

# Vom Weltall in die Wüste – Meteorite erzählen, wie unser Sonnsystem entstand

Dominik Hezel





## **AOR PD Dr Dominik Hezel**

am Institut für Geowissenschaften der GU seit dem 1. Januar 2021  
für die Leitung des Elektronenstrahl-Labors  
Forschung über Kosmochemie & Meteorite  
Datenbanken & Digitale Themen  
Digitale Lehre

Was sind Meteorite?

Warum sind Meteorite wichtig?

Was erzählen uns Meteorite?

Wo finden wir Meteorite?

# Was sind Meteorite?

## Warum sind Meteorite wichtig?

## Was erzählen uns Meteorite?

## Wo finden wir Meteorite?



Chelyabinsk (LL5)  
15. Februar 2013



9. Oktober 1992





25. Juli 2024

# Charlottetown meteorite

文 A Add languages ▾

Article Talk

Read Edit View history Tools ▾

From Wikipedia, the free encyclopedia

The **Charlottetown meteorite** was a [meteorite fall](#) observed on July 25, 2024. It is notable as the only meteorite known with video and audio of the impact recorded, and as the only known meteorite fall in [Prince Edward Island](#).<sup>[2]</sup>

The Charlottetown meteorite is classified as [H5 ordinary chondrite](#).  
<sup>[1]</sup>

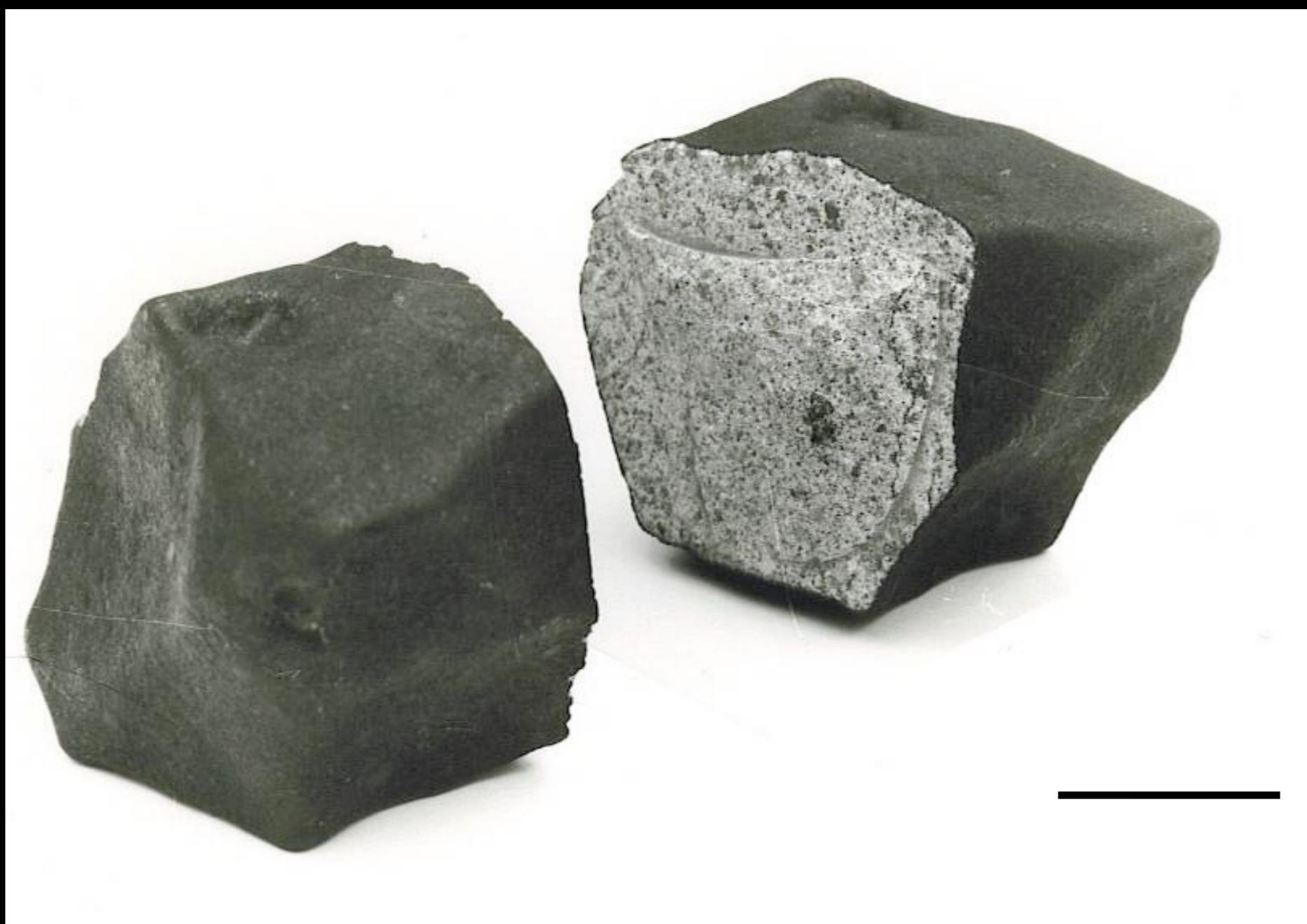
## Impact [ edit ]

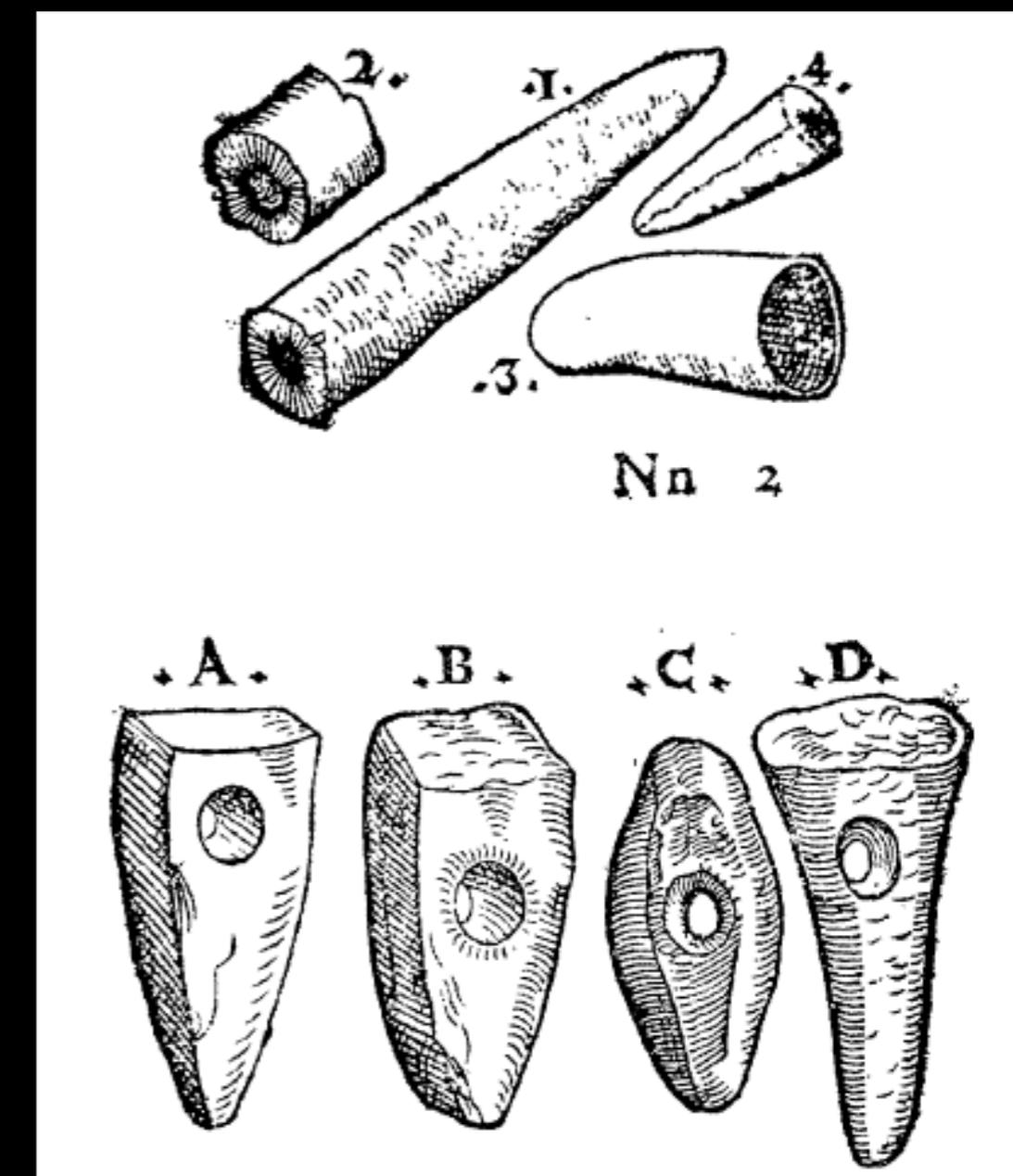
After coming home from an evening walk in Marshfield neighborhood of [Charlottetown, Prince Edward Island](#), Laura Kelly and her partner Joe Velaidum found a starburst pattern of gray dust on their sidewalk. They cleared it away, not knowing what it was.

### Charlottetown

Type	Chondrite <sup>[1]</sup>
Class	Ordinary chondrite
Group	H2 <sup>[1]</sup>
Country	Canada
Region	Prince Edward Island
Observed fall	Yes
Fall date	17:02:20, July 25, 2024 (-03:00)
Found date	July 25, 2024
TKW	95 g (3.4 oz)

[1]





*Durchsichtig erscheint die Luft, so rein,  
Und trägt im Busen Stahl und Stein.  
Entzündet werden sie sich begegnen,  
Da wird's Metall und Steine regnen*

J. W. Goethe

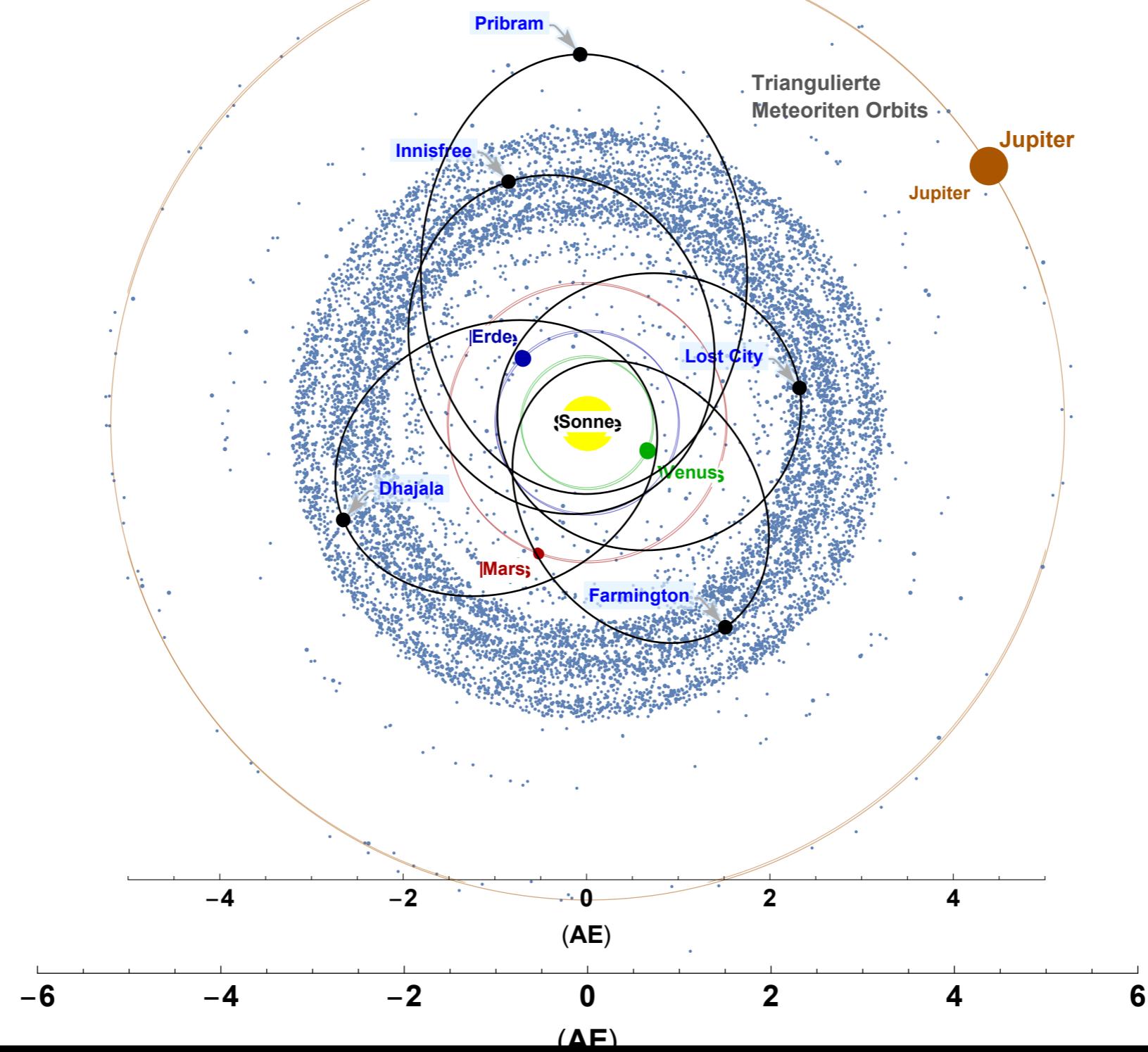


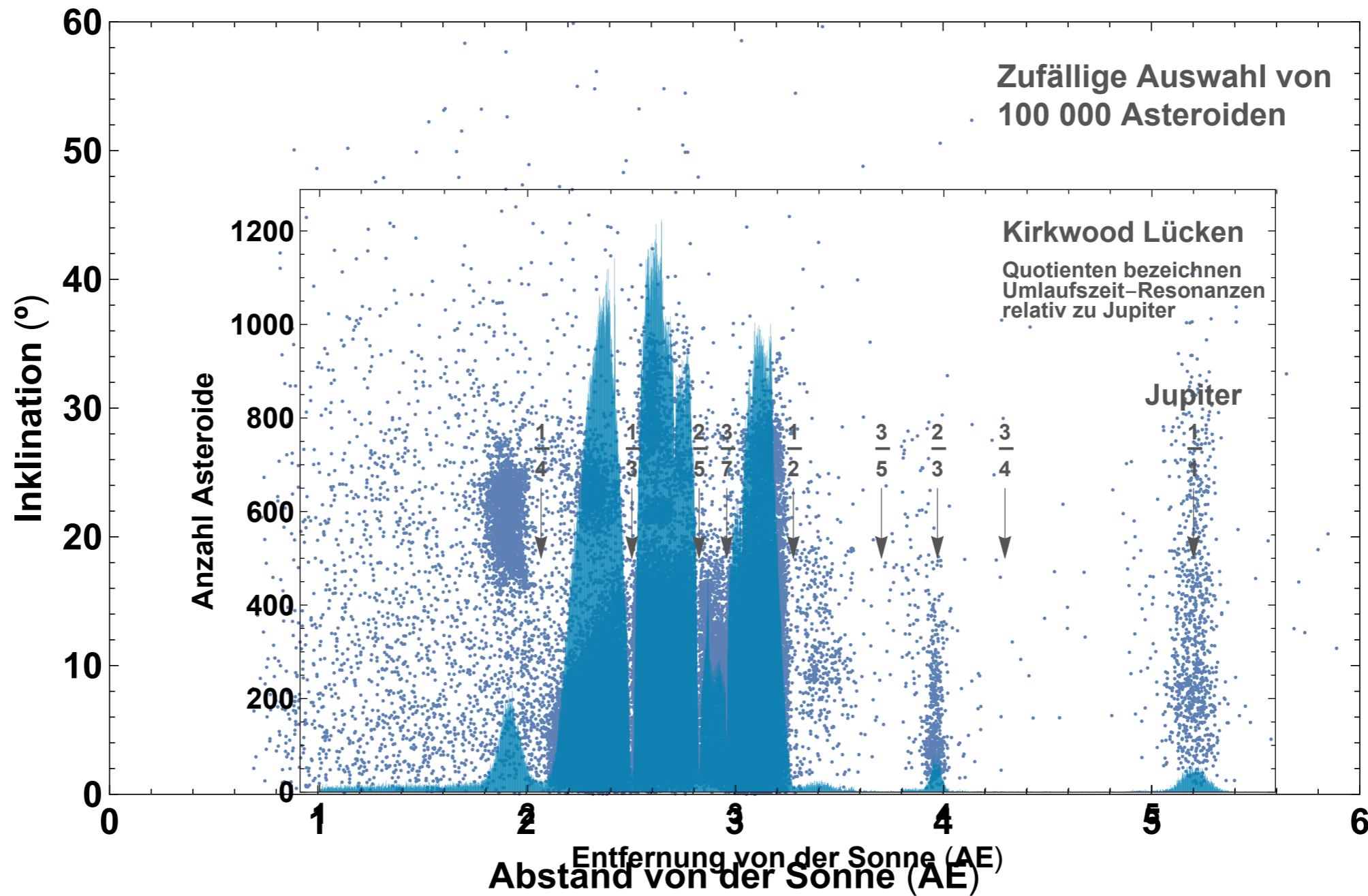
*Ernst Florens Friedrich Chladni*

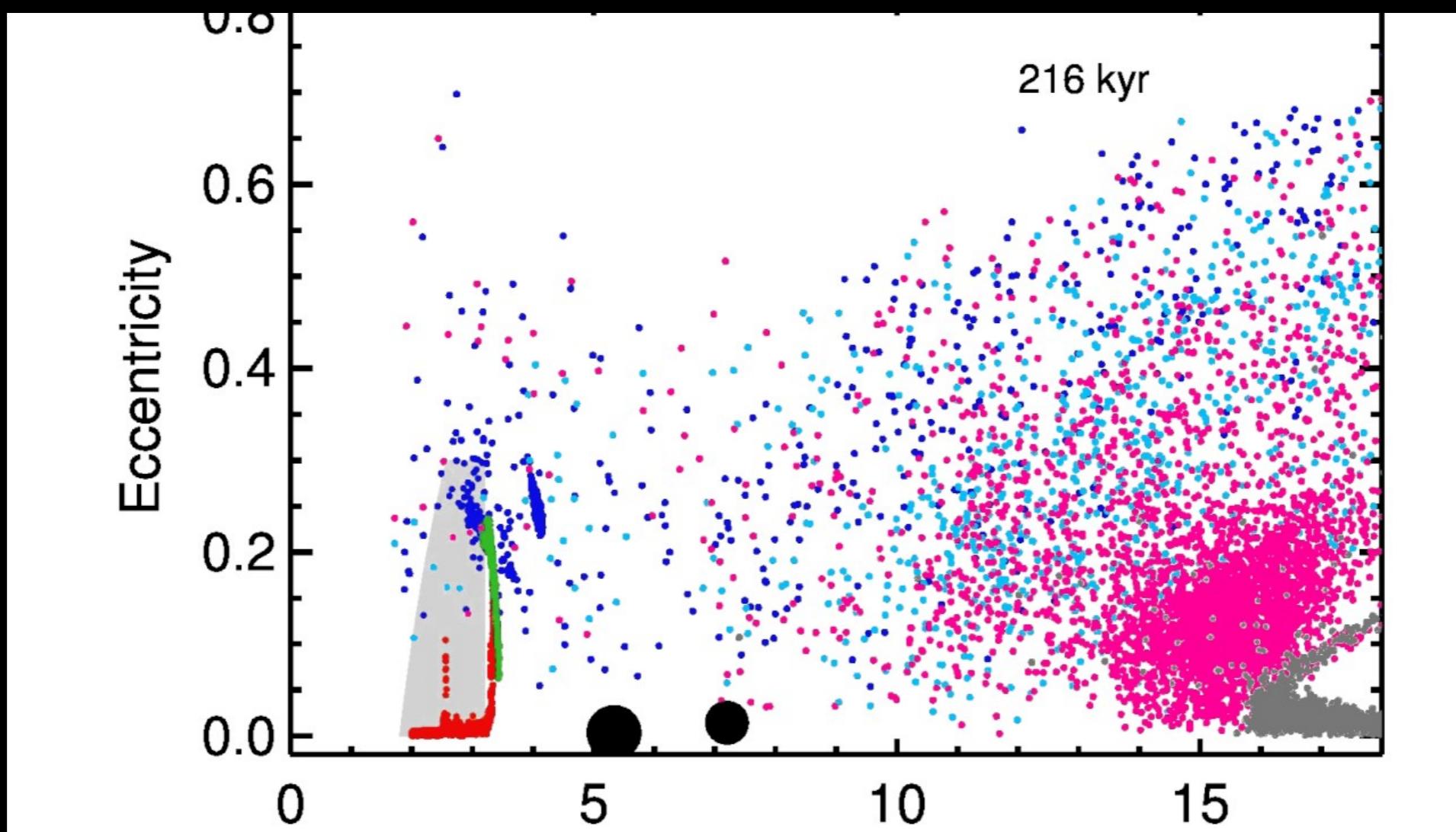
1794

FIG. 2. The title page of Chladni's book, *Eisenmassen...*, 1794. (From reprint edition, 1974, University of Arizona Press.)

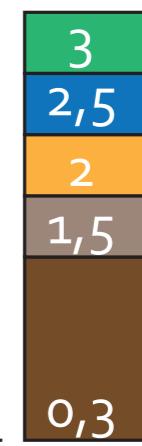
Zufällige Auswahl von  
10 000 Asteroiden



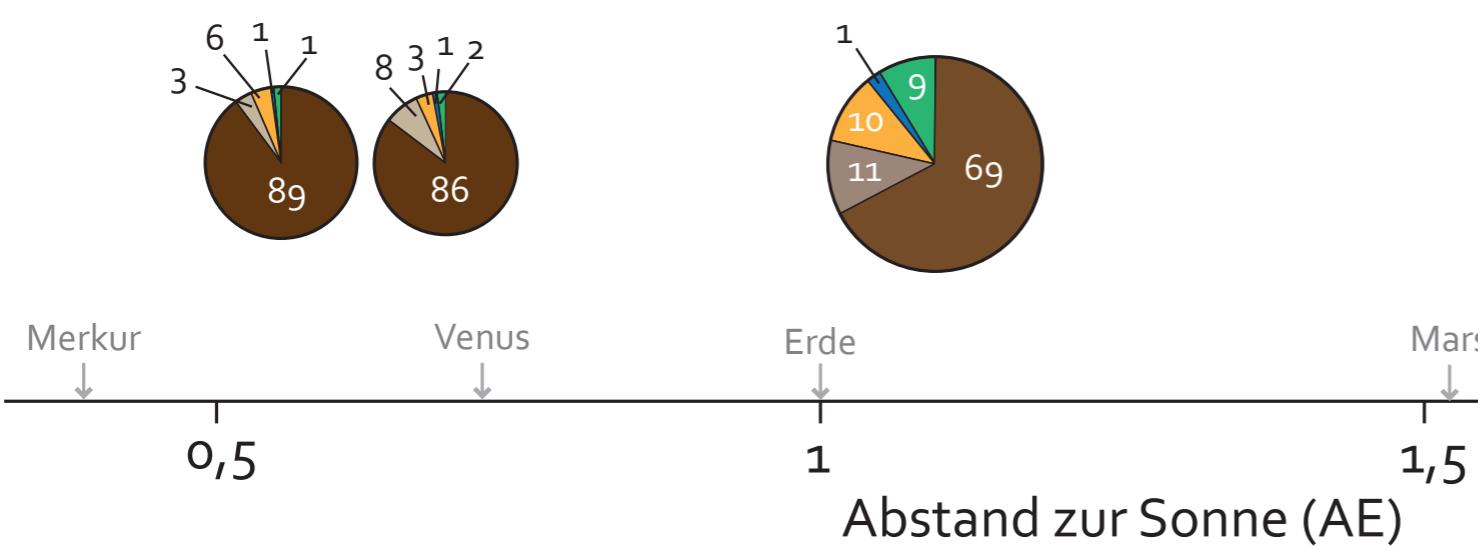


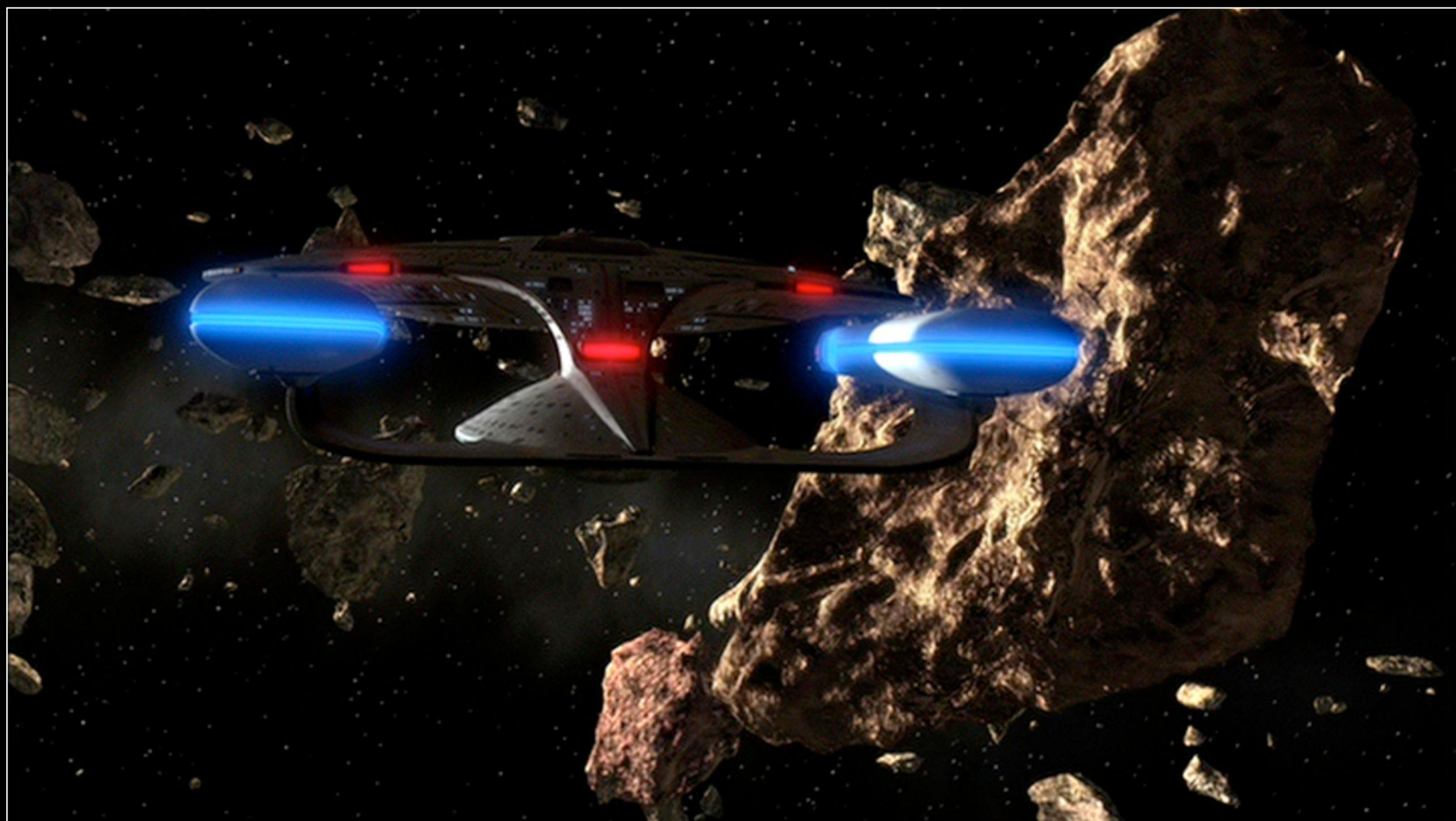


## Herkunftsregion des Materials (AE)

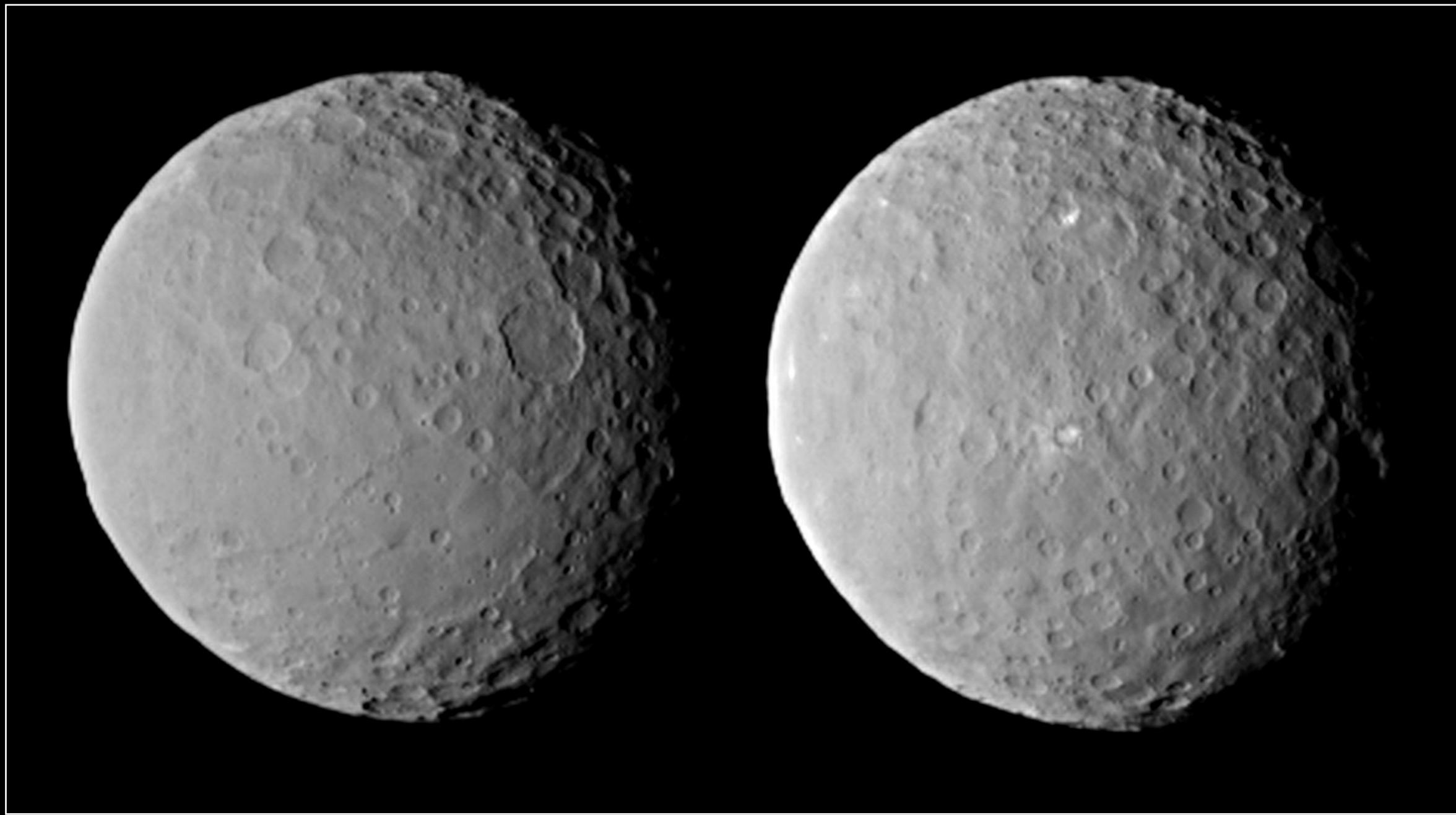


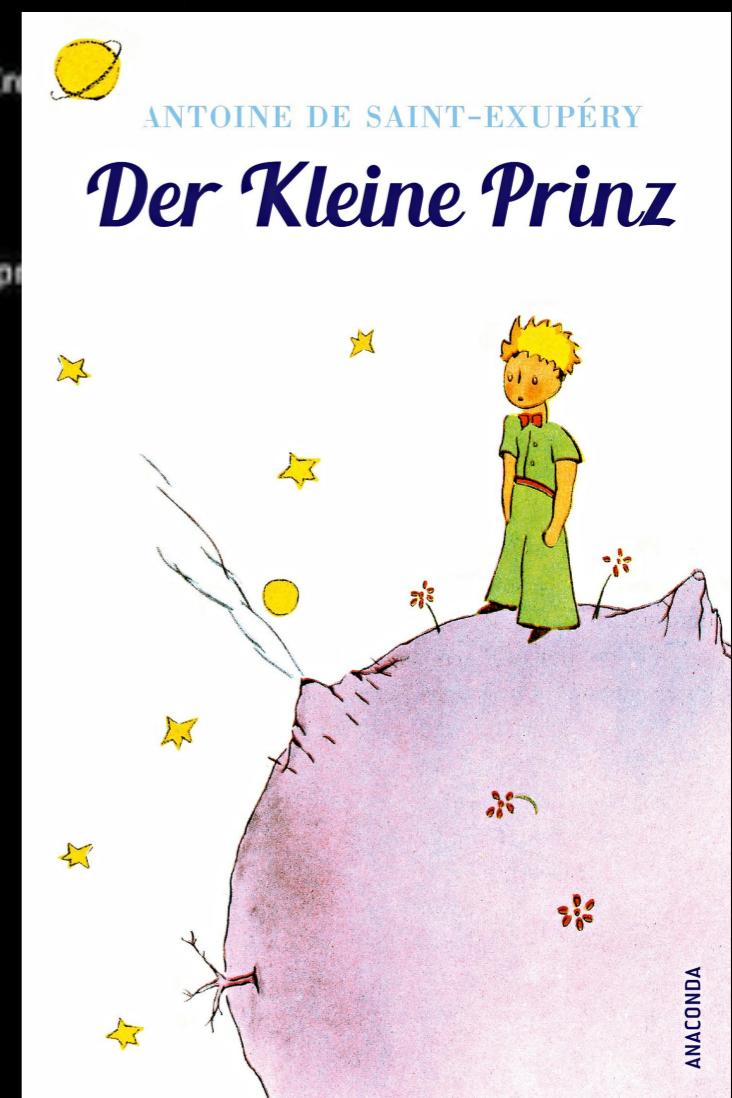
Herkunft und Beitrag planetarischer Bausteine bei der Modellierung von Planeten (%)





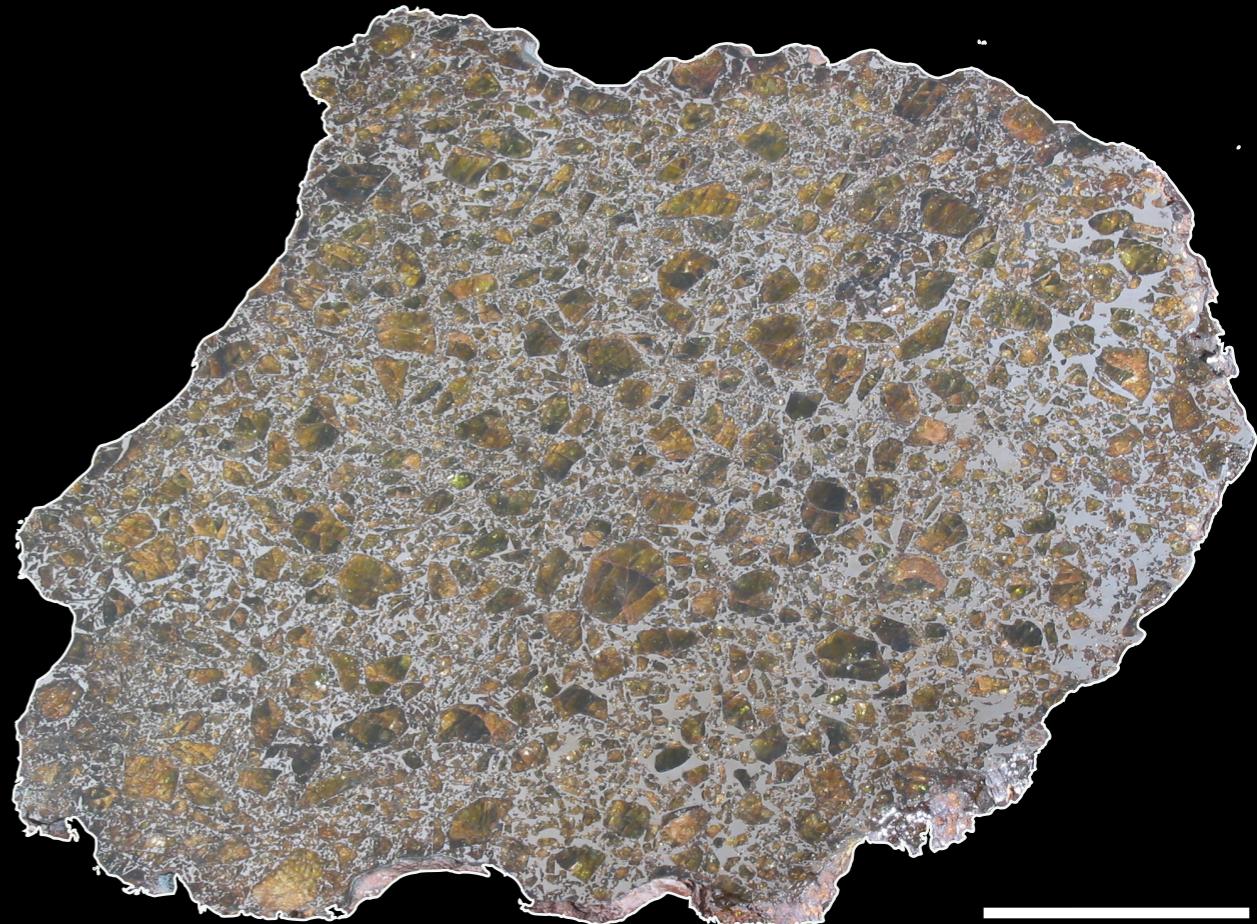
# Ceres







—



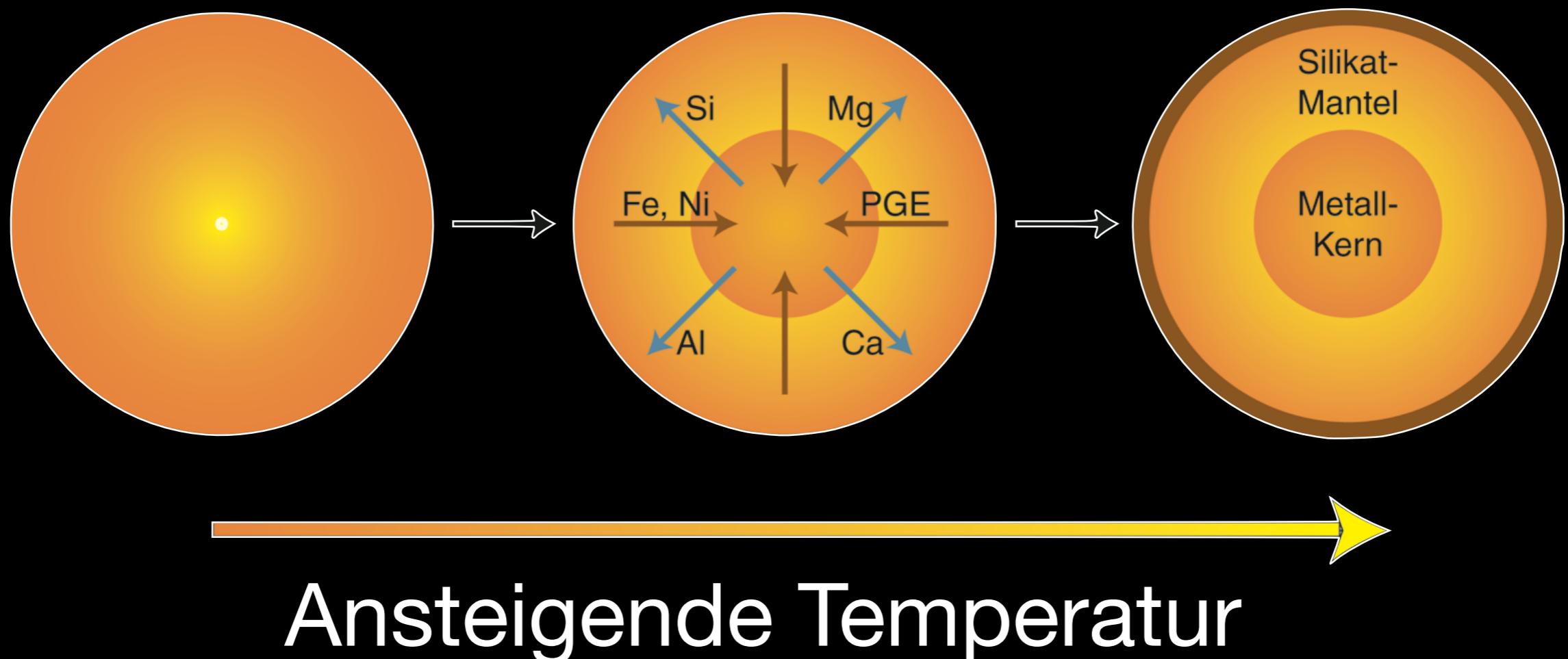
—

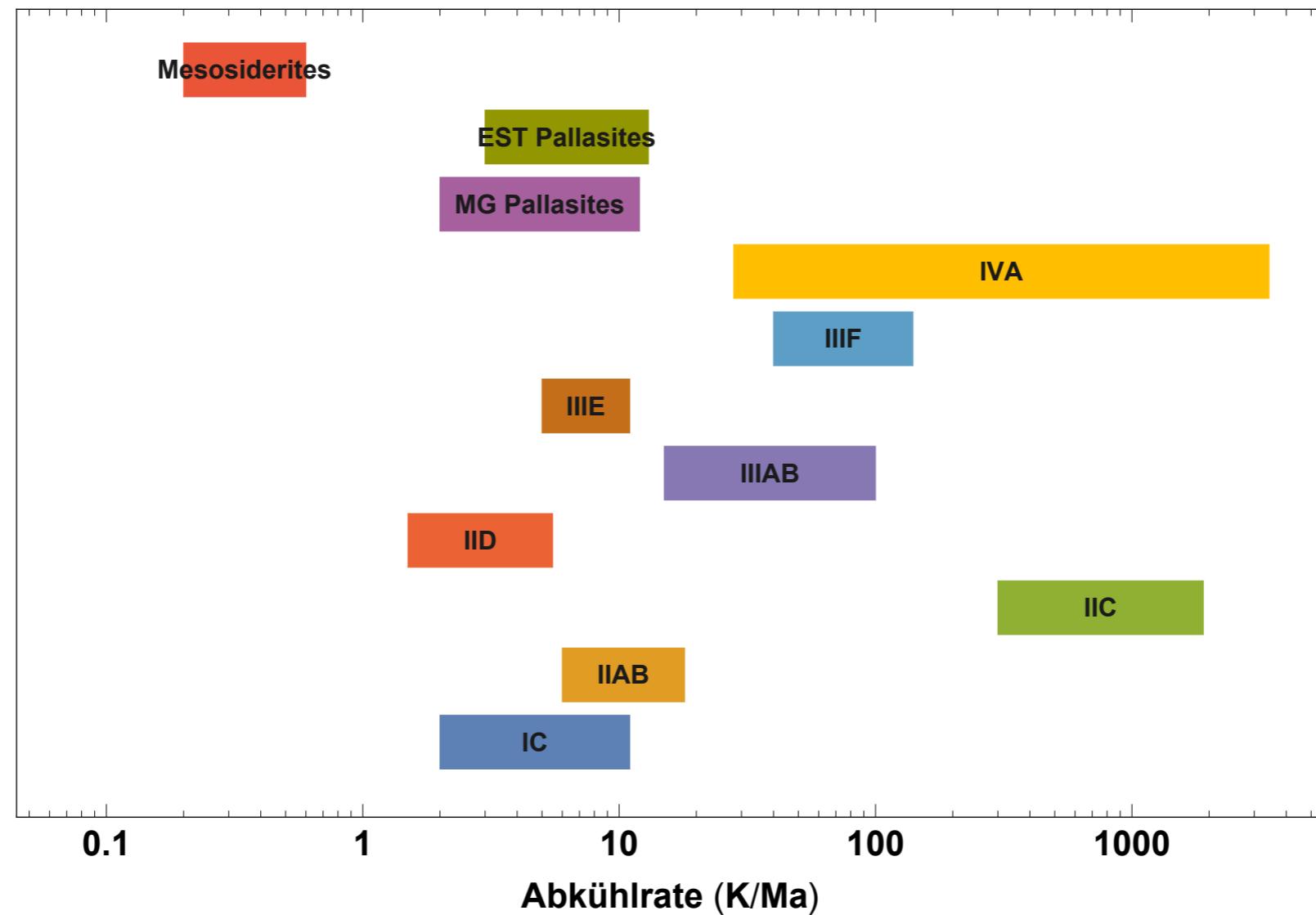


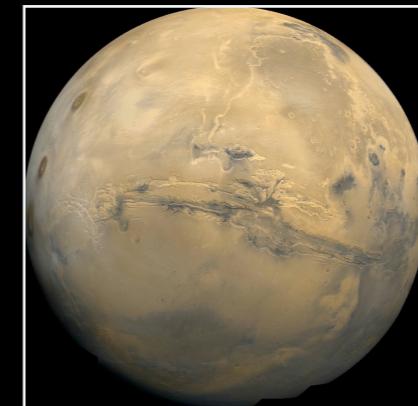
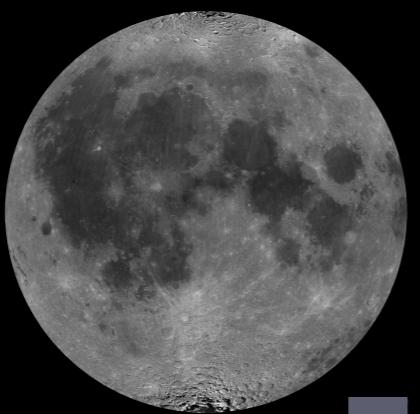
—

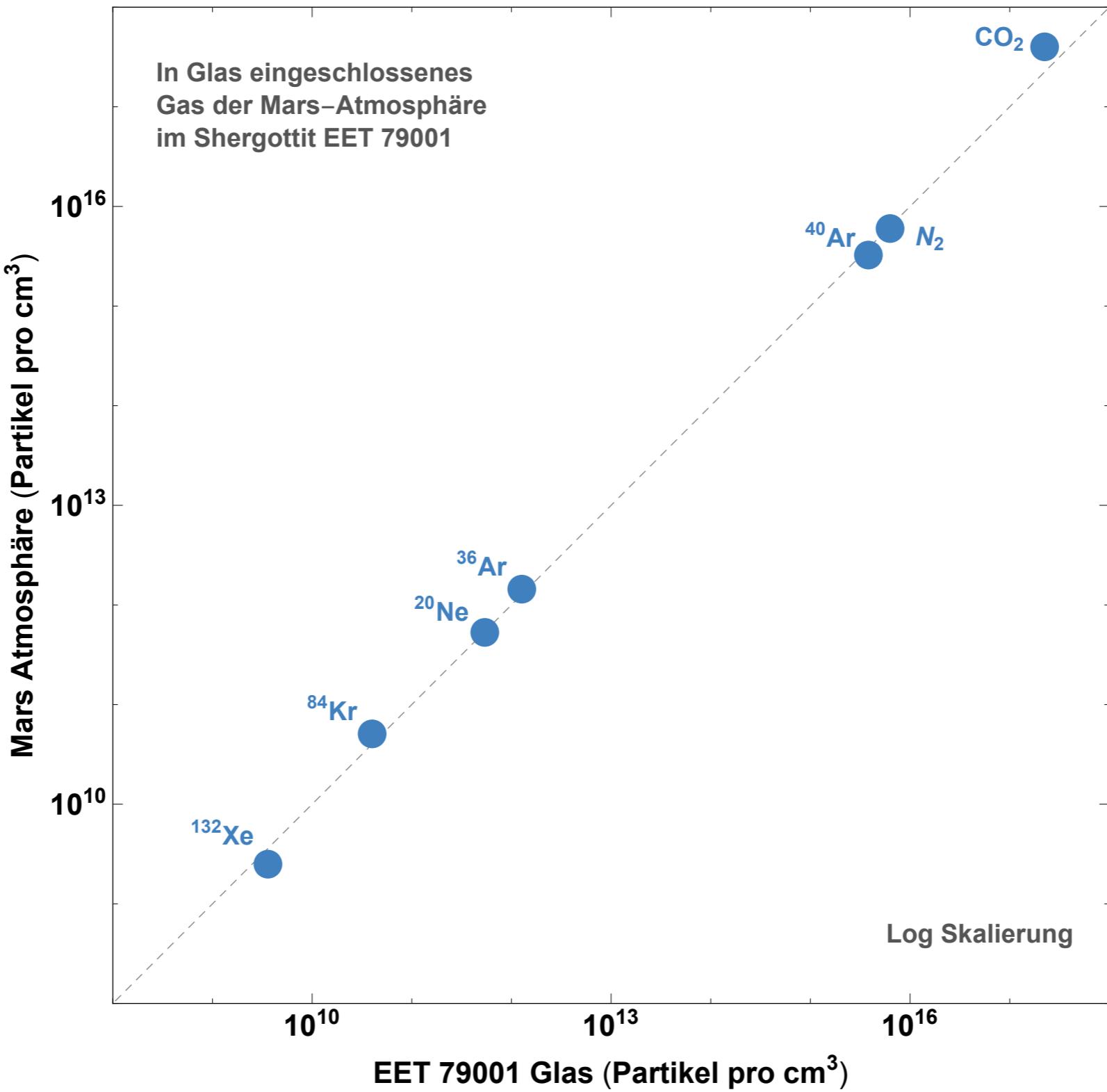
Undifferenziert

Differenziert









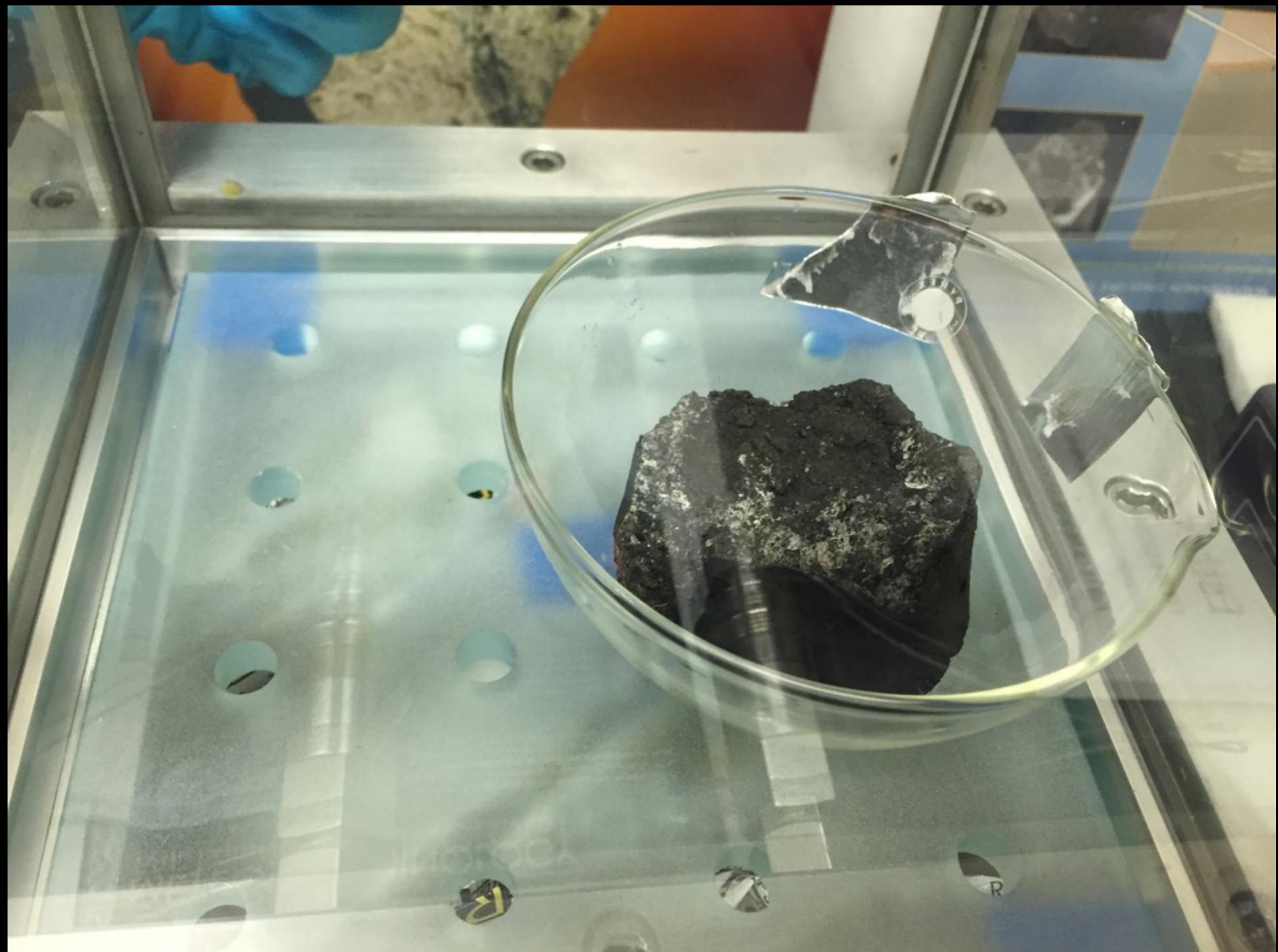
Was sind Meteorite?

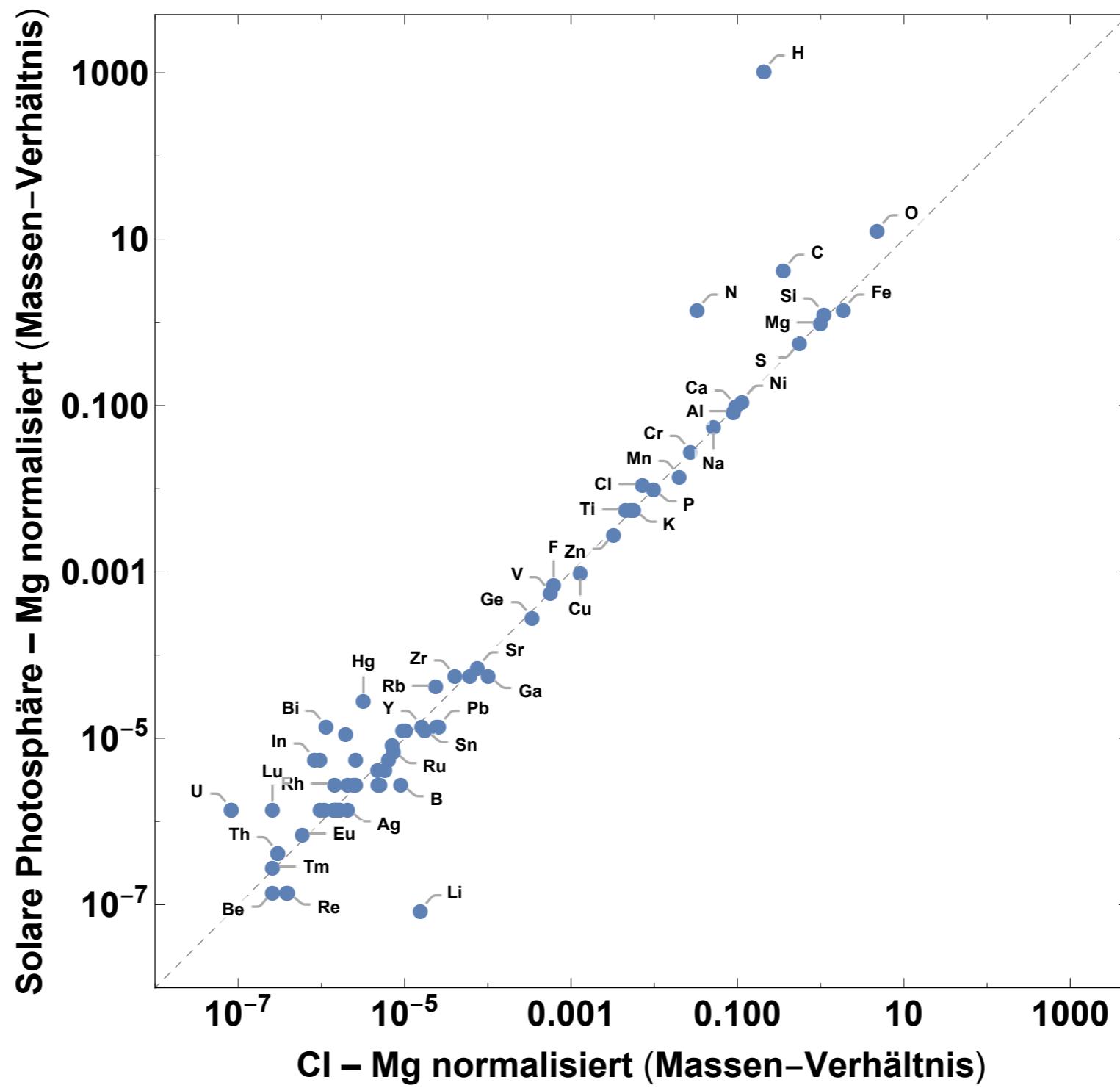
Warum sind Meteorite wichtig?

Was erzählen uns Meteorite?

Wo finden wir Meteorite?

# Ivuna





Mg

Si

Fe

Al

Ca

Na

O

S

Mg

Al

O

Si

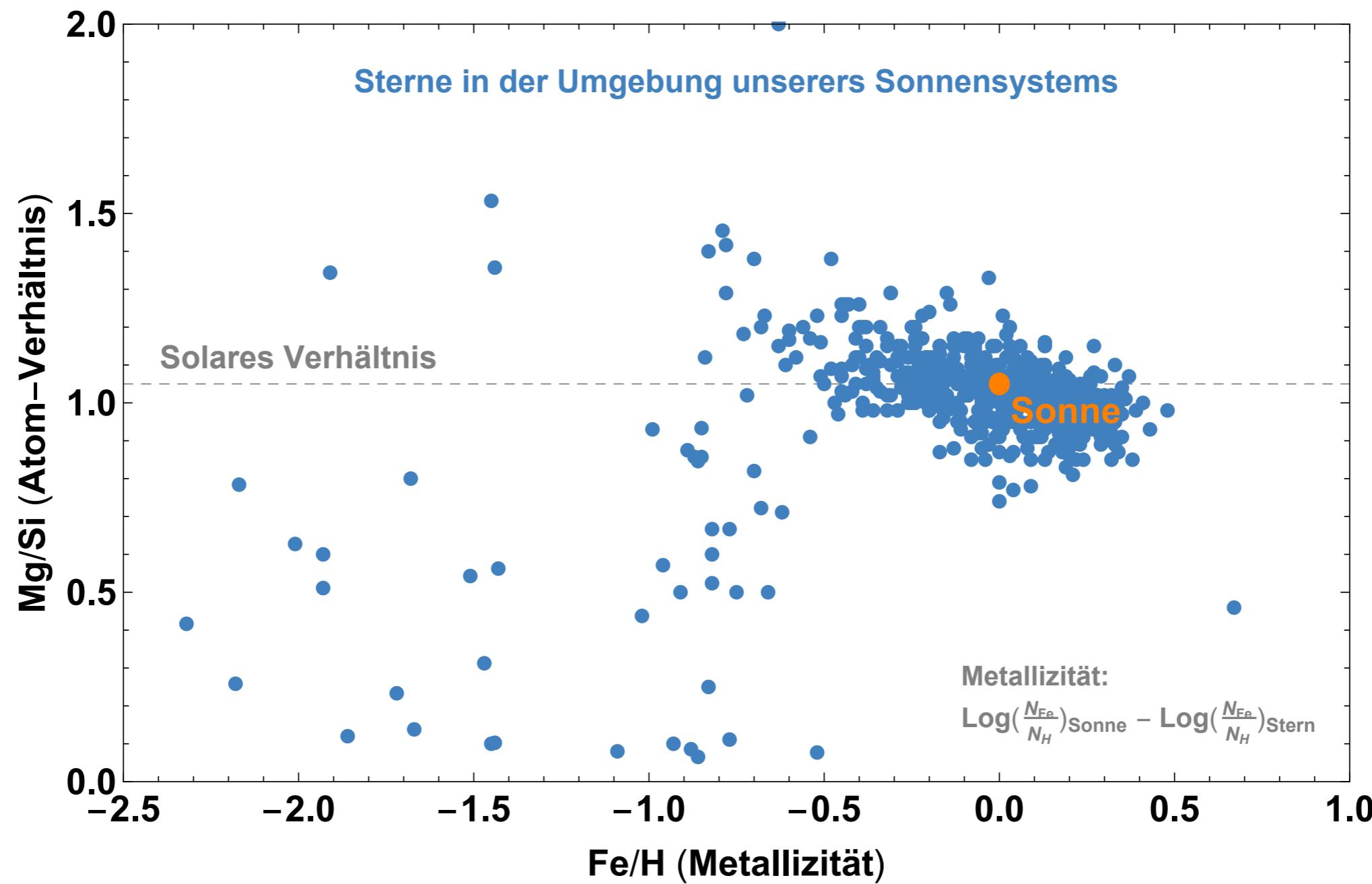
Ca

S

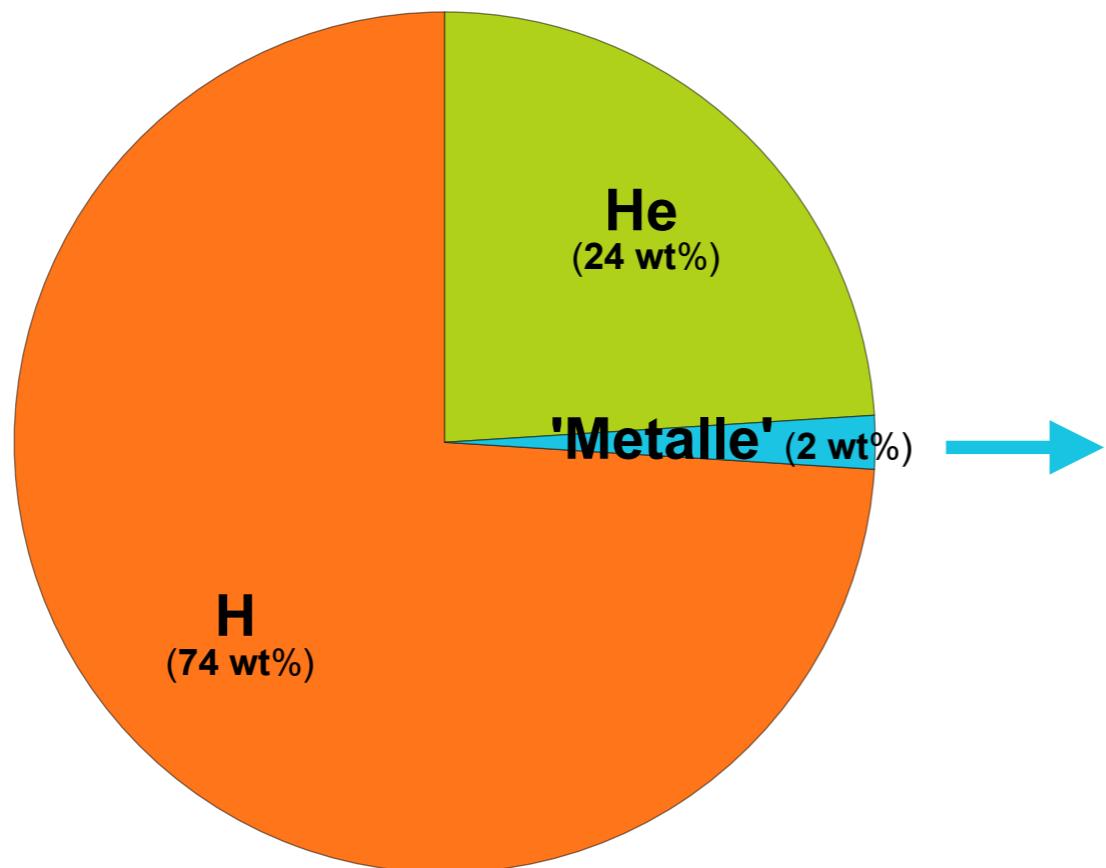
Fe

Na

Periodensystem  
der Elemente für  
den Nicht-Geo/  
Cosmo-Chemiker

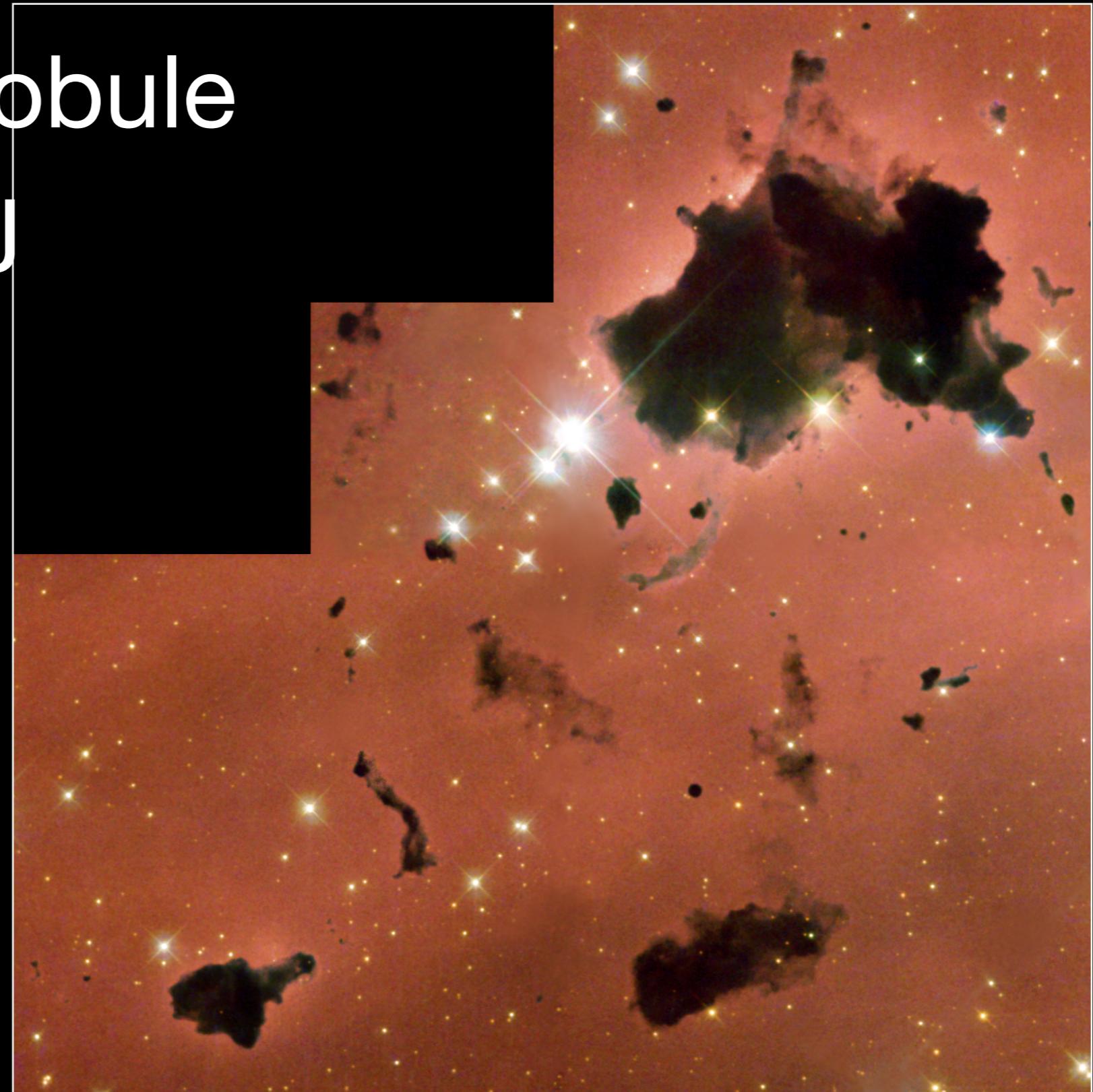


## Proplanetare Scheibe



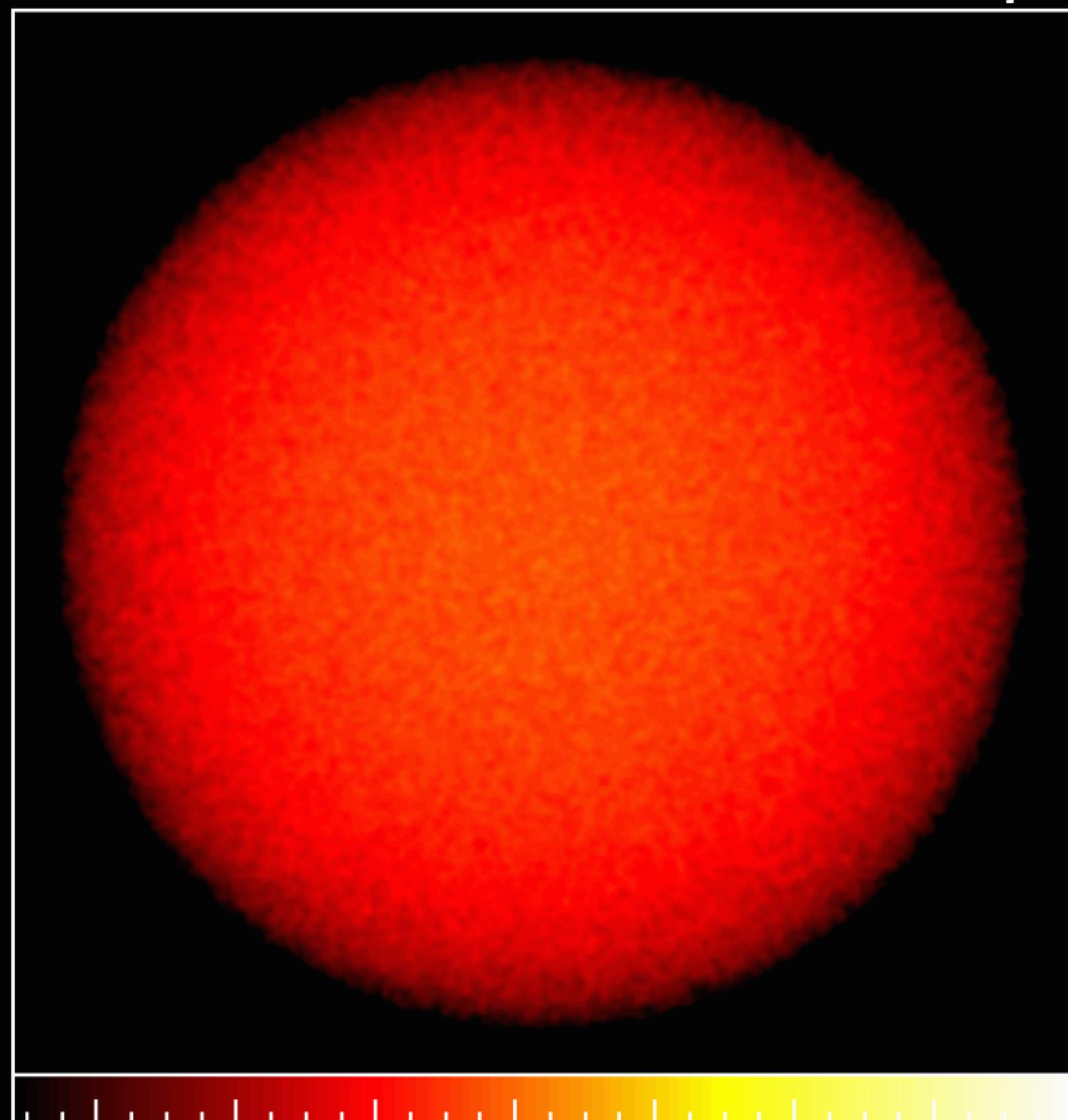
# Thackerays Globule

$\varnothing: \sim 1.5$  LJ



Dimensions: 82500. AU

Time: 0. yr

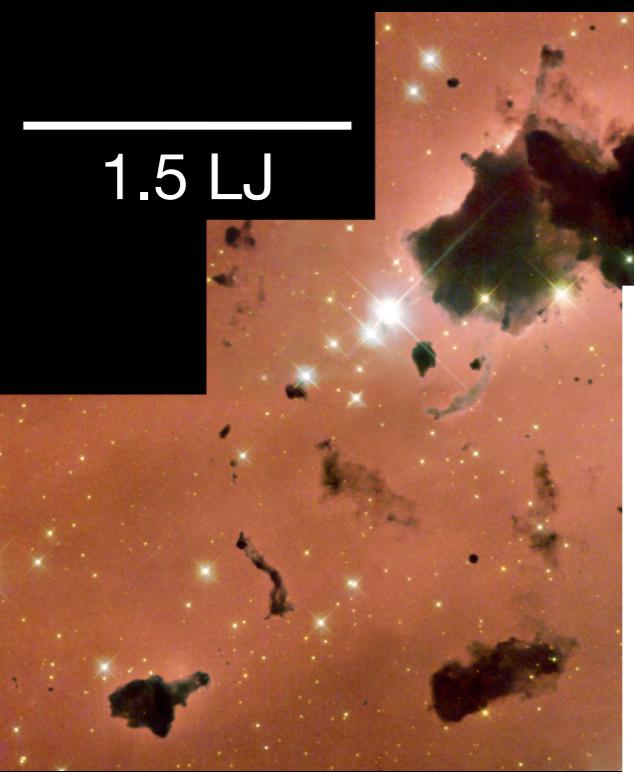


-1.4      -1.2      -1.0      -0.8      -0.6      -0.4      -0.2      0.0

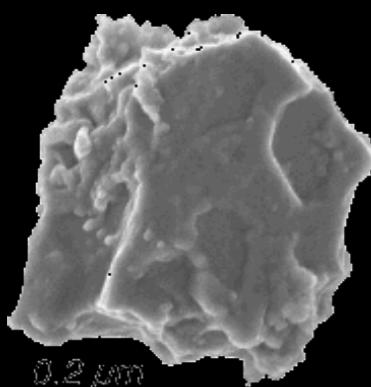
Log Column Density [g/cm<sup>3</sup>]

Matthew Bate

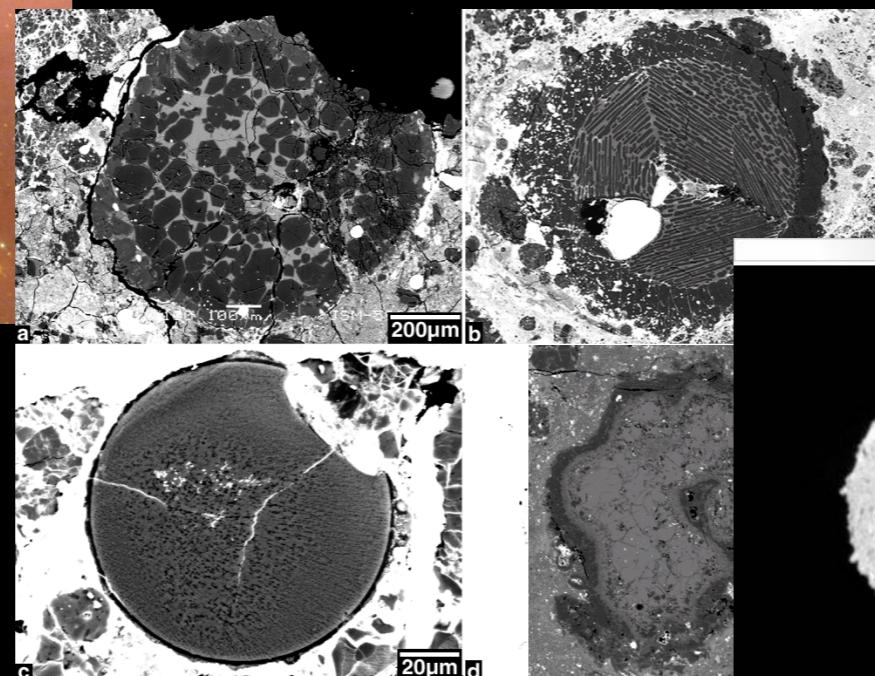
1.5 LJ



Inter-Stellares Material:  
sub- $\mu\text{m}$  große Körner

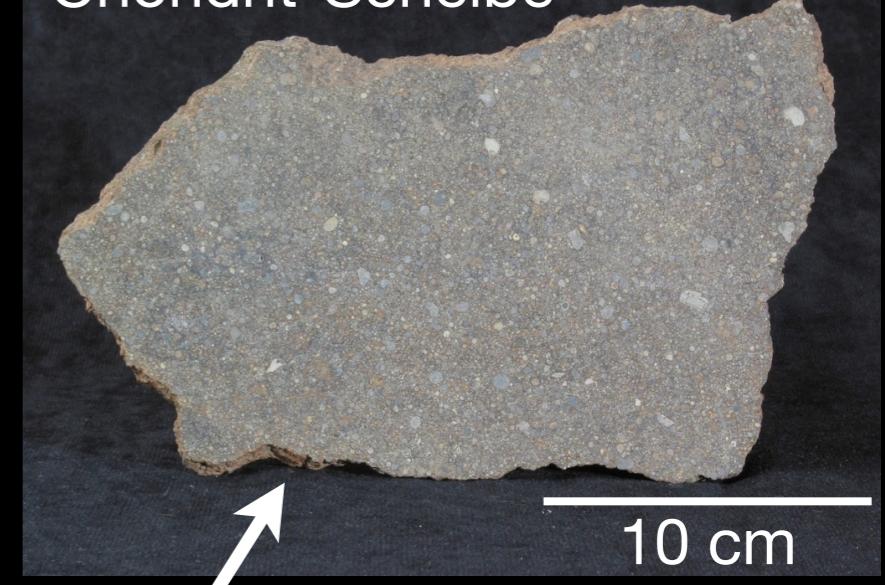


chondrules & CAI



Material im solaren Nebel/  
Meteoriten Komponenten:  
 $\mu\text{m}$ -mm große Körner

Chondrit-Scheibe



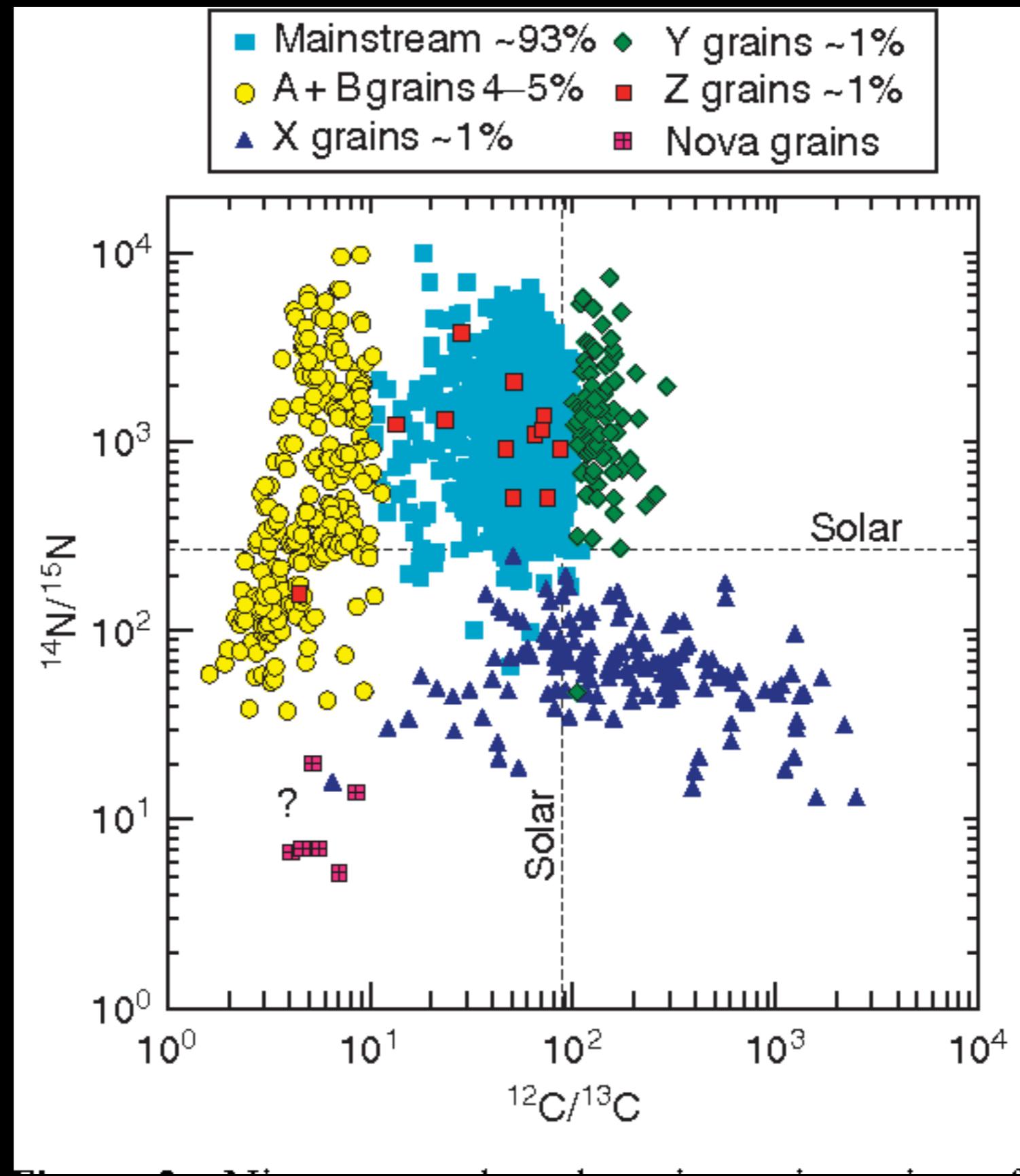
10 cm



Planetesimale:  
m-km große Objekte



Planeten: Tausende  
km im Durchmesser



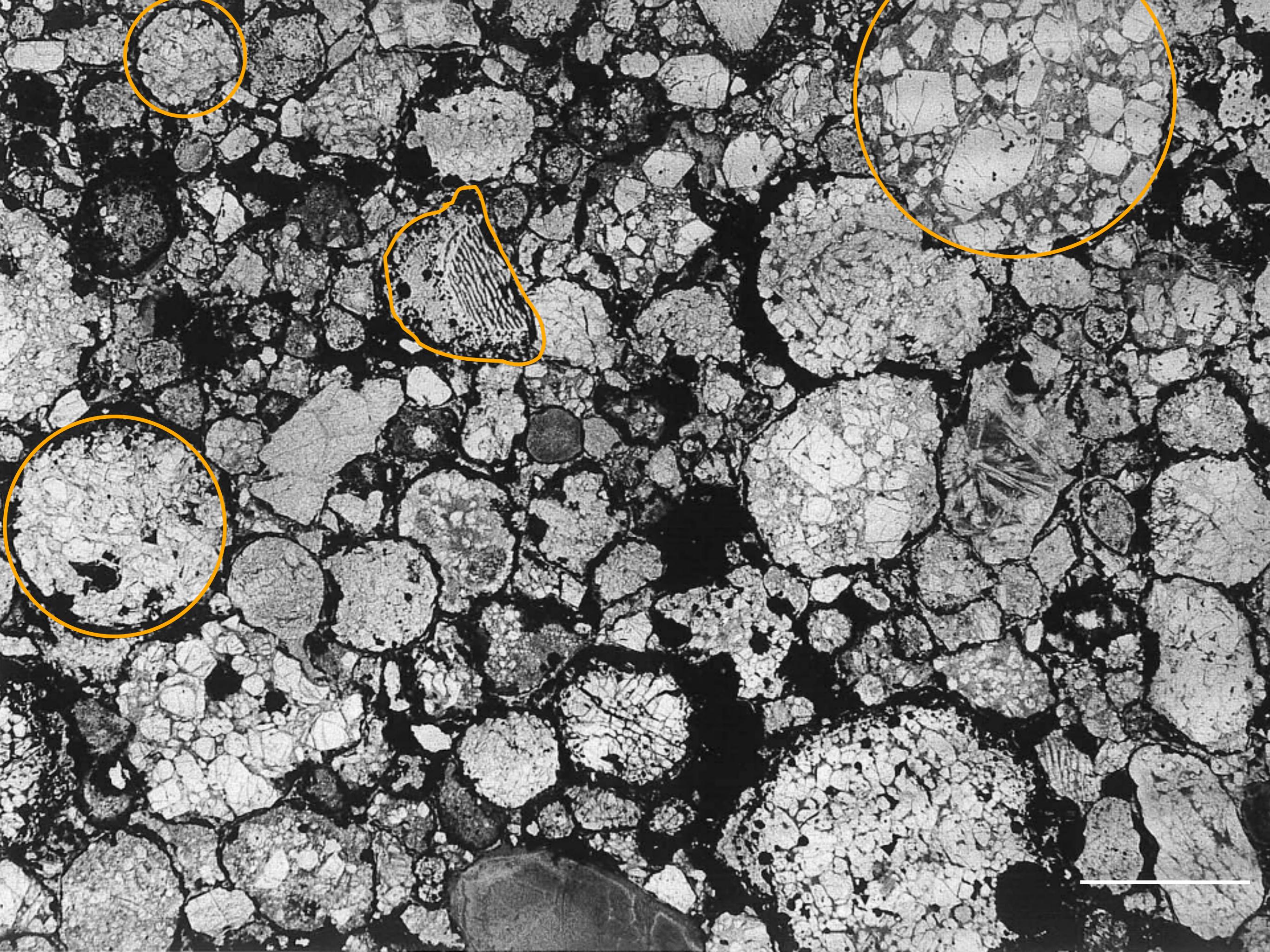
Was sind Meteorite?

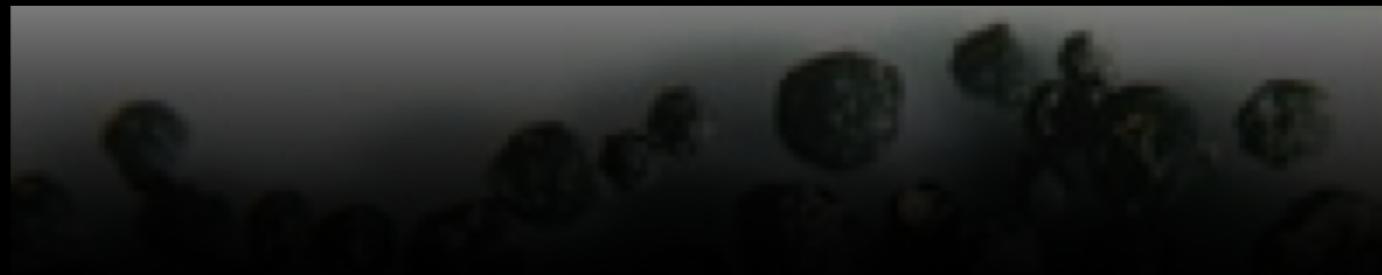
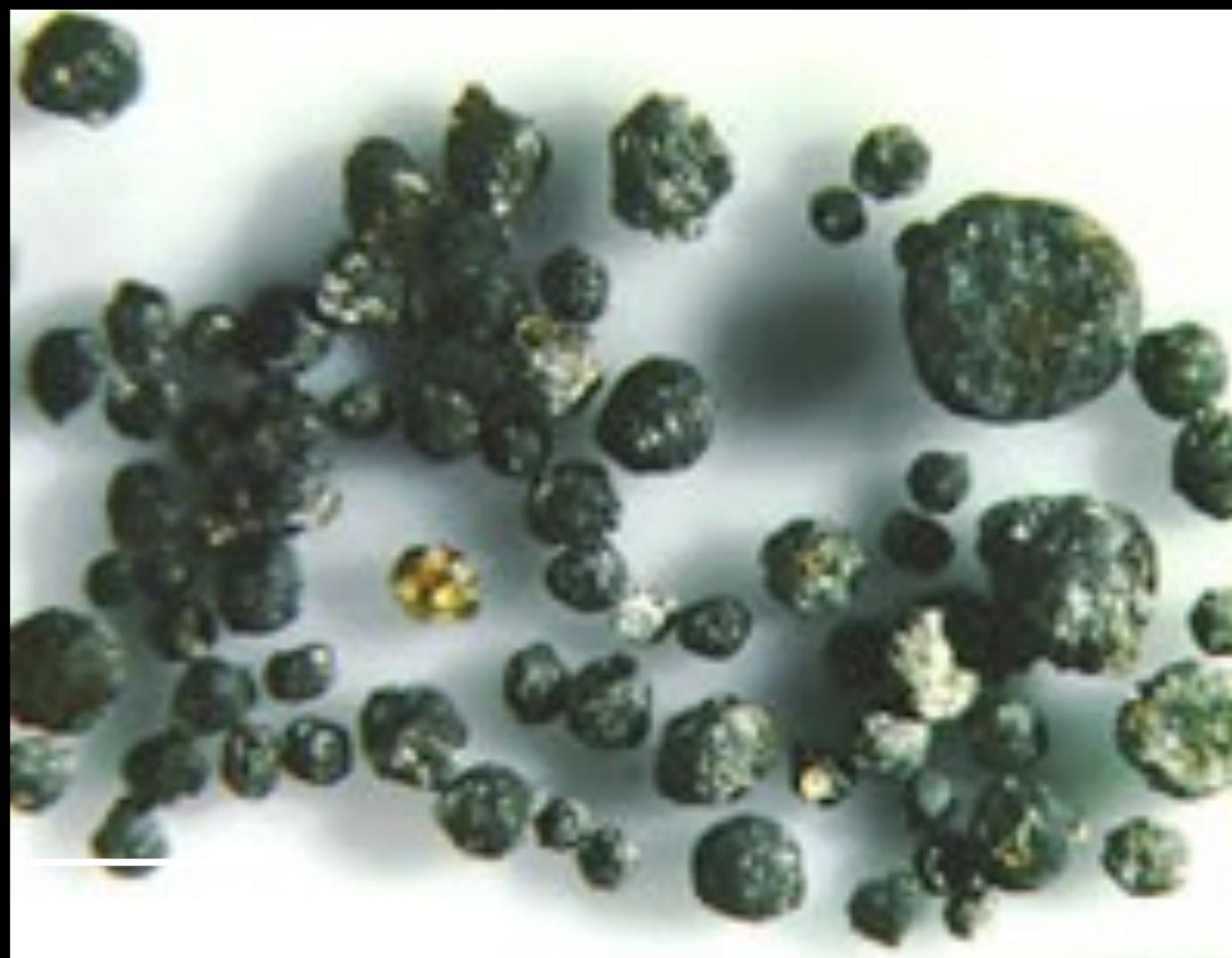
Warum sind Meteorite wichtig?

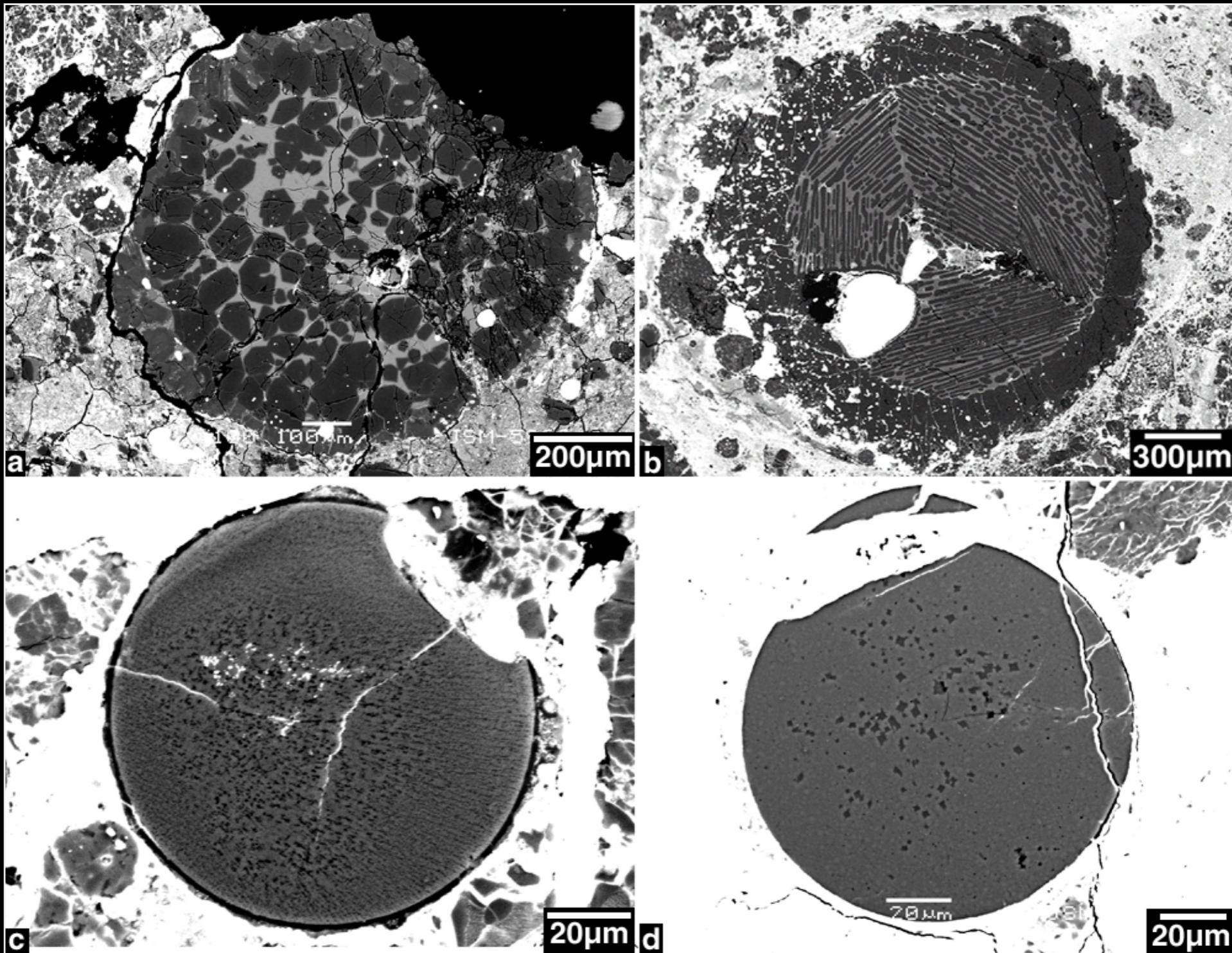
Was erzählen uns Meteorite?

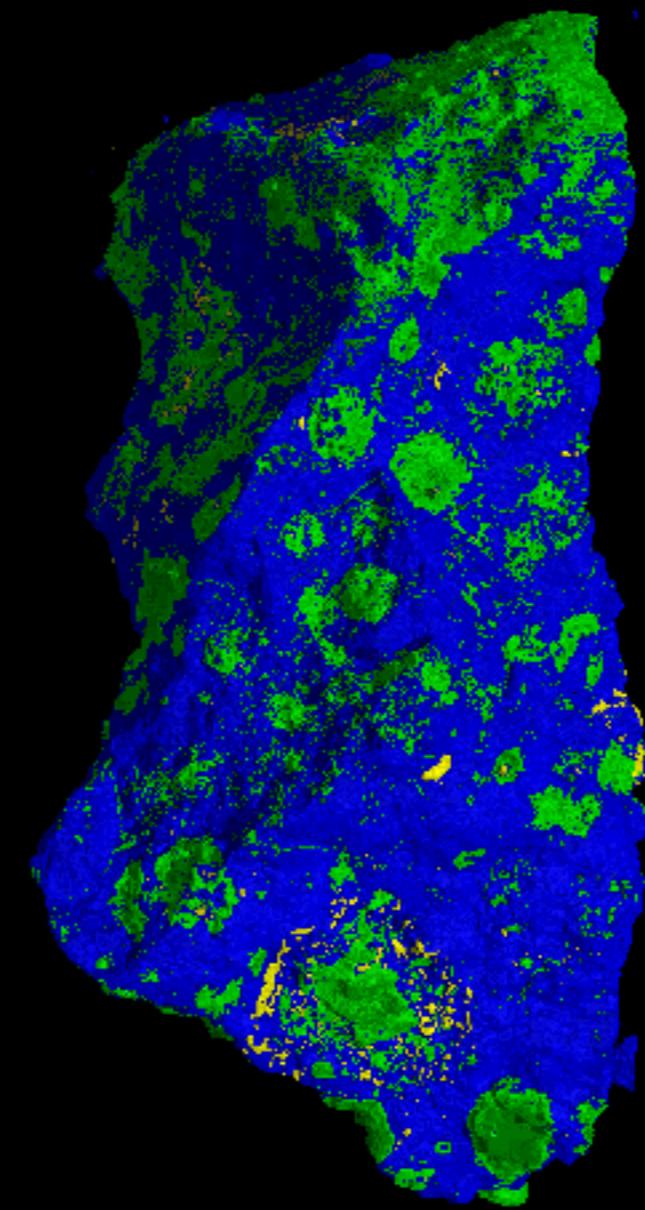
Wo finden wir Meteorite?

# Komponenten: Chondren



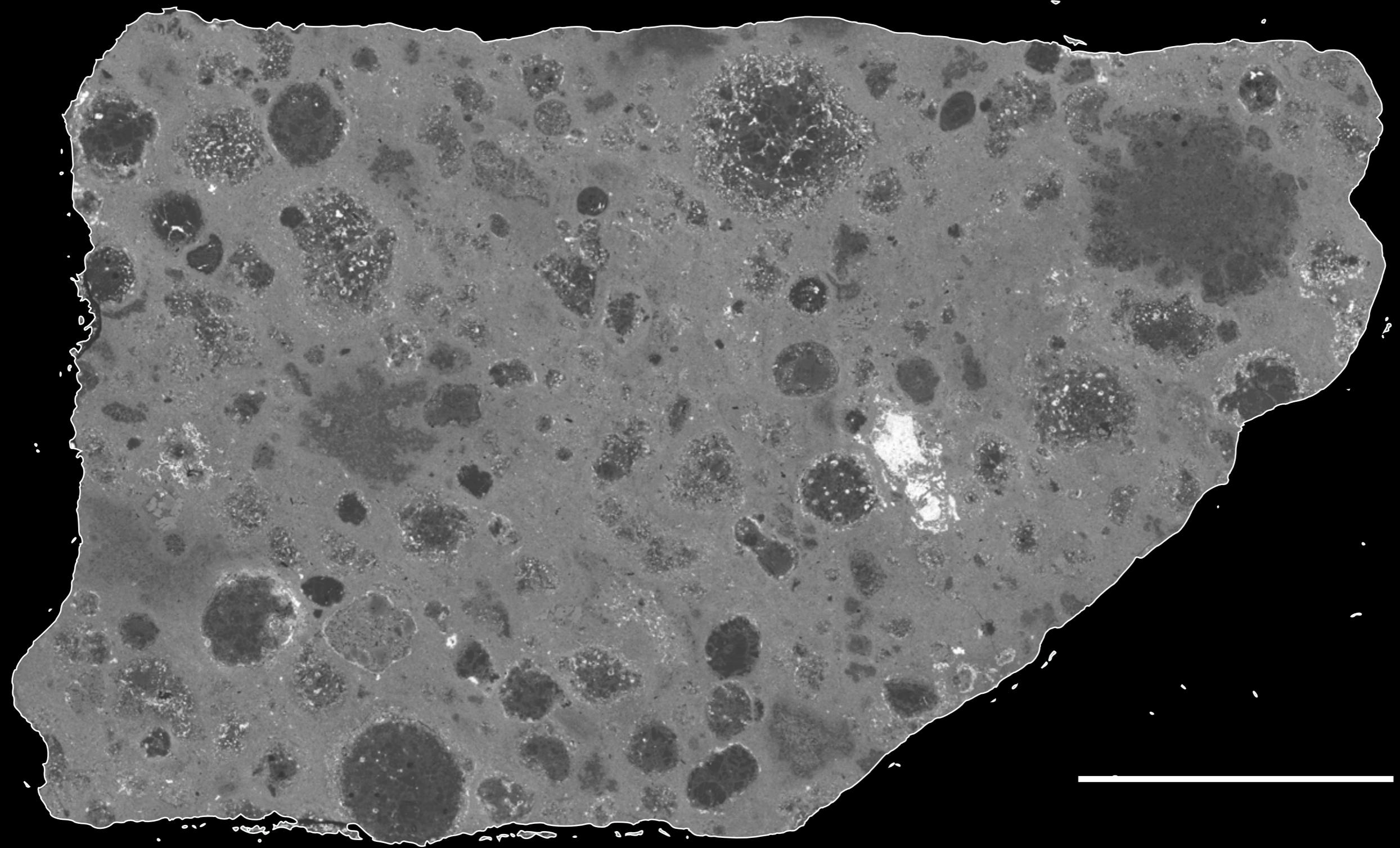






Allende

# Komponenten: Matrix



Allende



2  $\mu$ m

chip?

SE-image



1 μm

Mag = 30.00 K X

1.00 kV

Signal A = SE2

Image Pixel Size = 4.9 nm

Signal B = InLens

Aperture Size = 20.00 μm

7.03e-007 mbar

WD = 3.5 mm

Signal = 1.000

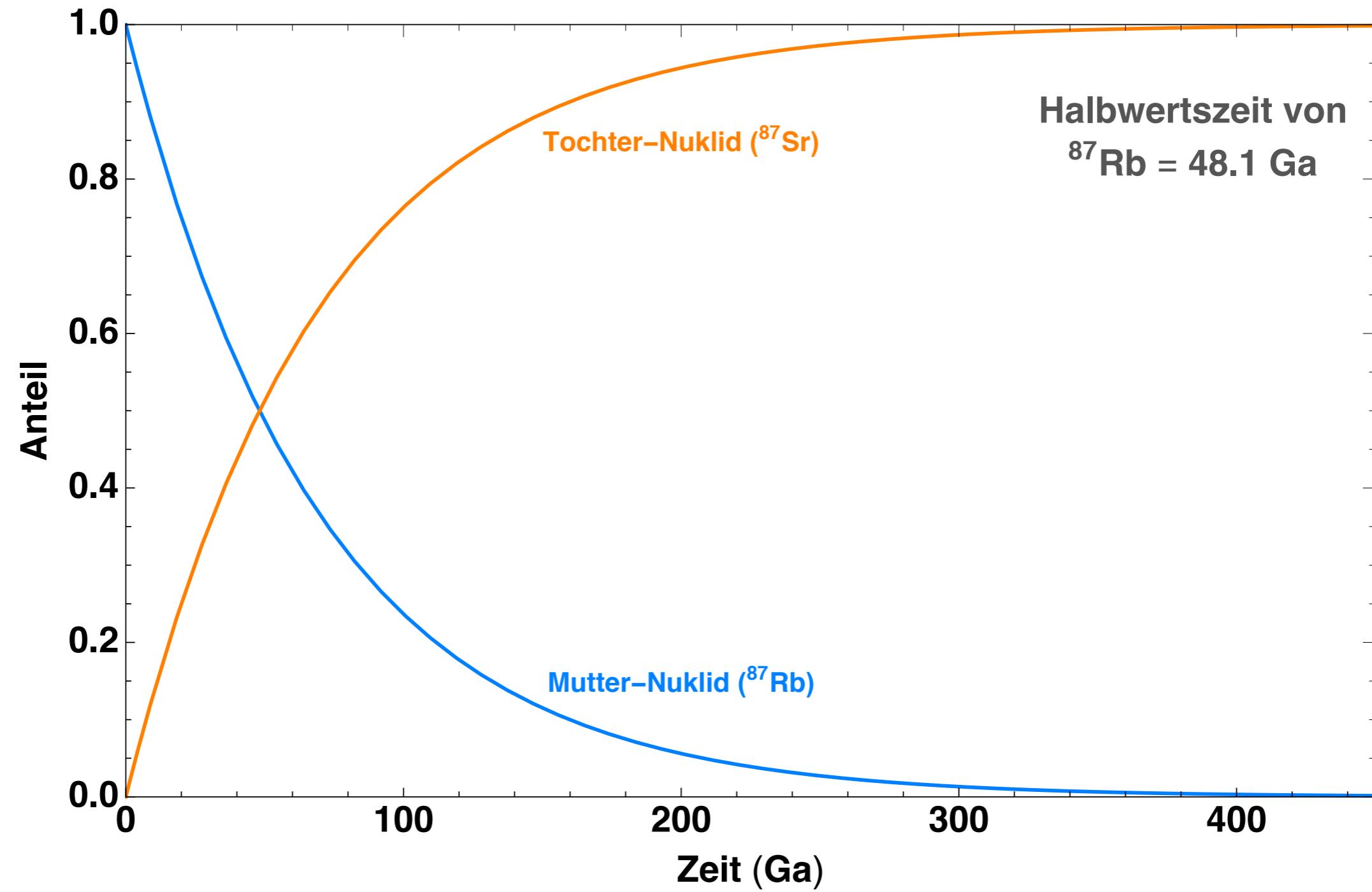
ESB Grid = 0 V

Pixel Avg.

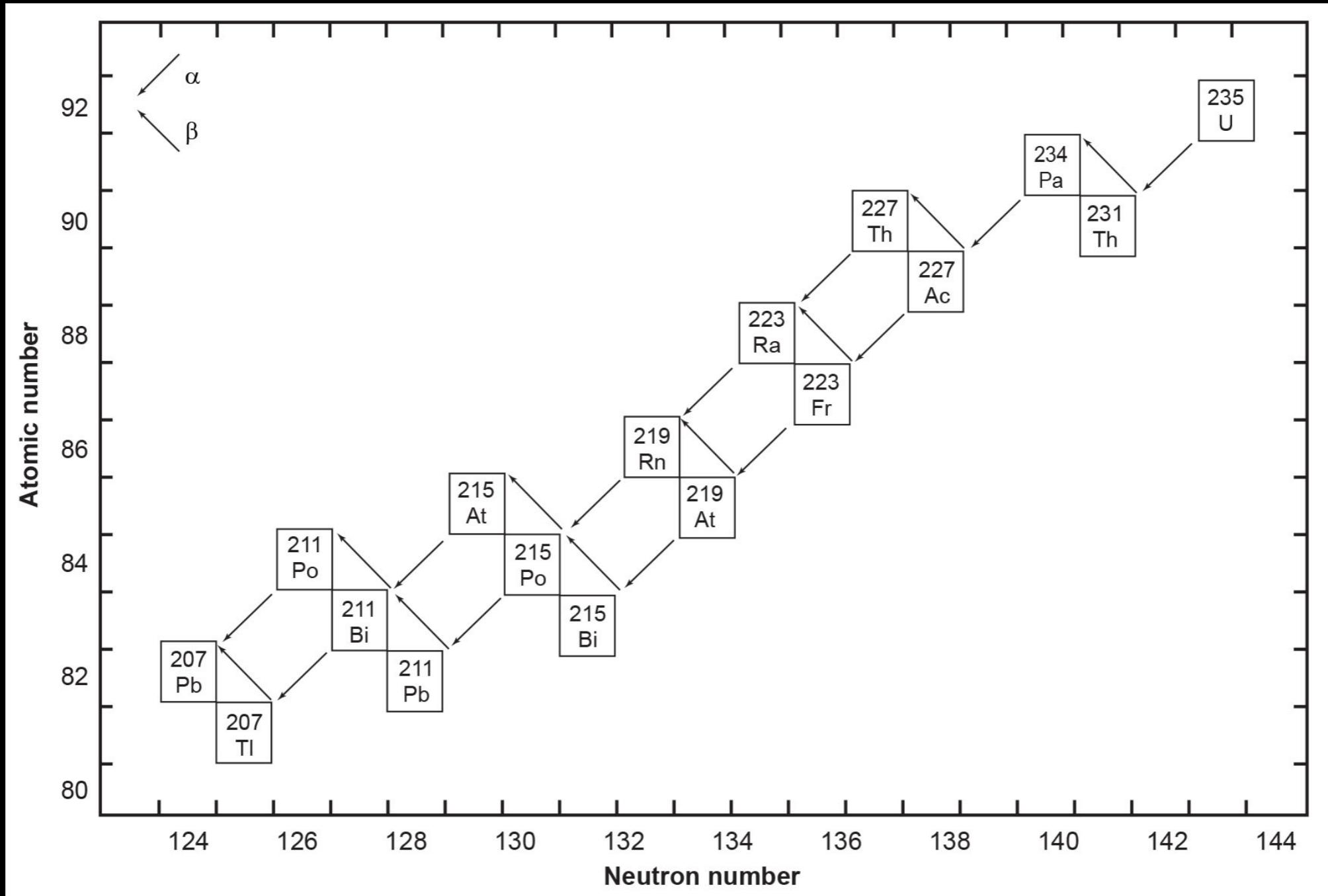
N = 1

File Name = DH\_UP\_0077.tif

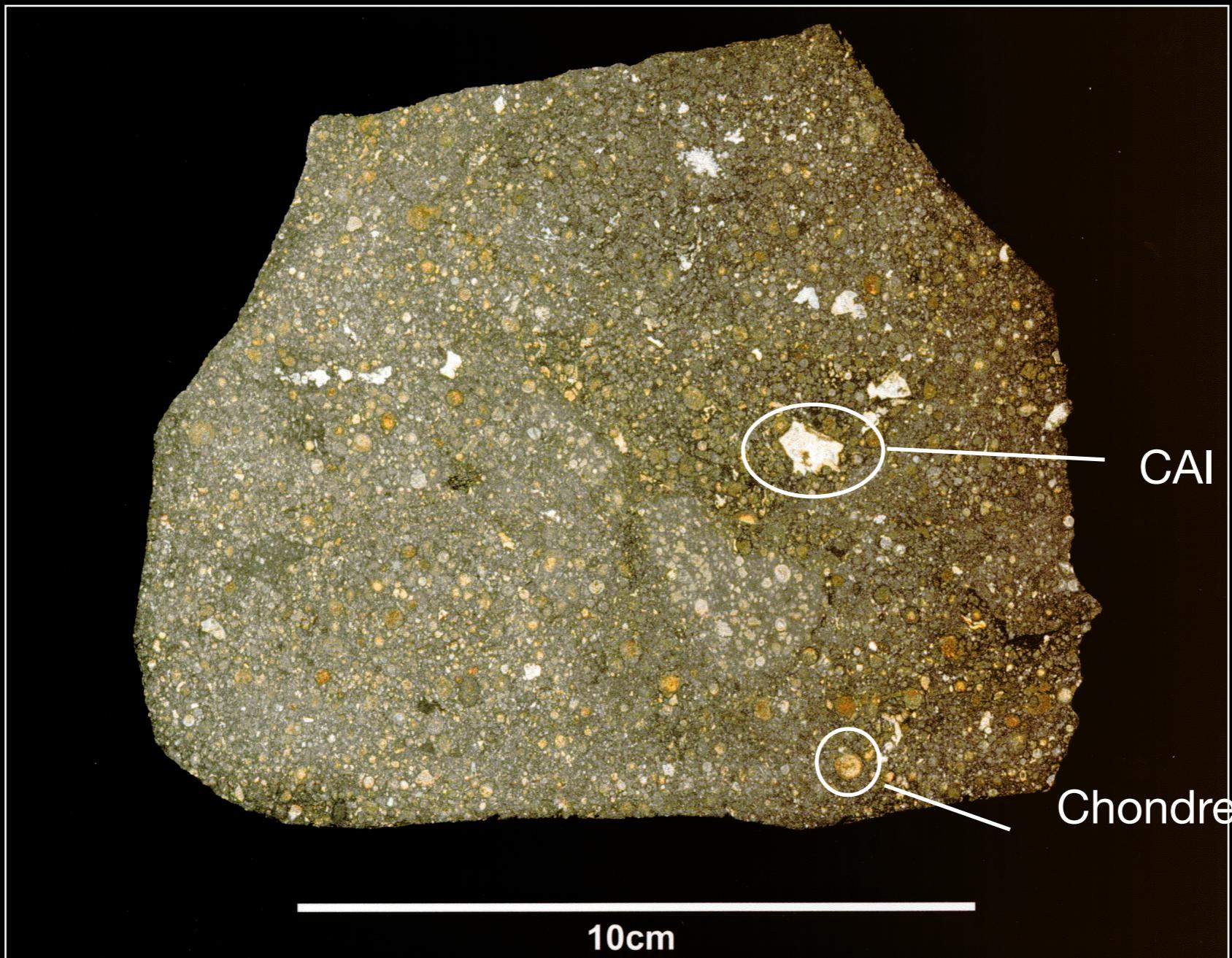
# Das Alter unseres Sonnensystems



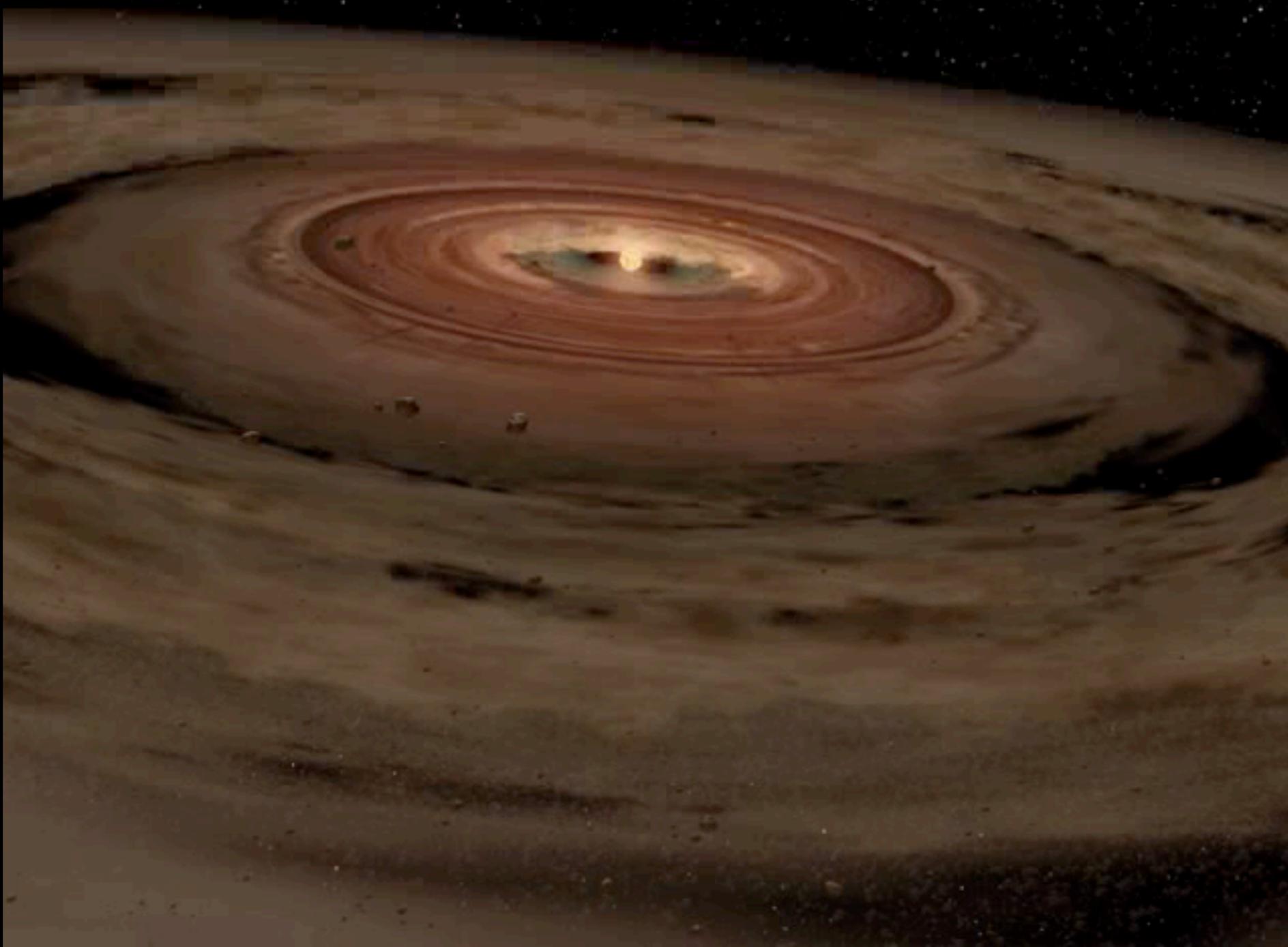
# Uran (U) → Blei (Pb) Zerfall



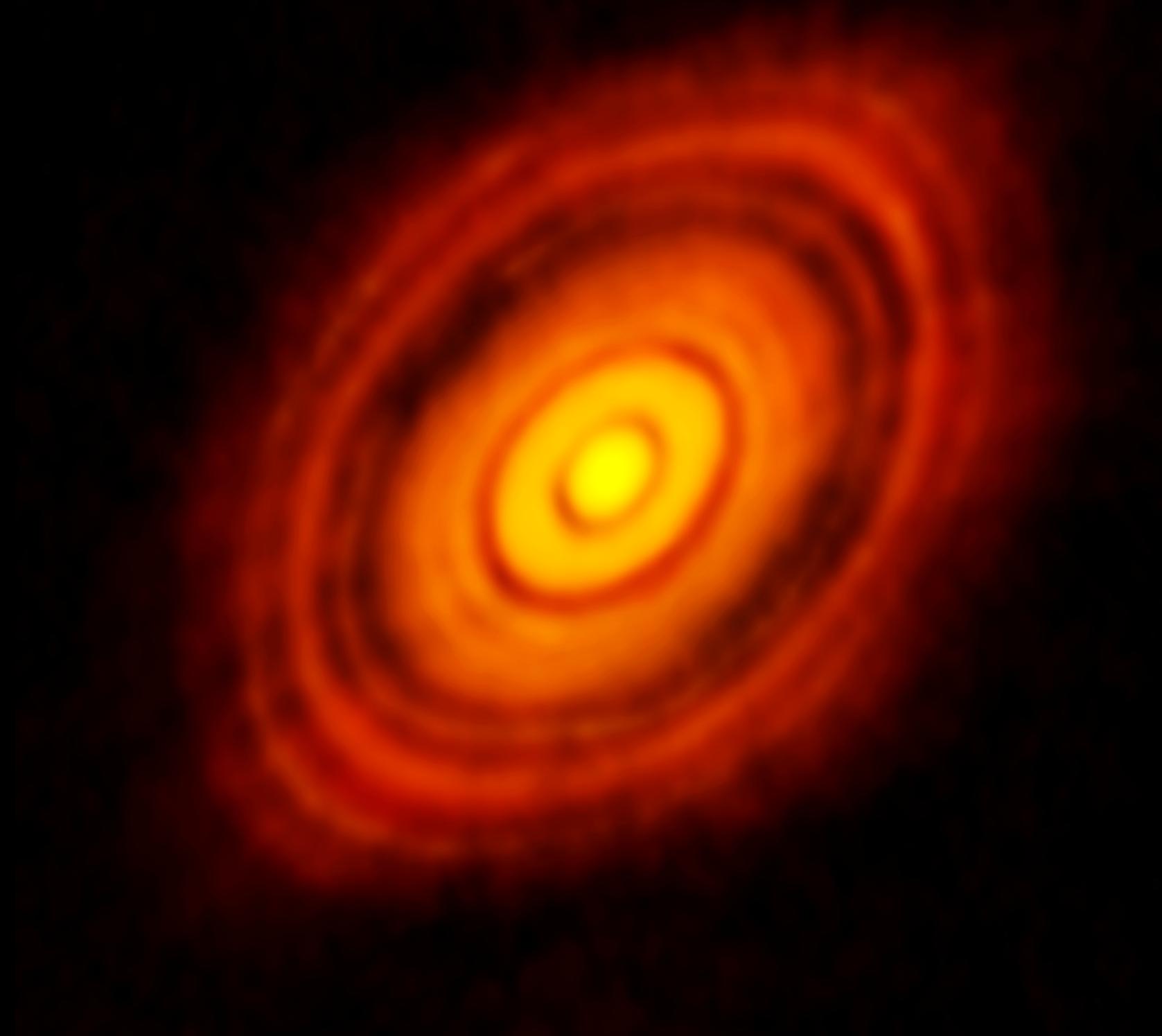
Komponenten:  
CALS



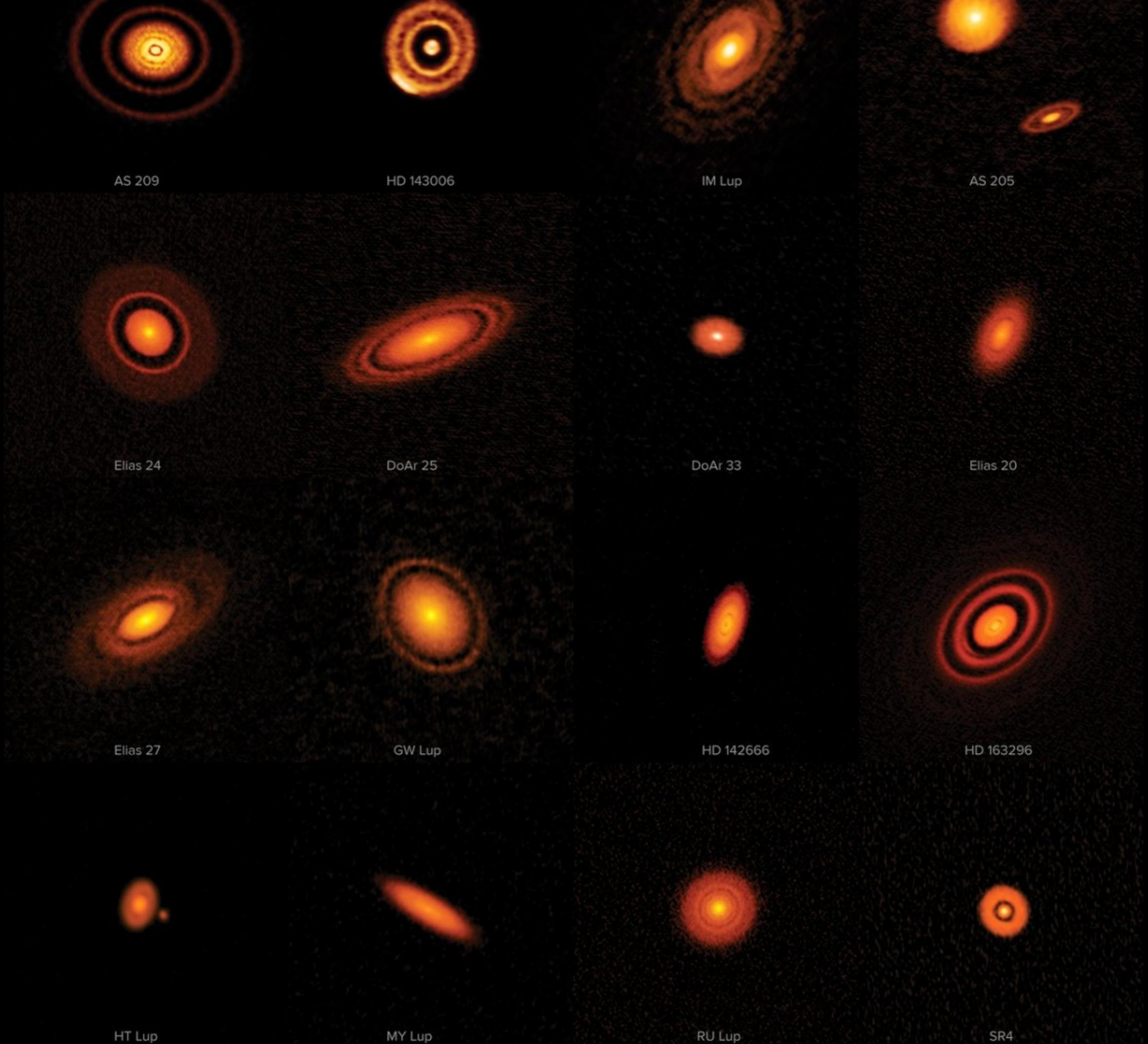
# Bildung unseres Sonnensystems



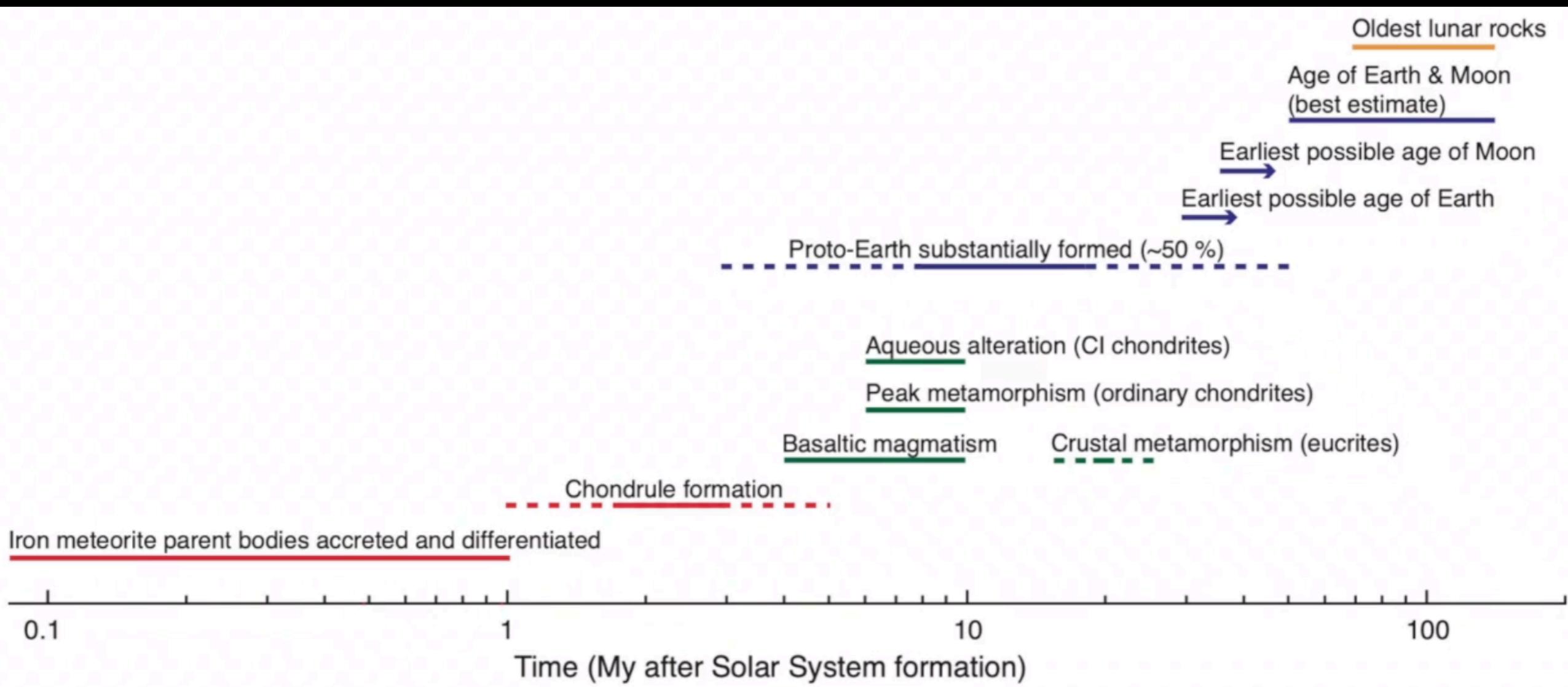




ALMA



ALMA



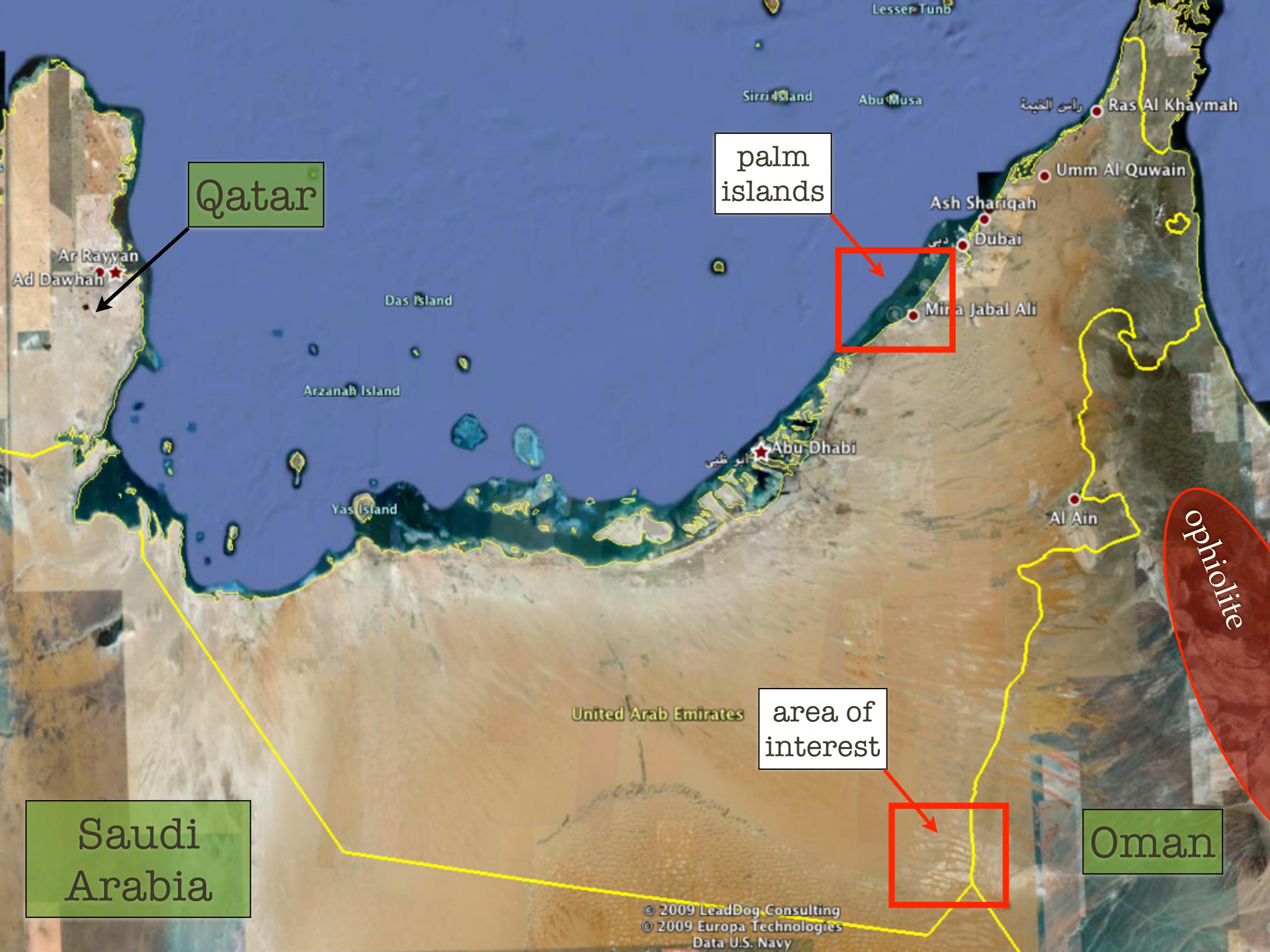
Was sind Meteorite?

Warum sind Meteorite wichtig?

Was erzählen uns Meteorite?

Wo finden wir Meteorite?





# Vereinigte Arabische Emirate



ca. 10-20 km

FeO/Fe<sub>2</sub>O<sub>3</sub>/FeO(OH)  
Ausblühungen

schwarze Schmelzkruste





‘Droppings’  
(oh, shit!)

# unsere Ausbeute!



# Atacama









L 4/5

found by Helmut Brückner