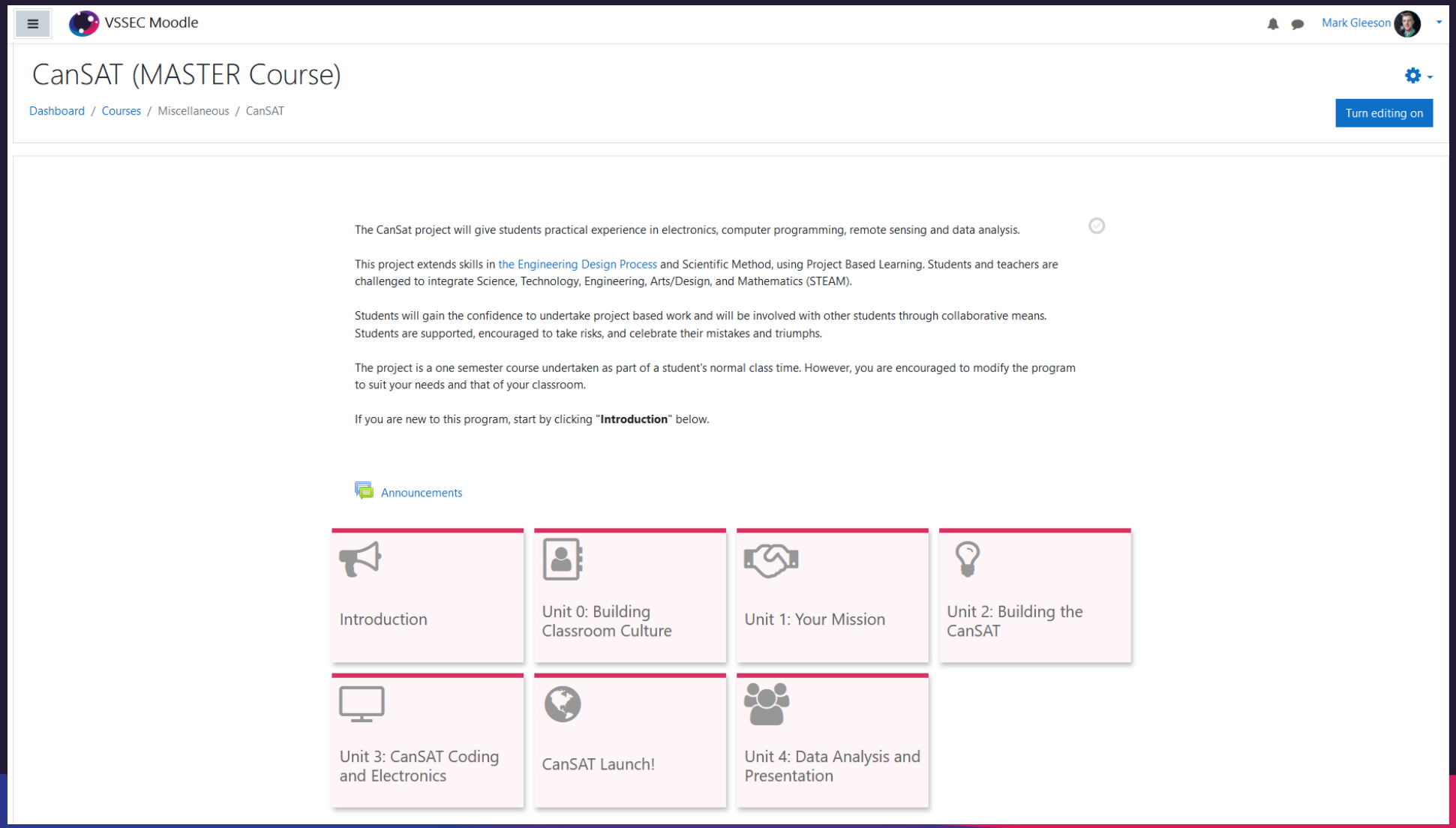
学習管理システム



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