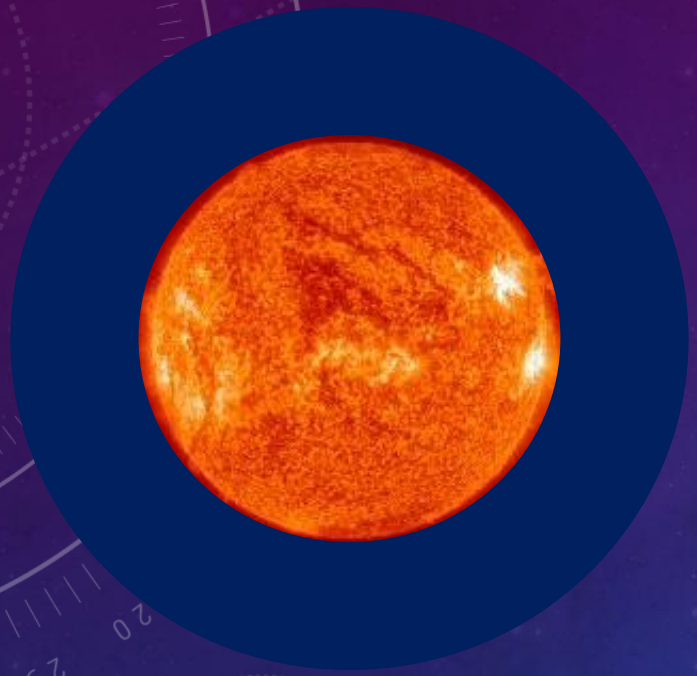


SOL

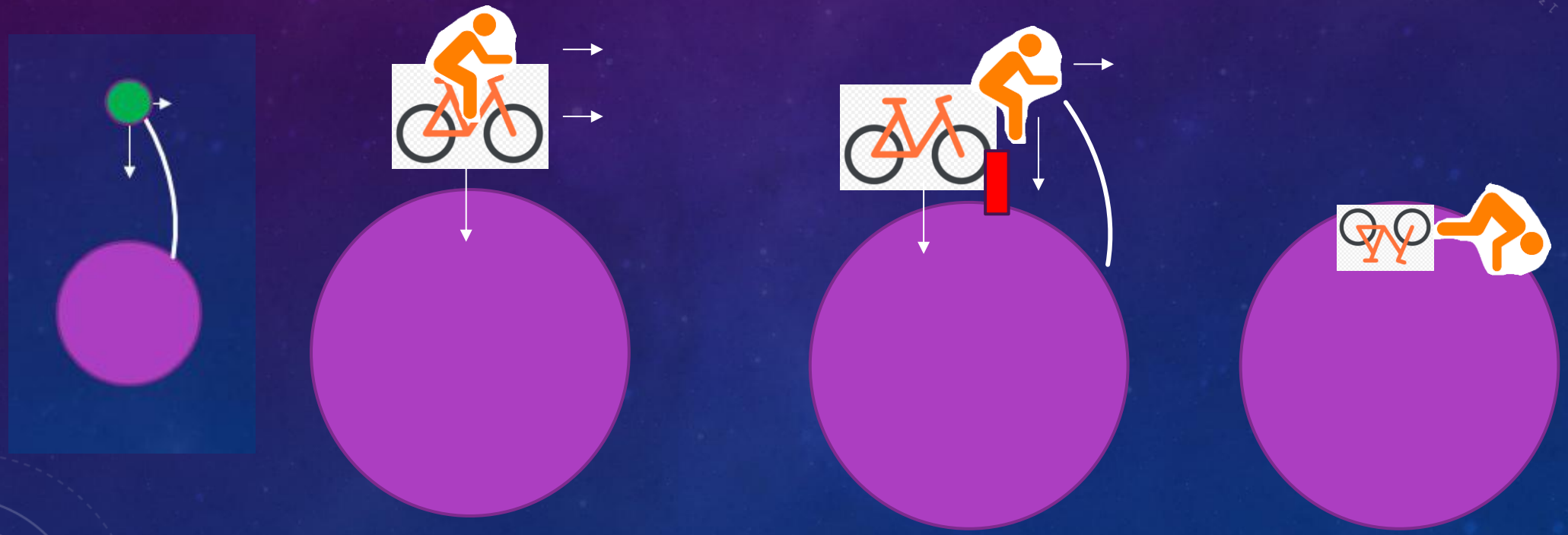
DE STER VAN TERRA

INITIATIE CURSUS STERRENKUNDE

MICHIEL COIGNET OBSERVATORIUM

ROGER VAN DER LINDEN

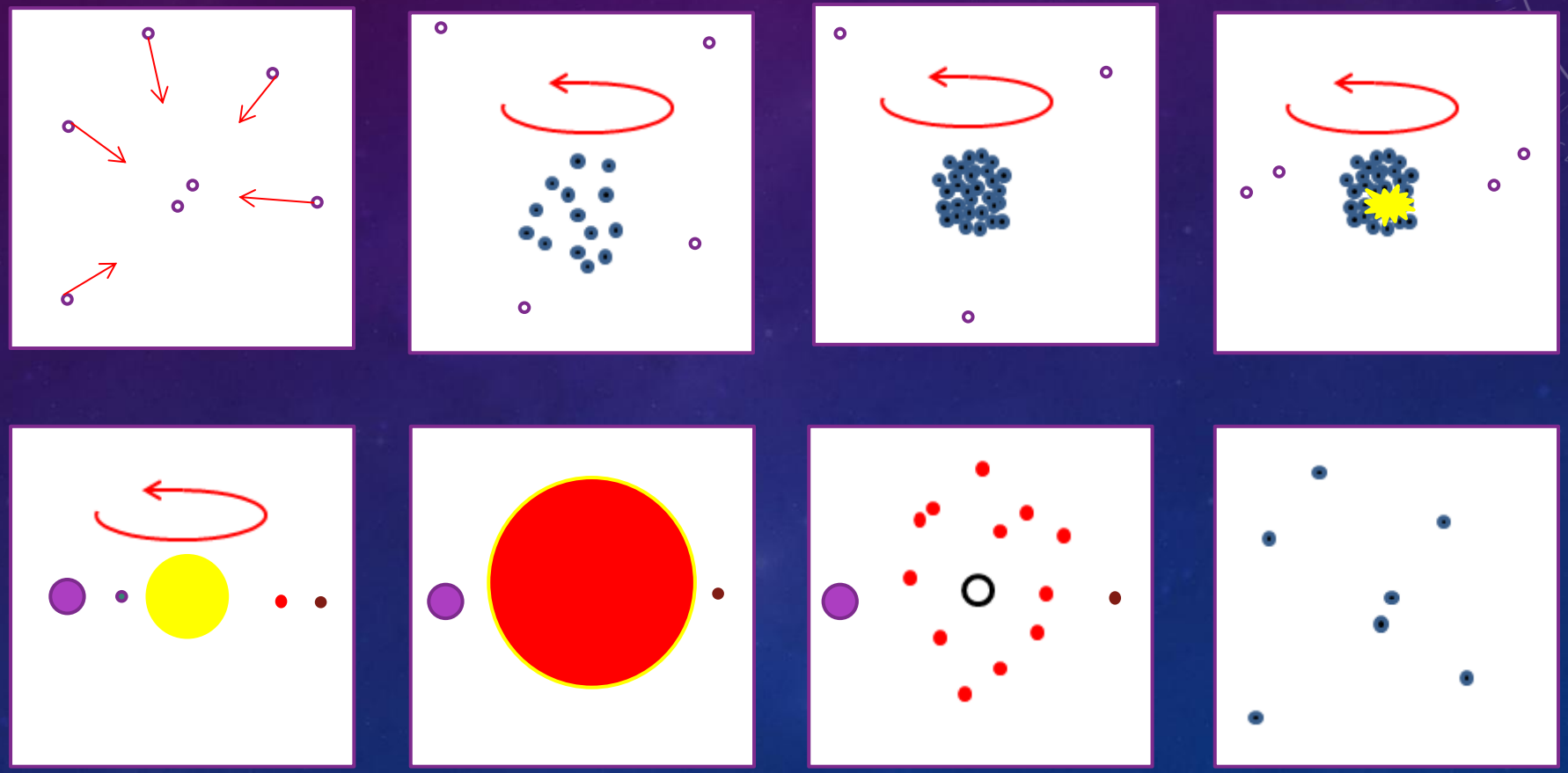
TEST VAN DE BEWEGINGSWETTEN VAN NEWTON



OVERZICHT

- Ontstaan en Evolutie
- Plaats tussen de andere sterren van onze melkweg
- Structuur
- Zon rotatie en magnetisch veld
- Maatstaf voor richting, tijd en plaats
- Mythologie en symbool
- Kijken naar de zon

Het leven van een ster



ONTSTAAN EN EVOLUTIE

ZONNESTELSEL VAN DE DERDE GENERATIE

H ⟶ He

He ⟶ C

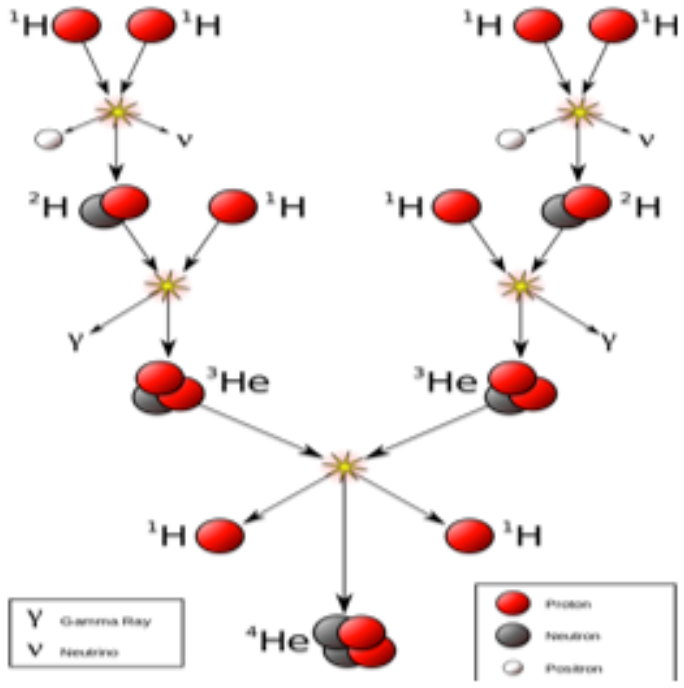
C ⟶ O, Ne

Ne ⟶ Mg, Si, S, Ca

Ca ⟶ Fe

KERNFUSIE REACTIES

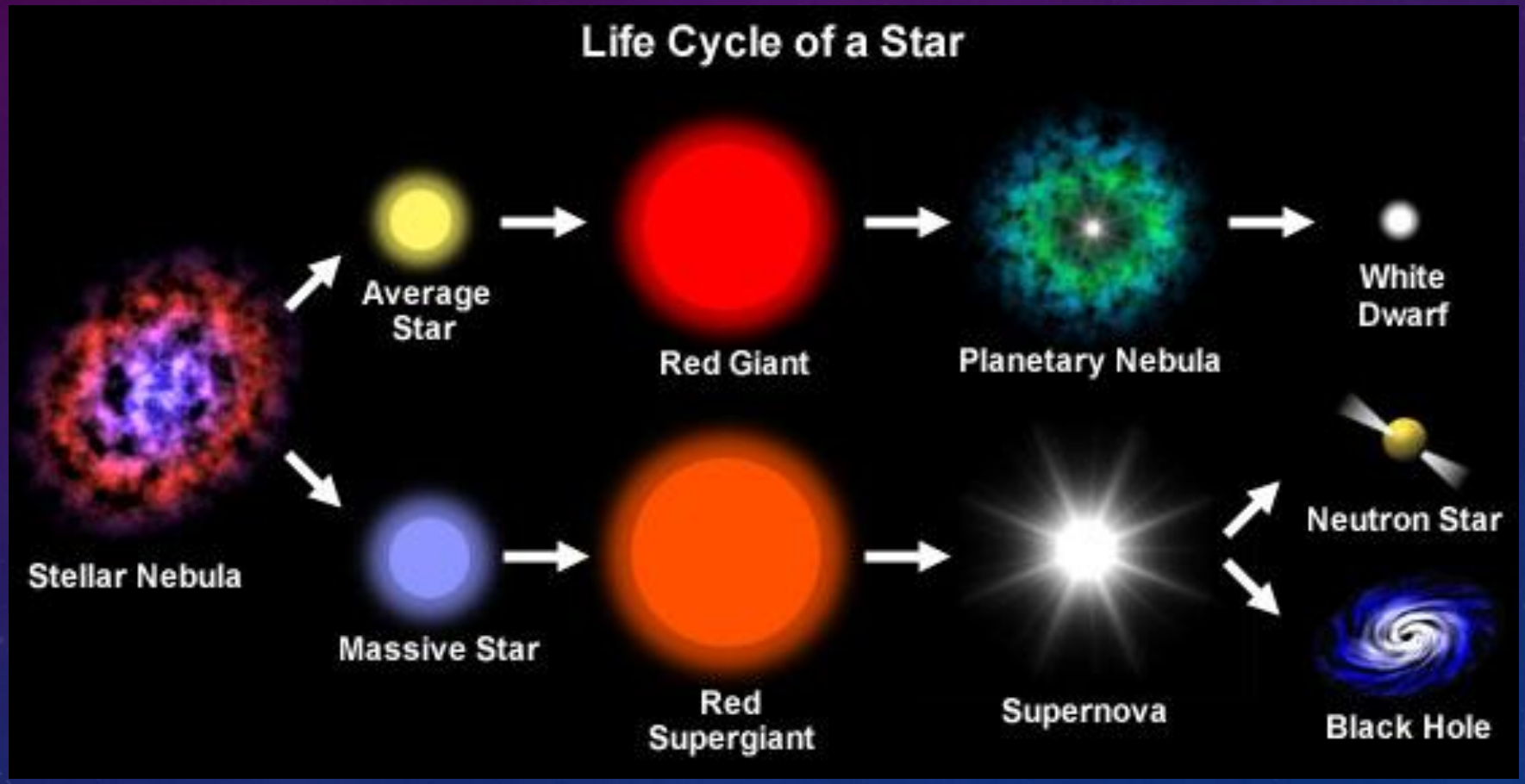
Element	% Aantal	Massa %
Waterstof	92	73.4
Helium	7.8	25



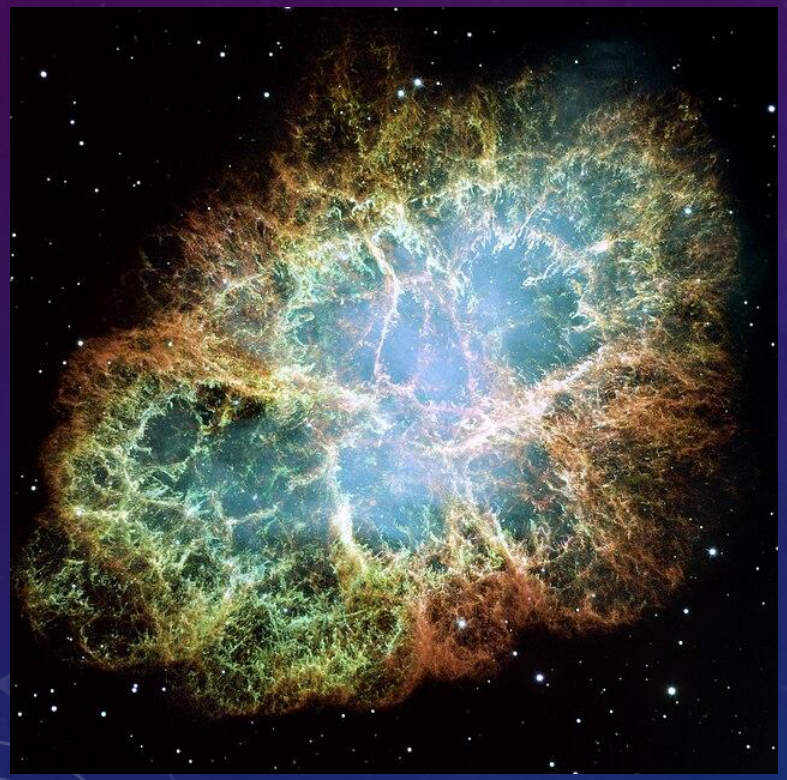
HUIDIGE SAMENSTELLING

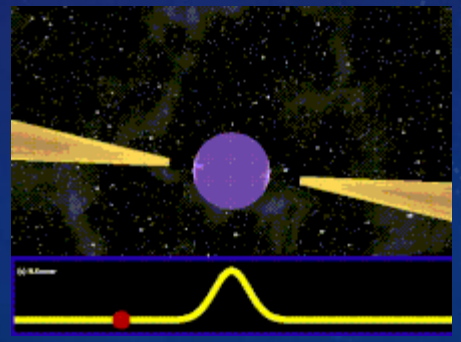
Element	% Aantal	Massa %
Waterstof	92	73.4
Helium	7.8	25
Koolstof	0.02	0.2
Stikstof	0.008	0.09
Zuurstof	0.06	0.8
Neon	0.01	0.16
Magnesium	0.003	0.06
Silicium	0.004	0.09
Zwavel	0.002	0.05
Ijzer	0.003	0.14

HET LEVEN VAN EEN STER

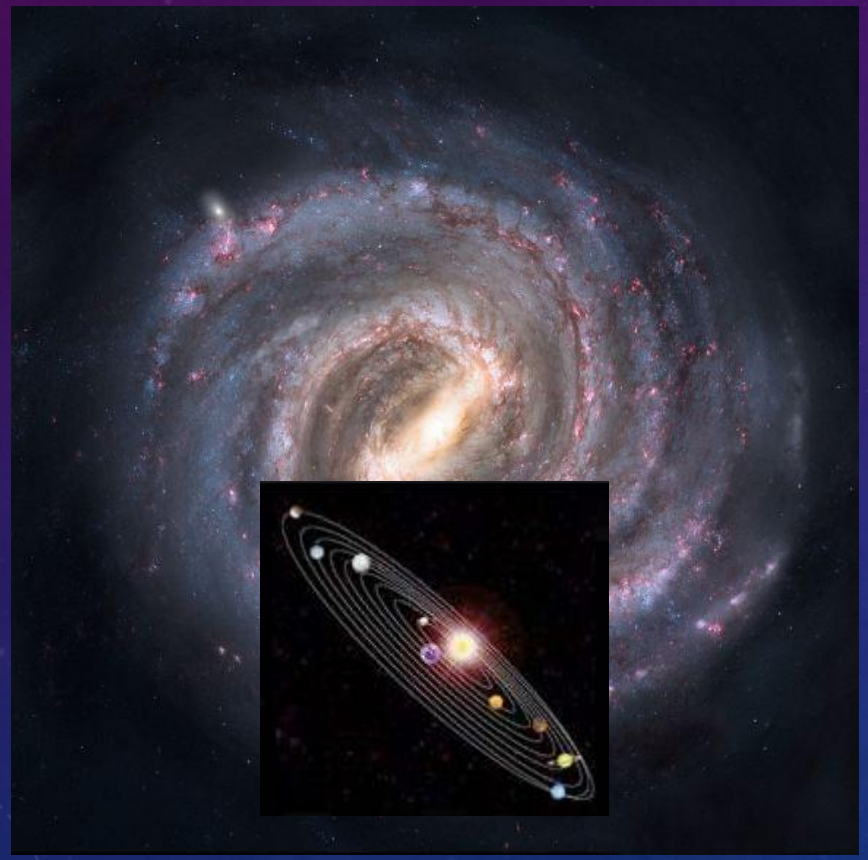


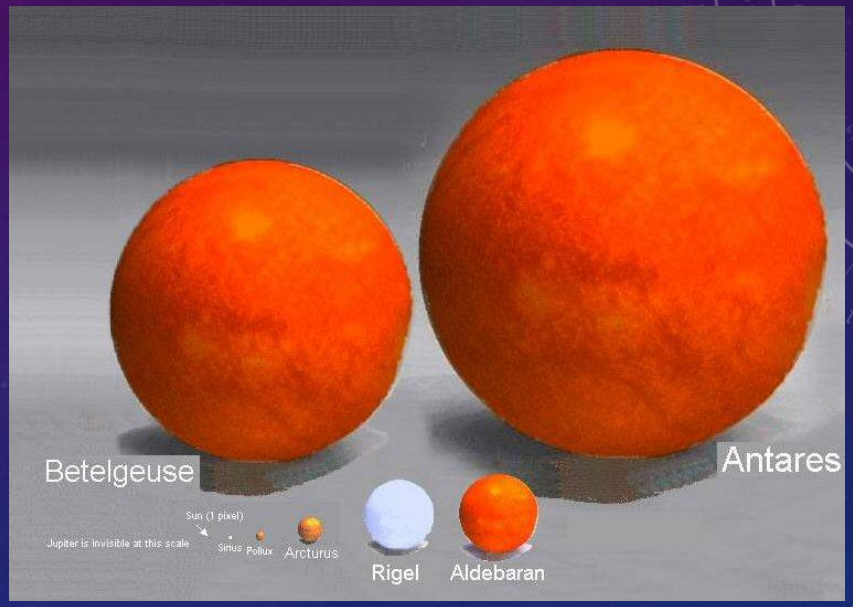
PLANETAIRE NEVELS



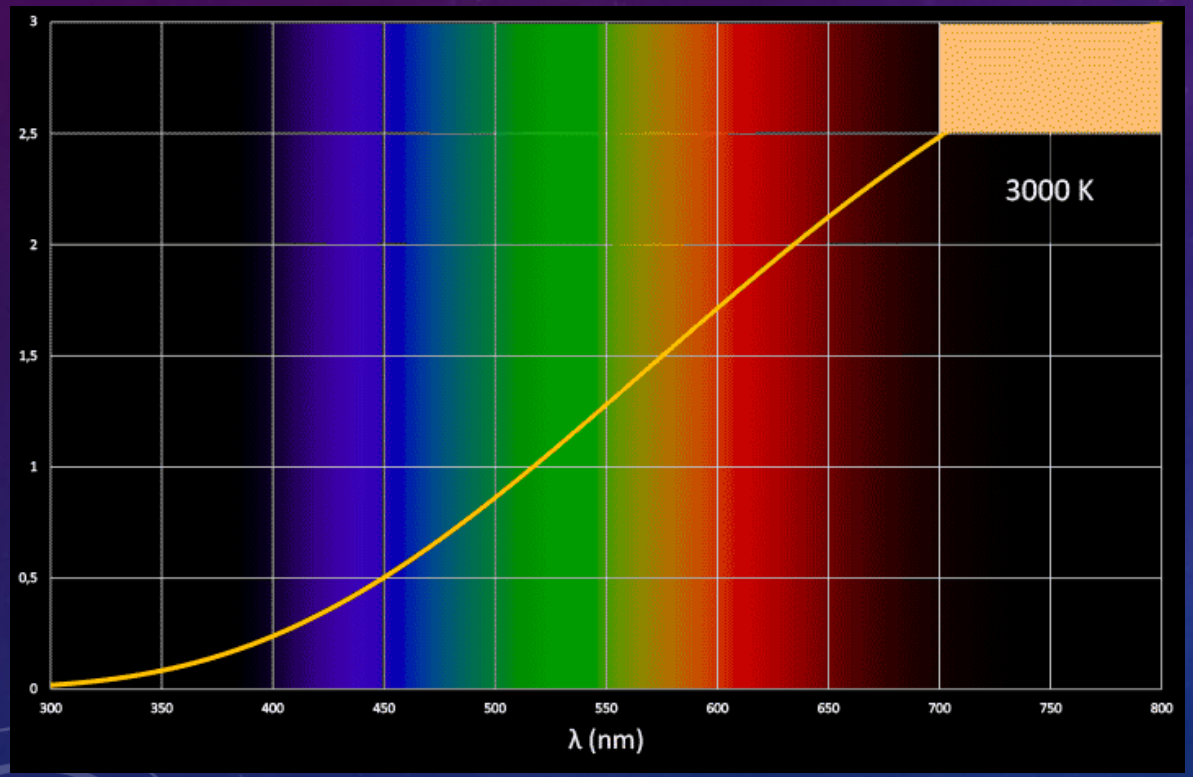


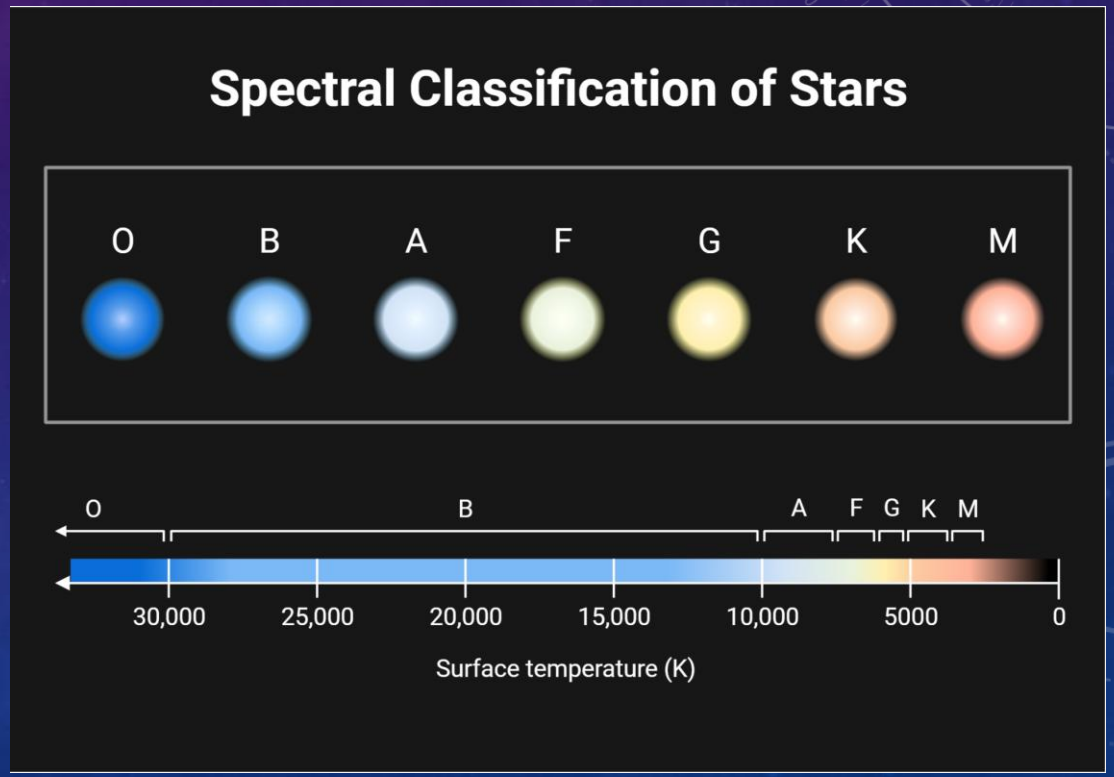
PLAATS TUSSEN DE ANDERE STERREN VAN ONZE MELKWEG



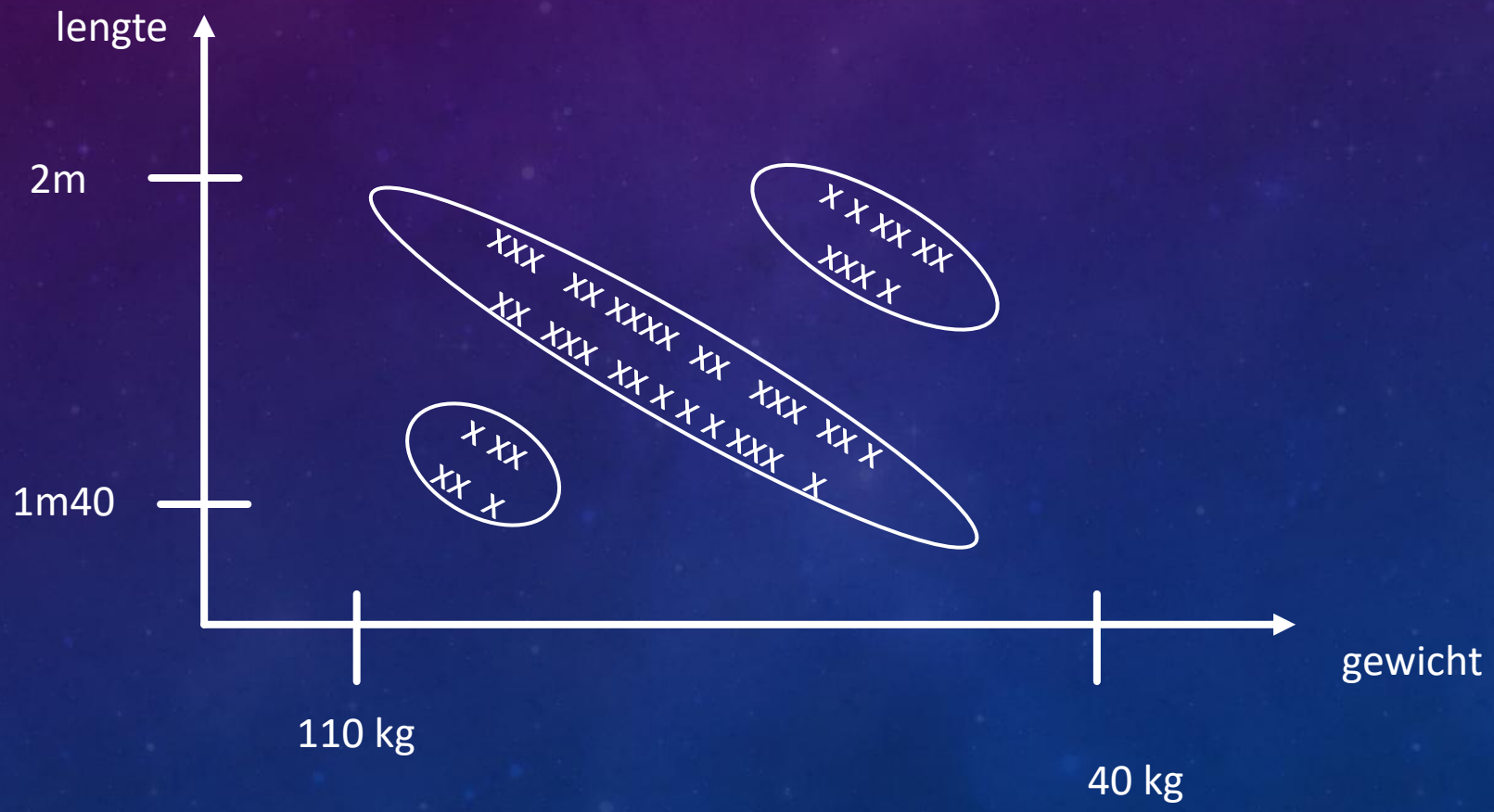


KLEUR- TEMPERATUUR VAN STERREN

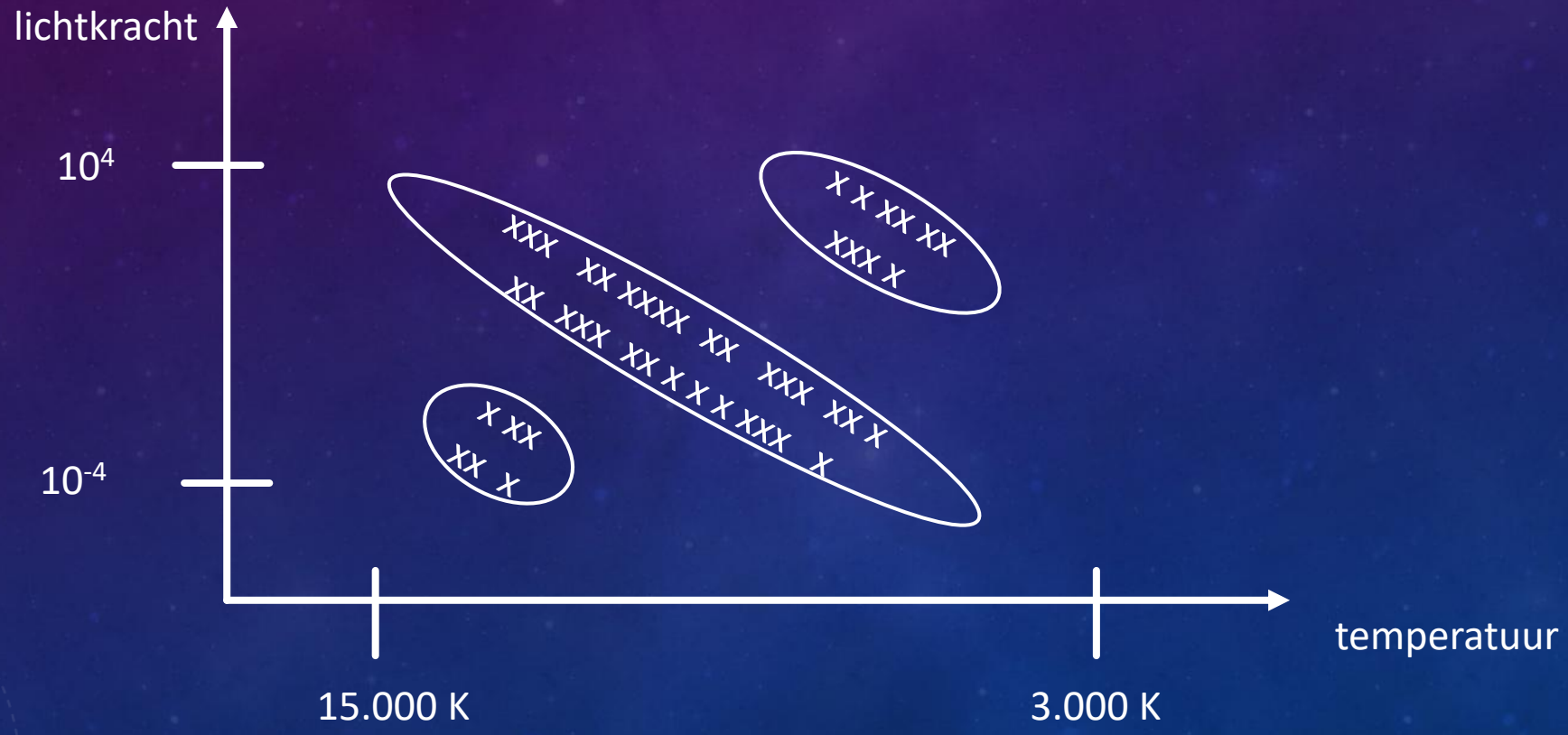




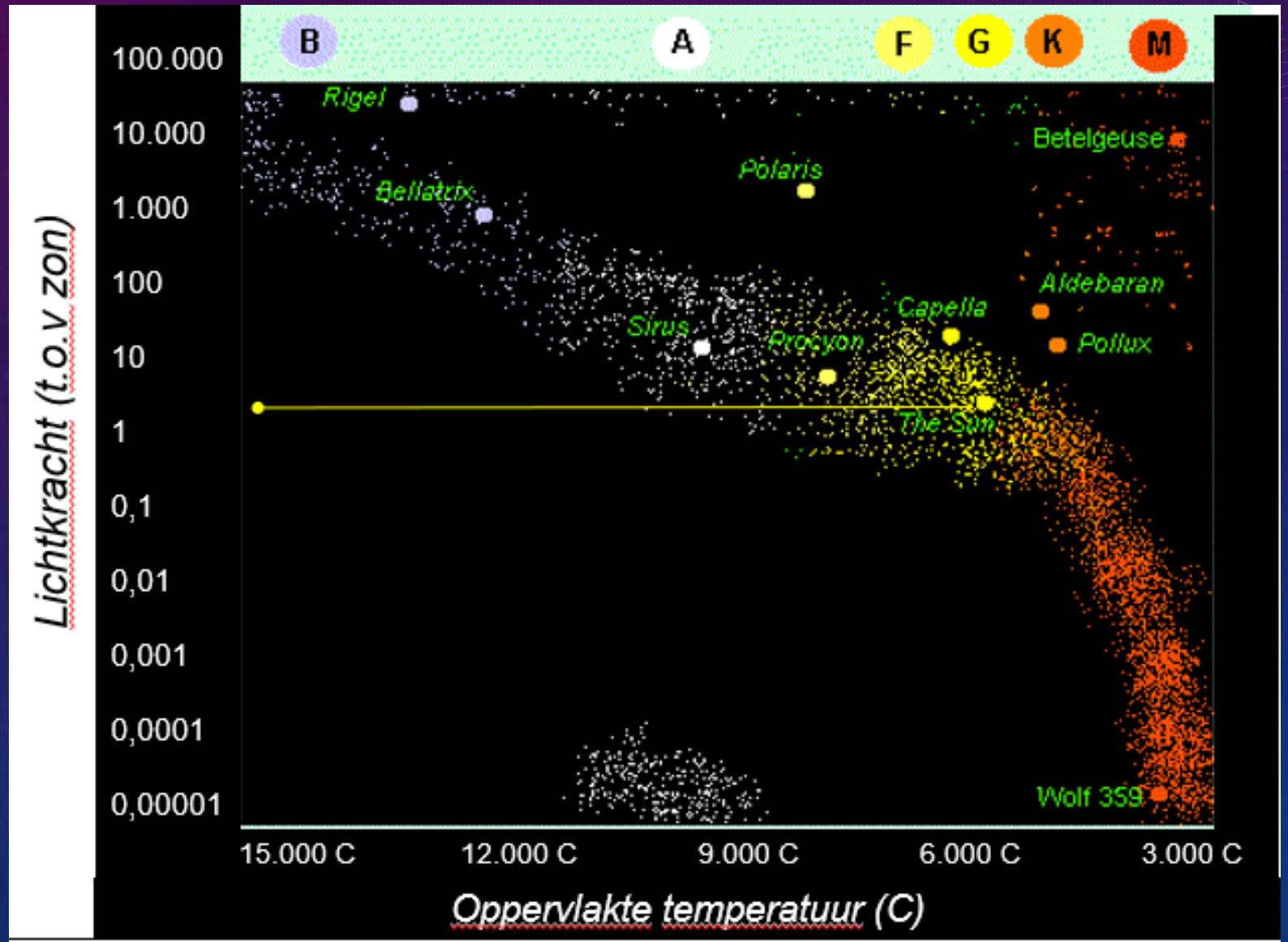
CLASSIFICATIE VAN MENSEN



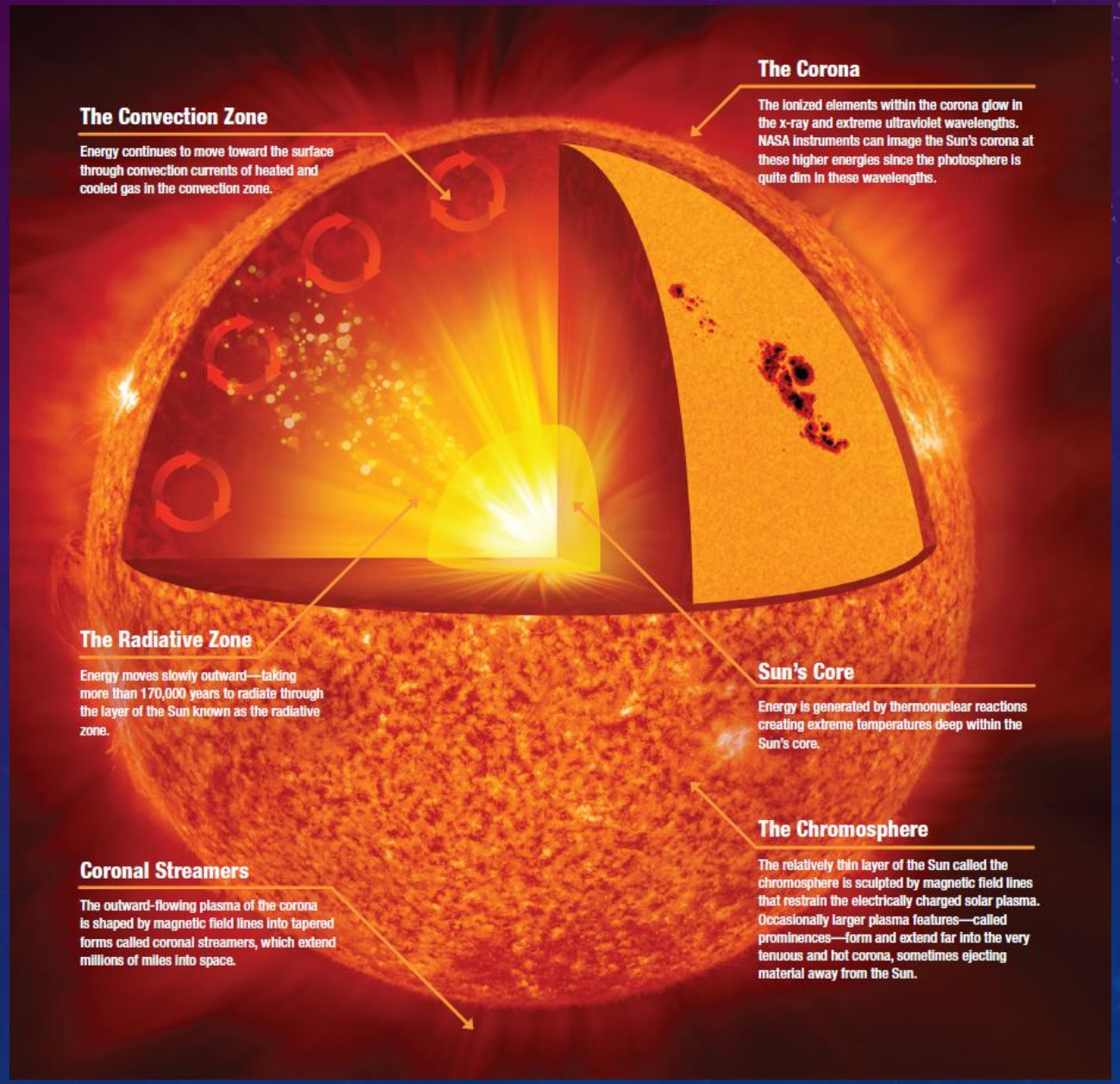
CLASSIFICATIE VAN STERREN



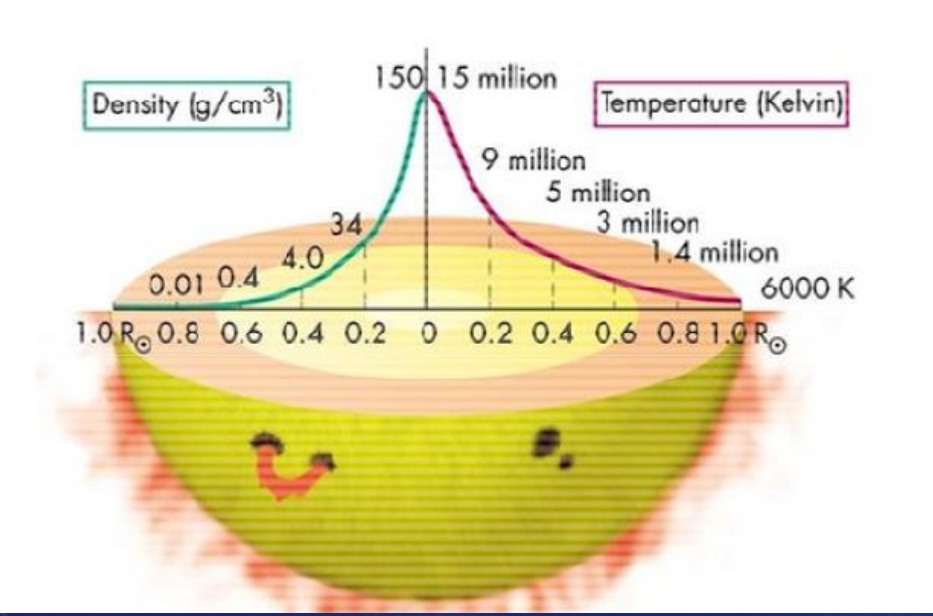
PLAATS TUSSEN DE ANDERE STERREN VAN ONZE MELKWEG



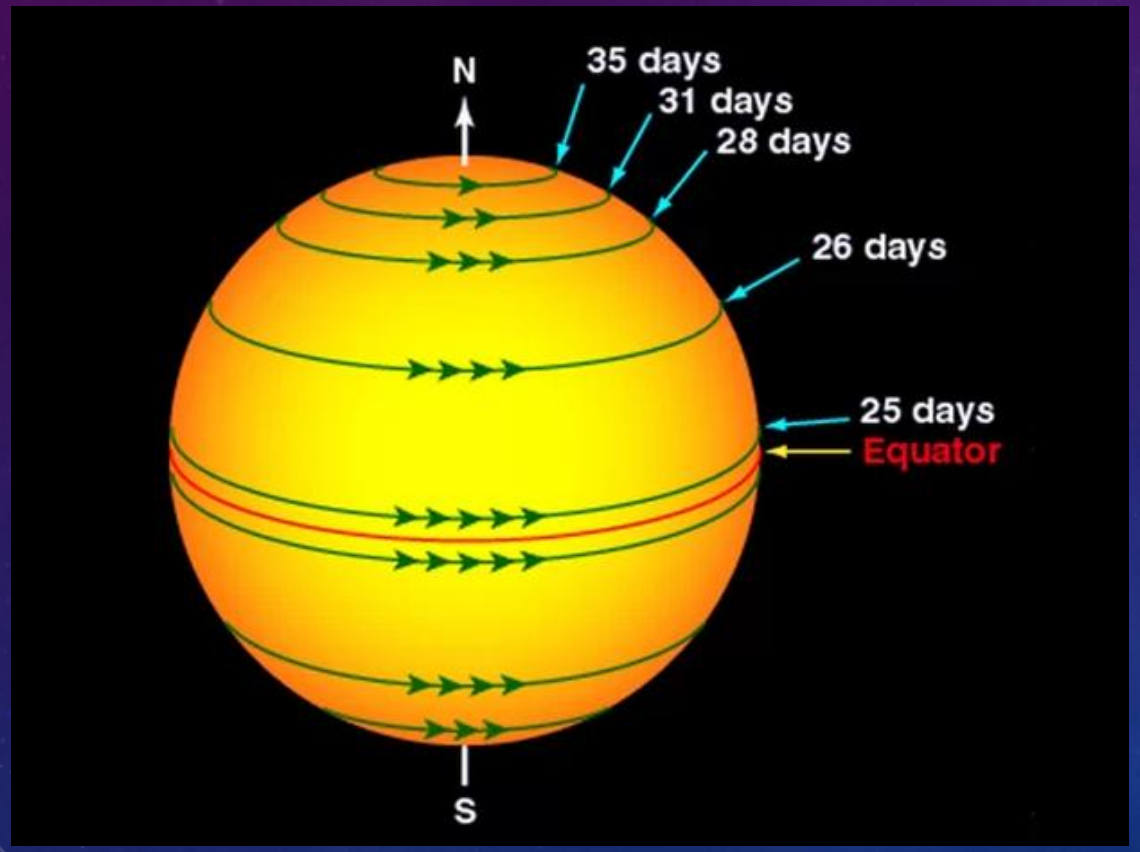
PROCESSEN

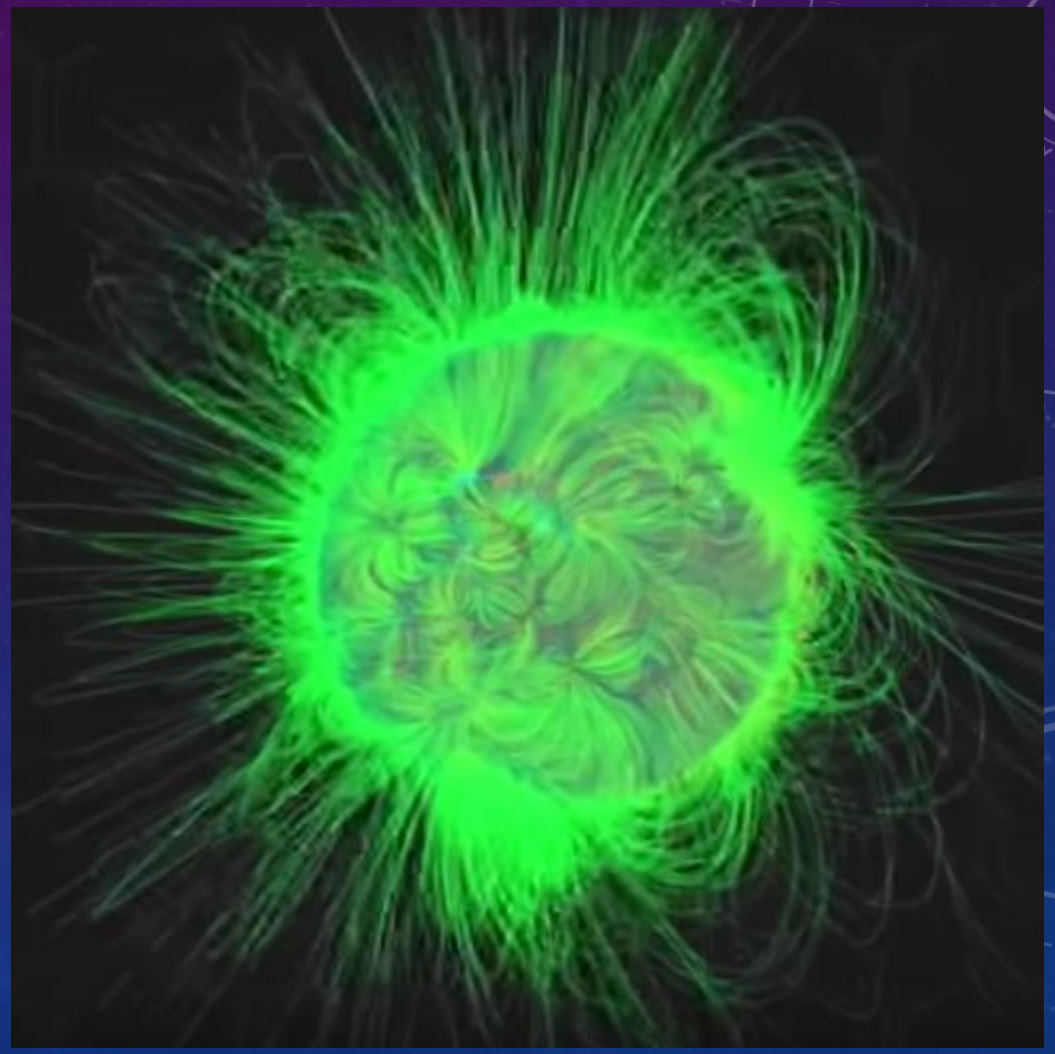

The Convection Zone
Energy continues to move toward the surface through convection currents of heated and cooled gas in the convection zone.
The Corona
The ionized elements within the corona glow in the x-ray and extreme ultraviolet wavelengths. NASA instruments can image the Sun's corona at these higher energies since the photosphere is quite dim in these wavelengths.
The Radiative Zone
Energy moves slowly outward—taking more than 170,000 years to radiate through the layer of the Sun known as the radiative zone.
Sun's Core
Energy is generated by thermonuclear reactions creating extreme temperatures deep within the Sun's core.
The Chromosphere
The relatively thin layer of the Sun called the chromosphere is sculpted by magnetic field lines that restrain the electrically charged solar plasma. Occasionally larger plasma features—called prominences—form and extend far into the very tenuous and hot corona, sometimes ejecting material away from the Sun.
Coronal Streamers
The outward-flowing plasma of the corona is shaped by magnetic field lines into tapered forms called coronal streamers, which extend millions of miles into space.

ZON STRUCTUUR

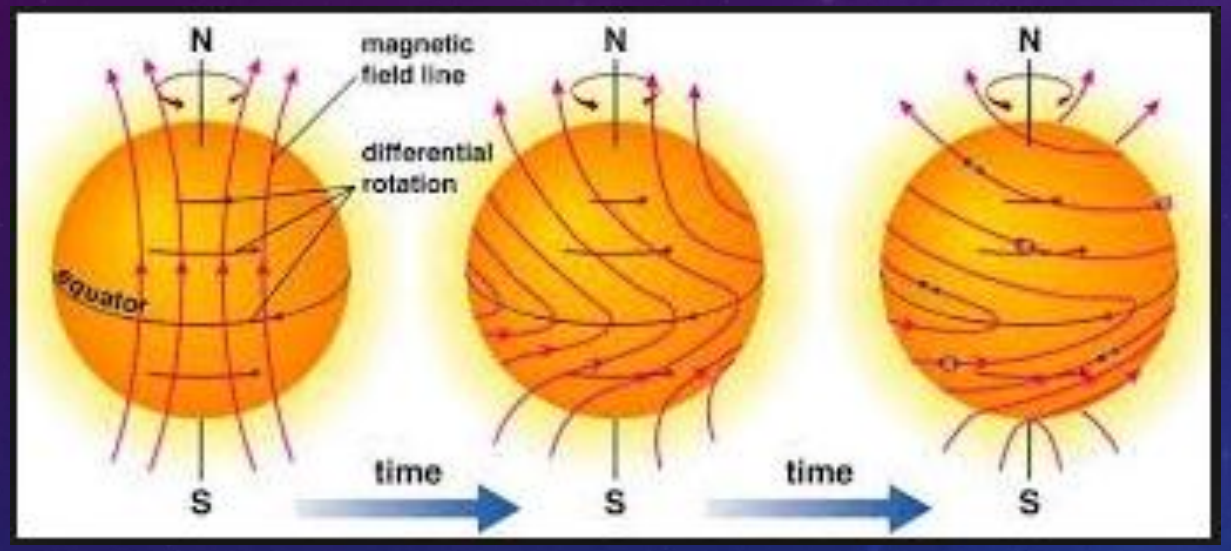


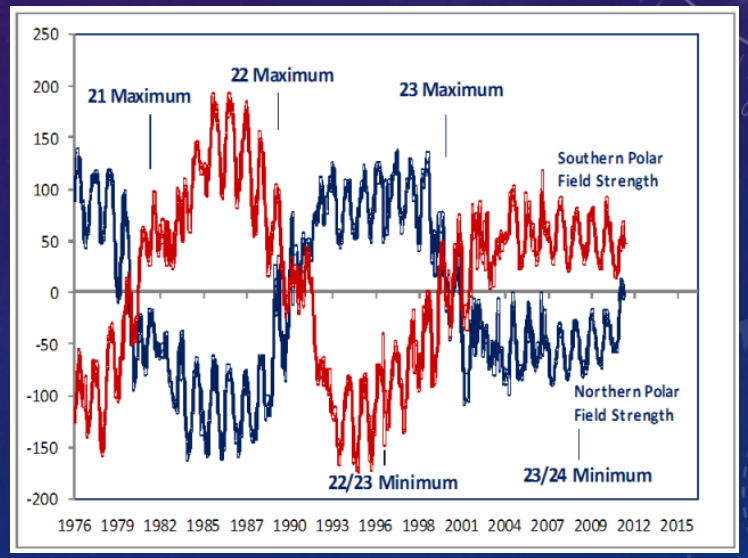
ZON ROTATIE



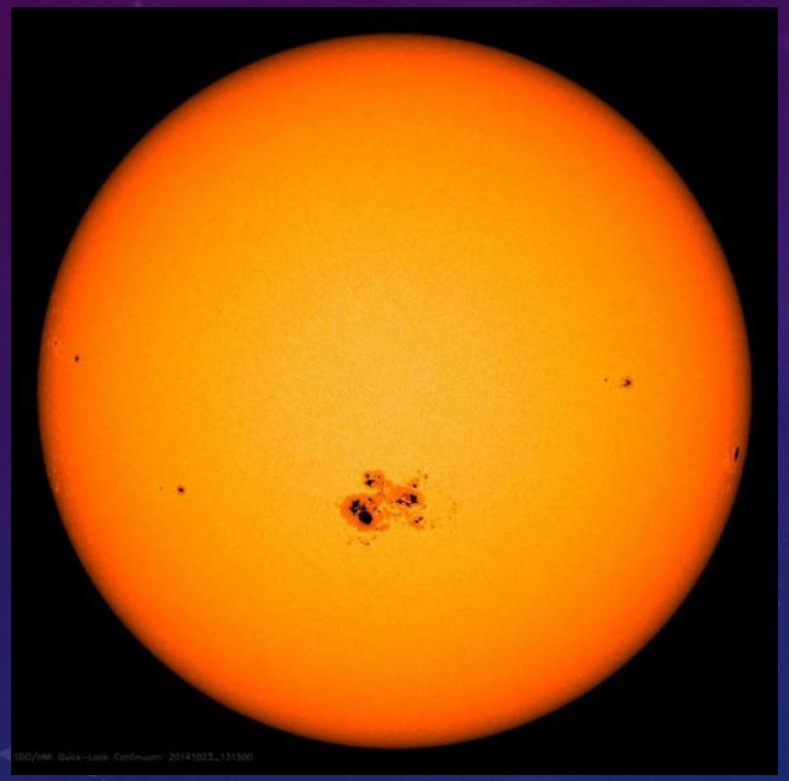


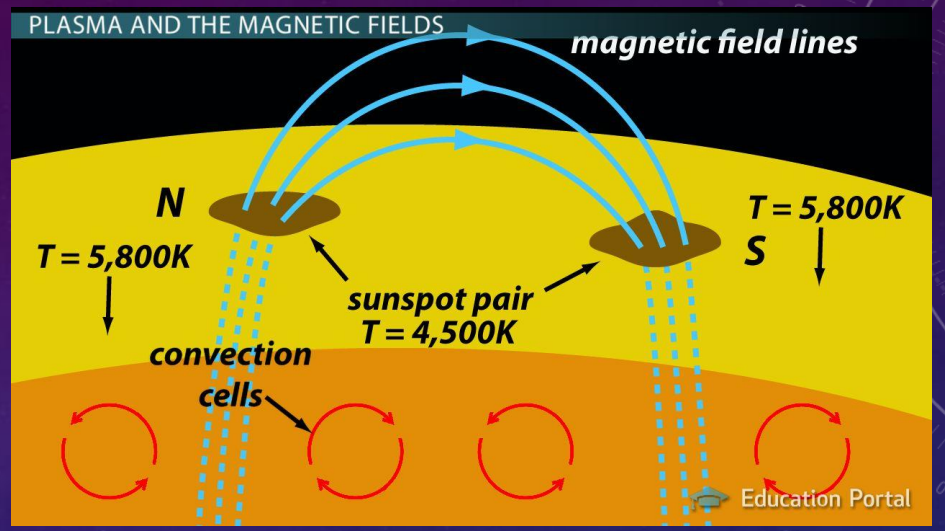
ZON OMPOLING

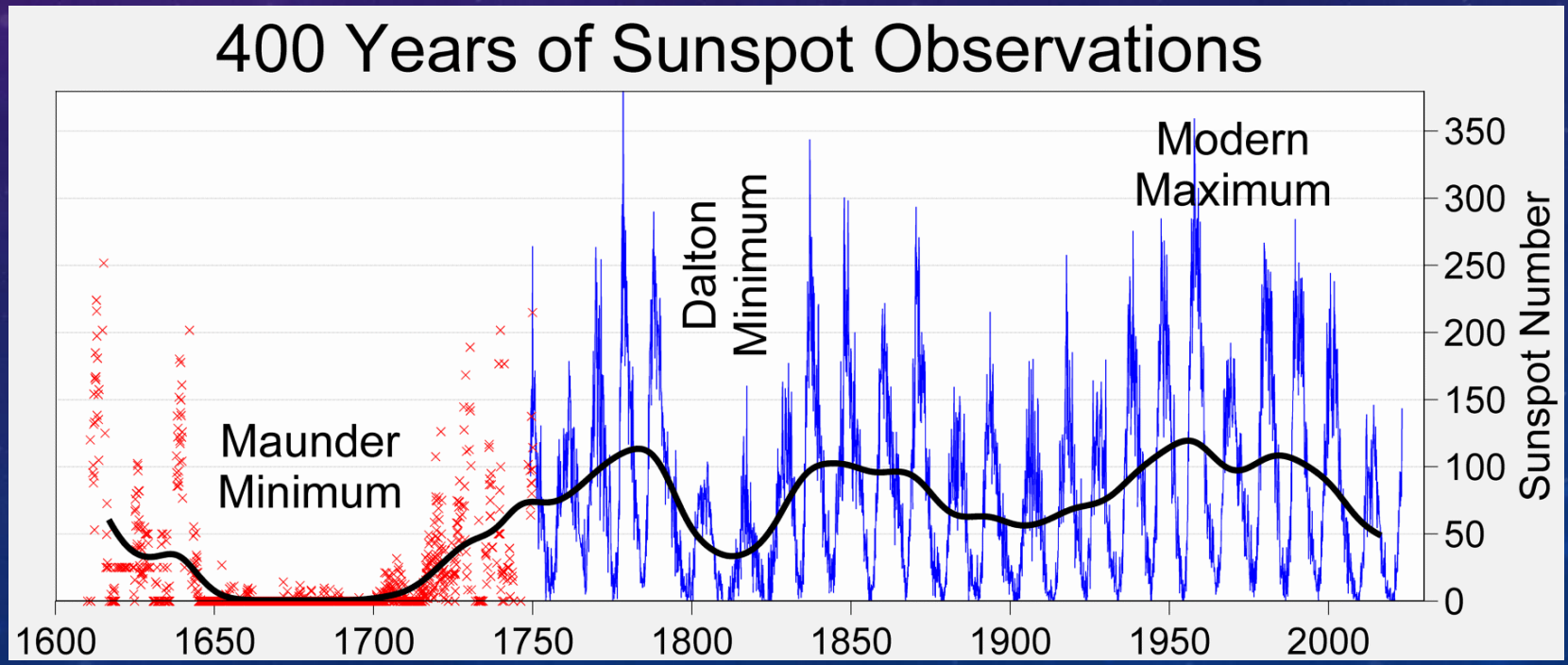




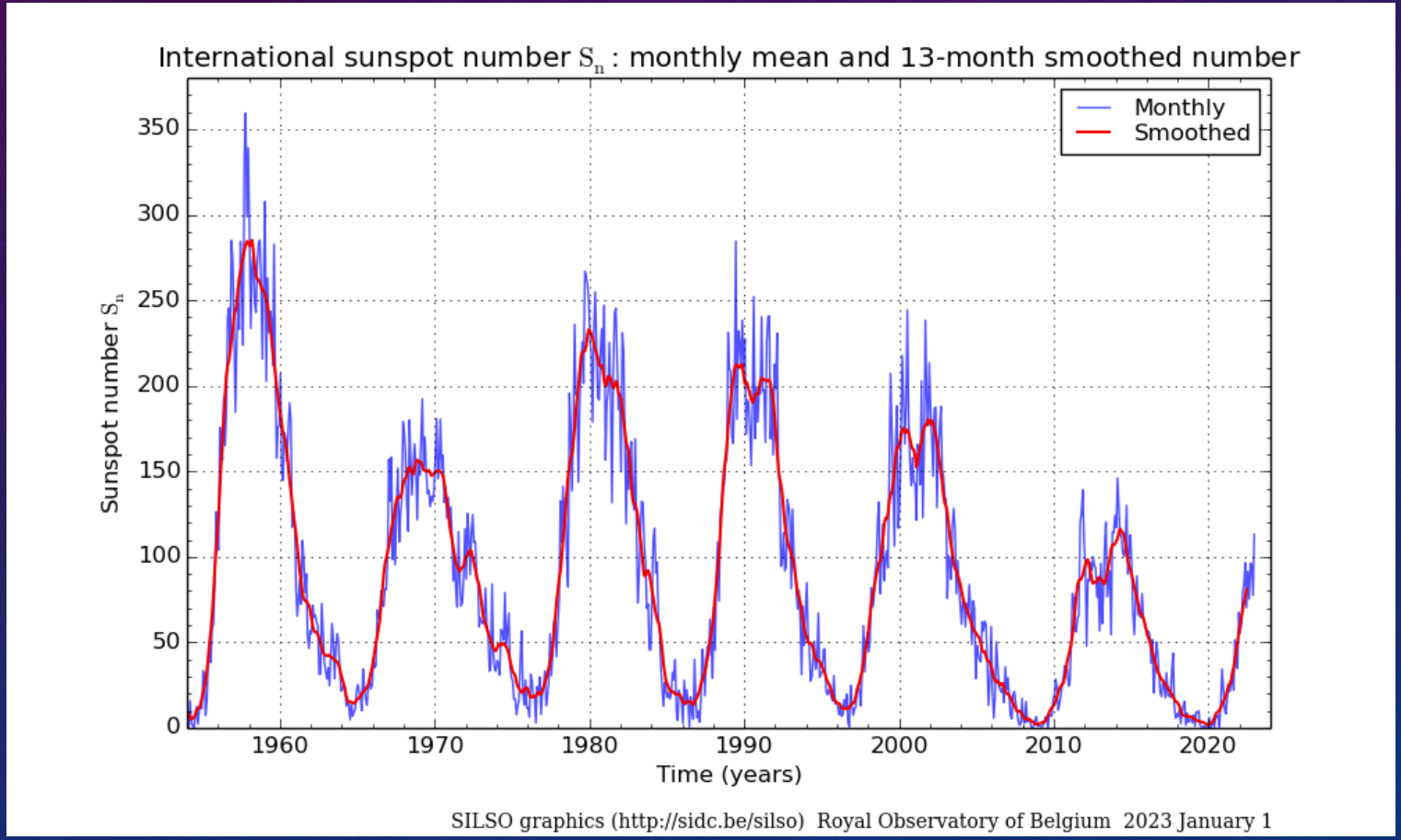
ZONNEVLEKKEN



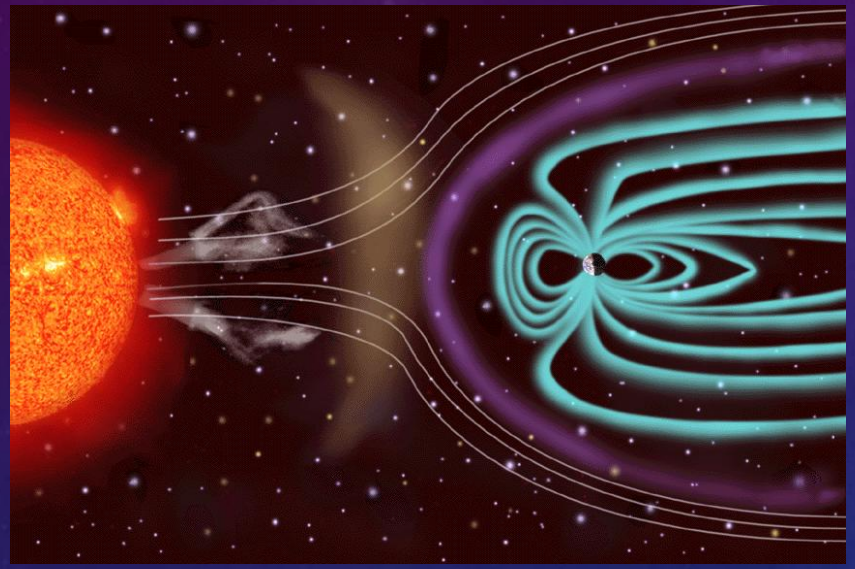


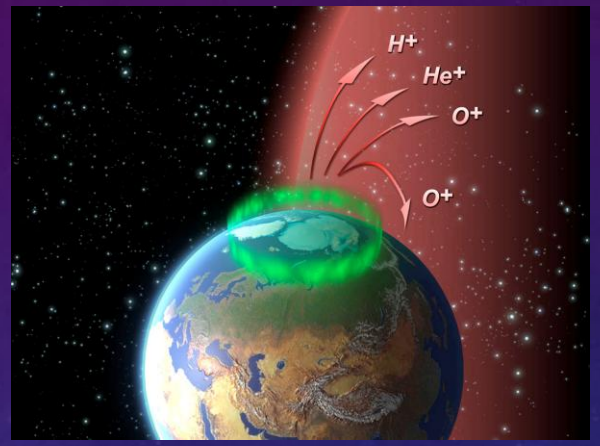


NIEUWE KLEINE IJSTIJD?

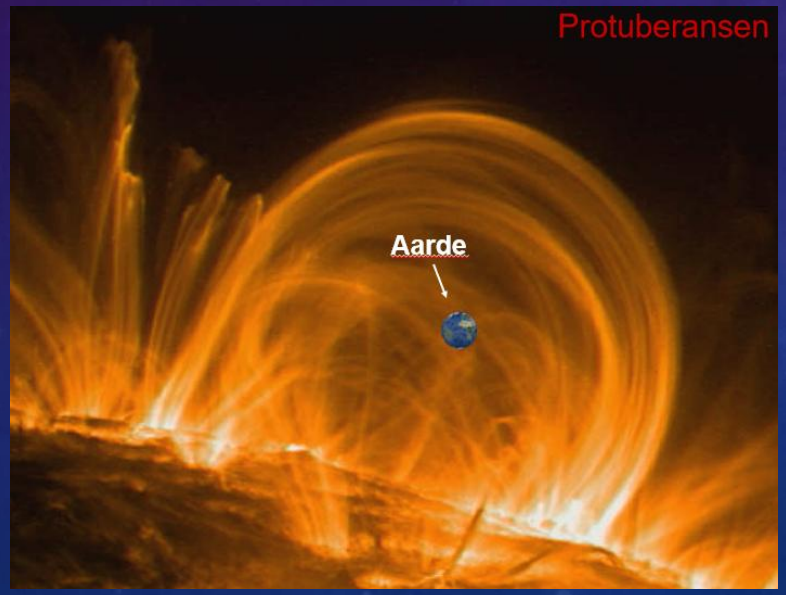


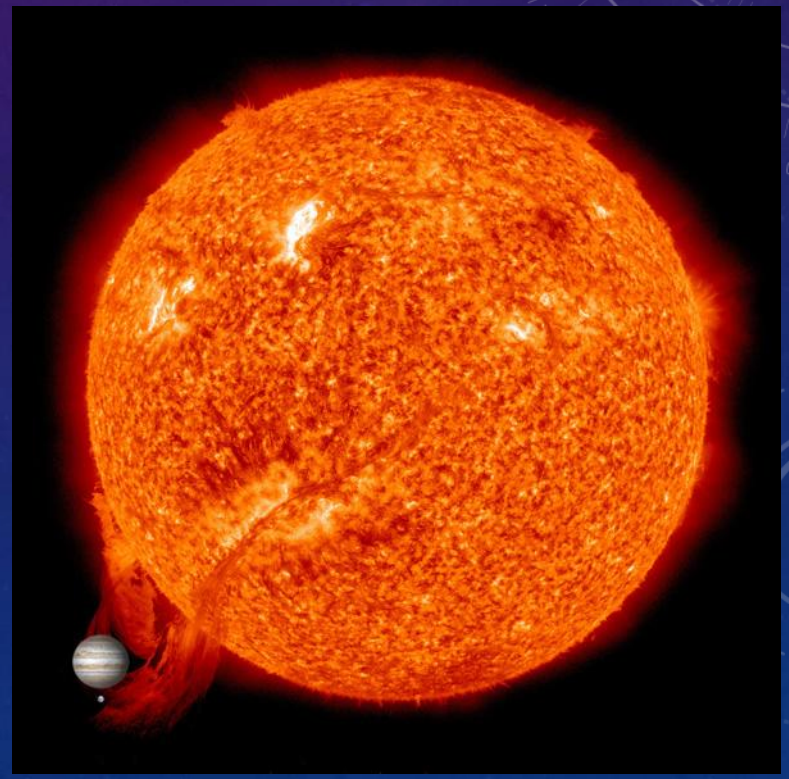
POOLLICHT



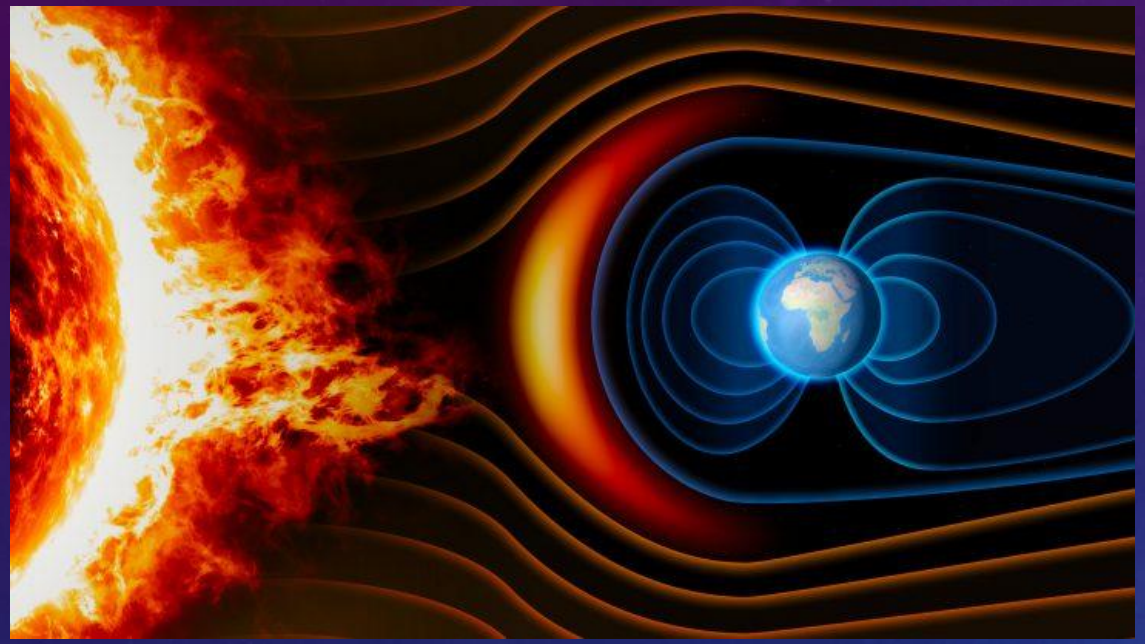


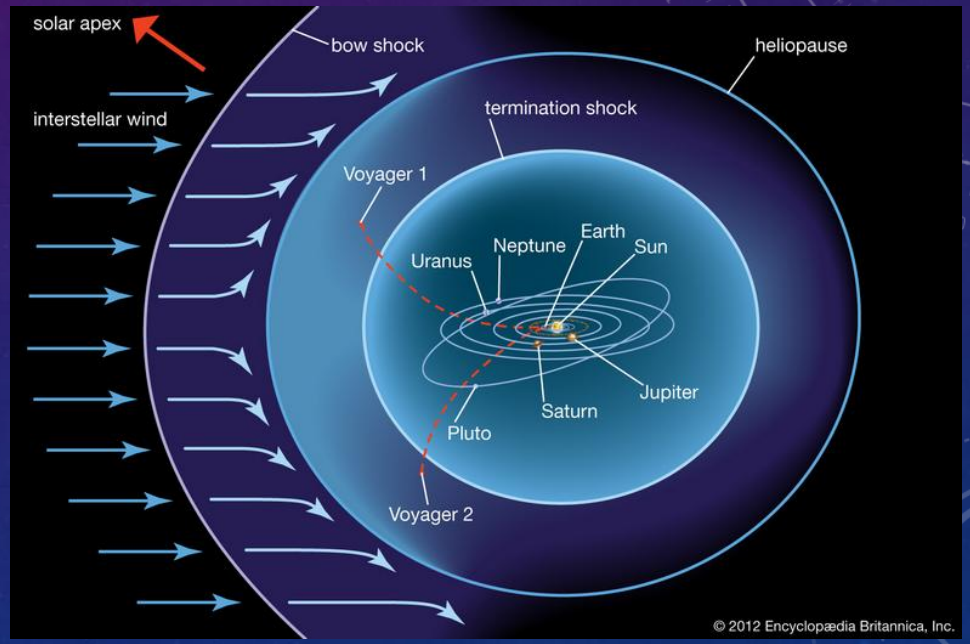
PROTUBERANSEN, ZONNEVLAMMEN, CME



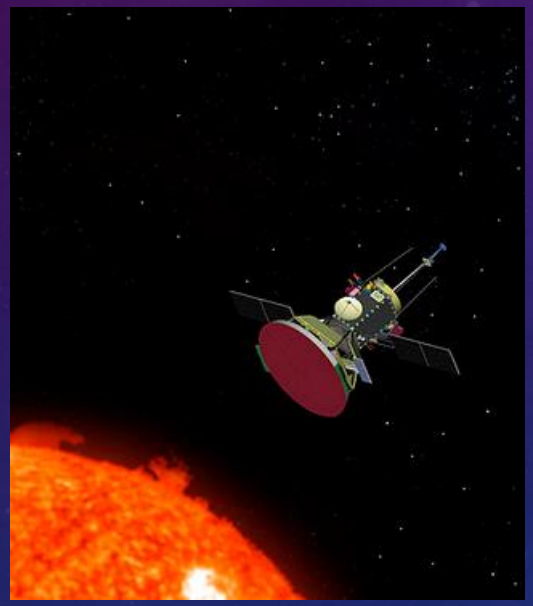


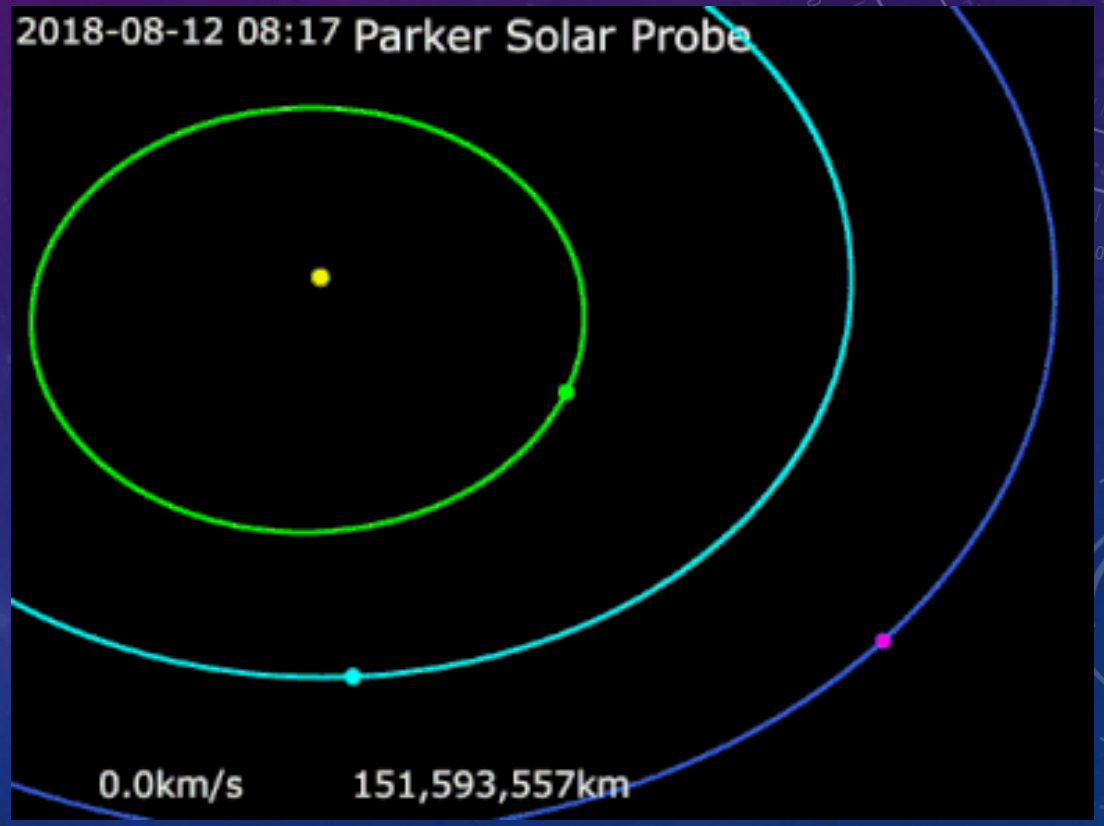
ZONNEWIND



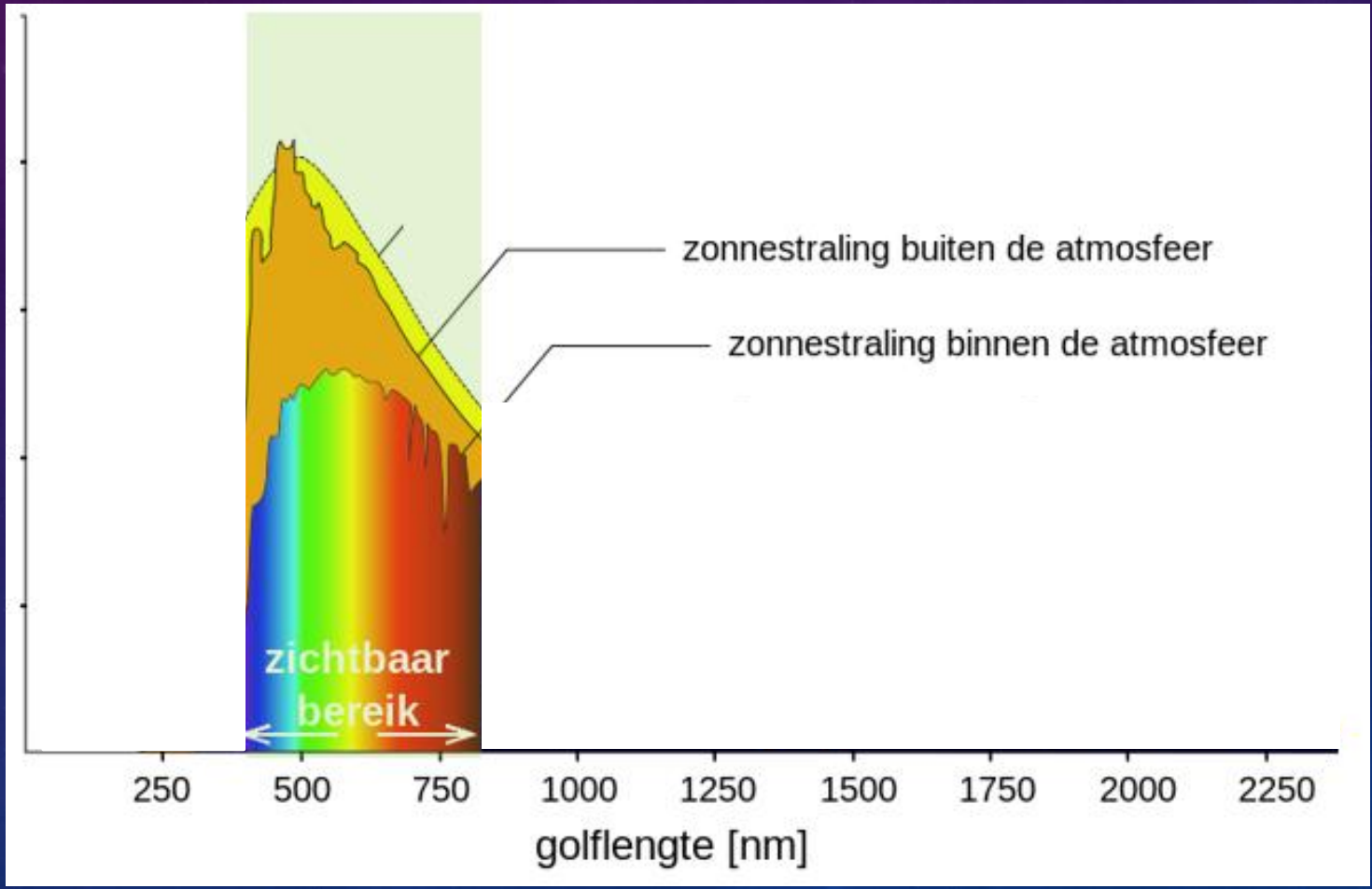

solar apex
bow shock
heliopause
interstellar wind
termination shock
Voyager 1
Uranus
Neptune
Earth
Sun
Jupiter
Saturn
Pluto
Voyager 2
© 2012 Encyclopædia Britannica, Inc.

DE “PARKER SOLAR PROBE MISSION” VAN NASA

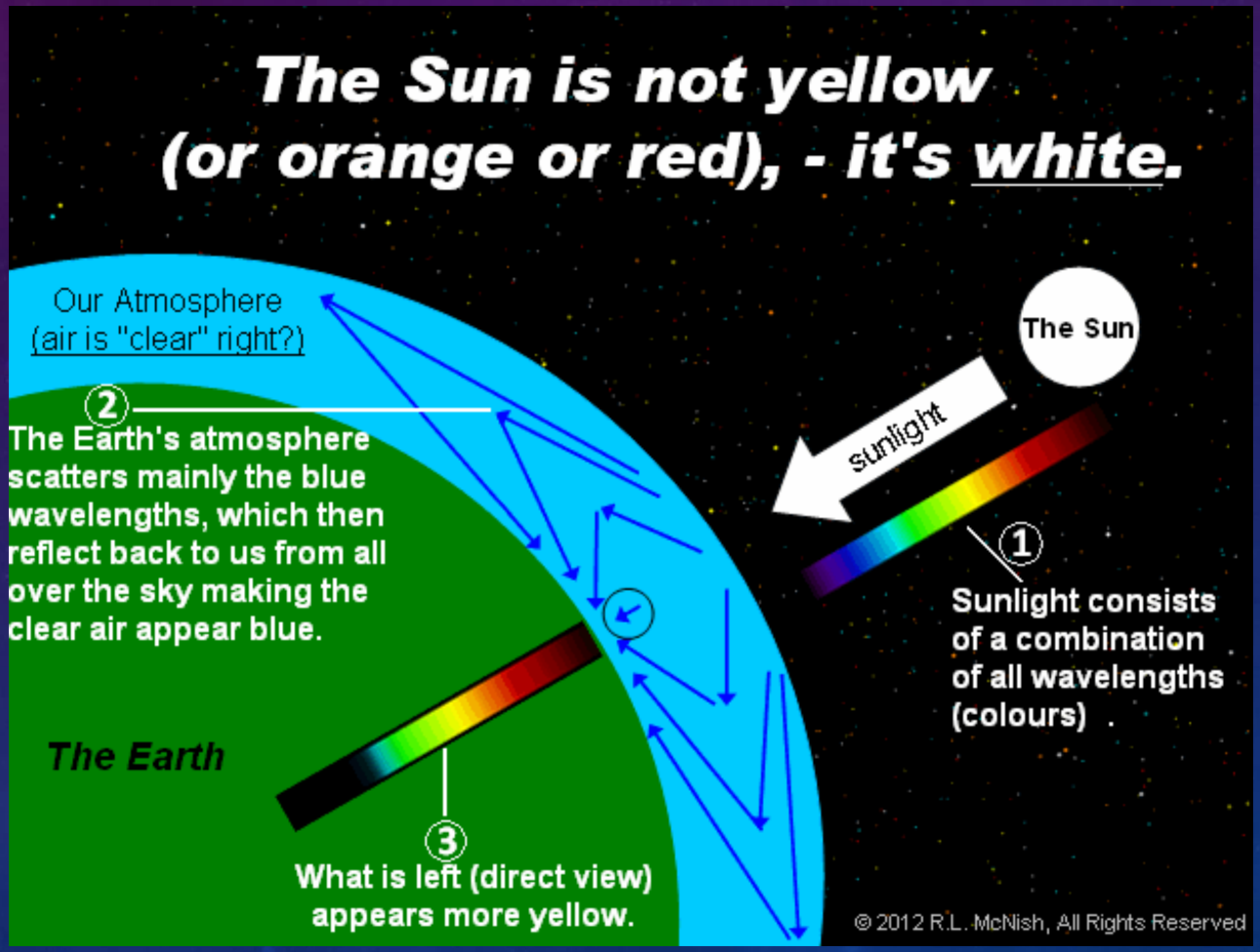




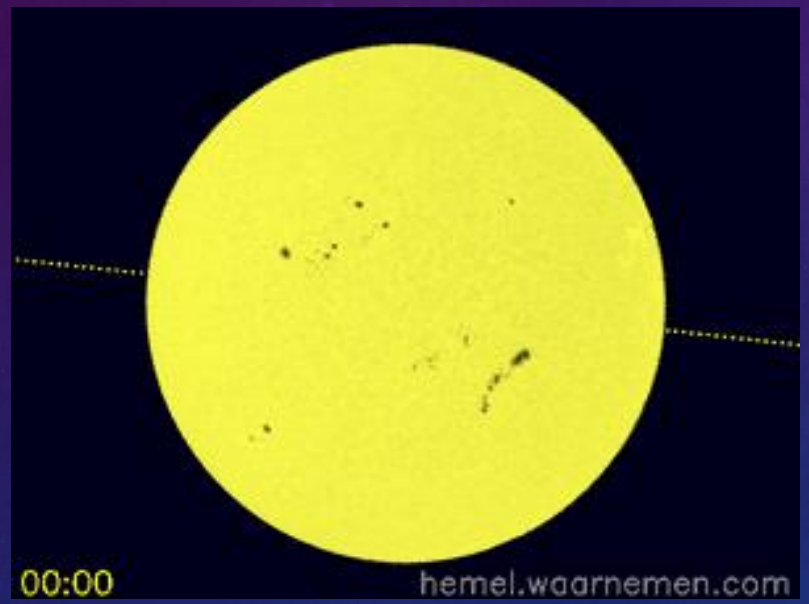
ZON STRALING

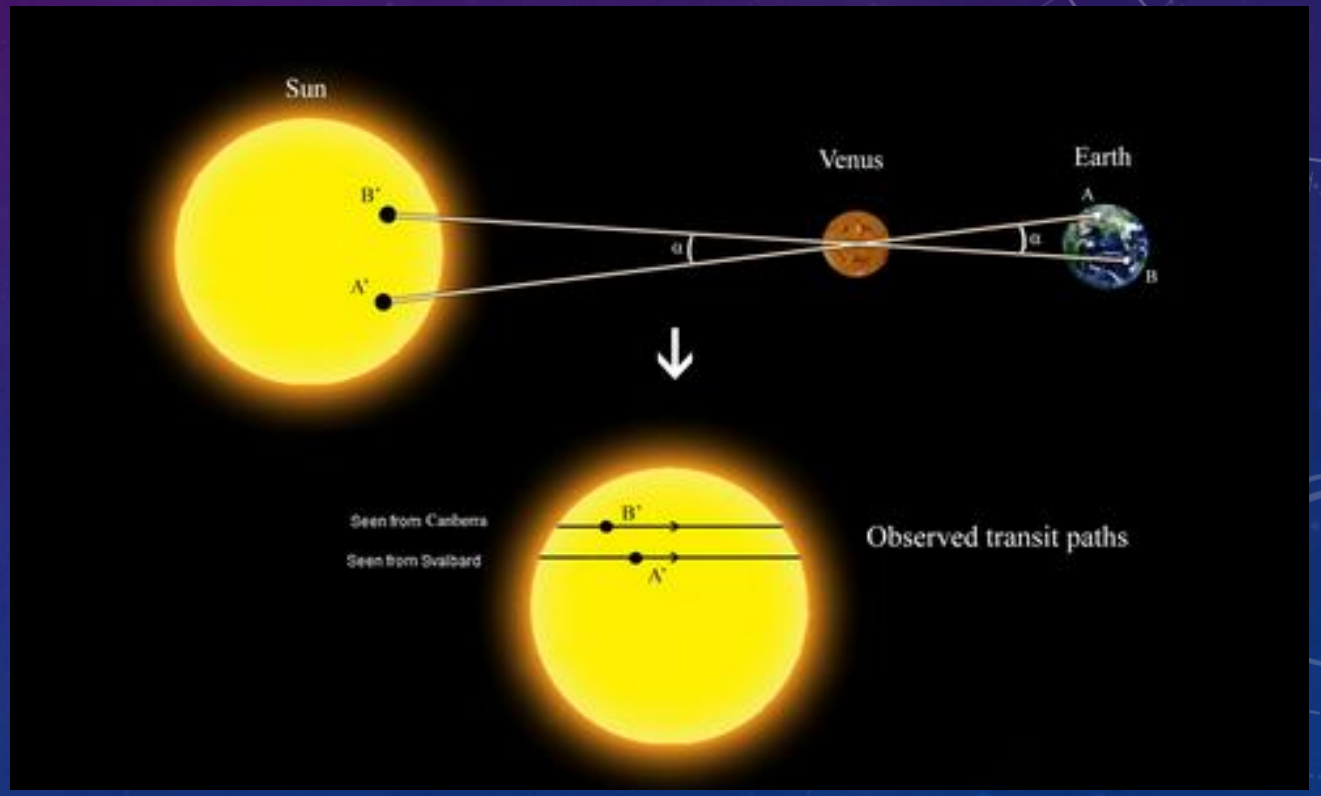


ZON STRALING

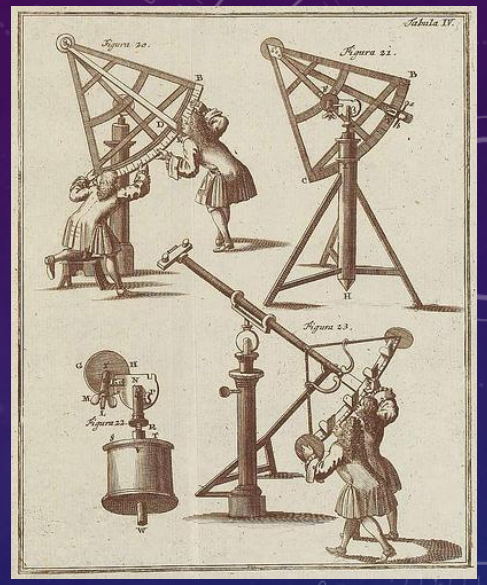


ZON OVERGANG





PARALLAX BIJ VENUS OVERGANG



- 1761 en 1769 ondanks 7 jarige oorlog
- 250 waarnemers op 130 locaties
- Geen standaard maten (meter, kilogram)
- Geen goede tijdsmeting
- Geen internationale coordinatie
- Geen goede kijkers of zonnefilters

Engelsen: Himalaya, Canada, Amerika, Noordkaap, Sumatra, Tahiti
Nederlanders: Batavia
Fransen: India, Mexico, Peking, Martinique
Duitsers: Rusland, Kazachstan
Spanjaarden: Mexico, Manillen
Zweden: Pello, Turku
Zwitsers: Rusland
Italianen, Denen, Oostenrijkers, Russen, Portugezen, Polen, Maltezers: in eigen land

- Tientallen waarnemers komen om: tyfus, schipbreuk, bevriezing, vermist
- Catherina de Grote, George III, Louis XIV, Christian VII volgen de overgang
- Wolken verstoren meer dan de helft van de waarnemingen

PARALLAX BIJ VENUS OVERGANG

- Resultaten:

  Aarde-zon afstand (A.E.) correct bepaald op 150 (+- 3) miljoen km

  Verbeterde wereldkaarten

  Duizenden vreemde planten en dieren verzameld van de pool tot pool

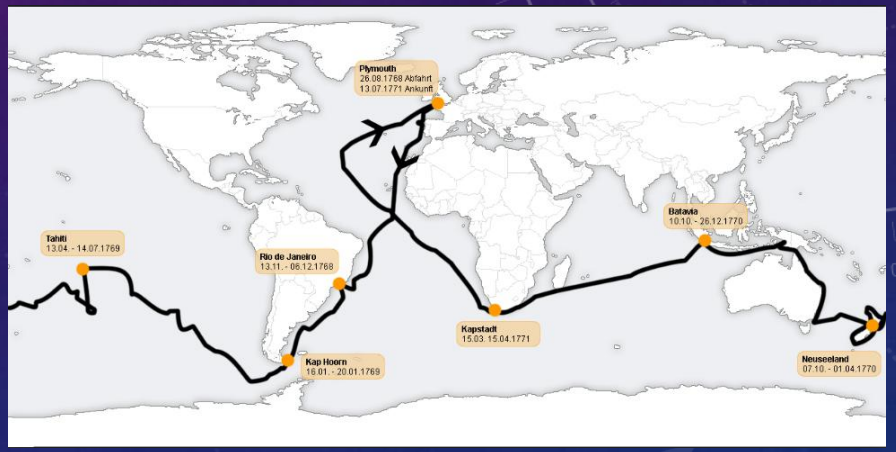
  Ertsen ontdekt en mijnbouw opgestart

  Rusland na vele eeuwen ontsloten (doel Catharina de Grote)

  Start internationaal wetenschappelijke samenwerking ondanks oorlog !

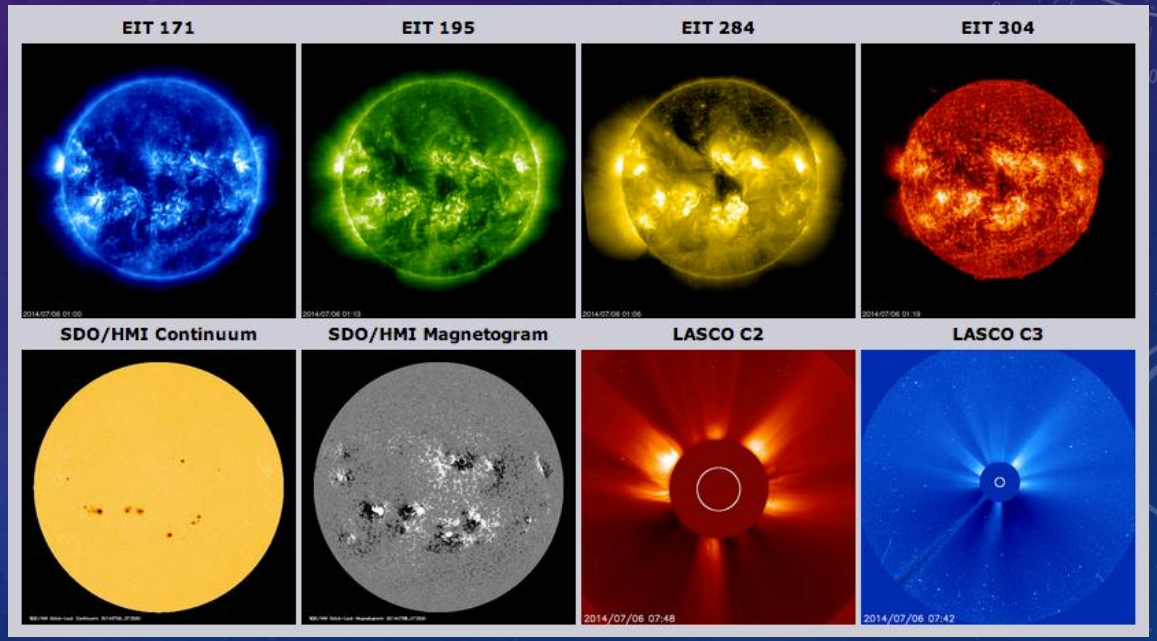
  Start wetenschappelijke expedities (Napoleon in Egypte)

  James Cook ontdekt Nieuw Zeeland en Australië



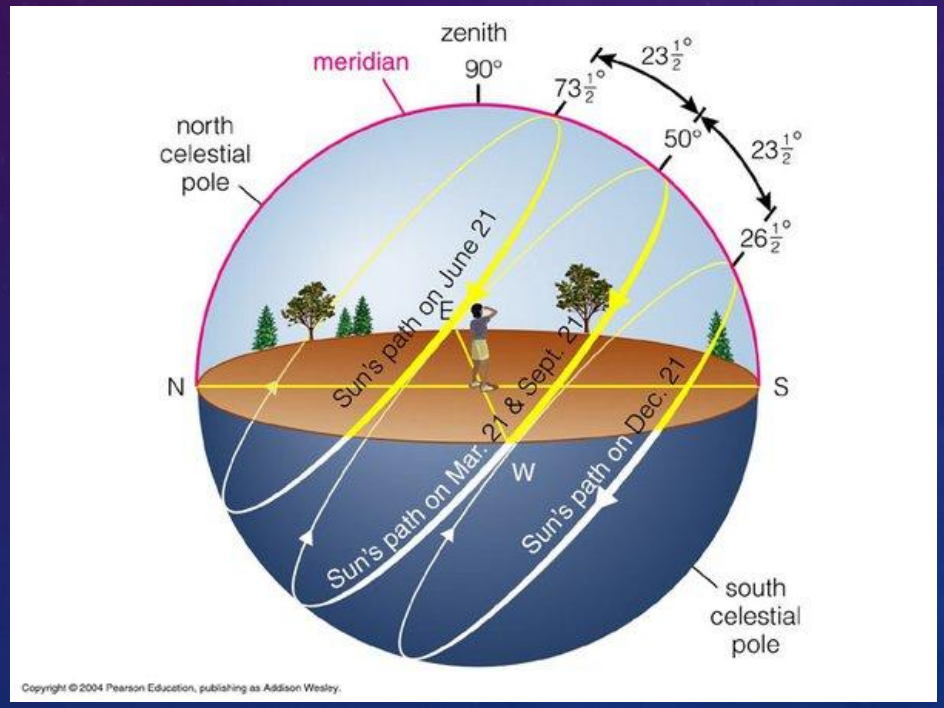
ZON OBSERVATIE

ESA + NASA SOHO : 1995 (Observatory) SOLO : 2020 (Orbiter)

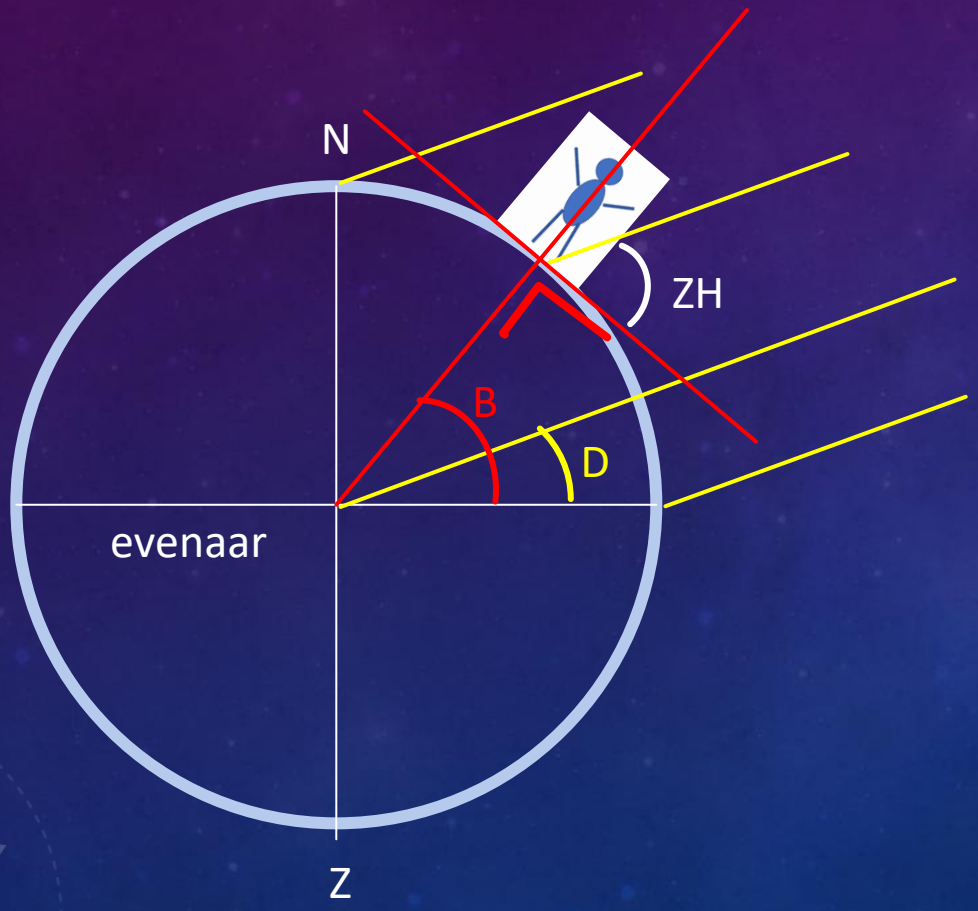


DE ZON : MAATSTAF VAN RICHTING, TIJD EN PLAATS

1) Richting : het zonnekompas



BREEDTEBEPALING OP DE ZON: DECLINATIE



B = breedtegraad
D = declinatie
ZH = zonnehoogte

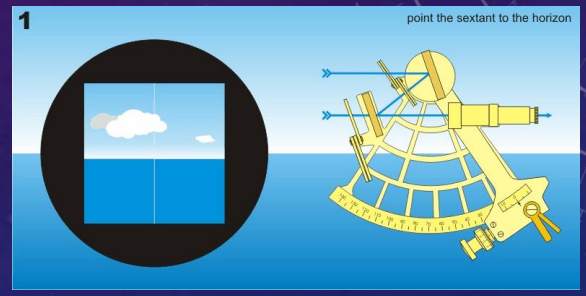
ZH = 90 – (B-D)

of

B = 90 + D -ZH

DE ZON : MAATSTAF VAN RICHTING, TIJD EN PLAATS

1) Richting : het culminatiepunt geeft je exact het zuiden



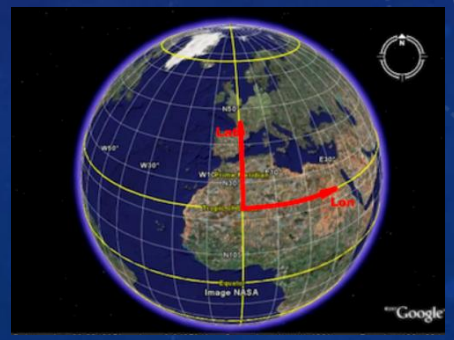
2) Tijd : het culminatiepunt geeft je exact de middag, 12h lokale zonnetijd

3) Plaats :

3.1) Breedteligging: de middag zonnehoogte, vergeleken met de zonnedeclinatie geeft je de breedteligging

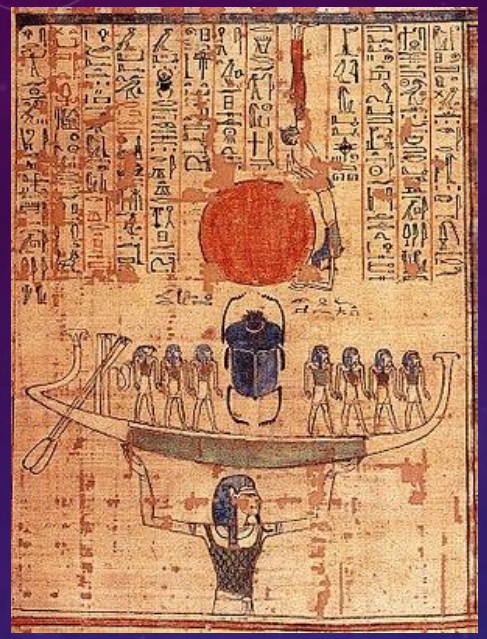
$$B = 90 + D - ZH$$

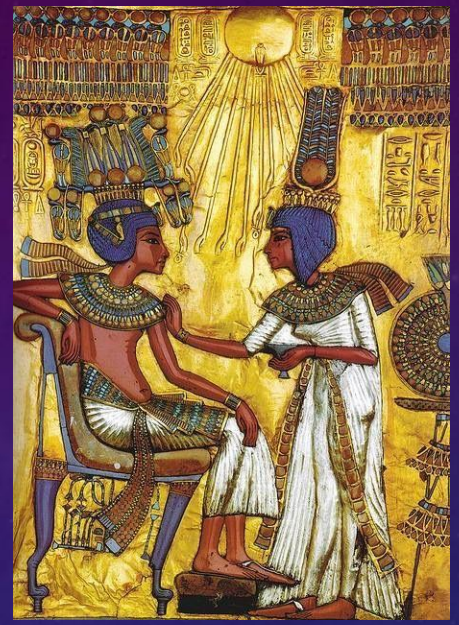
3.2) Lengte : Verschil (lokale tijd – Greenwichtijd) x 15°/uur = breedteligging

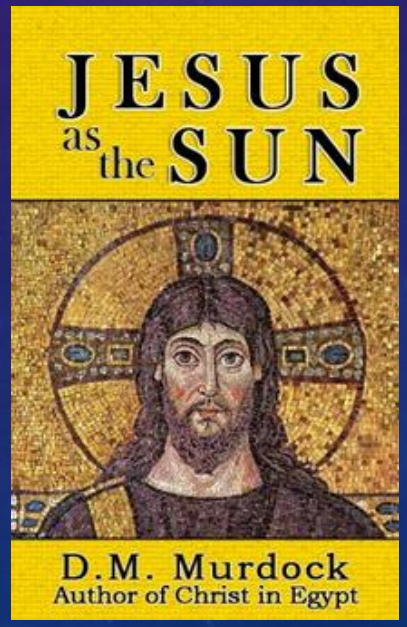


MYTHOLOGIE


www.theoi.com

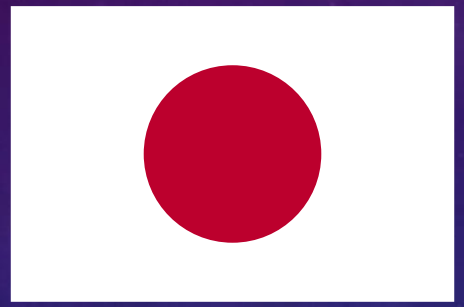





JESUS
as the SUN
D.M. Murdock
Author of Christ in Egypt

VLAGGEN MET ZONNEN

Kazachstan



Japan

Argentinië

Ecuador

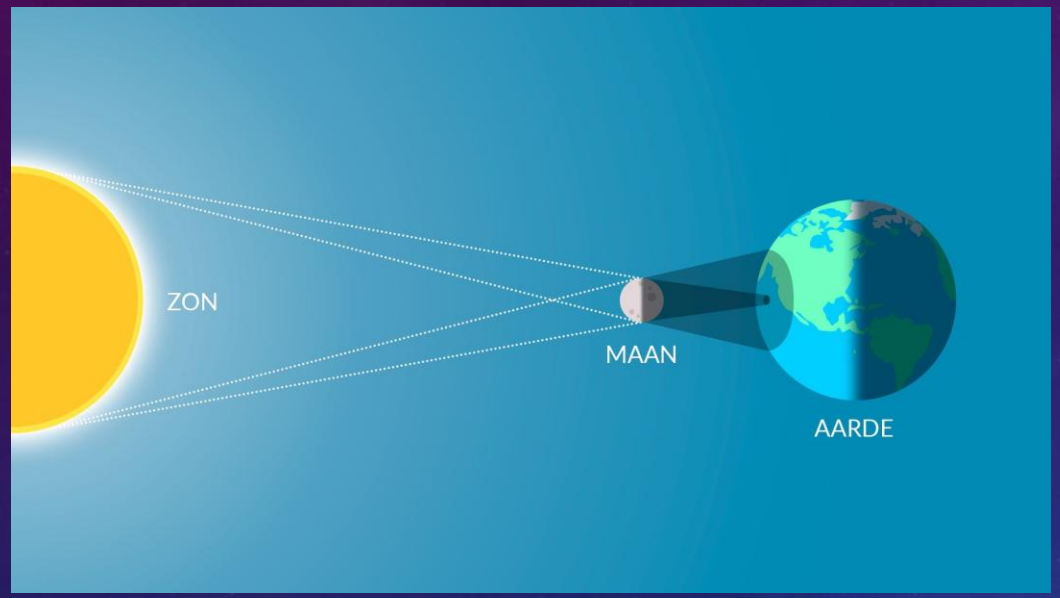
Uruguay

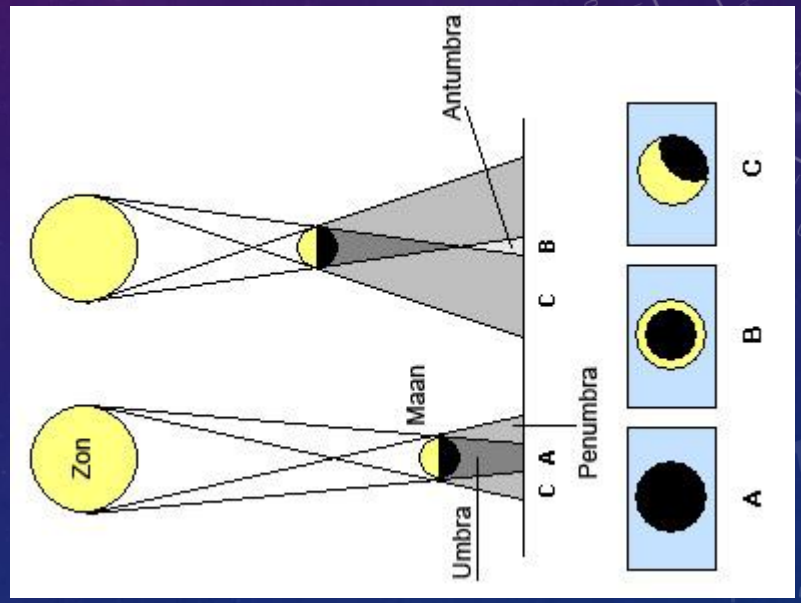
Koerdistan

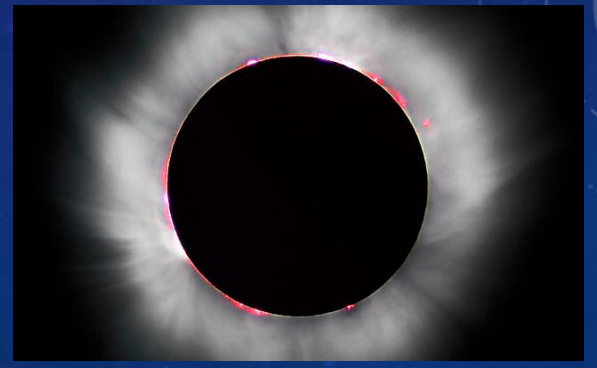
Filipijnen

Kiribati

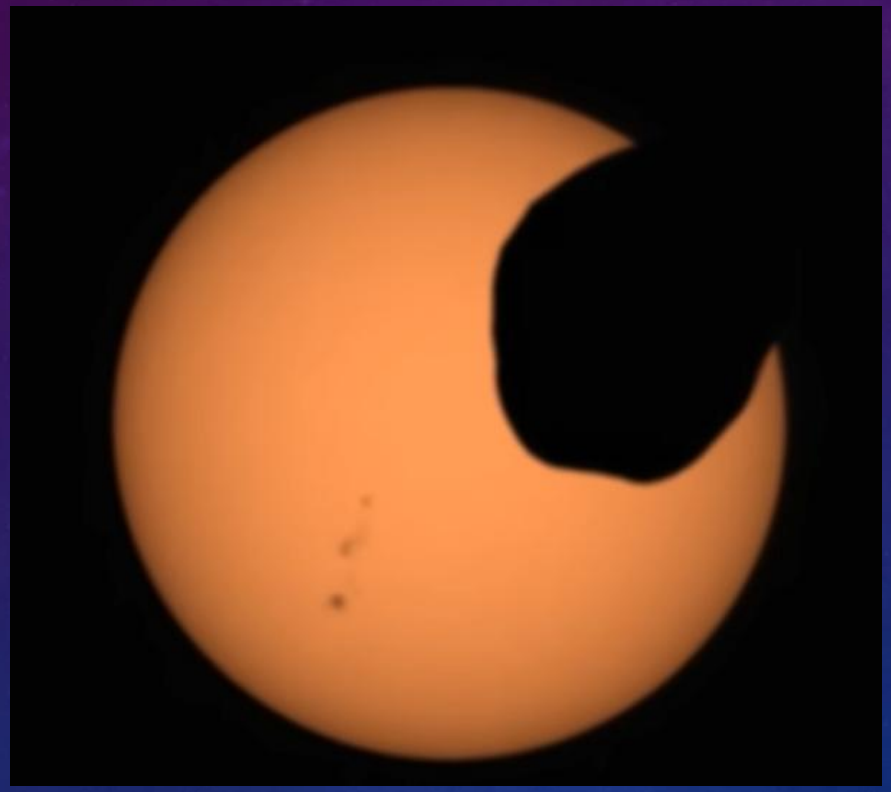
ZONSVERDUISTERING





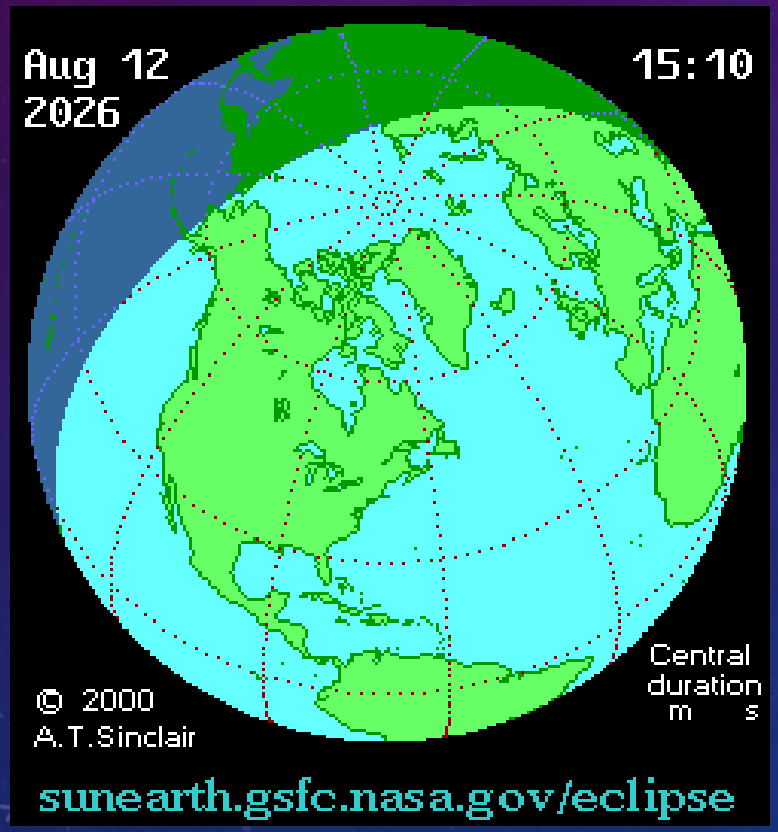


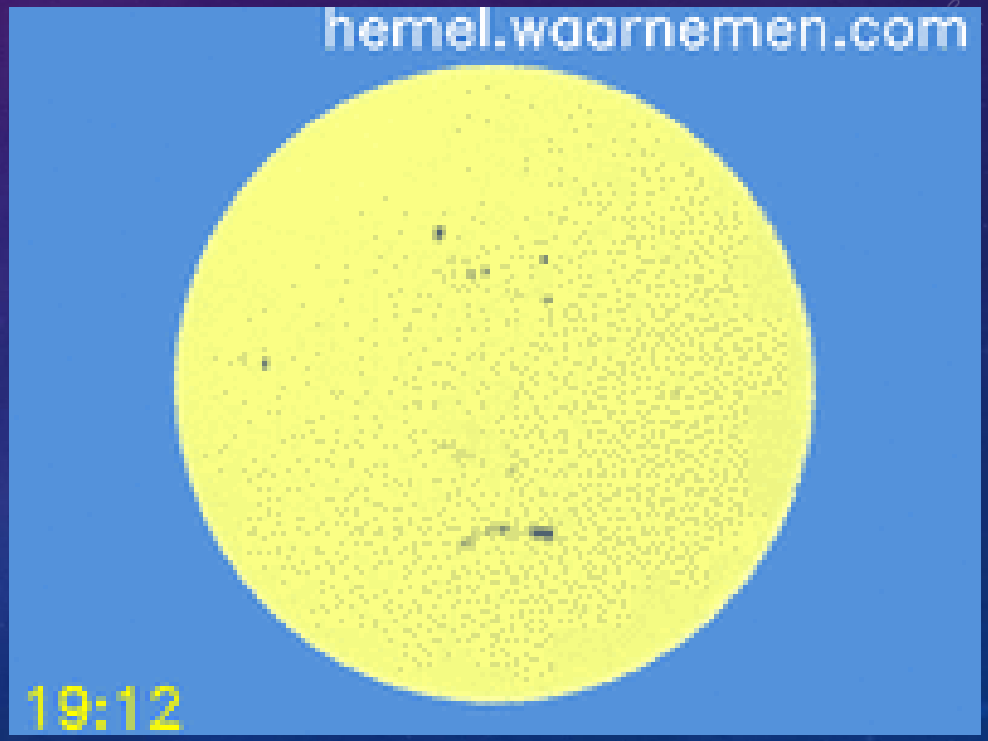
ZON VERDUISTERING



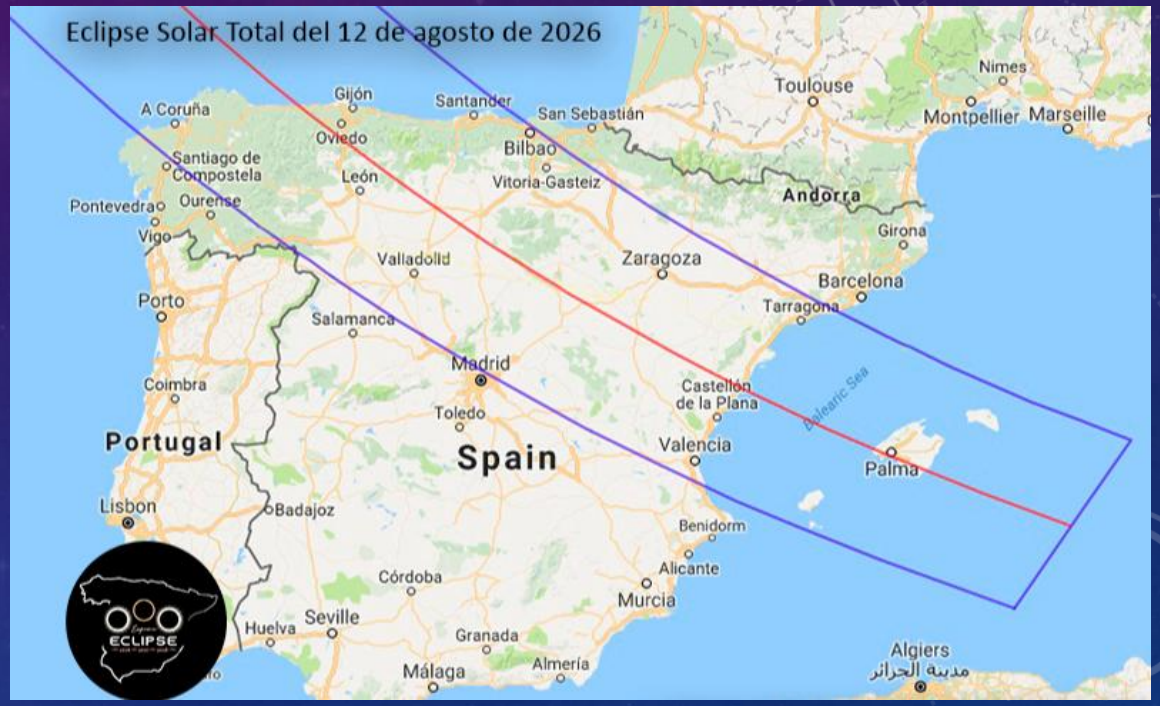
https://www.youtube.com/watch?v=aKK7vS2CHC8

12 AUGUSTUS 2026

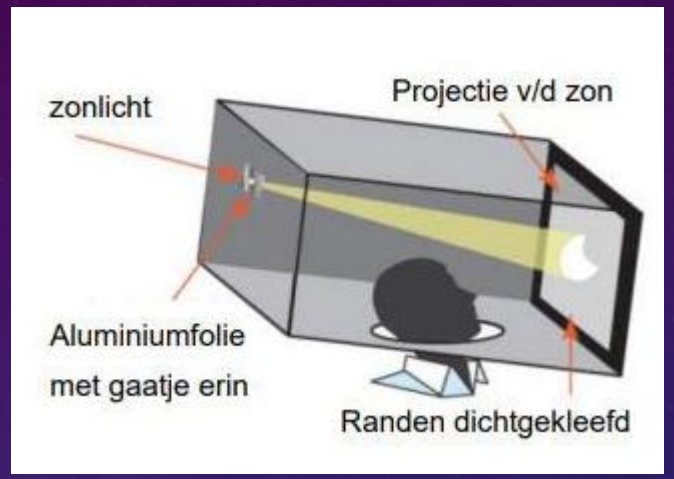


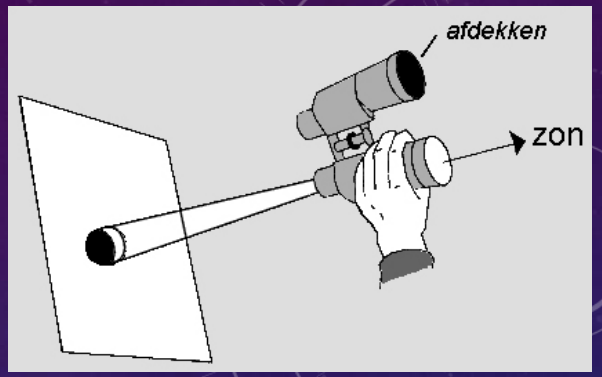


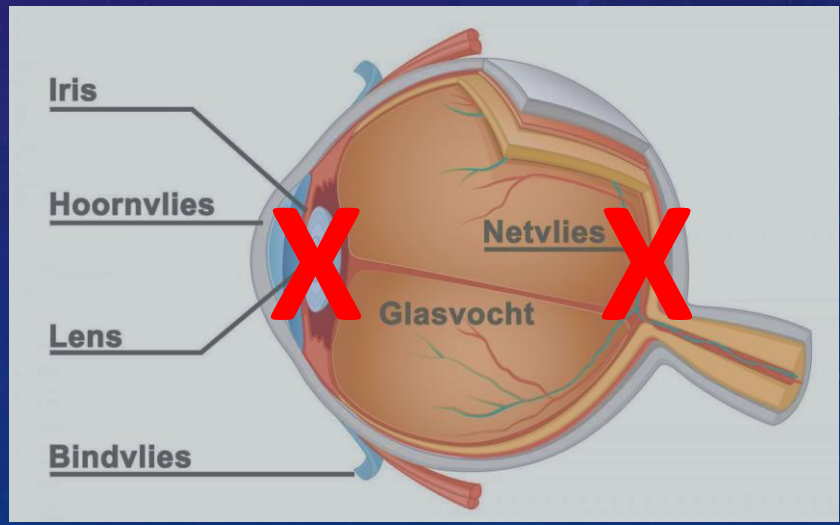
12 AUGUSTUS 2026



KIJKEN NAAR DE ZON



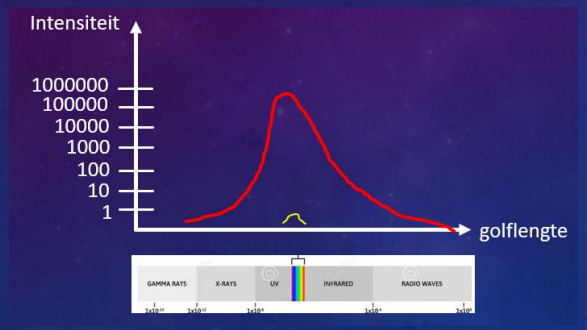




MCO : STORINGEN OP HET ZONNE OPPERVLAK

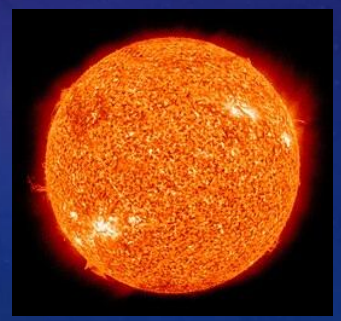
zonnevlekken

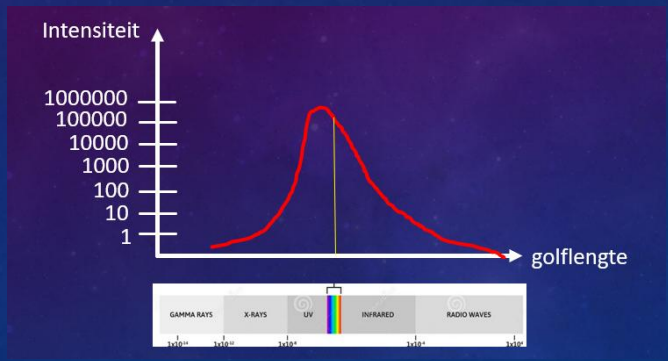
- Magnetische storingen
- veroorzaken koude gebieden op zonoppervlak
- 11 jaarlijkse cyclus
- Filter laat slechts 0,00001% licht door



protuberansen

- Zonne uitbarstingen
- Massa wordt door magneetvelden uitgestoten
- Massa van zonne oppervlak bestaat uit waterstof
- Alle licht weggenomen, behalve waterstof lijn





Einde

CLASSIFICATIE VAN STERREN

https://www.youtube.com/watch?v=EFO_bsg1sw8

https://www.youtube.com/watch?v=UIWeKsFCfqI

https://www.youtube.com/watch?v=PsS80huL47c

KIJKEN NAAR DE ZON