Formación del Sistema Solar

Colegio San Pablo
Agosto 2022

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Departamento de Astronomía
Instituto de Física
Facultad de Ciencias

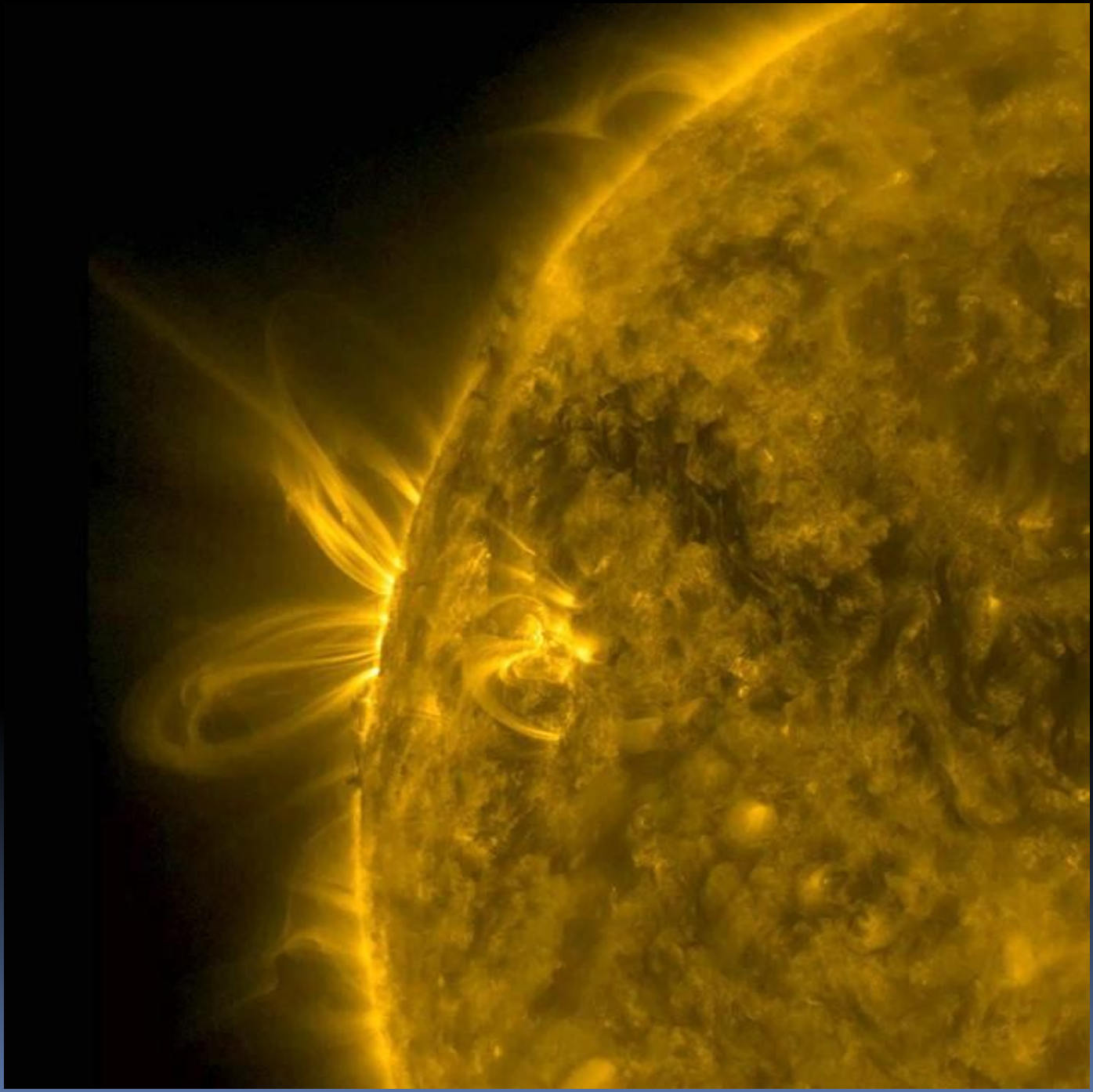
Nuestra galaxia

500.000 millones de estrellas

PLANETAS:

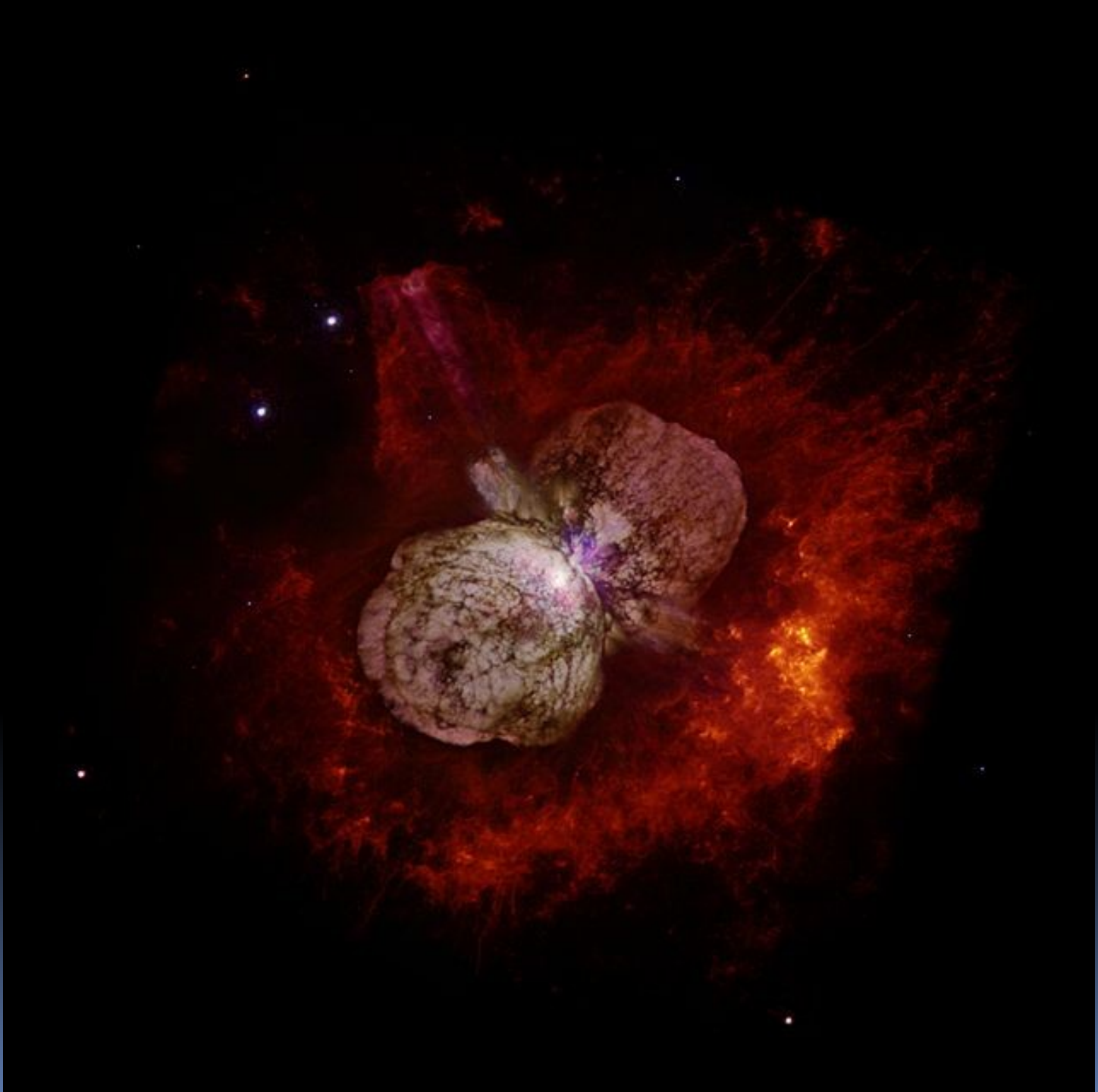
¿Cómo se forman?

Sol

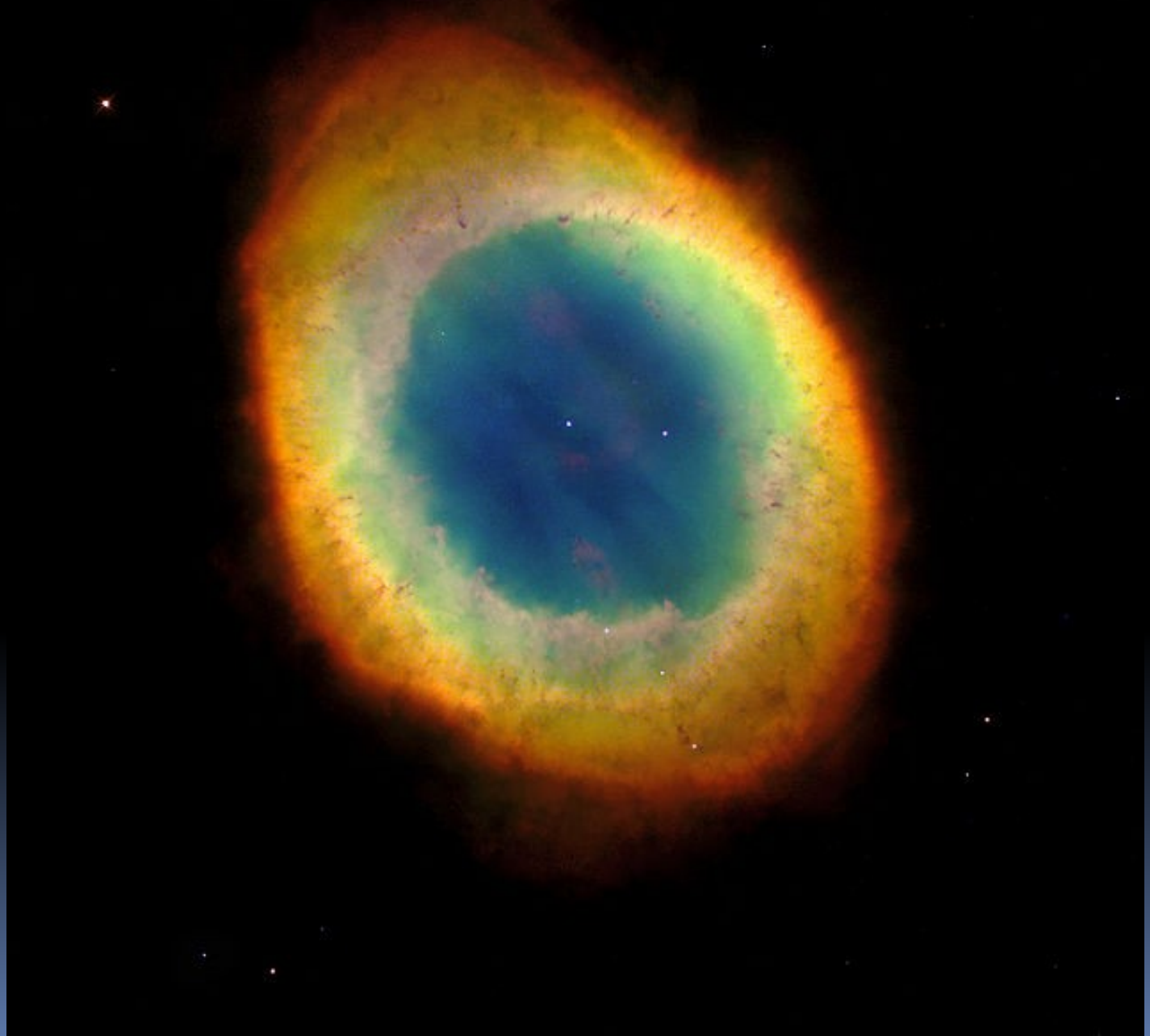


Muerte estelar

www.hubblesite.org



Medio interestelar enriquecido con “polvo” de estrellas.

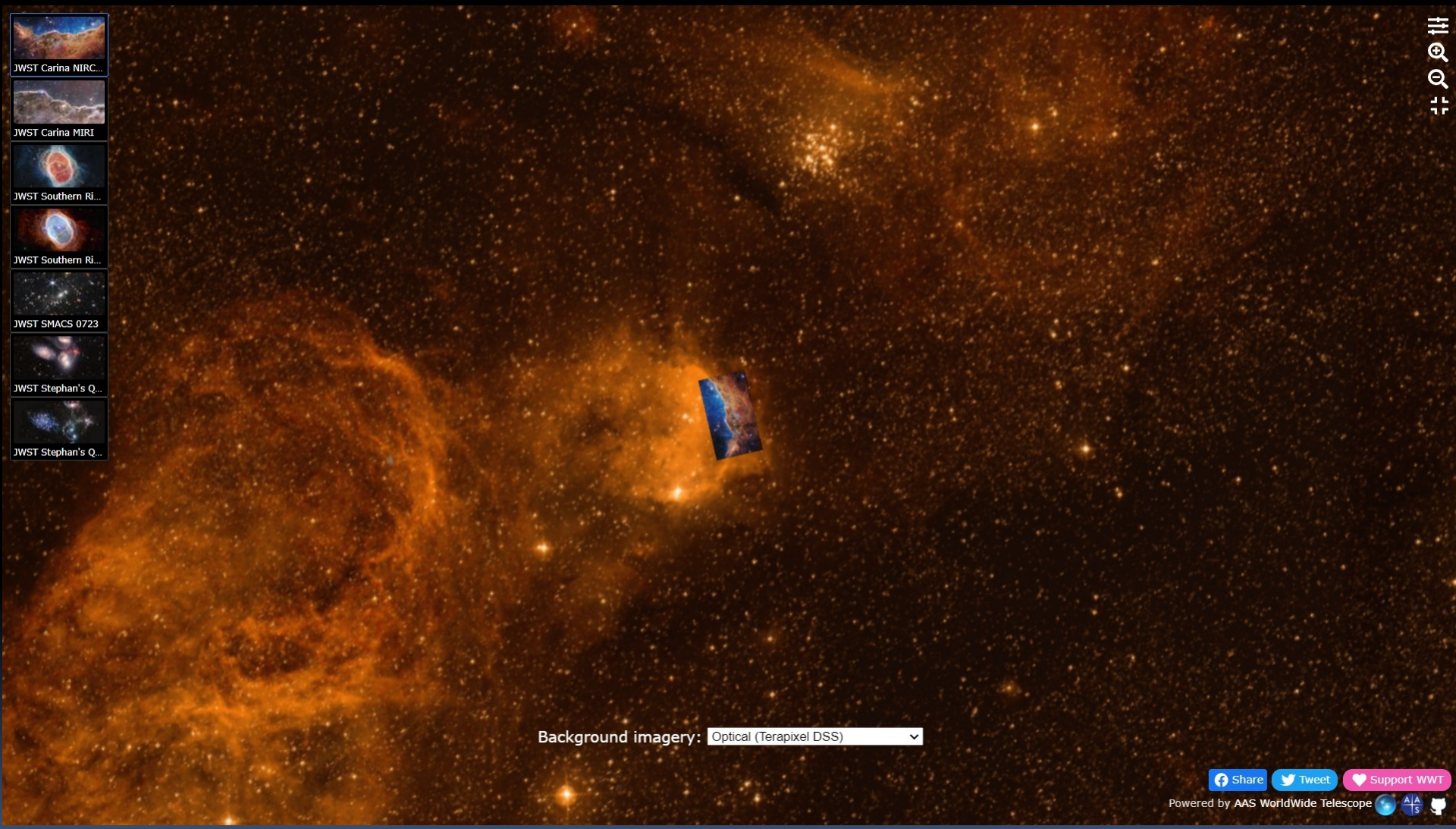


Principales elementos en el polvo: CHON

Protoplanetary Disks in the Orion Nebula **HST • WFPC2**

NASA, J. Bally (University of Colorado), H. Throop (SWRI), and C.R. O'Dell (Vanderbilt University) • STScI-PRC01-13

Formación estelar


JWST Carina NIRC...
JWST Carina MIRI
JWST Southern Ri...
JWST Southern Ri...
JWST SMACS 0723
JWST Stephan's Q...
JWST Stephan's Q...
Background imagery:
Optical (Terapixel DSS)
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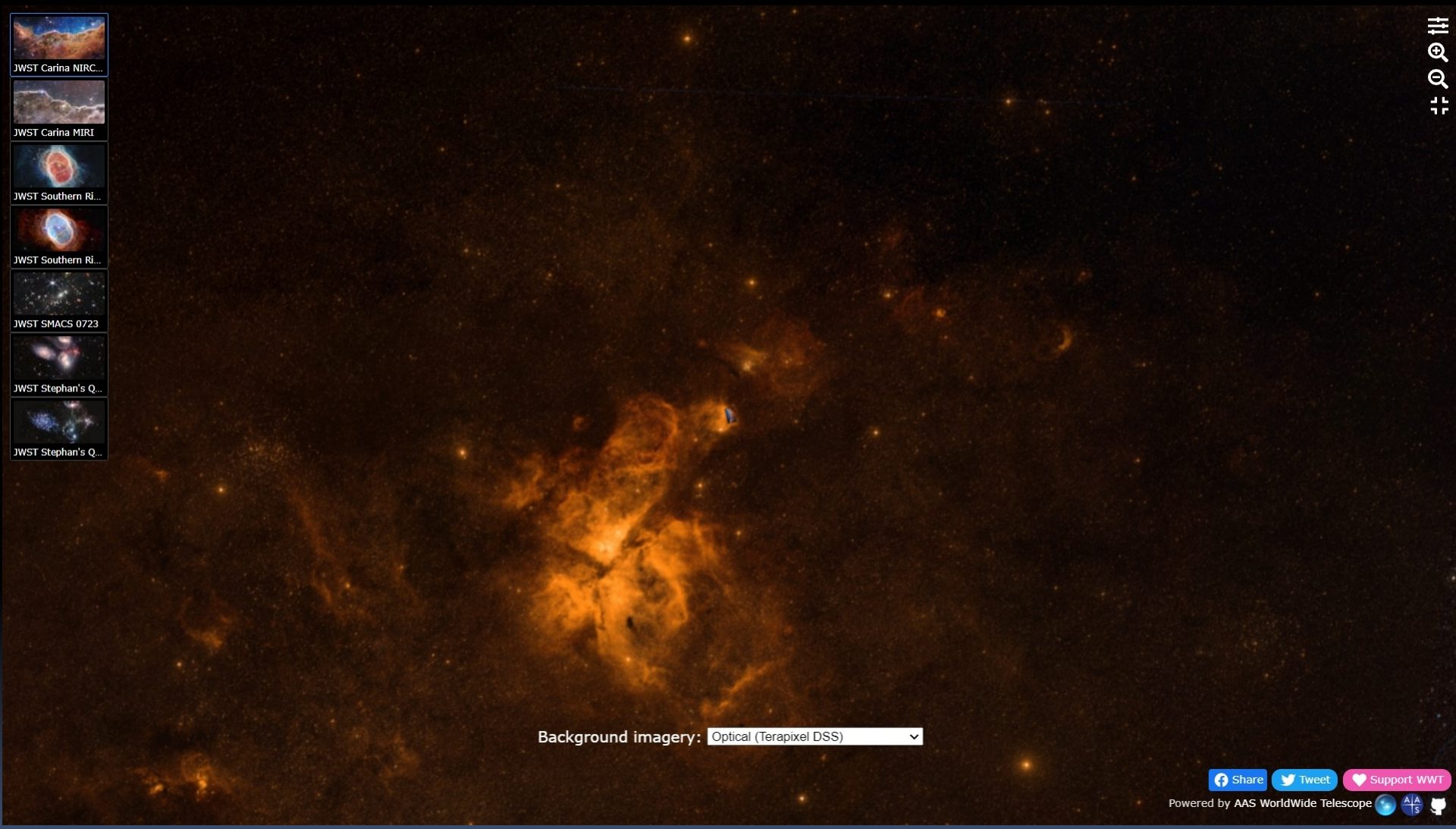
Powered by AAS WorldWide Telescope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JWST Stephan's Q...
Background imagery:
Optical (Terapixel DSS)
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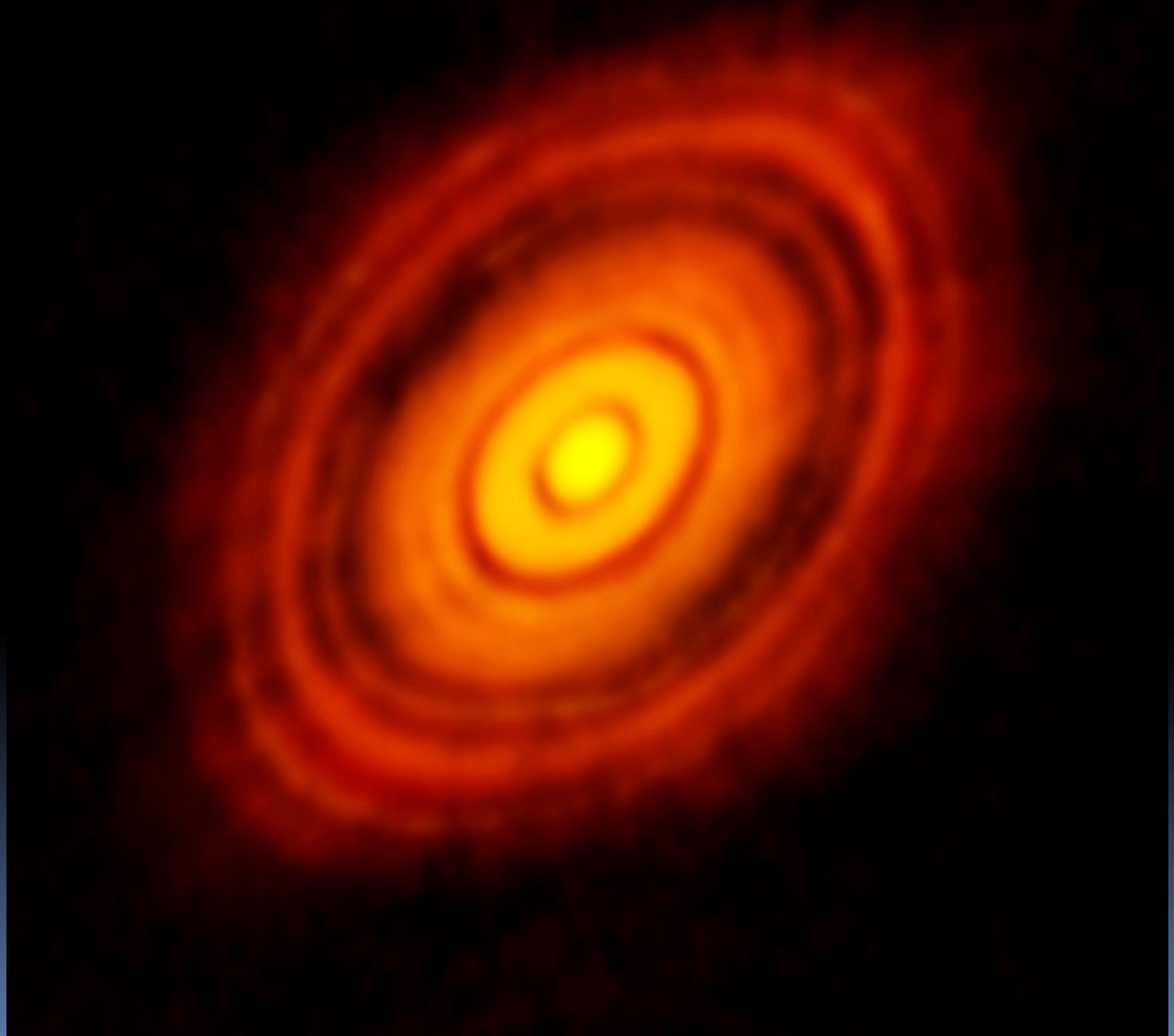
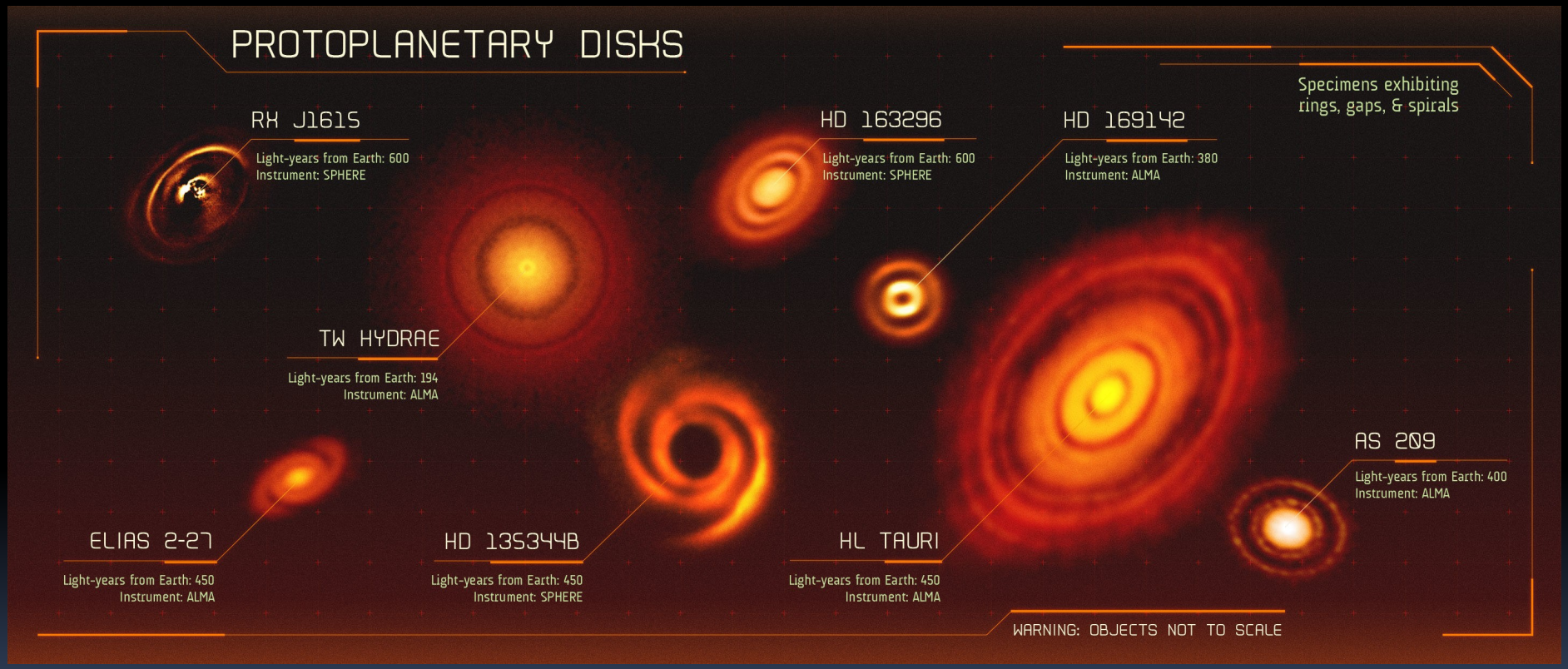
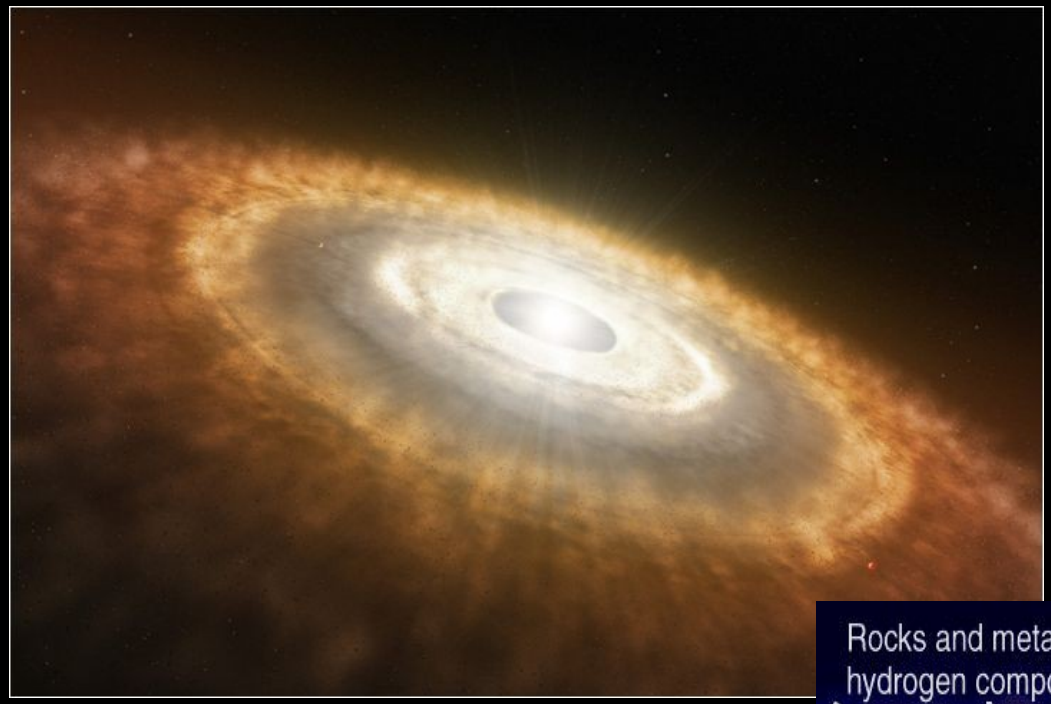
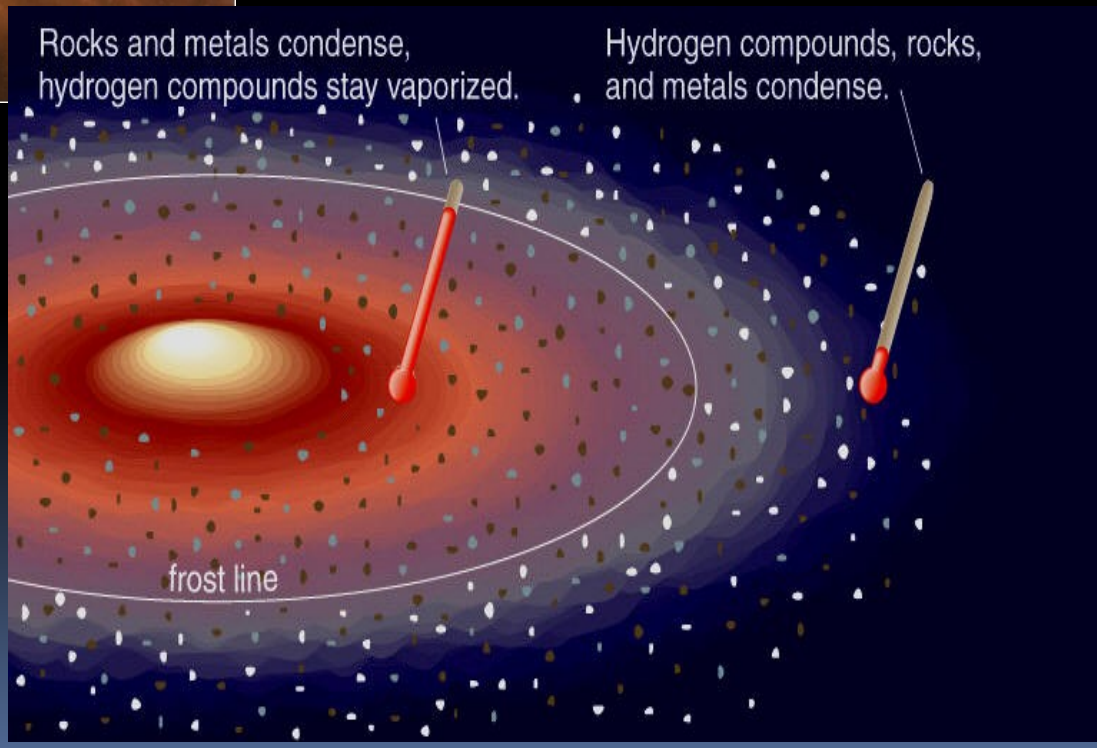
Formación Sistema planetario

Disco protoplanetario a 450 AL de la Tierra



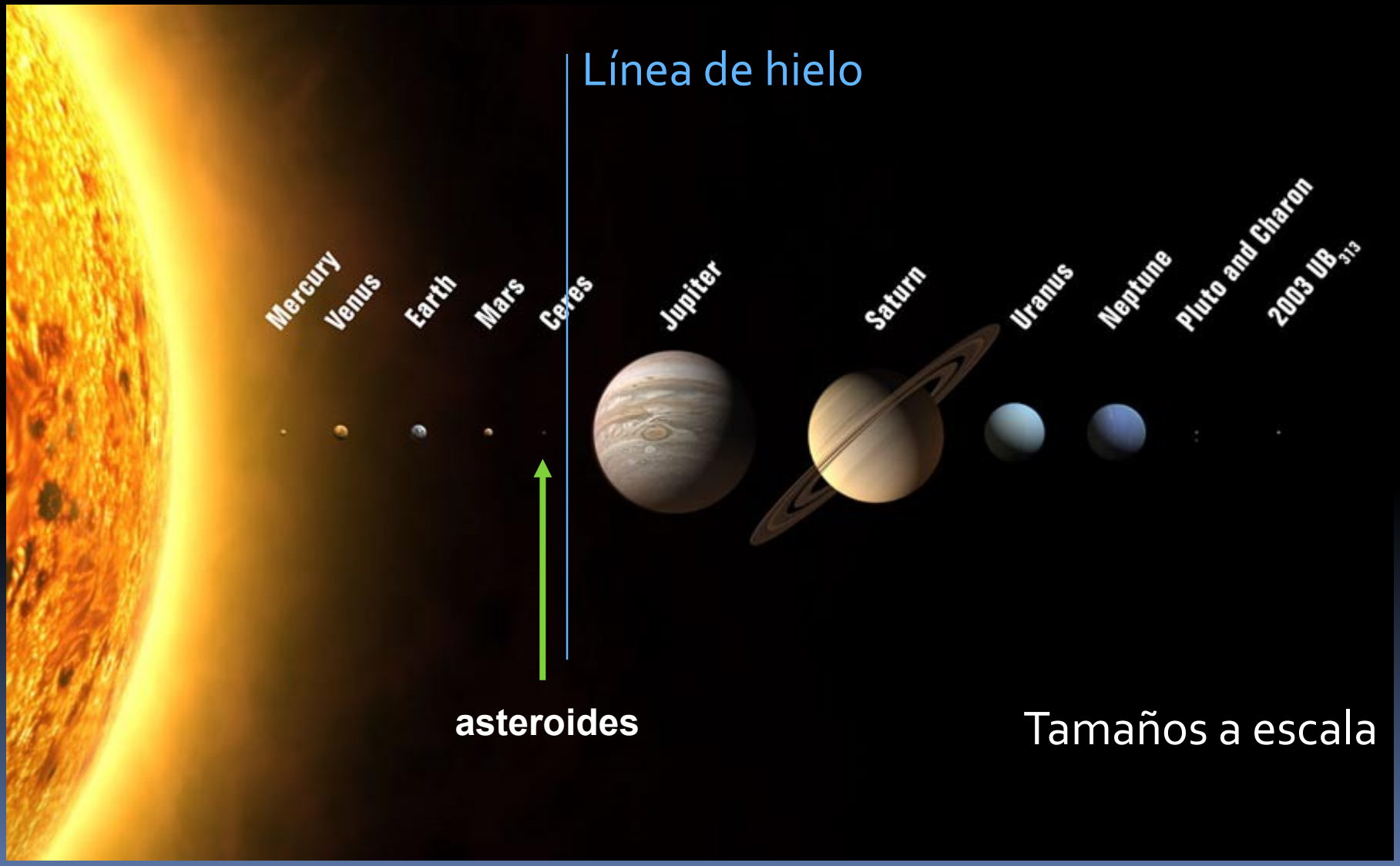

PROTOPLANETARY DISKS
Specimens exhibiting rings, gaps, & spirals
RX J1615
Light-years from Earth: 600
Instrument: SPHERE
HD 163296
Light-years from Earth: 600
Instrument: SPHERE
HD 169142
Light-years from Earth: 380
Instrument: ALMA
TW HYDRAE
Light-years from Earth: 194
Instrument: ALMA
AS 209
Light-years from Earth: 400
Instrument: ALMA
ELIAS 2-27
Light-years from Earth: 450
Instrument: ALMA
HD 135344B
Light-years from Earth: 450
Instrument: SPHERE
HL TAURI
Light-years from Earth: 450
Instrument: ALMA
WARNING: OBJECTS NOT TO SCALE




Rocks and metals condense,
hydrogen compounds stay vaporized.
Hydrogen compounds, rocks,
and metals condense.
frost line

Sistema Solar

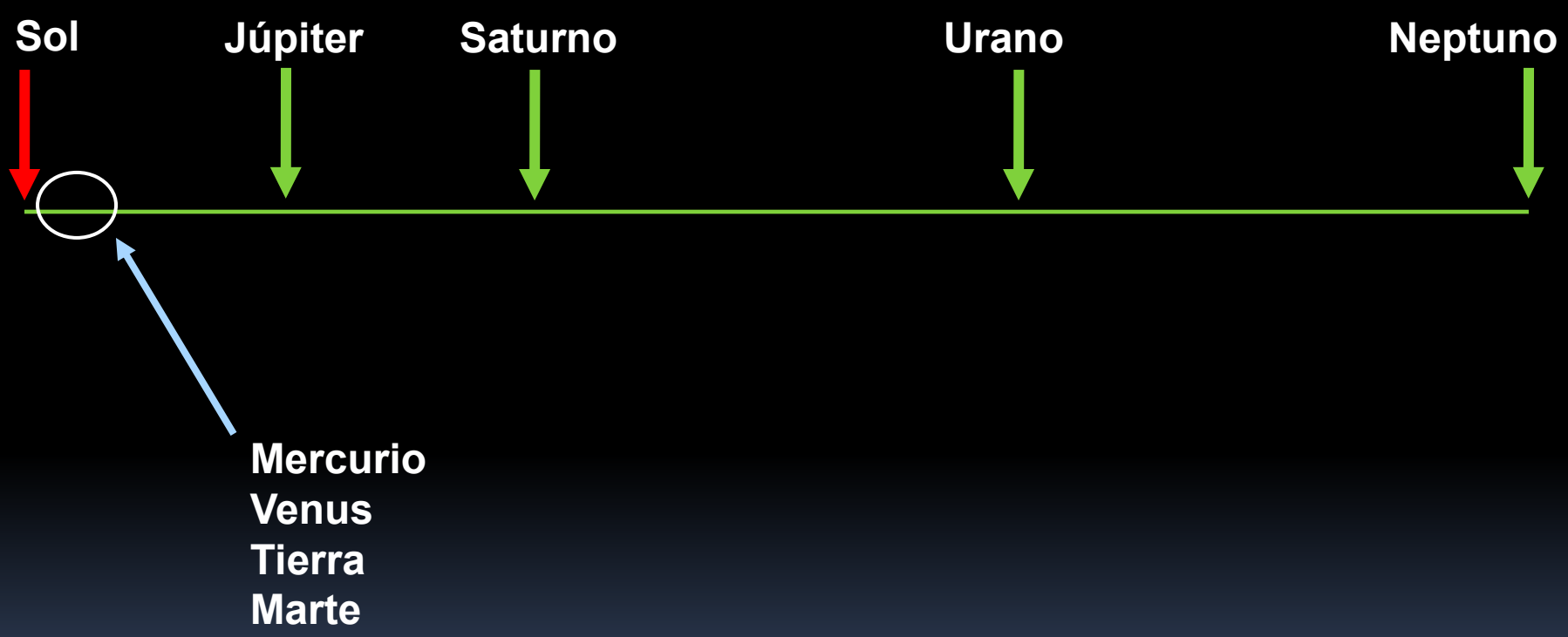
Mundos rocosos, gaseosos y helados



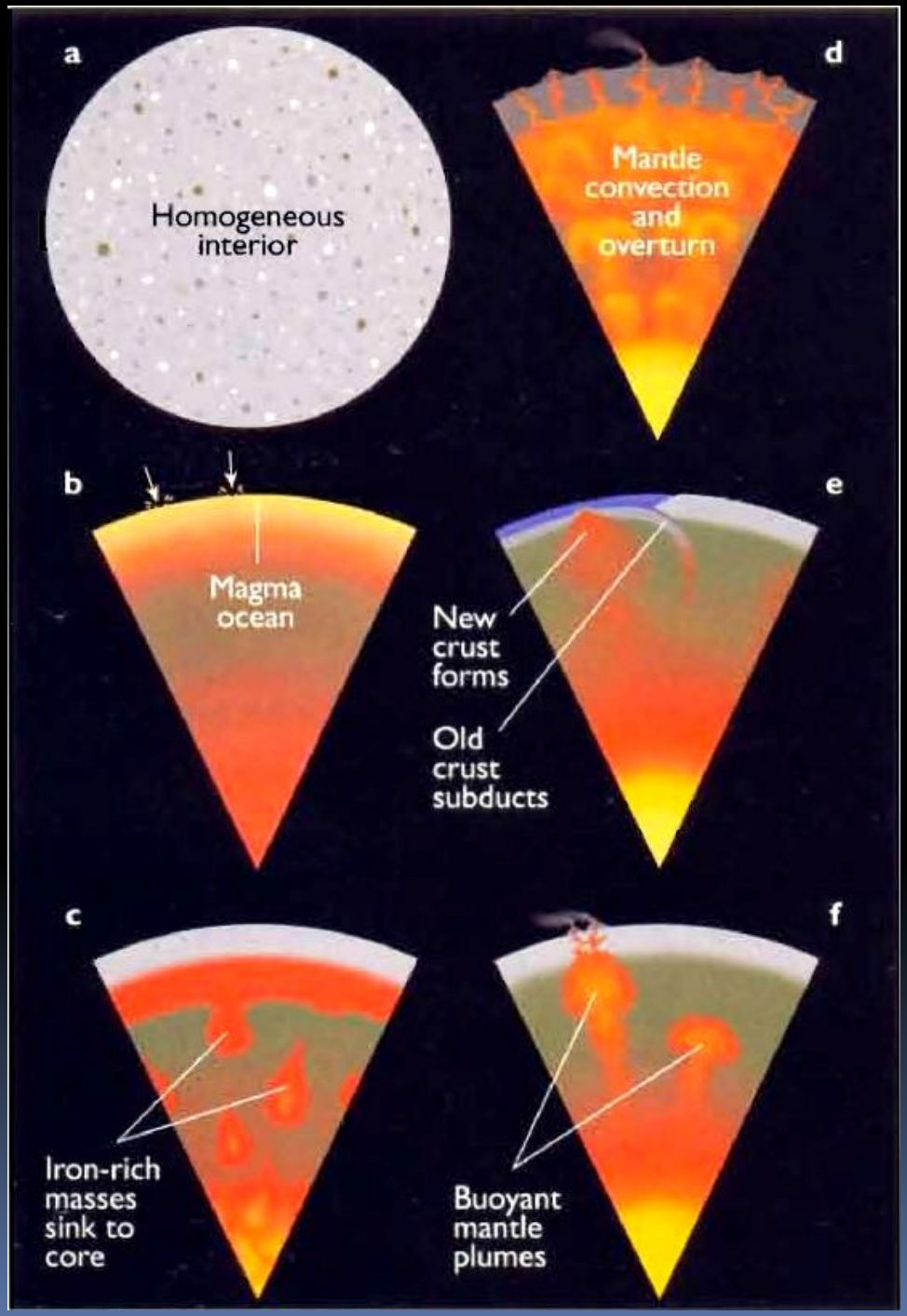
Tamaños a escala

Sistema Solar

Distancias a escala



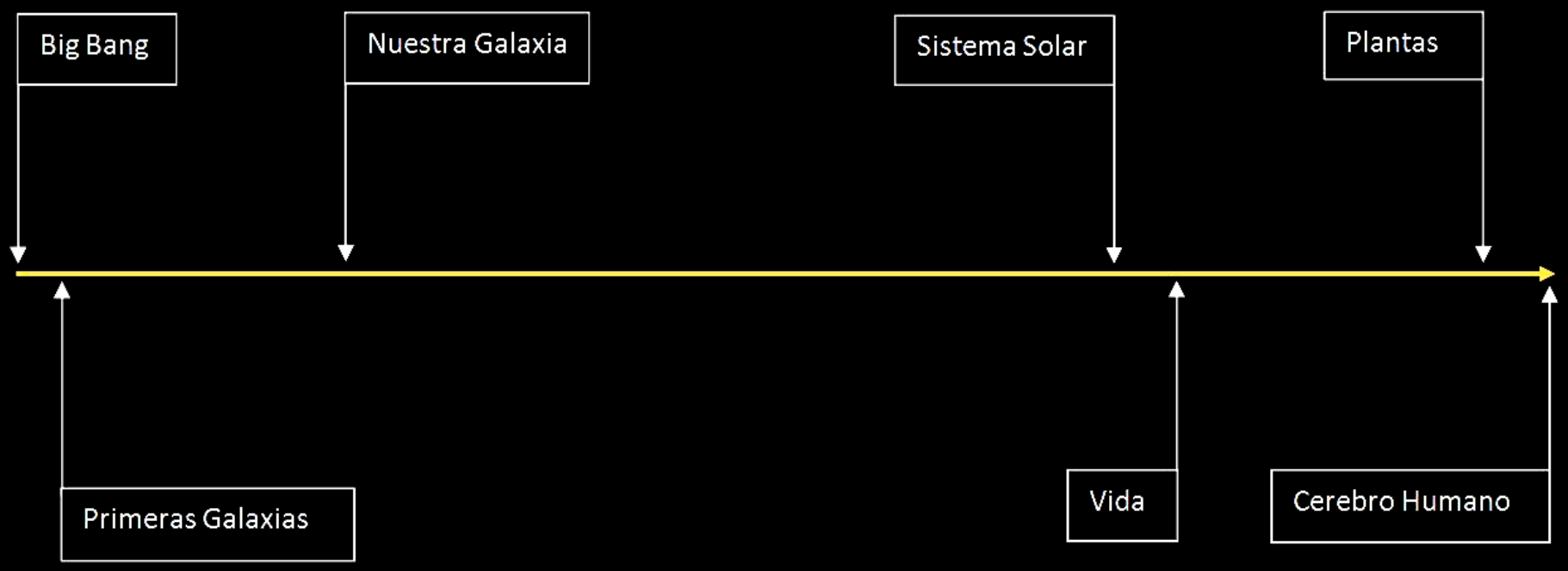
Evolución planetaria



Meteorito: material primitivo

Meteorito de San Carlos

Cronología



Big Bang: hace 13.700 millones de años

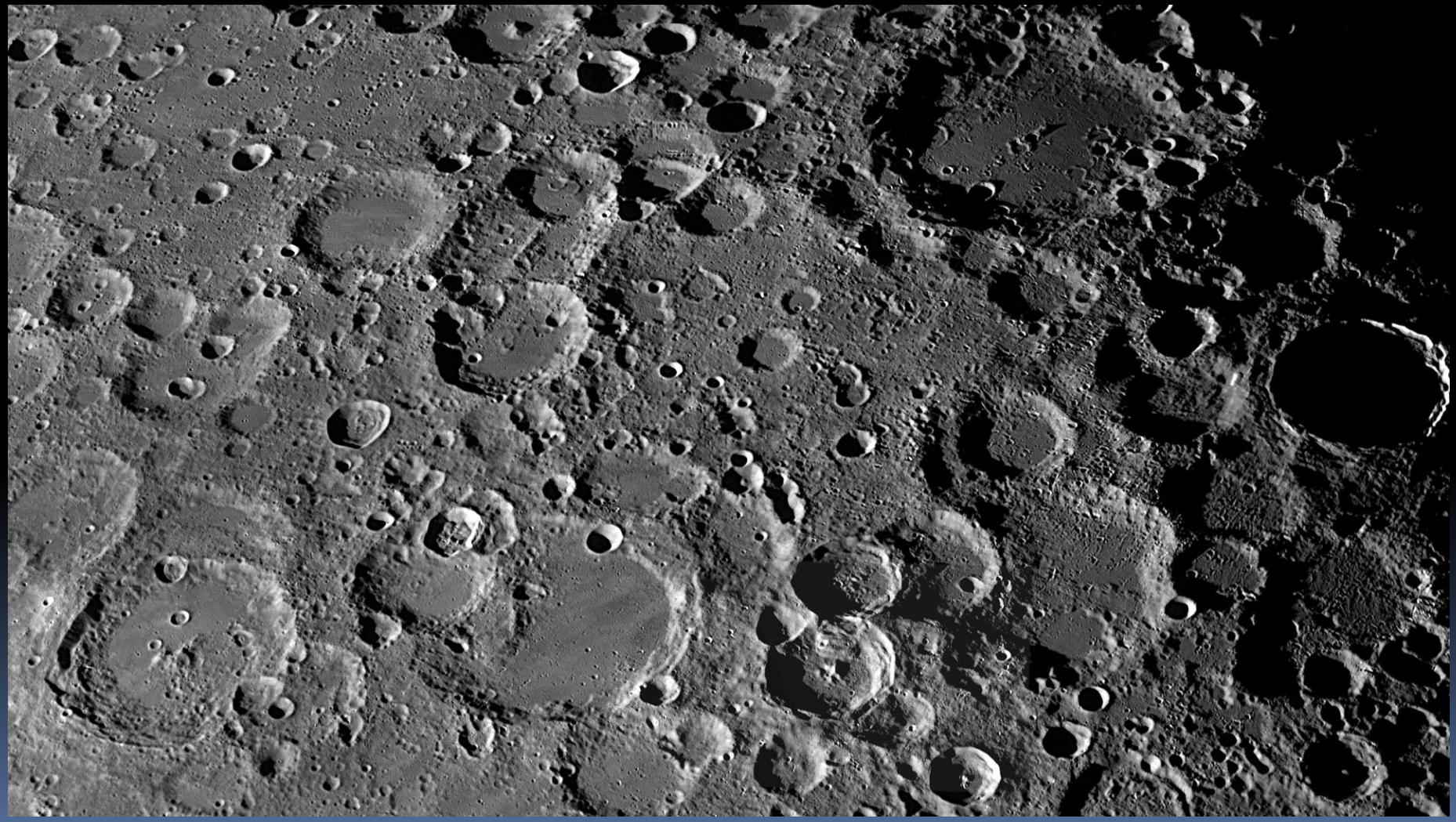
Mercurio: fosilizado y sin atmósfera

-170 C < Temperatura < 400 C

DIA

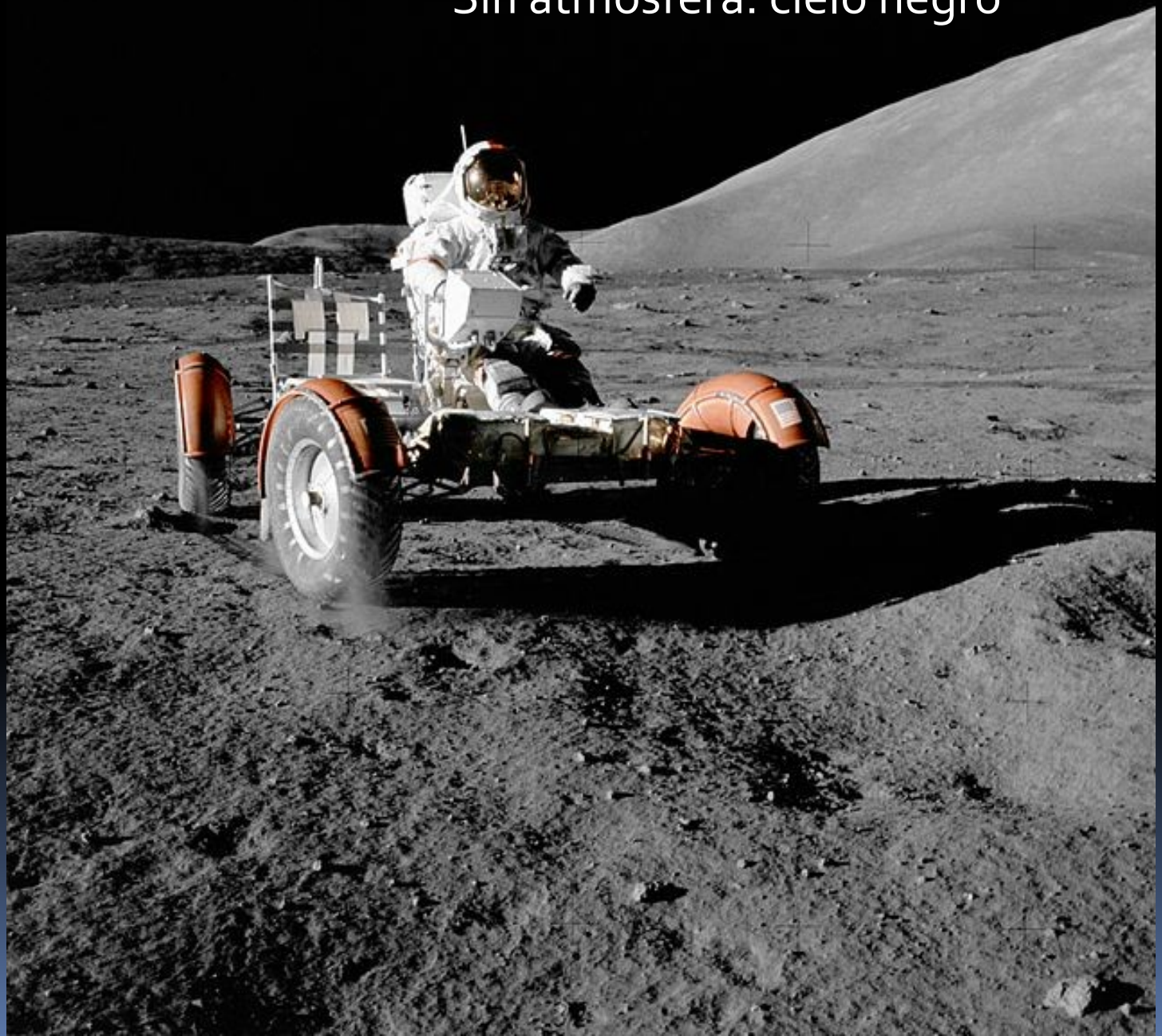
NOCHE

Cráteres lunares: bombardeo



Luna

Sin atmósfera: cielo negro



Venus

Roca sólida y seca (basaltos)

Marte

Sin agua superficial.

Hielo subsuperficial (permafrost)

Agua sólida, líquida y gaseosa: ¿de dónde proviene?

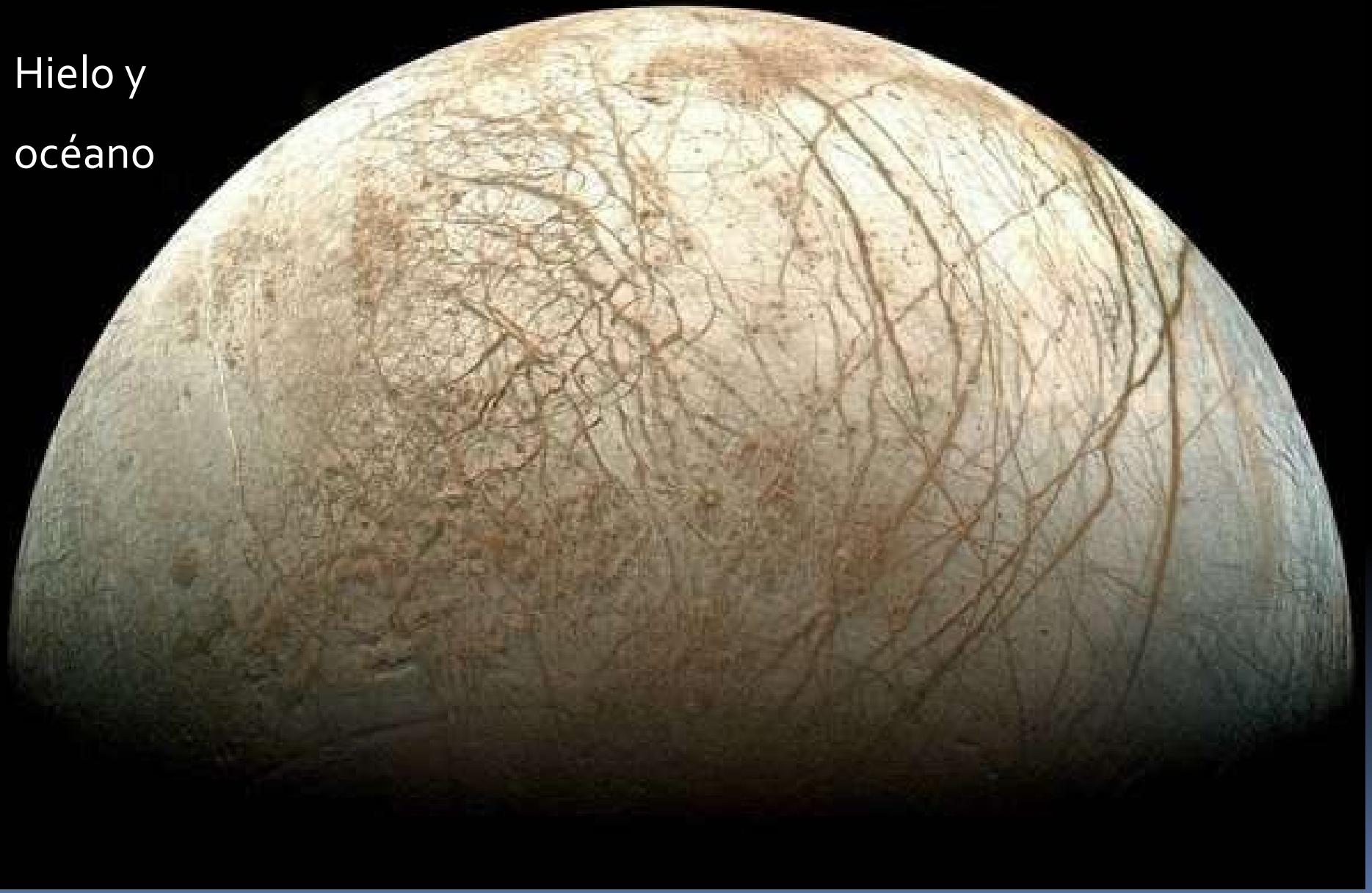
Única atmósfera rica en Oxígeno: energía y protección UV.

Júpiter

Europa (satélite)

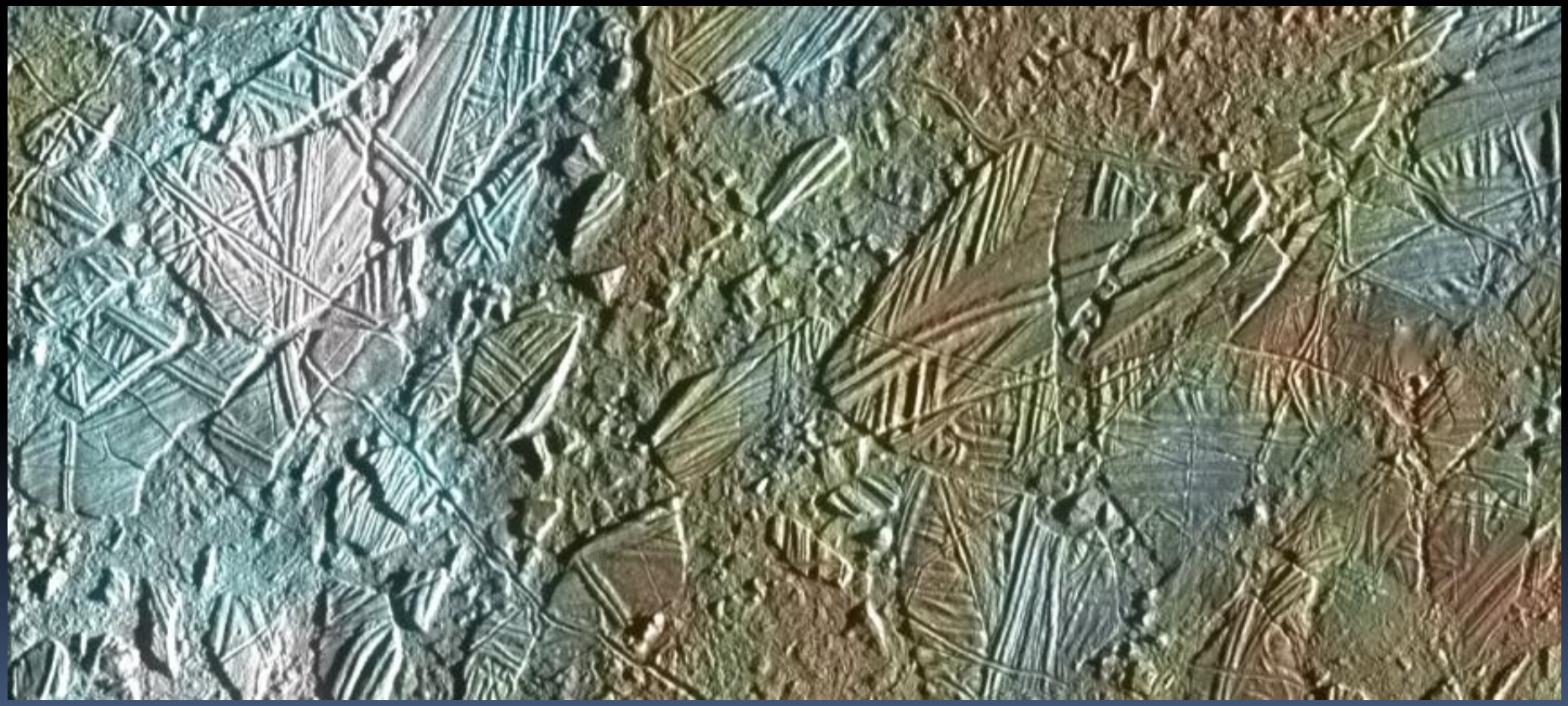
Hielo y

océano



Europa

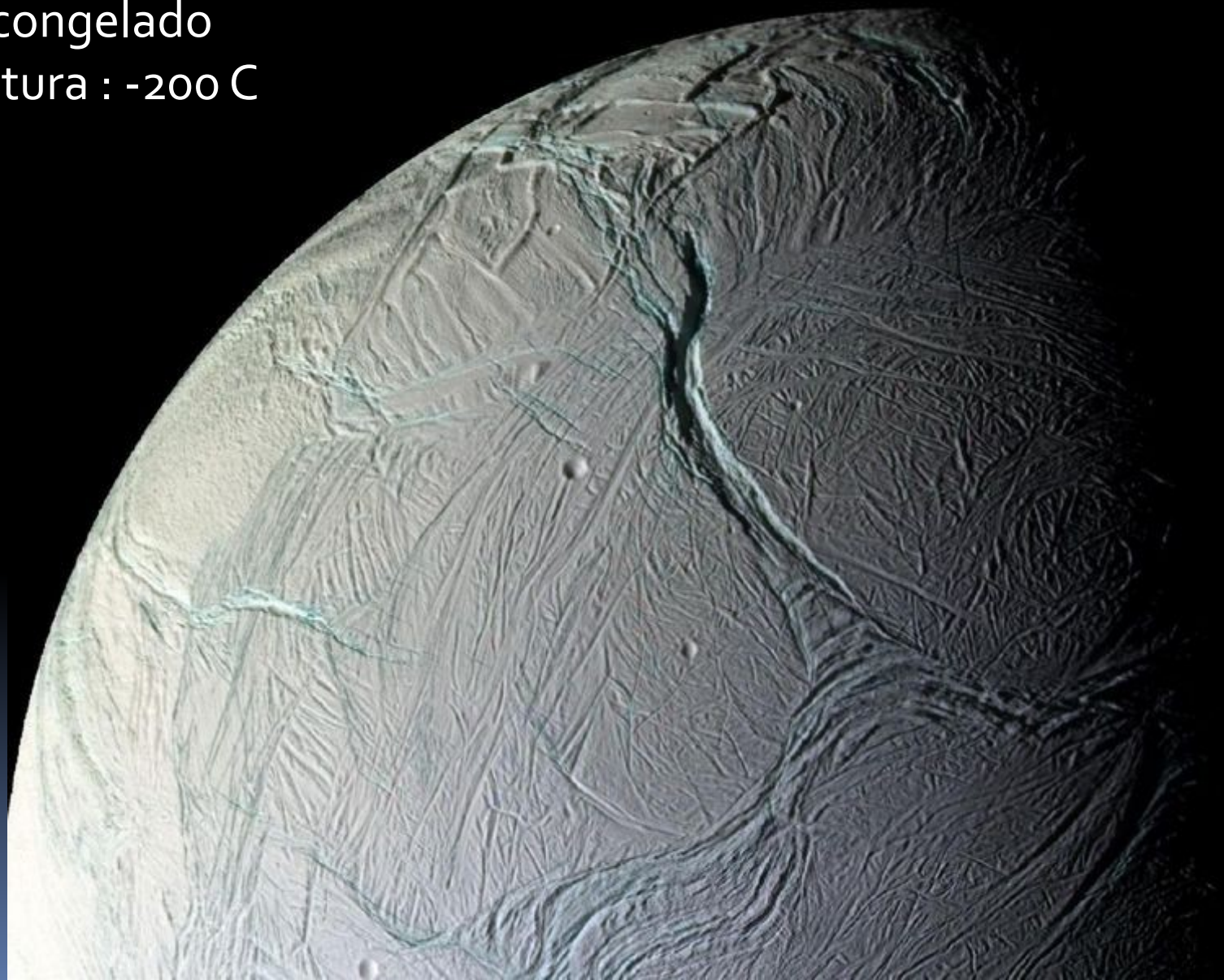
Manchas marrones: tholins



Saturno

Encelado

Océano congelado
Temperatura : -200 C

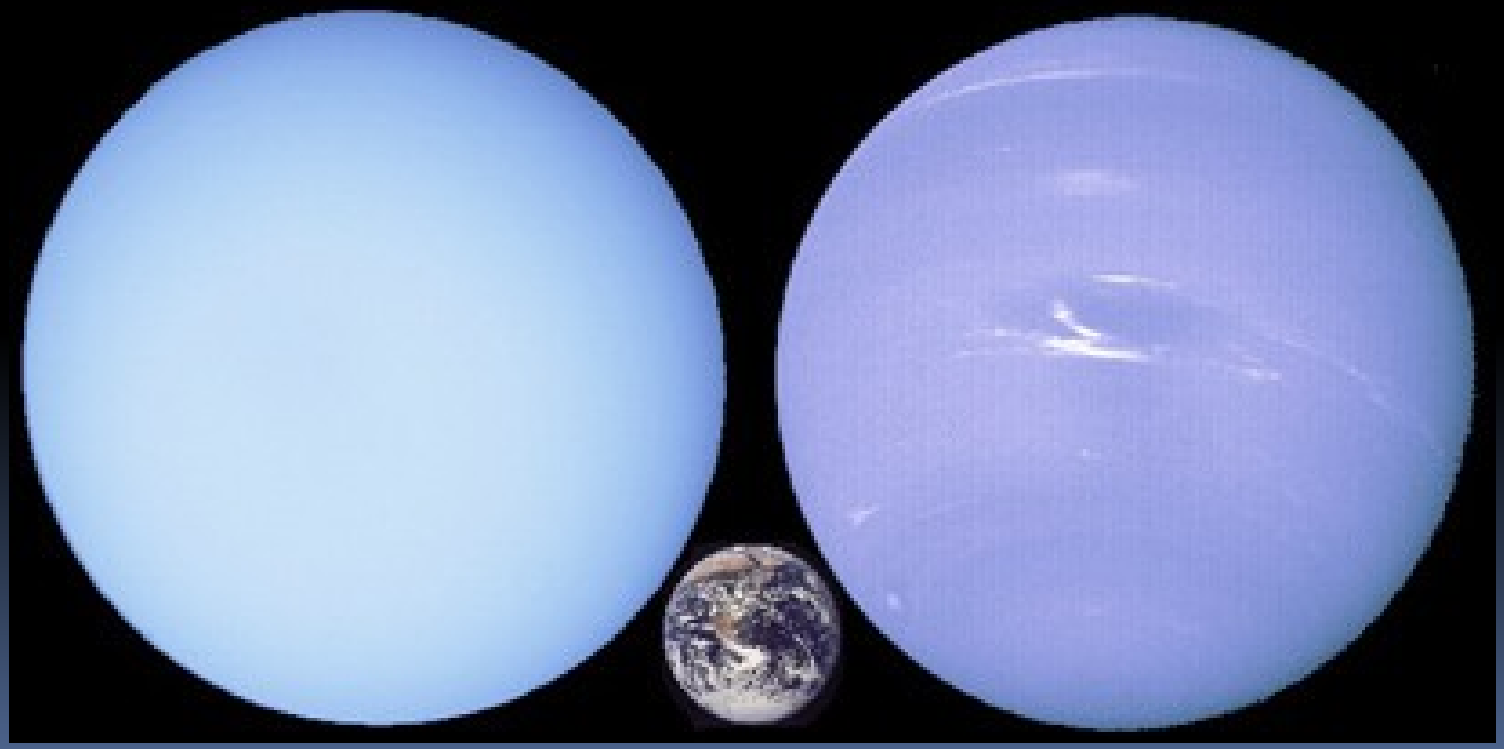


Encelado

Compuestos orgánicos

Urano y Neptuno

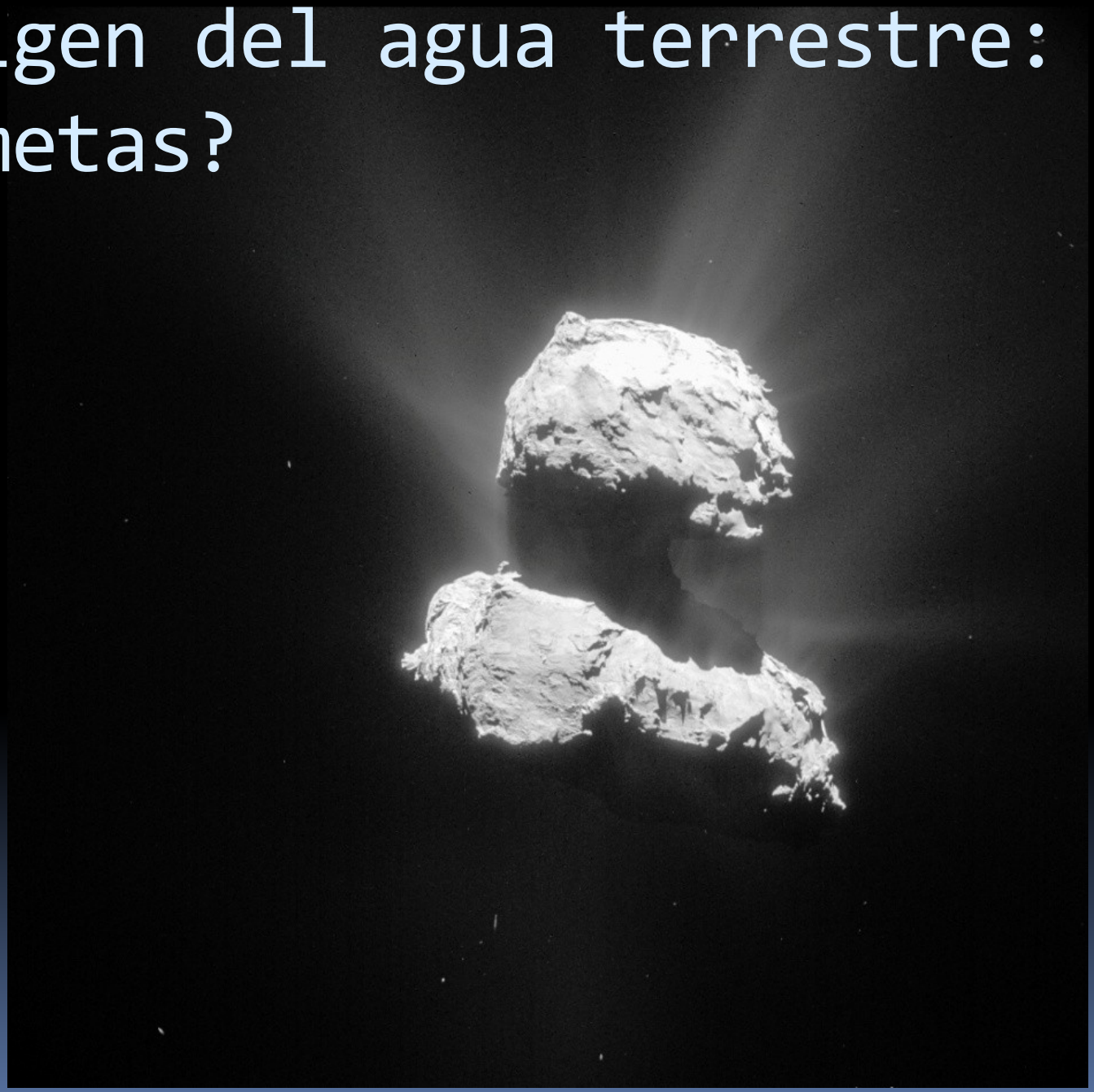
$CH_4 + NH_3$
Temp: -220 C



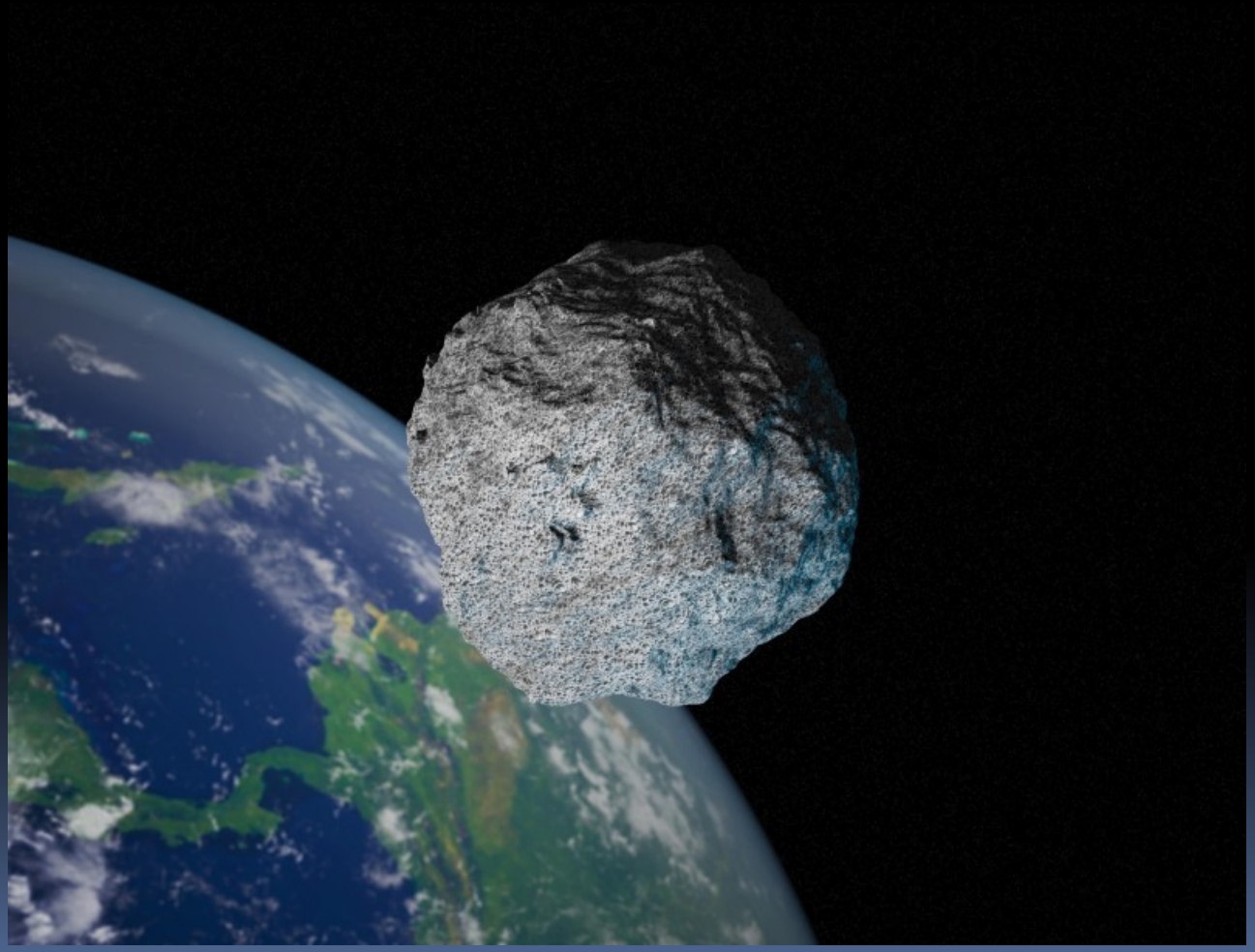
Plutón

Manchas marrones: tholins

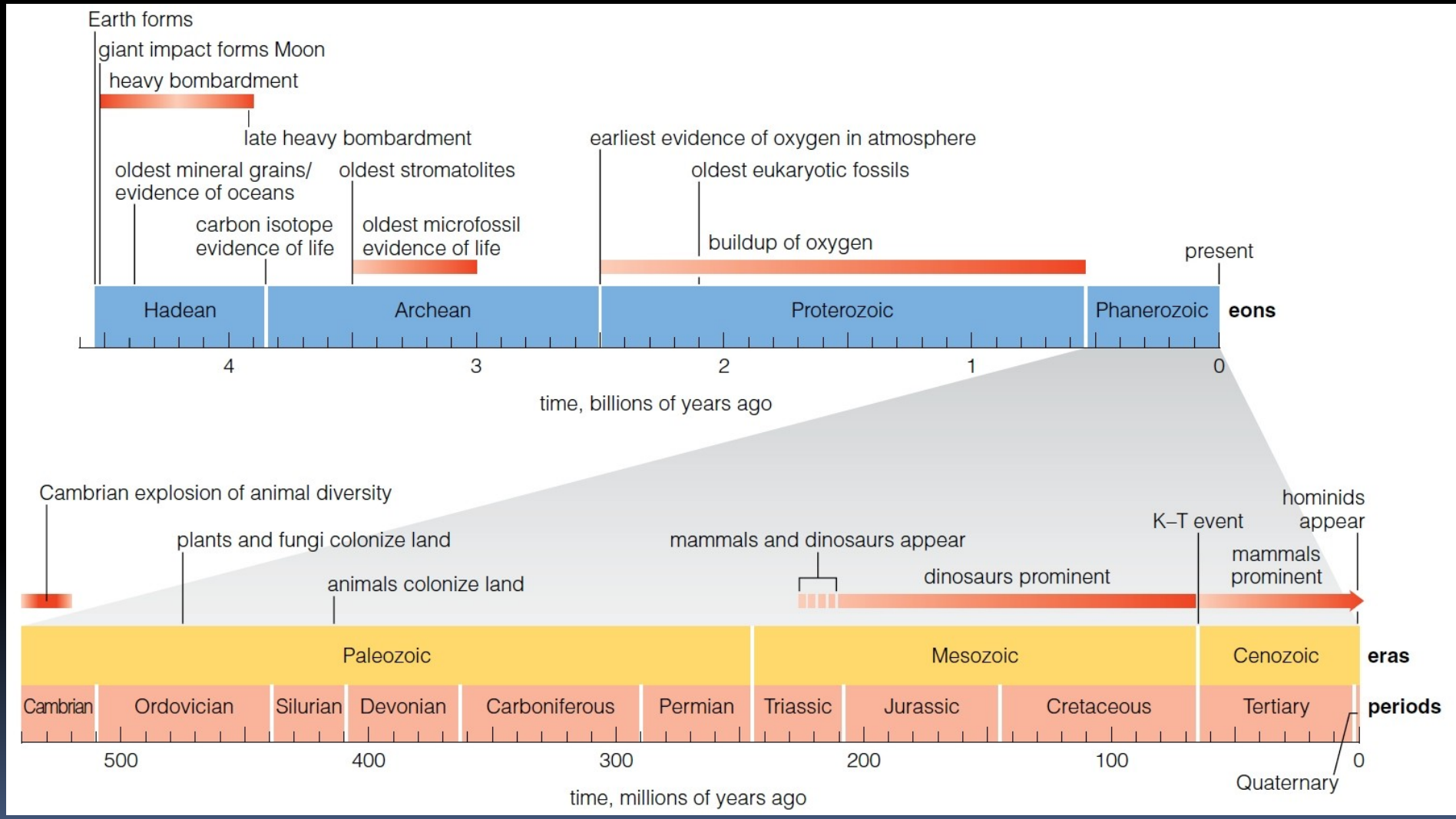
Origen del agua terrestre: cometas?



Origen del agua: asteroides?



Origen de la vida



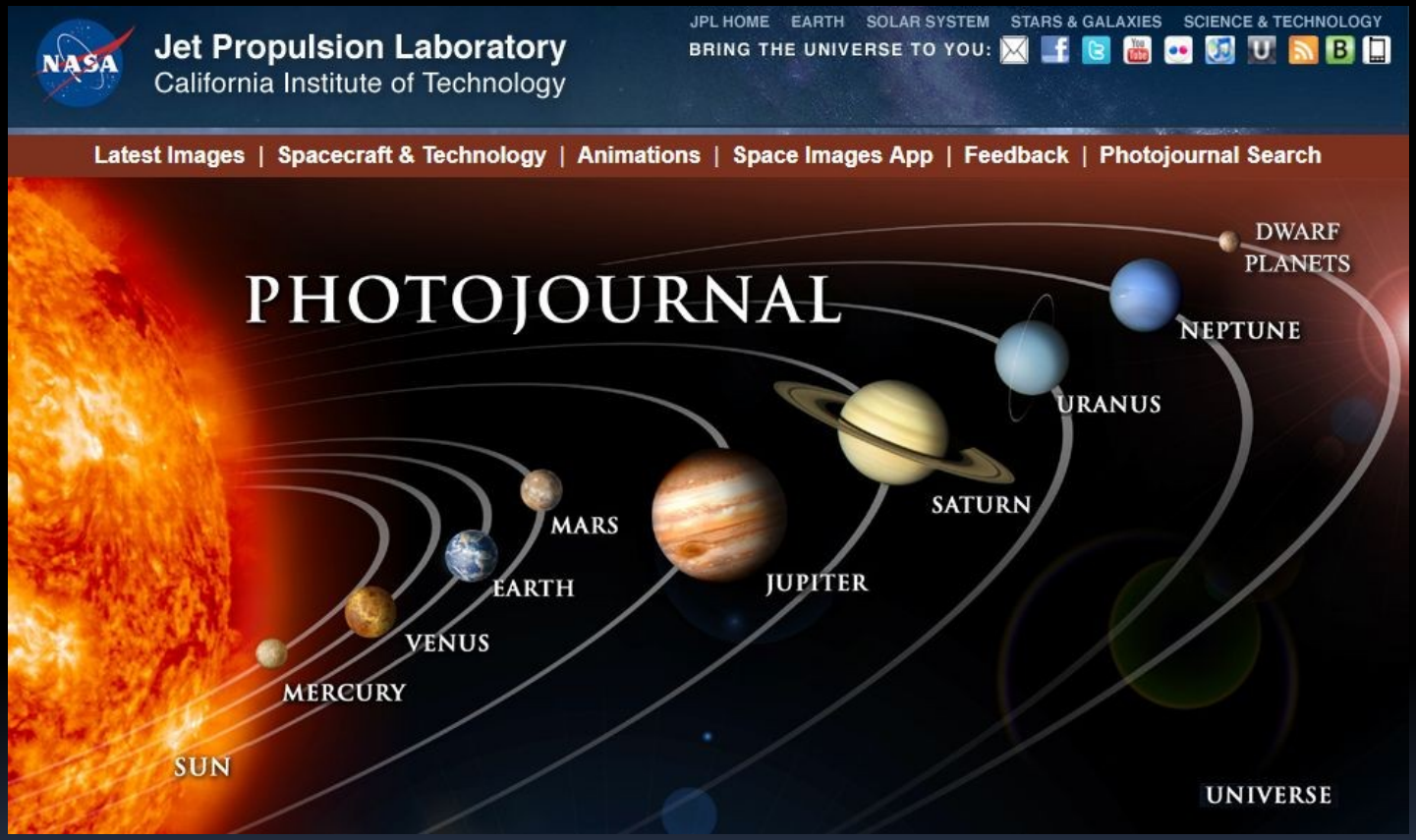
Estromatolitos: hace 3600 millones de años

Origen de la vida: experimento de Miller-Urey

PROYECTO
MUSEO
DEL TIEMPO

www.museodeltiempo.org.uy/efemerides/index.htm

photojournal.jpl.nasa.gov



www.astronomia.edu.uy/sistemasolar

FIN

Gracias!