

# The DRAO

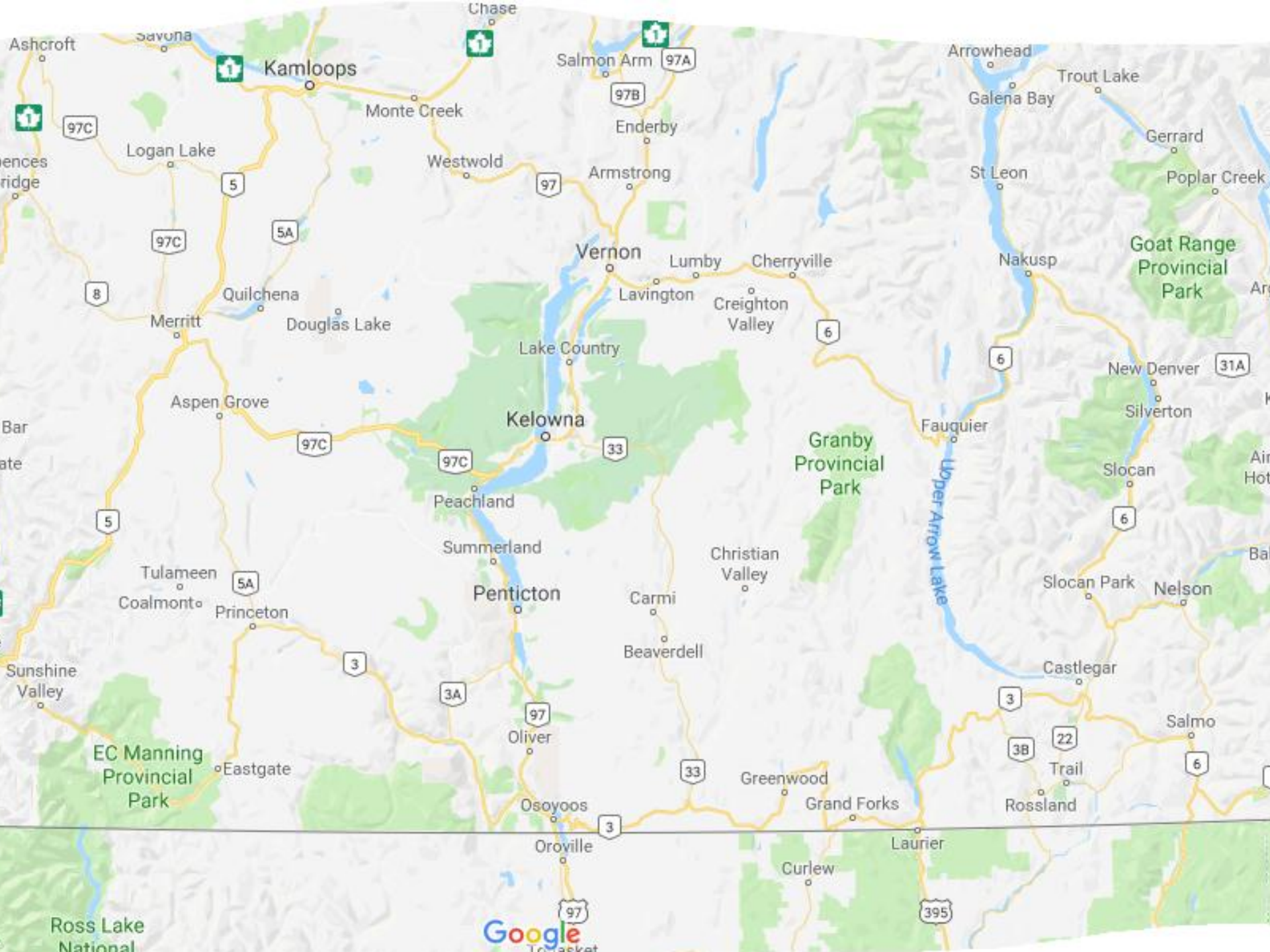
(Dominion Radio Astrophysical Ob.)

Penticton, BC

PAA Meeting

March 1<sup>st</sup>, 2019

By Astro-Traveler - Rick Stankiewicz



Ashcroft  
Savona  
Kamloops  
Chase  
Salmon Arm  
97A  
97B  
97C  
5  
5A  
8  
Monte Creek  
Enderby  
Westwold  
Armstrong  
Vernon  
Lumby  
Cherryville  
Arrowhead  
Trout Lake  
Galena Bay  
Gerrard  
Poplar Creek  
St Leon  
Nakusp  
Goat Range Provincial Park  
Quilchena  
Douglas Lake  
Lake Country  
Creighton Valley  
Fauquier  
New Denver  
31A  
Silverton  
Merritt  
Aspen Grove  
Kelowna  
97C  
33  
6  
Slocan  
Air Hot  
Peachland  
Summerland  
Christian Valley  
Slocan Park  
Nelson  
Tulameen  
Coalmont  
Princeton  
Penticton  
Carmi  
Beaverdell  
Castlegar  
Sunshine Valley  
EC Manning Provincial Park  
Eastgate  
Oliver  
3A  
97  
3  
3B  
22  
Salmo  
Osoyoos  
Oroville  
3  
33  
Greenwood  
Grand Forks  
Rossland  
Curlew  
Laurier  
395  
97

# Canada's Observatories

**NRC-CNRC**

Herzberg Astronomy and Astrophysics

NRC manages Canada's participation in some of the world's most important optical and radio astronomy observatories, facilitating access for the Canadian astronomy community. We also engage industry in the design and development of the innovative technology these observatories use to advance our understanding of the Universe.



National Research  
Council Canada

Conseil national de  
recherches Canada

Canada

 National Research Council Canada / Conseil national de recherches Canada
 Canada

**Radio interference control zone**  
 **TURN OFF**   
**ALL**  
**ELECTRONIC DEVICES**  
 Thank you

 National Research Council Canada / Conseil national de recherches Canada
 Canada

**Zone de contrôle des interférences radio**  
 **VEUILLEZ ÉTEINDRE**   
**TOUS**  
**VOS APPAREILS ÉLECTRONIQUES**  
 Merci



**Hours of operation / Heures d'ouverture**

08:30 - 16:30 Monday - Friday Closed weekends and holidays	08h30 - 16h30 Lundi - vendredi Fermé les fins de semaines et jours fériés
--	---

Self-guided tours during business hours / Visites sans guide disponibles durant les heures d'ouverture  
 Please walk in / Veuillez procéder



**Radio Quiet Zone / Zone radio sensible aux interférences**

No vehicles beyond this point, except on business. / Aucun véhicule au-delà de ce point, sauf pour affaires.  
 Switch off all electronics, including cellular telephones. / Fermez tout appareil électronique, y compris les téléphones cellulaires.

**Weekend Tours**  
 10:00 am - 5:00 pm

 Government of Canada / Gouvernement du Canada

**National Research Council Canada / Conseil national de recherches Canada**

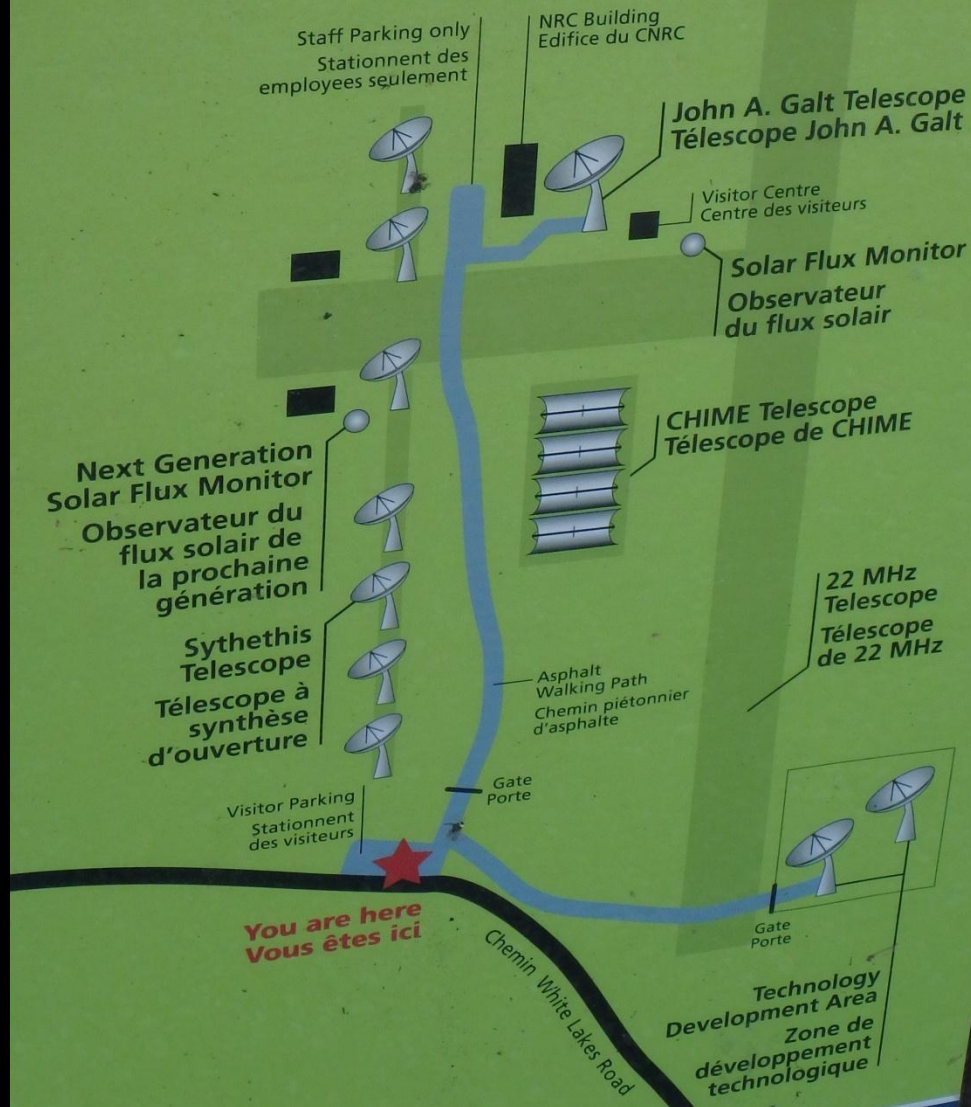
Dominion Radio Astrophysical Observatory / Observatoire fédéral de radioastrophysique  
 717 White Lake Rd. / 717, ch. White Lake

Canada



# Site Map / Plan du site

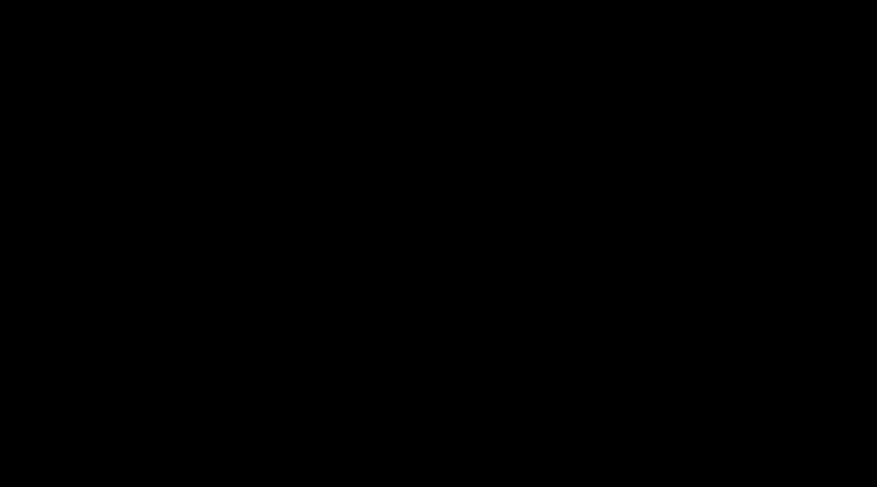
CHIME Pathfinder Telescope  
Télescope de CHIME Pathfinder









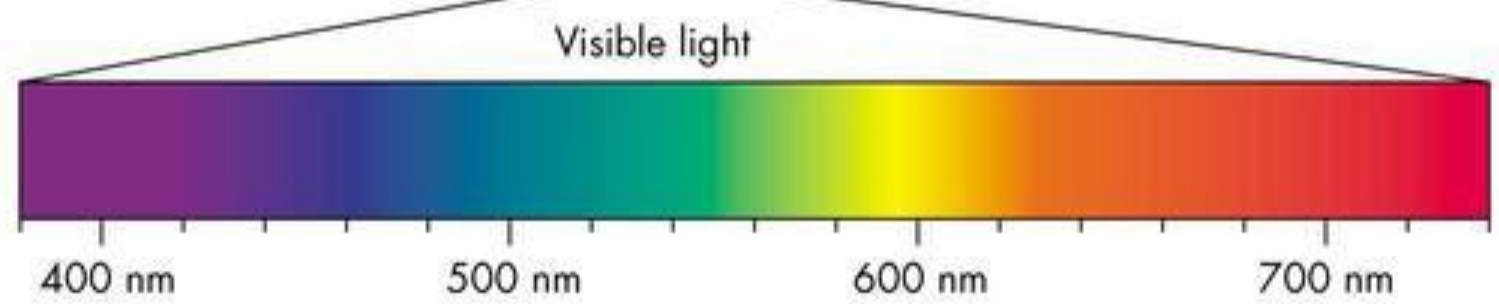
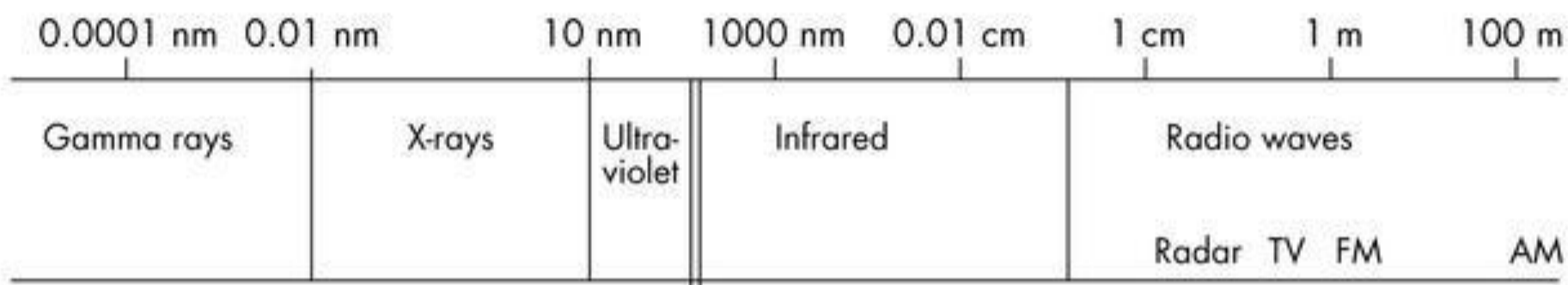
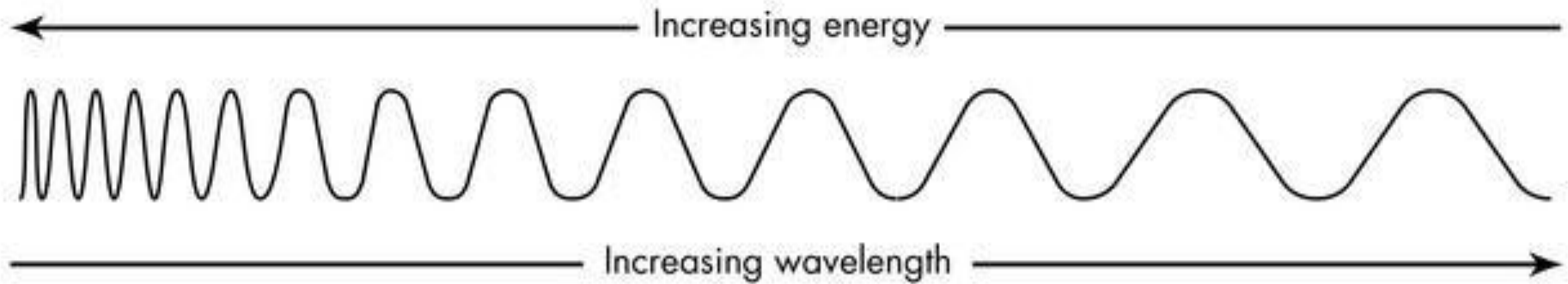




VISITORS CENTRE  
PAVILLON DES VISITEURS

12

14





# 22MHz Telescope

## The 22MHz Telescope

The 22 MHz telescope is a well-known landmark at DRAO. It was used to produce a map of the entire "radio" sky observable from this site. The map of the sky can be seen in the Visitors Center. This unusual telescope ...

- o is sensitive to very long radio wavelengths (13.6m). The Universe "seen" at these wavelengths is very different from what is seen at shorter wavelengths
- o operated from the 1950s to mid-1970s
- o has nearly 1700 "telephone" poles supporting thousands of metres of wire
- o is a "baguette antenna" 1.3 km long

## Le télescope à 22 MHz

Le télescope à 22 MHz est un repère bien connu à l'OFPR. Il a été utilisé pour la réalisation d'une carte de tout le « ciel radio » observable de ce site. On peut voir la carte en question au Centre des visiteurs. Ce télescope inhabituel :

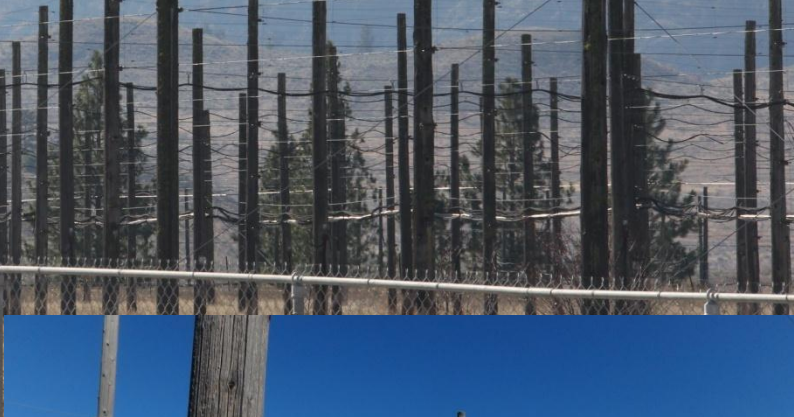
- o est sensible à de très grandes longueurs d'onde (13,6 m) : l'univers « vu » à ces longueurs d'onde semble très différent de ce qu'on observe à de plus petites longueurs d'onde
- o a été en opération des années 60 au milieu des années 70
- o comporte plus de 1700 « poteaux de téléphone » supportant des milliers de mètres de câble
- o a la forme d'un T de 1,3 km de long

# Le télescope à 22 MHz



## Site Map / Plan du site







# Solar Telescope

## Solar Flux Monitor Program

The Solar Flux Monitor Program measures the strength of the radio waves produced by the Sun. It is the most accurate and longest running measure of the Sun's activity in existence. Astronomers worldwide use the results in their research. The data is of special interest to industries that are affected by the Sun – power and radio communications companies, and satellite operators. The program ...

- measures the radio emission from the Sun at a wavelength of 10.7 cm
- originated in 1946 near Ottawa and moved to DRAO in 1990
- is a fully automated system that has tracked the sun for over 50 years

## Le Programme de monitoring du flux radio solaire

Le Programme de monitoring du flux radio solaire mesure l'intensité des ondes radio produites par le soleil. Il s'agit de la mesure à plus long terme et la plus précise de l'activité solaire ayant jamais existé. Ses résultats sont utilisés à des fins de recherche par des astronomes du monde entier. De plus, les données recueillies sont d'un intérêt particulier pour les industries affectées par l'activité solaire, soit les compagnies énergétiques et de communication radio et les opérateurs de satellites. Ce programme :

- permet de mesurer l'émission radio en provenance du soleil à une longueur d'onde de 10,7 cm
- a débuté à Ottawa en 1946 et a été déménagé à l'OFRA en 1990
- est un système entièrement automatisé qui observe le soleil depuis plus de 50 ans.

**Le Programme de monitoring du flux radio solaire**









# Synthesis Telescope



The Synthesis Telescope comprises of seven 9m dishes on an east-west line that is 600m long. Three of the antennas can be moved to different locations along a precision rail track.

This telescope began in 1972 as a two-element interferometer and was quickly expanded to four antennas. A series of upgrades between 1985 and 1994 led to an additional observing frequency, expansion of the system to seven antennas, and new correlators that were designed and built by DRAO engineers.

The Synthesis Telescope operates as a national facility for radio astronomy and has recently been mostly dedicated to the Canadian Galactic Plane Survey (CGPS).

THE "REBER FACILITY" OF THE SYNTHESIS TELESCOPE

On October 3, 1985, Dr. Grote Reber, distinguished radio astronomy pioneer, officially opened the 408 MHz facility of the DRACO synthesis telescope. This new feature of the telescope, to be known as the "Reber facility" in honour of Dr. Reber's contributions to the project, provides Canadian astronomers with a sensitive instrument for studies of large, faint radio sources. Dr. Reber's support, in the form of encouragement and funding, enabled the facility to come into operation on the occasion of the Observatory's 25<sup>th</sup> anniversary celebrations.

"L'INSTALLATION REBER" DU TÉLESCOPE DE SYNTHÈSE

Le 3 octobre 1985, le Dr. Grote Reber, distingué pionnier de la radioastronomie inaugura officiellement l'installation de 408 MHz du télescope de synthèse de l'OFRA. Ce nouvel élément du télescope, qui portera le nom d'installation Reber en l'honneur des contributions du Dr. Reber au projet, fournira aux astronomes canadiens un instrument sensible pour l'étude des grandes radiosources de faible intensité. L'appui du Dr. Reber, sous forme d'encouragements et de financement, a permis de mettre en service cette installation à l'occasion des célébrations du 25<sup>e</sup> anniversaire de l'Observatoire.





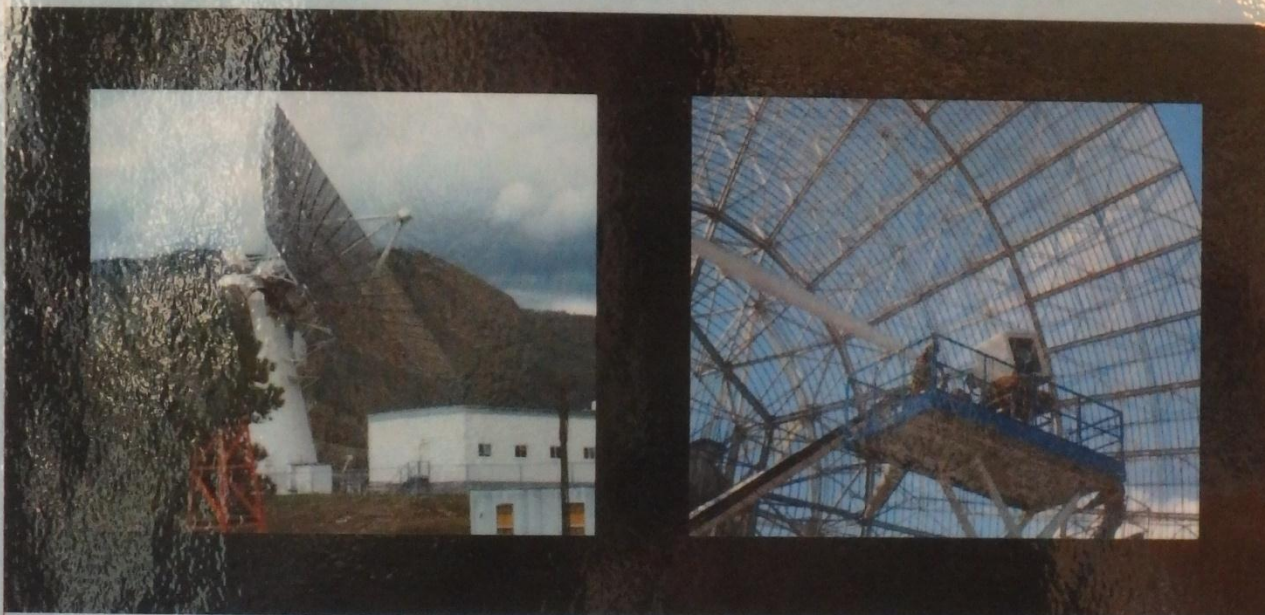
TÉLESCOPE  
JOHN A. GALT  
TELESCOPE

**THE JOHN A. GALT TELESCOPE**  
**John Alexander Galt (1925-2012)**

John Galt was the first scientist at the Dominion Radio Astrophysical Observatory when it was built in 1959-1960. He was its Director from 1963 to 1980. His work with this telescope helped establish radio astronomy as an important scientific endeavour in Canada and gave this observatory world prominence.

John Galt was an extraordinary experimenter, resourceful and enthusiastic, making significant advances in new areas of astrophysical research through his mastery of equipment and techniques. This telescope is his legacy: it has stood for over fifty years, re-equipped many times, always contributing at the forefront of astronomy.

# 26m Telescope



Construction began on this telescope in 1959 and was completed in time for the official opening of DRAO in 1960. The dish is 25.6m in diameter, fully steerable, has an open-mesh surface, and can observe at multiple frequencies.

The 26m telescope was used in the first Very Long Baseline Interferometry (VLBI) experiment in 1967 in conjunction with the 46m telescope at Algonquin Radio Observatory in Ontario.

This telescope has been used over the decades to provide data to cutting-edge science projects, including the Canadian Galactic Plane Survey (CGPS).

Over the past 3 years the receiving system of the 26m telescope has been upgraded for the Global Magneto-Ionic Medium Survey (GMIMS).

# IEEE MILESTONE IN ELECTRICAL ENGINEERING AND COMPUTING

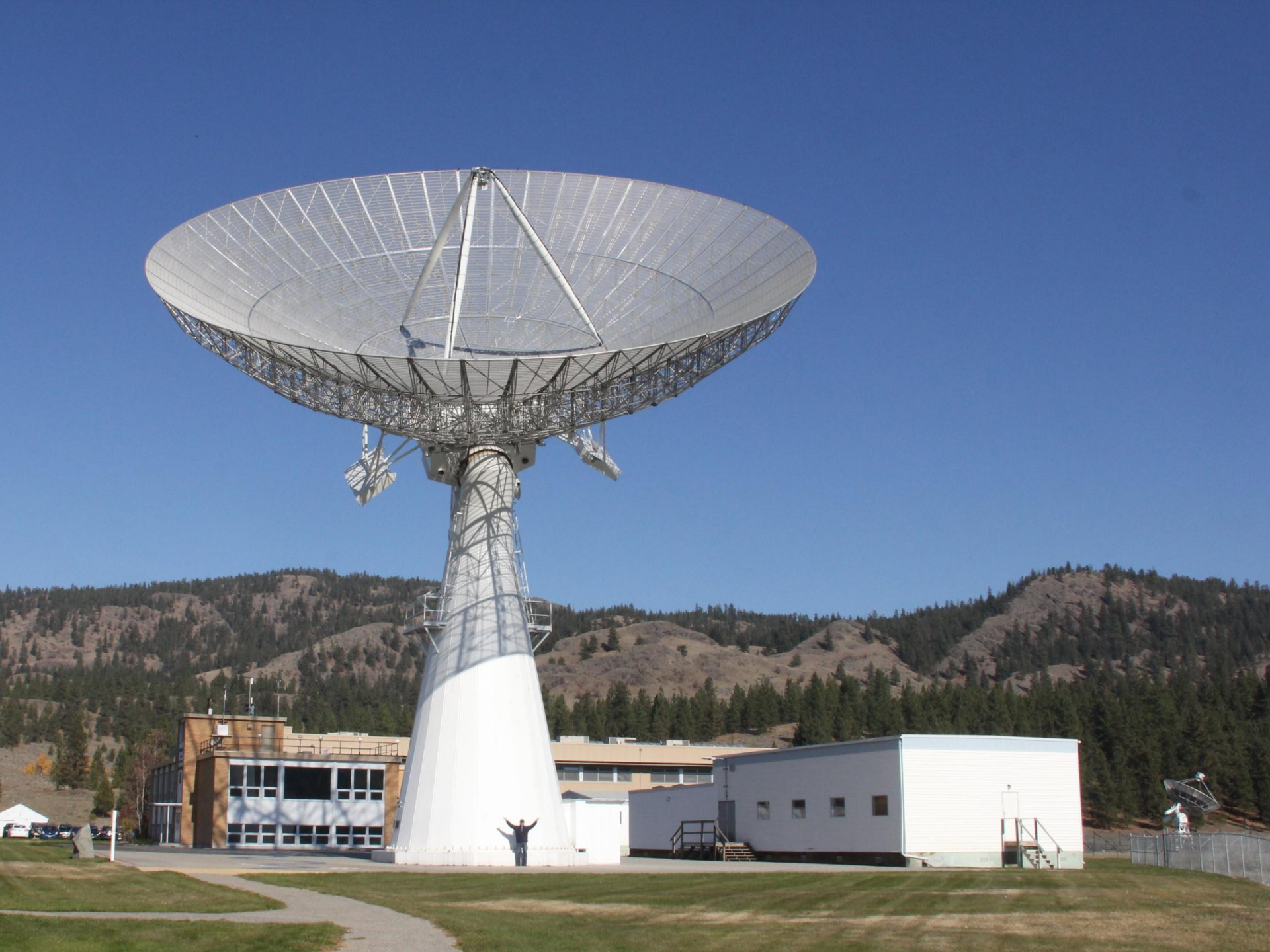
## First Radio Astronomical Observations Using VLBI, 1967

On the morning of 17 April 1967, radio astronomers used this radiotelescope at DRAO and a second one at the Algonquin Radio Observatory located 3074 km away to make the first successful radio astronomical observations using Very Long Baseline Interferometry. Today, VLBI networks span the globe, extend into space, and continue to make significant contributions to both radio astronomy and geodesy.

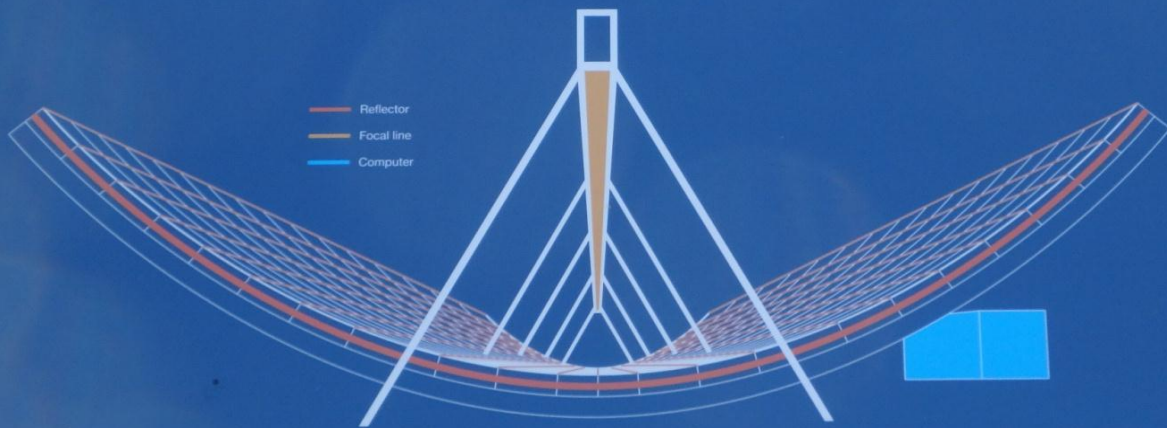
September 2010



**IEEE**



# CHIME



 National Research Council Canada  
Conseil national de recherches Canada

 THE UNIVERSITY OF BRITISH COLUMBIA

 McGill

 UNIVERSITY OF TORONTO

**INNOVATION.CA**  
CANADA FOUNDATION FOR INNOVATION | FONDATION CANADIENNE POUR L'INNOVATION

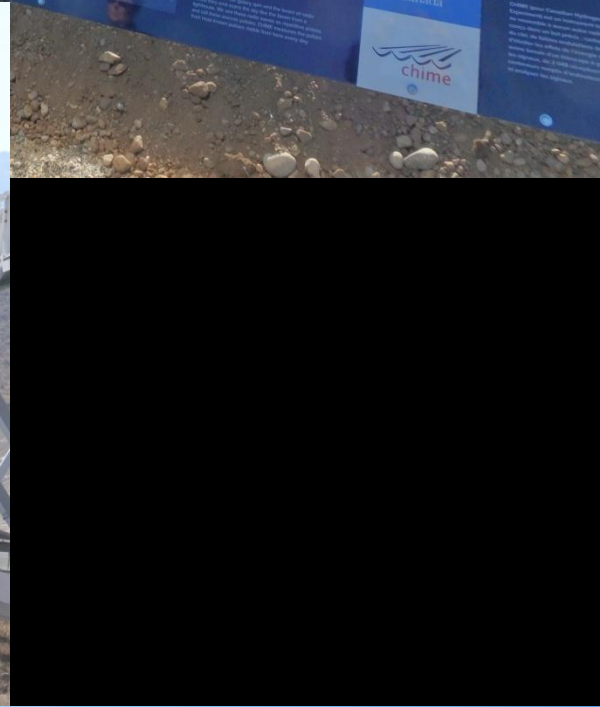
 **NSERC  
CRSNG**

**Canada**

  
**chime**









Hope you enjoyed the tour of the  
DRAO

When you travel, make sure you plan  
for the astronomical and share with  
the PAA



Keep looking up!