

Zvočni zapisi vesoljskih pojavov

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Portal v vesolje - www.portalvvesolje.si

Sprehod skozi vesolje, 6.2.2014

Zvok

Zvok je longitudinalno (mehansko) valovanje, ki ga lahko zazna človeško uho.

- Frekvence: 16 do 20000 Hz

$$c_s = \sqrt{\frac{p}{\rho}}$$

Zrak 320 m/s
Voda 1,5 km/s
Jeklena žica 5 km/s



Vesolje je prazen prostor...

- Plazma (predvsem vodik in helij)
- Elektromagnetno sevanje
- Magnetna polja
- Nevtrini
- Prah
- Kozmični delci

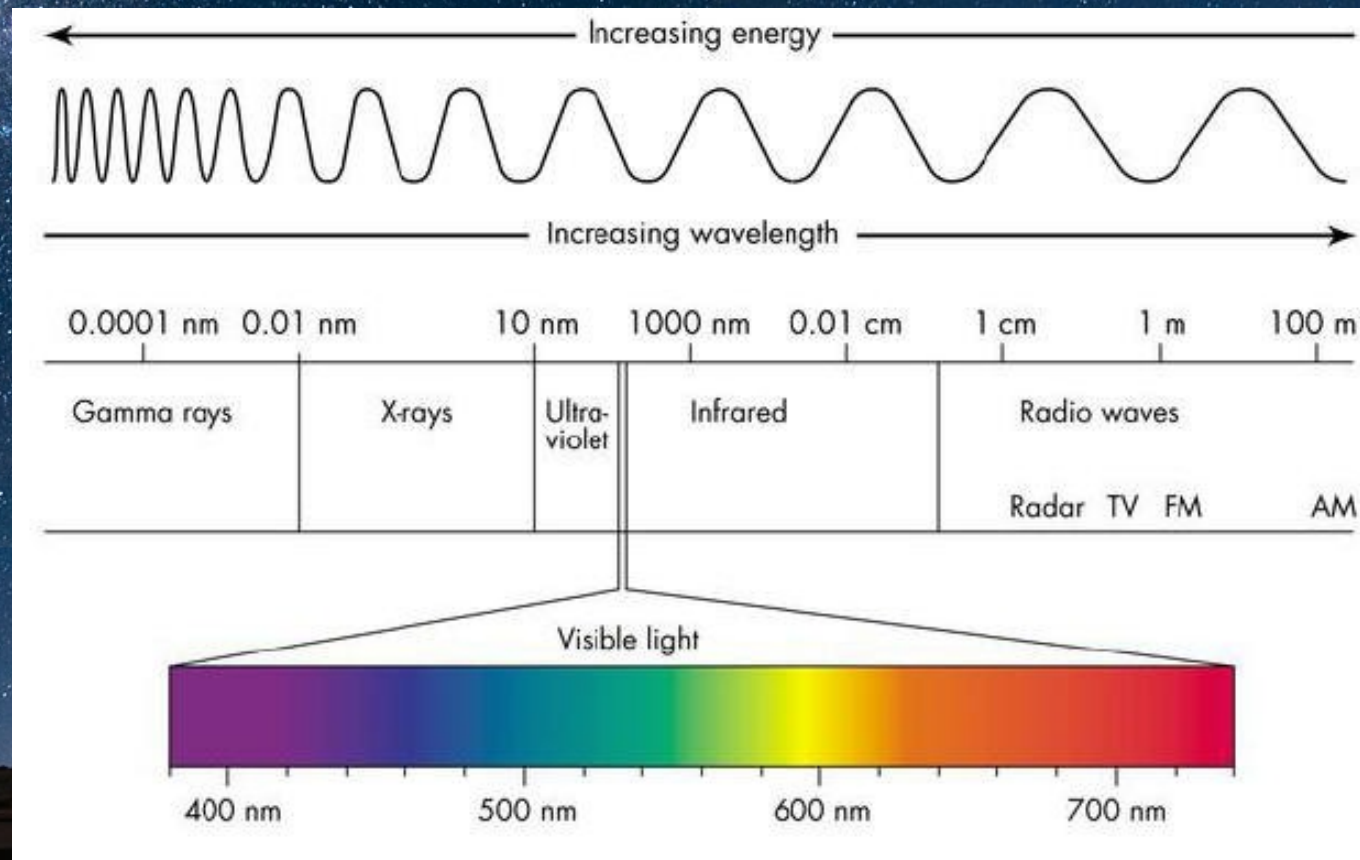


Zvok v vesolju



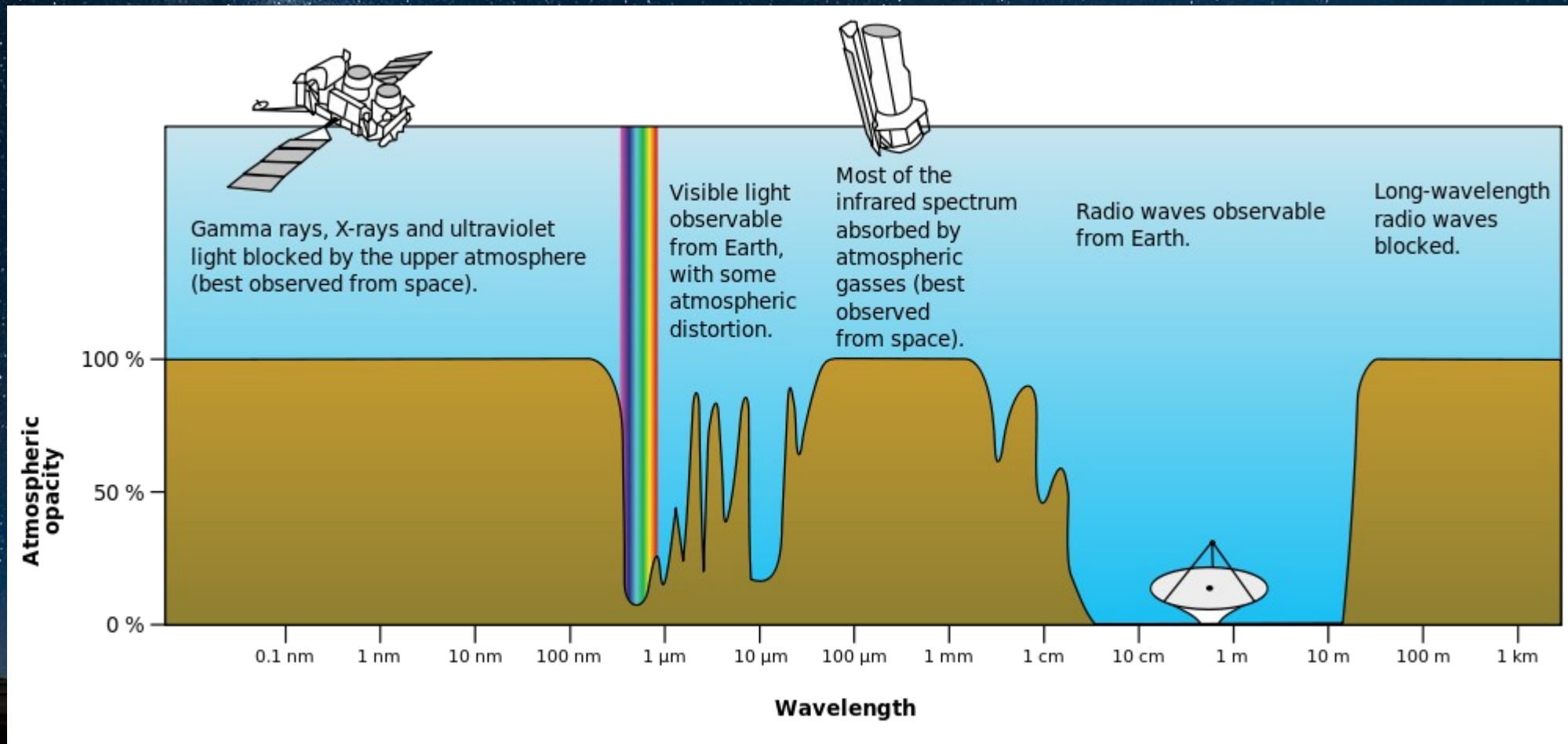
Valovanje v vesolju

Valovanje električnega in magnetnega polja, ki potuje s hitrostjo svetlobe.



Valovanje v vesolju

Valovanje električnega in magnetnega polja, ki potuje s hitrostjo svetlobe.



Pojavi v Zemljini atmosferi



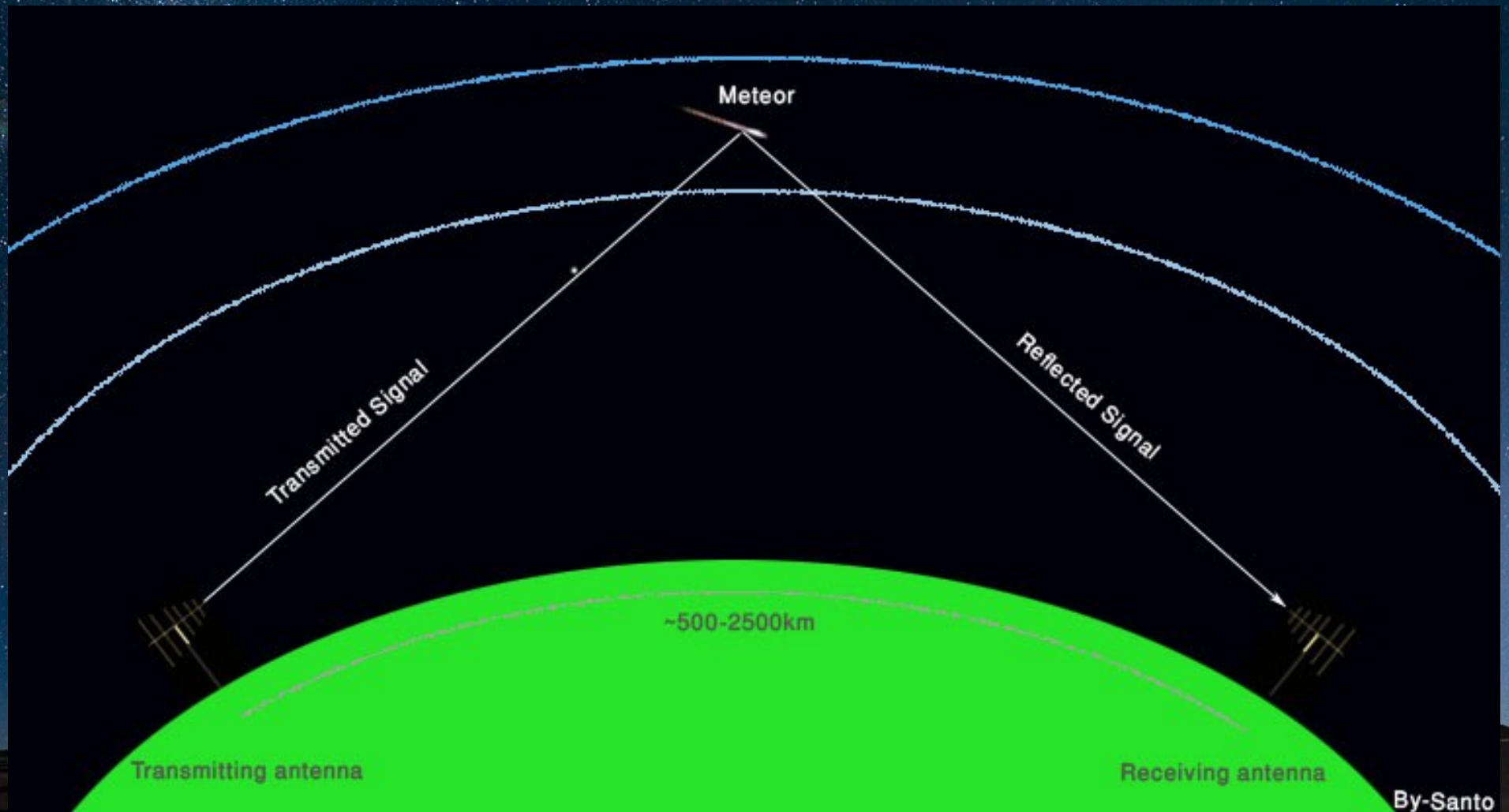
Meteorji



Creative Commons

Avtor: jeffsmallwood (Flickr)

Meteorji



Meteorji

- ▶ “močnejši” Perzeid
- ▶ Geminid
- ▶ več Geminidov (67Hz radar, 13.12.2003, Thierry Lombry)

Več o radijskem opazovanju meteorjev: <http://www.imo.net/radio>

Meteoriti



Avtor: Nikita Plekhanov

Meteoriti

Spletna povezava: <http://www.youtube.com/watch?v=H-8ij80vs1E>



Animation: Krzysztof Kolasinski; scientific data: Pierrick Mialle

Polarni sij



Avtor: Anthony Clavien

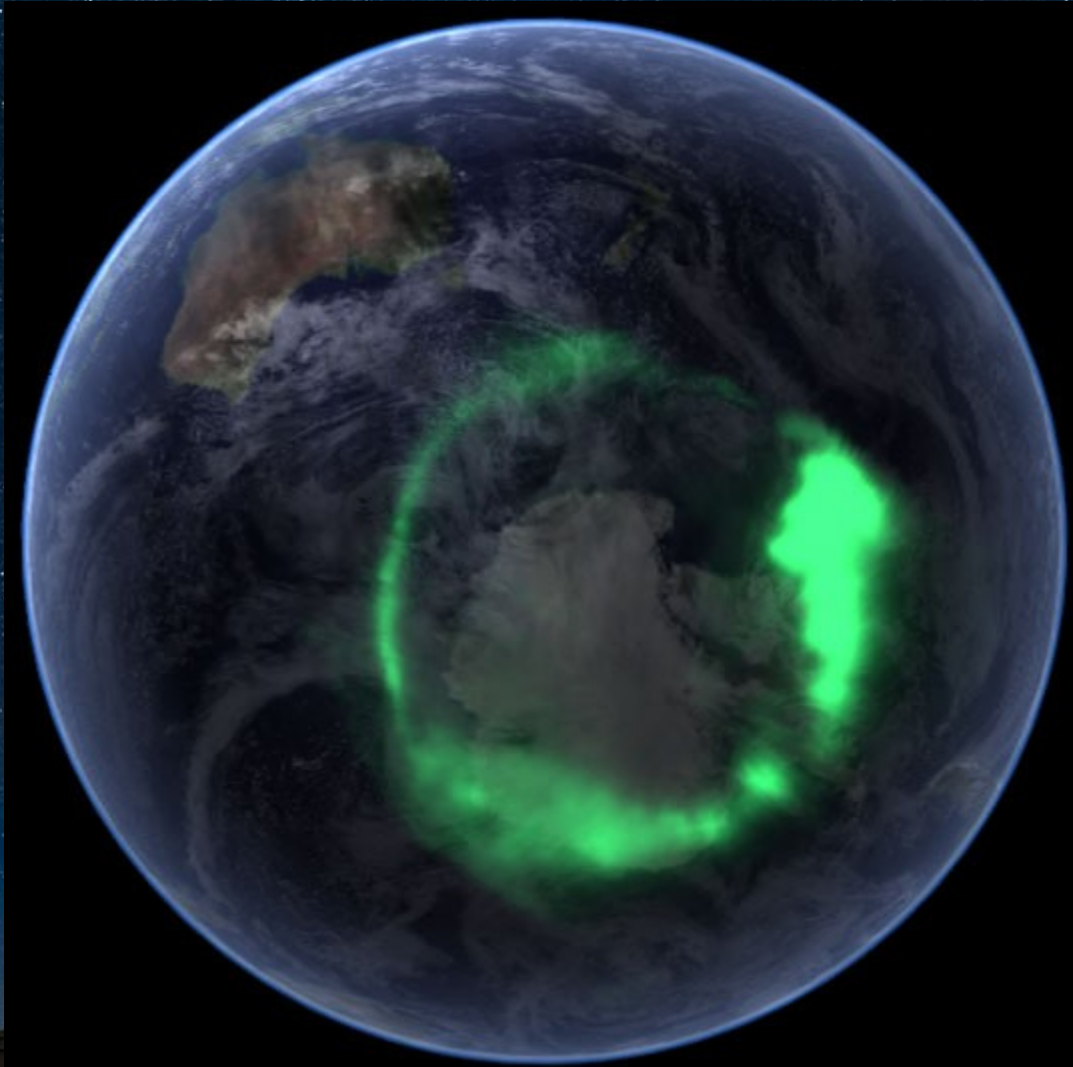
Polarni sij

Polarni sij iz Slovenije



Avtor: Javor Kac, MBK Team

Polarni sij



▶ “Auroral whistlers”
(0.1-11kHz, 9.9.1995,
Stephen P. McGreevy)

▶ “Auroral chorus”
med magnetno nevihto
(Stephen P. McGreevy)



Aurora australis (avtorstvo: NASA)

Sateliti

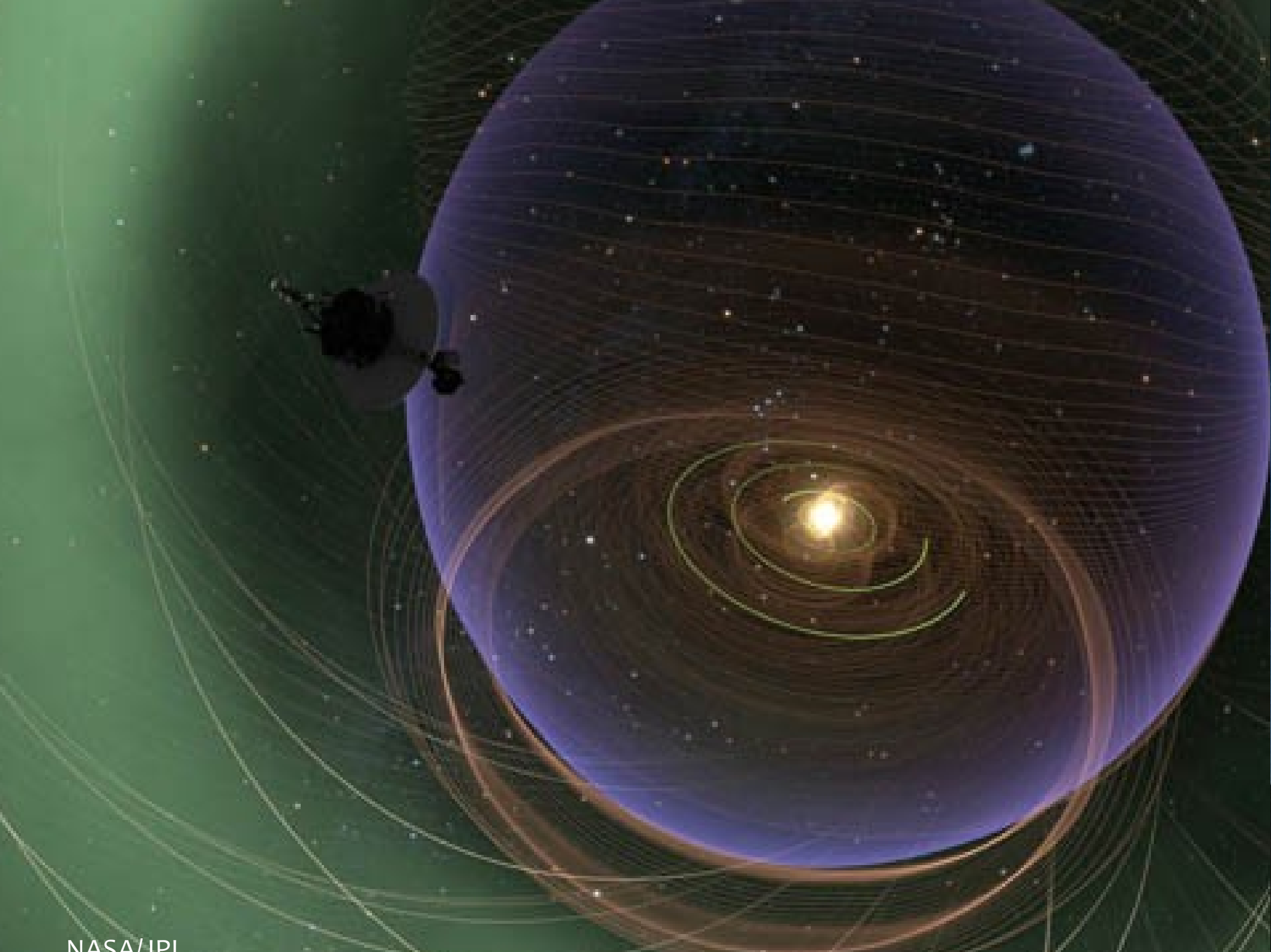


—Dallas News Staff Photo.

SIGNALS FROM THE SATELLITE

Ham operator Roy Welch of Dallas, seated, plays a tape-recorded signal from the Russian space satellite for fellow hams at the State Fair of Texas. Welch recorded the signals on a receiver at his home.





Spletna povezava <http://www.youtube.com/watch?v=aNB4FaNh0wQ>



Udarni val?

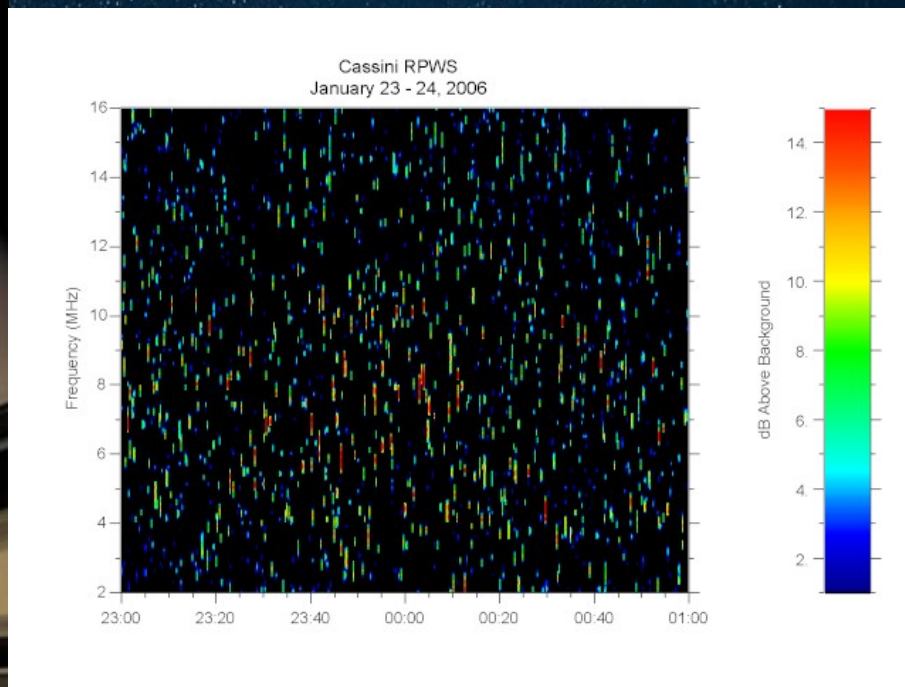
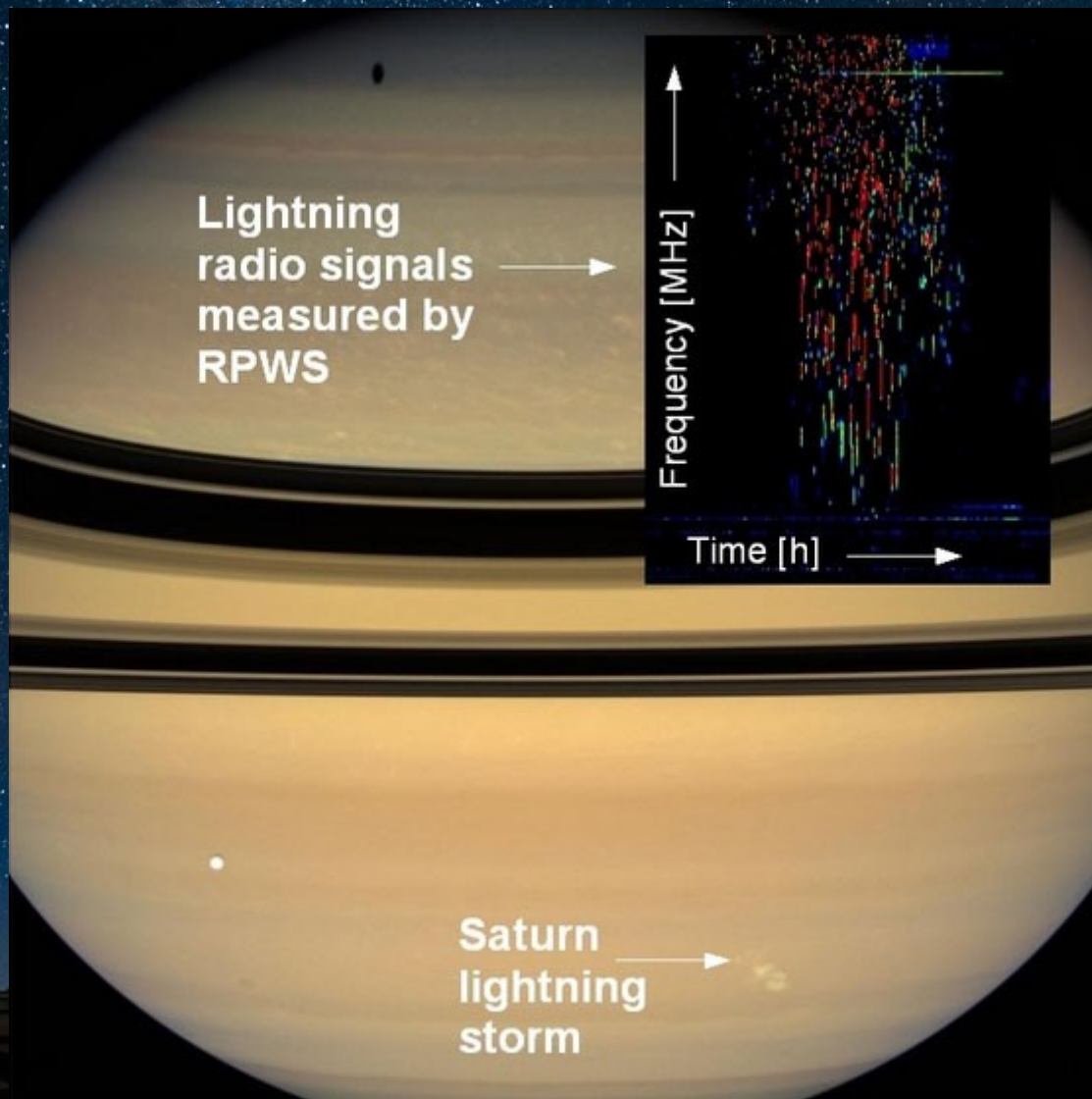
Heliopavza

Heliosfera

Osončje



Nevihte na Saturnu



Spust na Titan

▶ Spuščanje
na Titan

▶ Merjenje površja
z odmevi



Huyghensov prvi posnetek s Titanovega površja

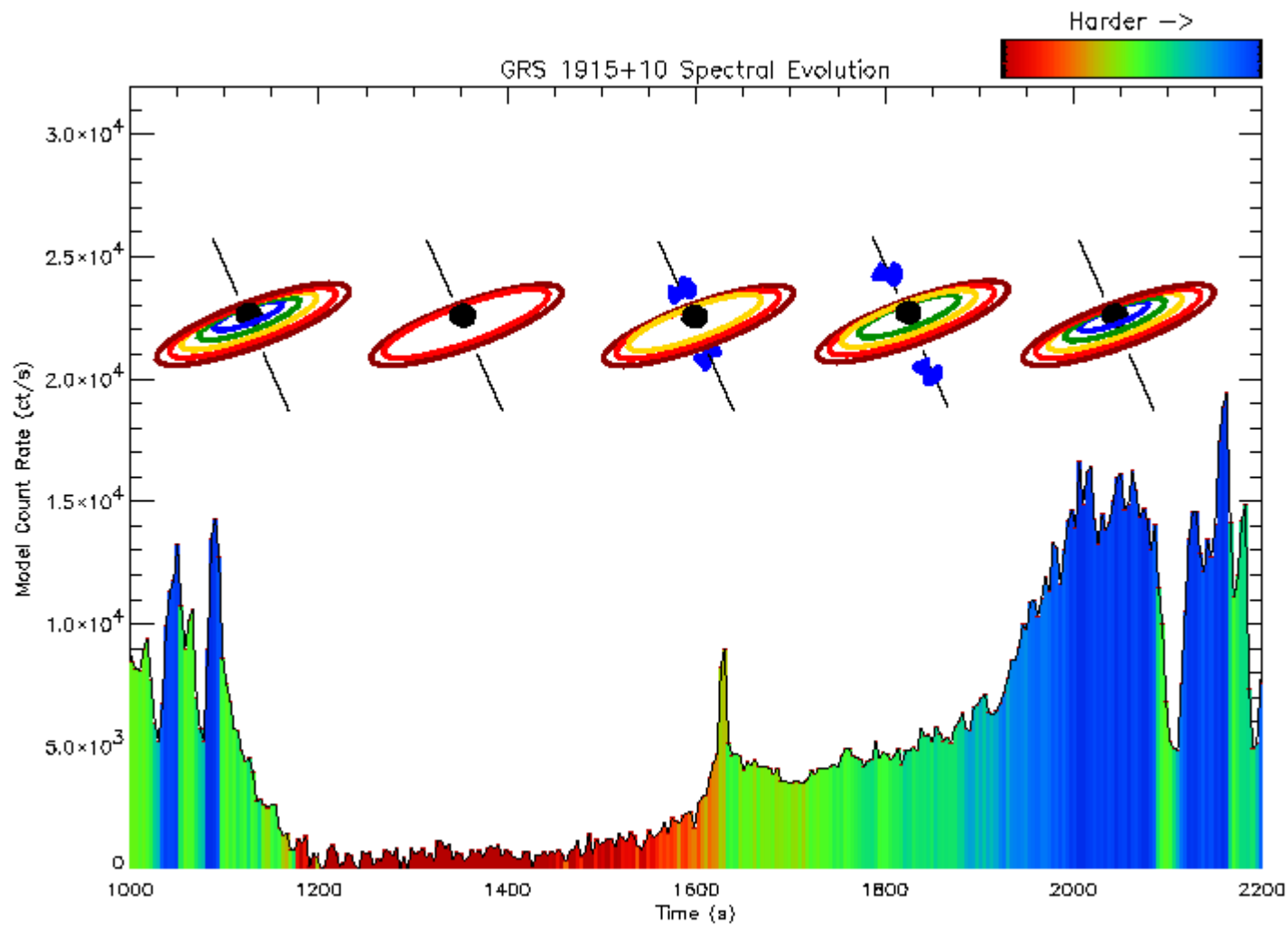
Pulzarji

- ▶ pulzar PSR 0950+08-0,
Perioda 0.253 sec
(NRAO 92-m radijski
teleskop @410 MHz)
- ▶ pulzar PSR B0531+21
(Rakovica), perioda
1/30 sekunde
(Jodrell Bank)

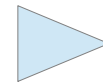


Vidna svetloba: NASA/HST/ASU/J. Hester et al. rentgenska: NASA/CXC/ASU/J. Hester et al.

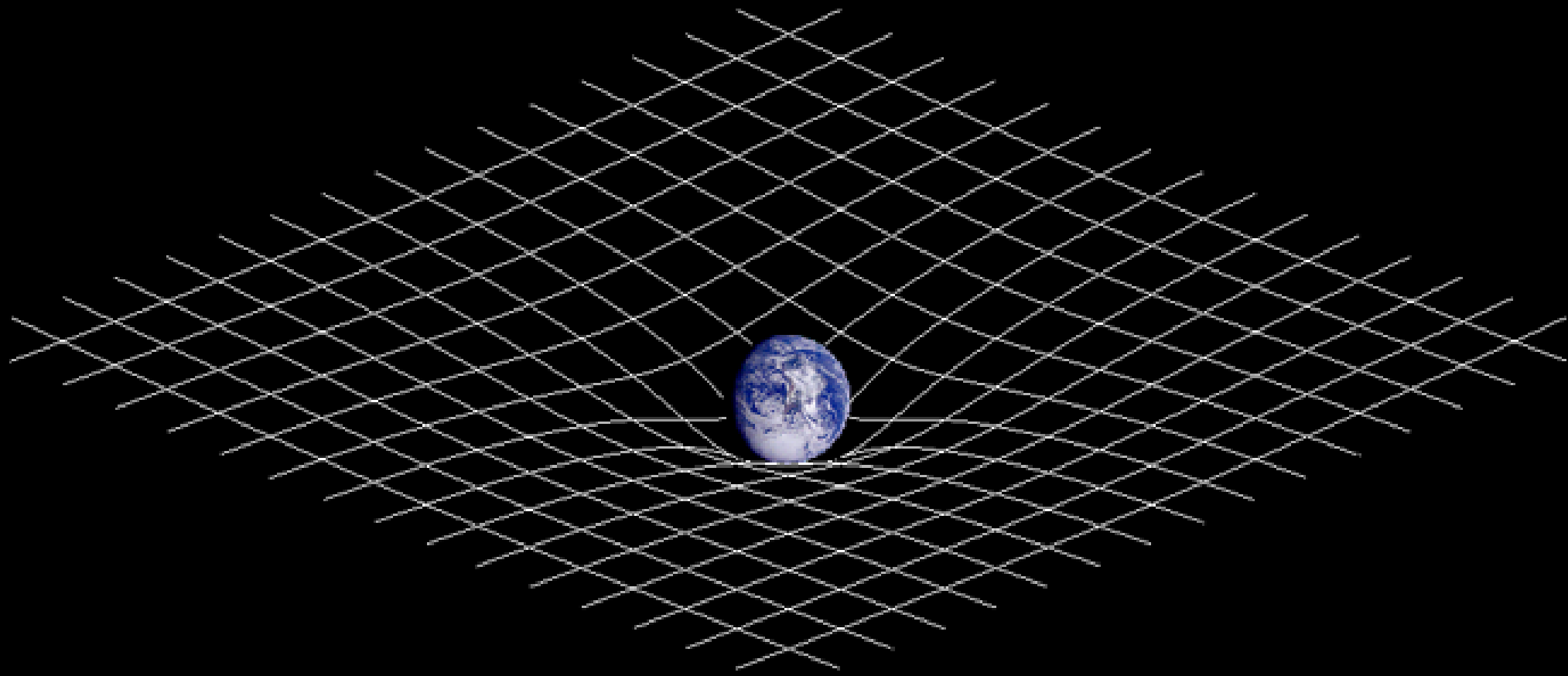
Požrešna črna luknja

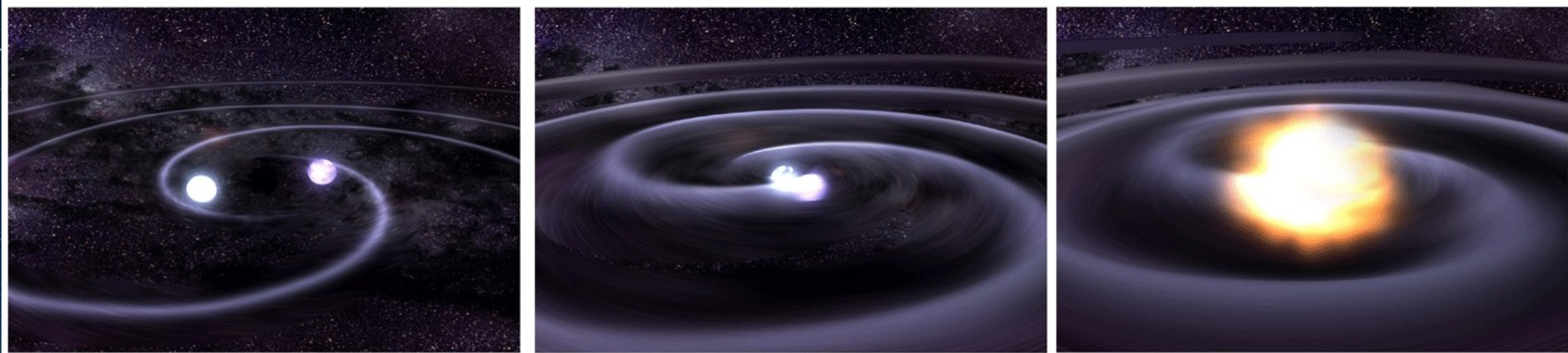
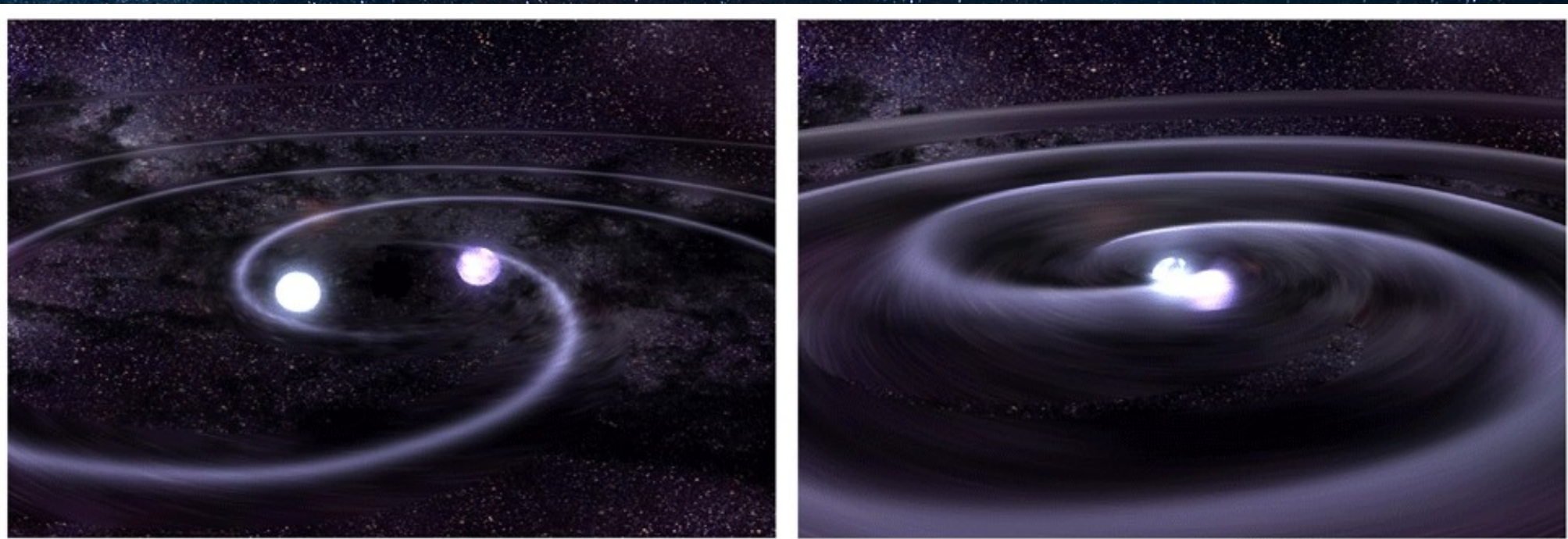


Opazovanje rentgenske svetlobe



Pa še drugo valovanje...





Avtorstvo: NASA/CXC/GSFC/T.Strohmayer (umetniška upodobitev)

Spletna povezava <http://www.youtube.com/watch?v=esdzw8XETJM>



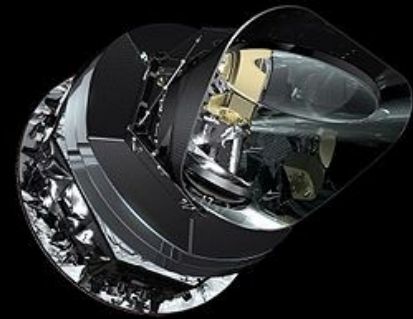
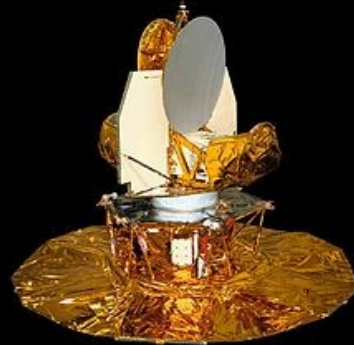
Črni luknji. Avtorja: Aftab Khan in Janna Levin

Spletna povezava <http://www.youtube.com/watch?v=cyvttthizaJI>

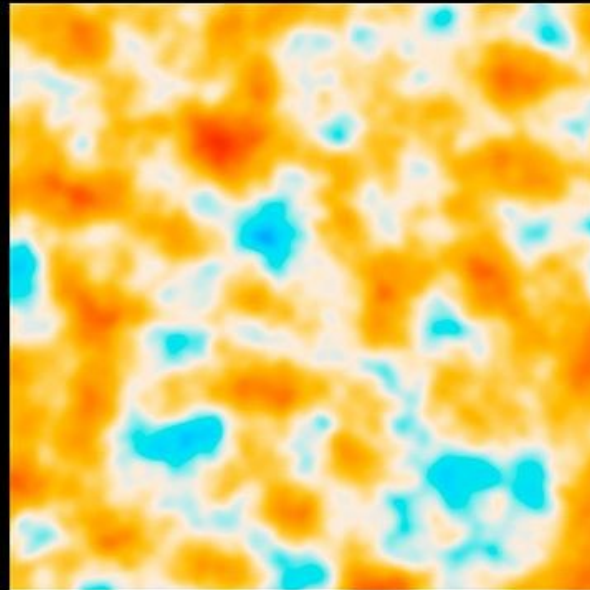


Nevtronska zvezda in črna luknja. Avtorja: Aftab Khan in Janna Levin

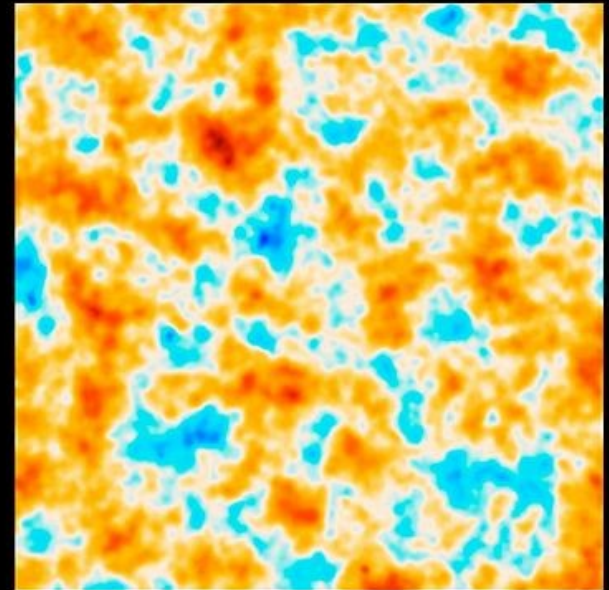
Mikrovalovno sevanje ozadja



COBE

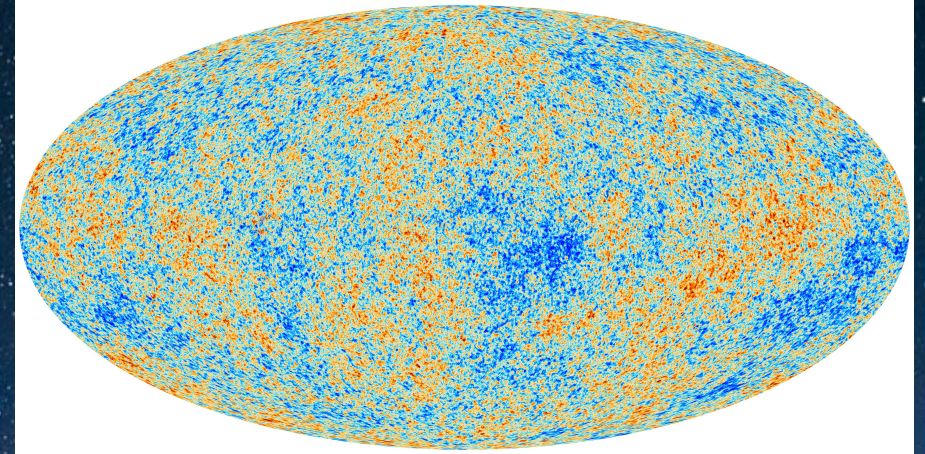
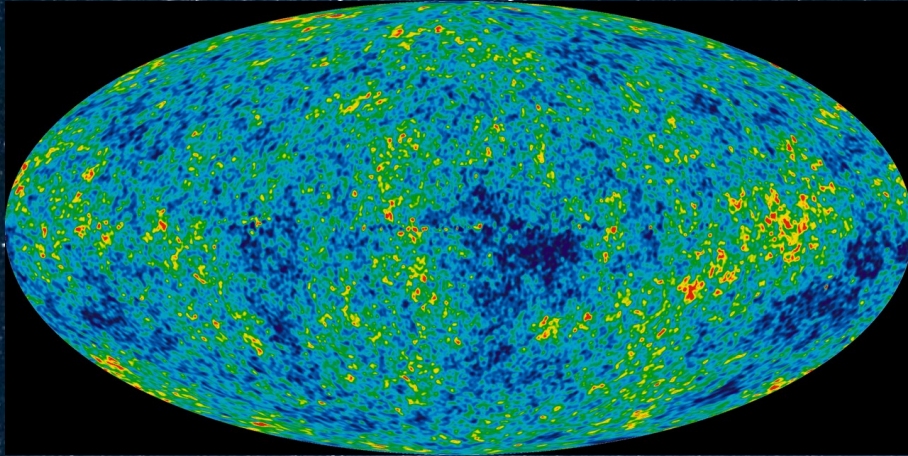


WMAP



Planck

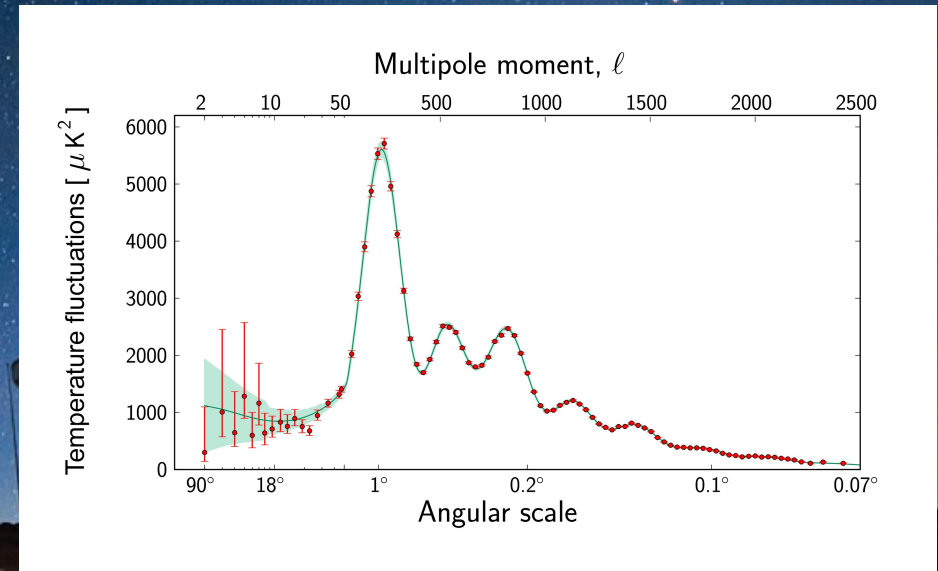
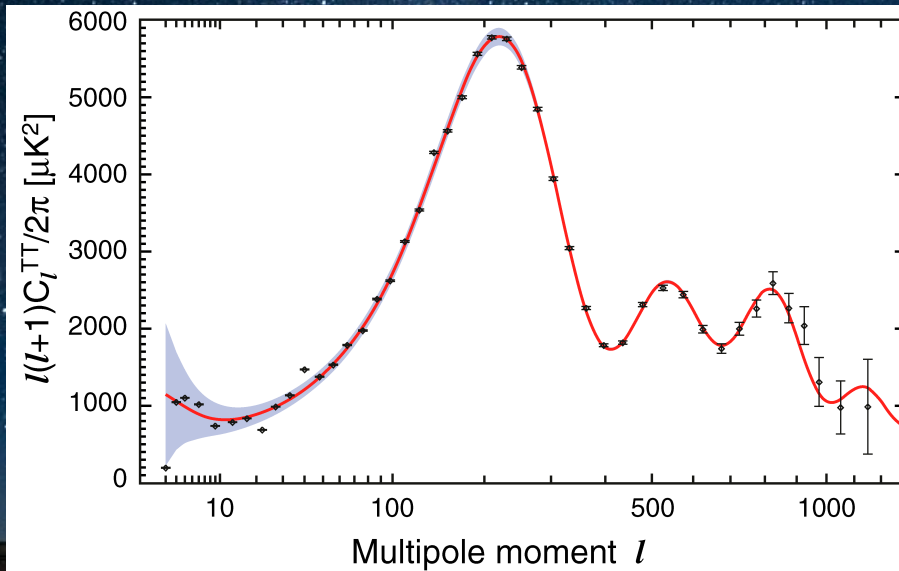
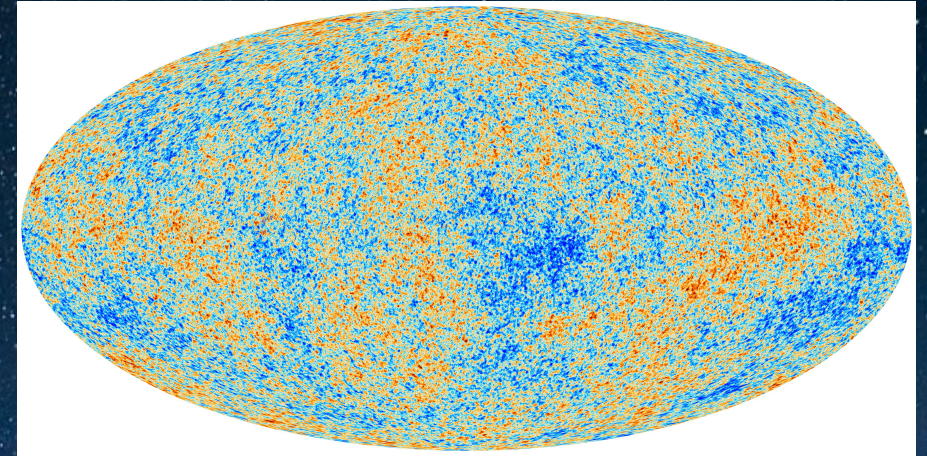
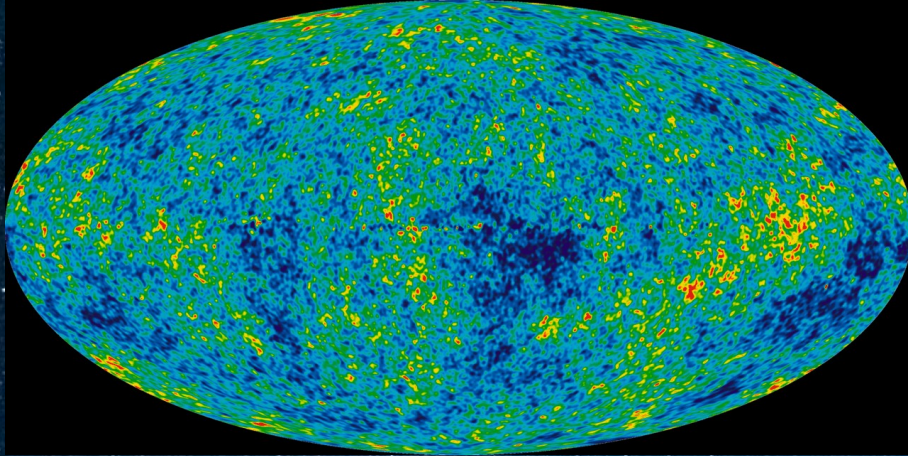
Prvih 760.000 let vesolja



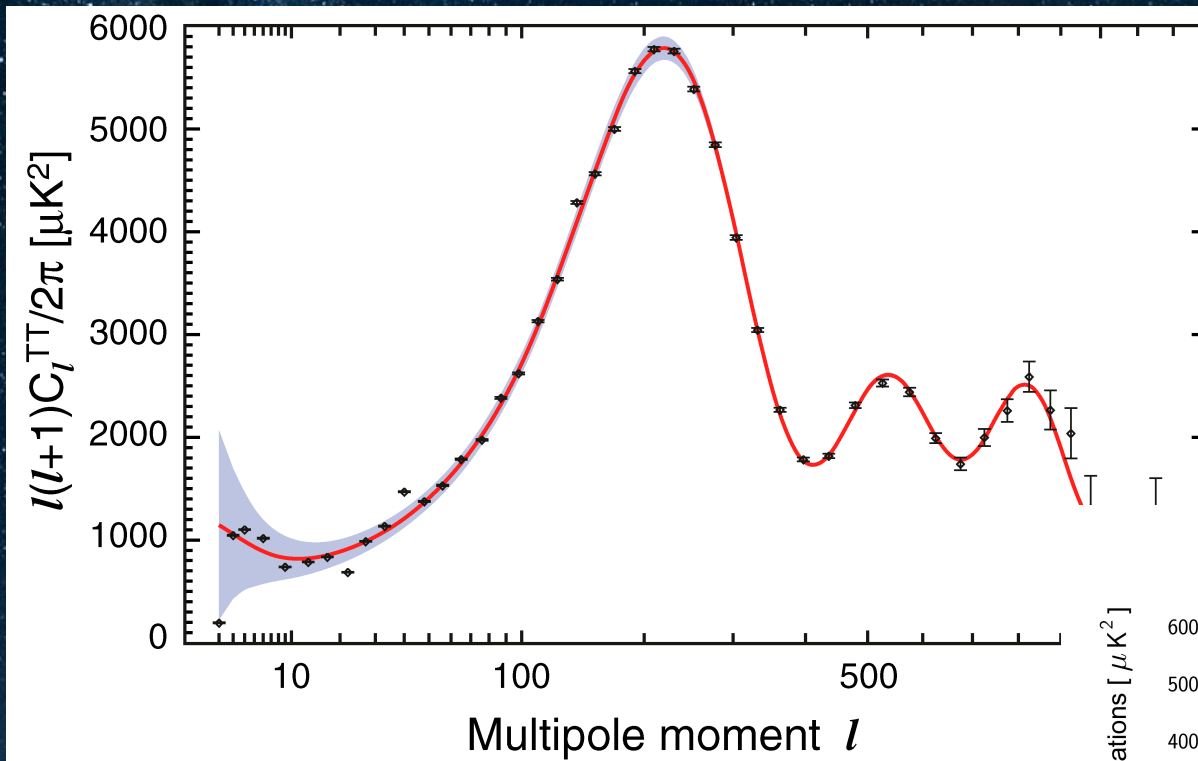
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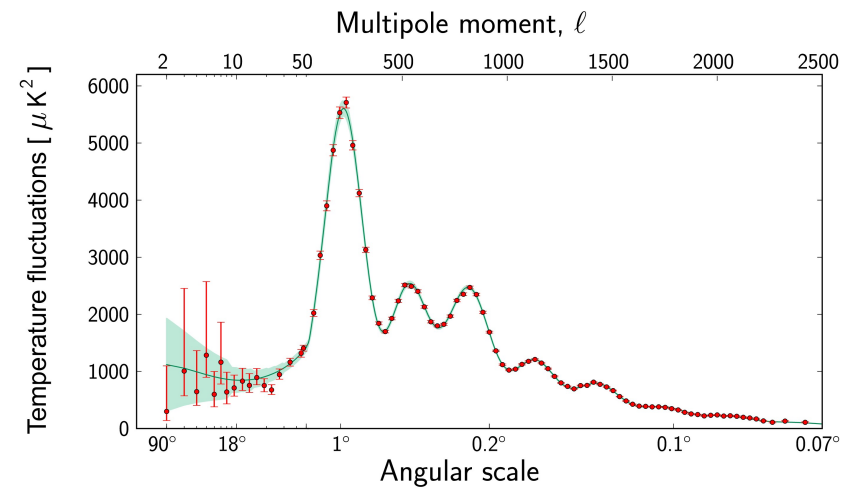
Prvih 760.000 let vesolja



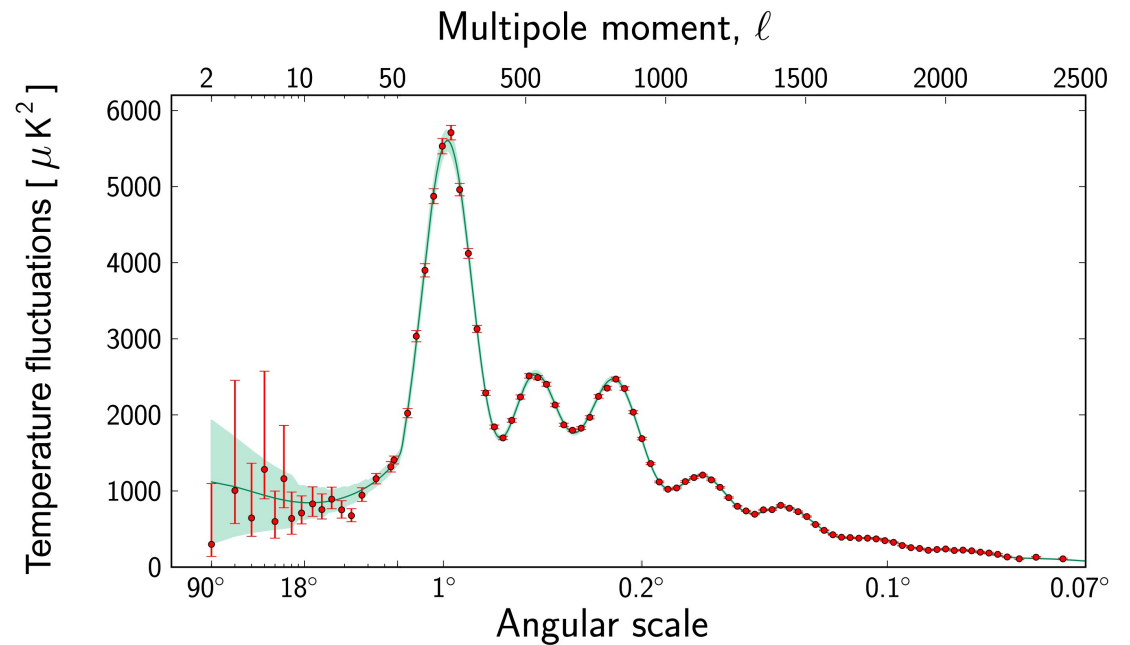
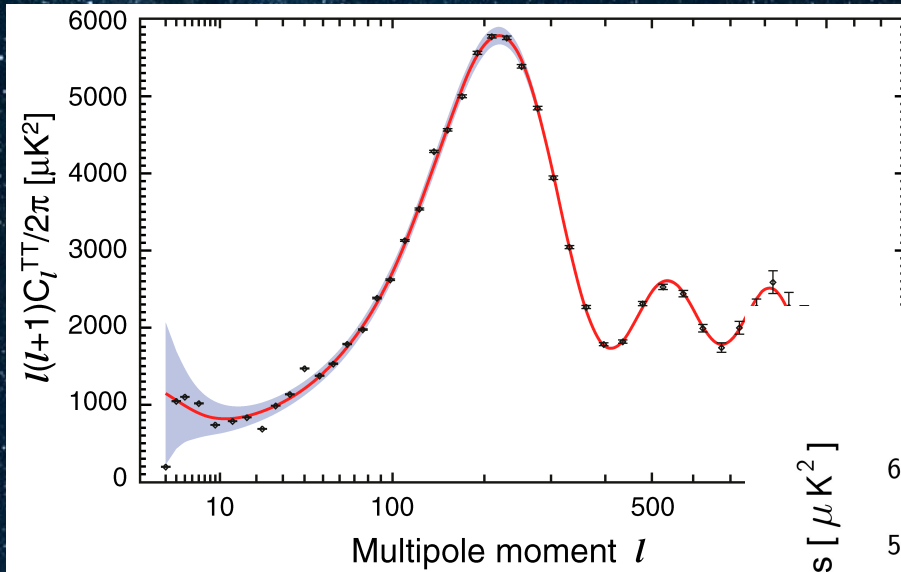
Prvih 760.000 let vesolja



▶ WMAP



Prvih 760.000 let vesolja



▶ Planck

... ali pa sestavljene frekvence

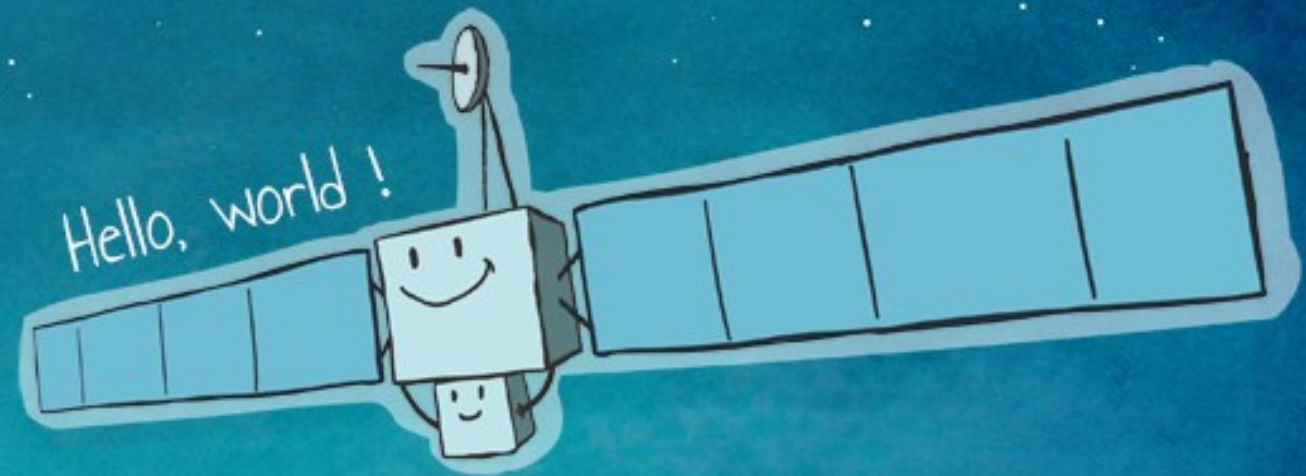


Mikrovalovno sevanje ozadja

Se še spomnite Rosette?

Prebudila se je 20. januarja!

#WakeUpRosetta



Se še spomnite Rosette?

Rosetta DSHM Exit Open Loop Displays | ID: 8689 - Windows Internet Explorer provided by European Space Agency

https://mpweb7.jpl.nasa.gov/m107220/tauchner/rose

Participant List (10) | Share - Danny (Guest)

My Status: Speaking

Participants: Danny (Guest), Guest User, J. Velasco (Guest), J. Reynolds (Guest), James Godfrey (Guest)

Chat

To: Everyone

File Share

Clisco Unified MeetingPlace | Adobe Technologies

C.E.T. 19:17
U.T.C. 18:17
Goldstone 10:17
Camberra 05:17
Perth/MNO 03:17
Marsague 16:17
Cabreros 19:17
Kourou 15:17

Goldstone	
17:00:00z Spacecraft	ROSE • TX ON
17:45:00 Goldstone	
18:00:00 Goldstone	
18:10:00 Goldstone	
18:15:00 Camberra	
18:45:00 Spacecraft	ROSE • UPLINK arrives • RCVR LOCK

european space operations centre

Viri

- Janna Levin: The sound the universe makes, TED2011 in <http://www.jannalevin.com/science.html>
- John G. Cramer, The Sound of the Big Bang
http://faculty.washington.edu/jcramer/BBSound_2003.html
http://faculty.washington.edu/jcramer/BBSound_2013.html
- <http://www.astrosurf.com/luxorion/audiofiles.htm>
- Sounds from the first Satellites,
<http://www.amsat.org/amsat/features/sounds/firstsat.html>
- Sonification,
<http://spdf.gsfc.nasa.gov//research/sonification/sonification.html>

Viri

- Projekt “Sounds of Space”,
http://cse.ssl.berkeley.edu/stereo_solarwind/sounds.html
- Spletna stran z zvočnimi efekti <http://www.sounddogs.com/>
- Zvoki, ki jih je posnela sonda Cassini:
<http://saturn.jpl.nasa.gov/news/cassinifeatures/feature20060424/>
- Sounds of the Universe
<http://www.mso.anu.edu.au/pfrancis/Music/>
- Signali s prvih satelitov
<http://www.amsat.org/amsat/features/sounds/firstsat.html>

