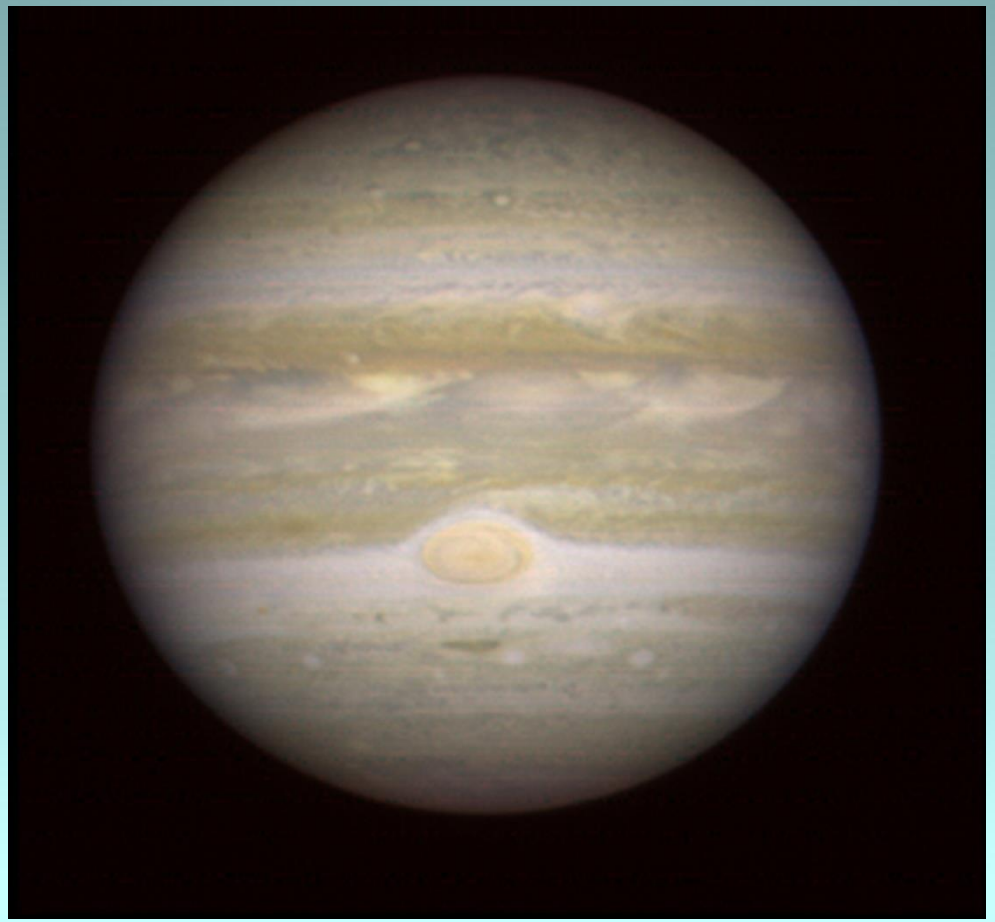
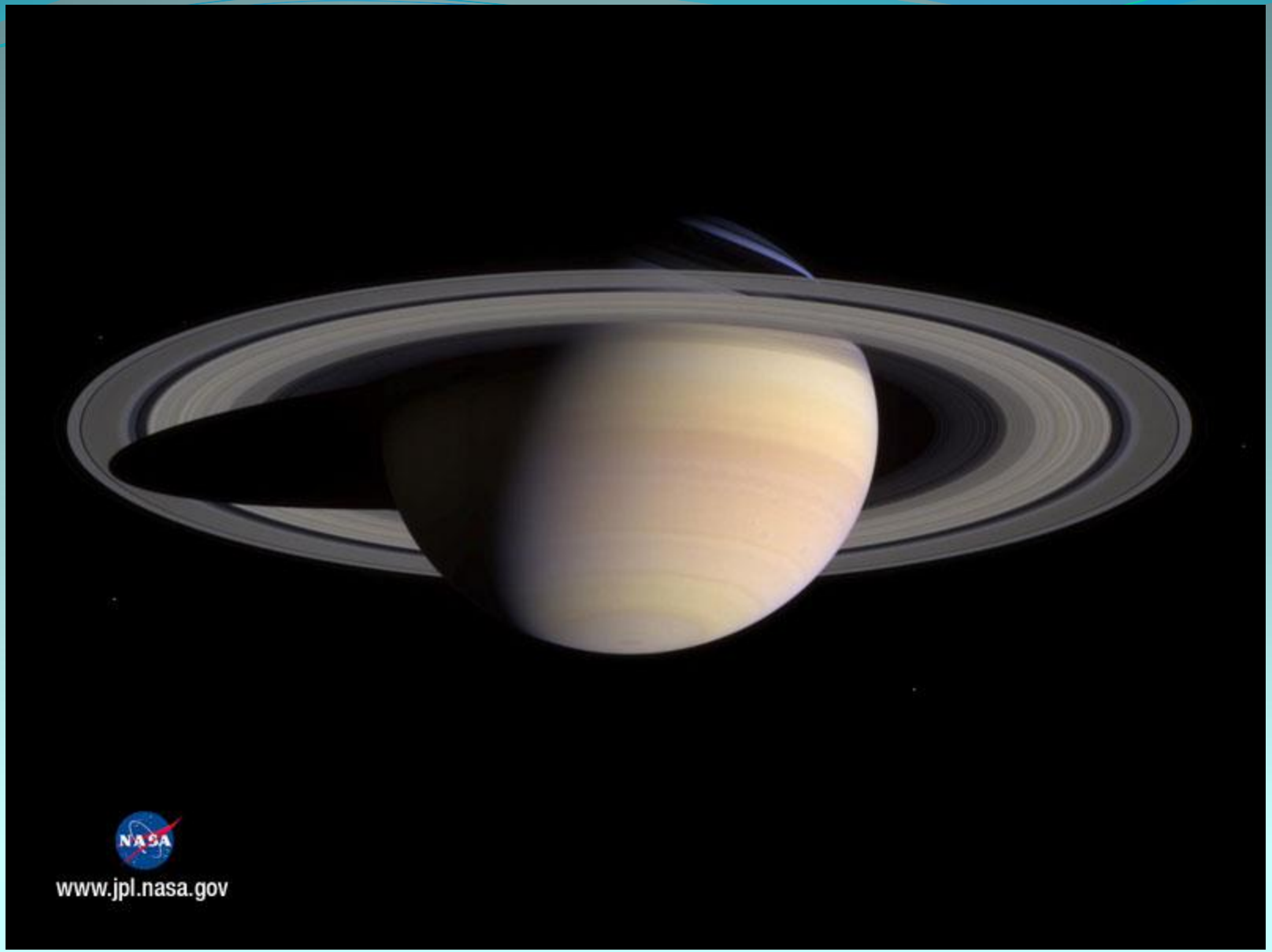
Introduzione alla morfologia cometaria

Giannantonio Milani

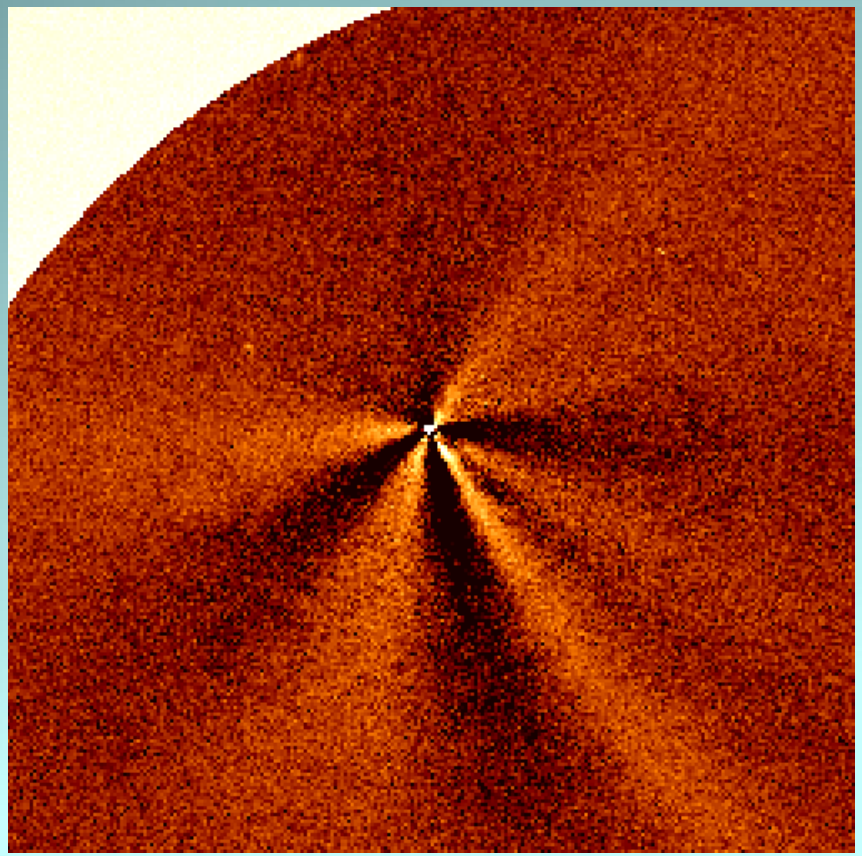
Corso teorico pratico sull'osservazione delle comete 7-8 settembre 2019



Per molti oggetti del Sistema Solare possiamo fare riferimento
a modelli noti che ci consentono di interpretare facilmente le osservazioni

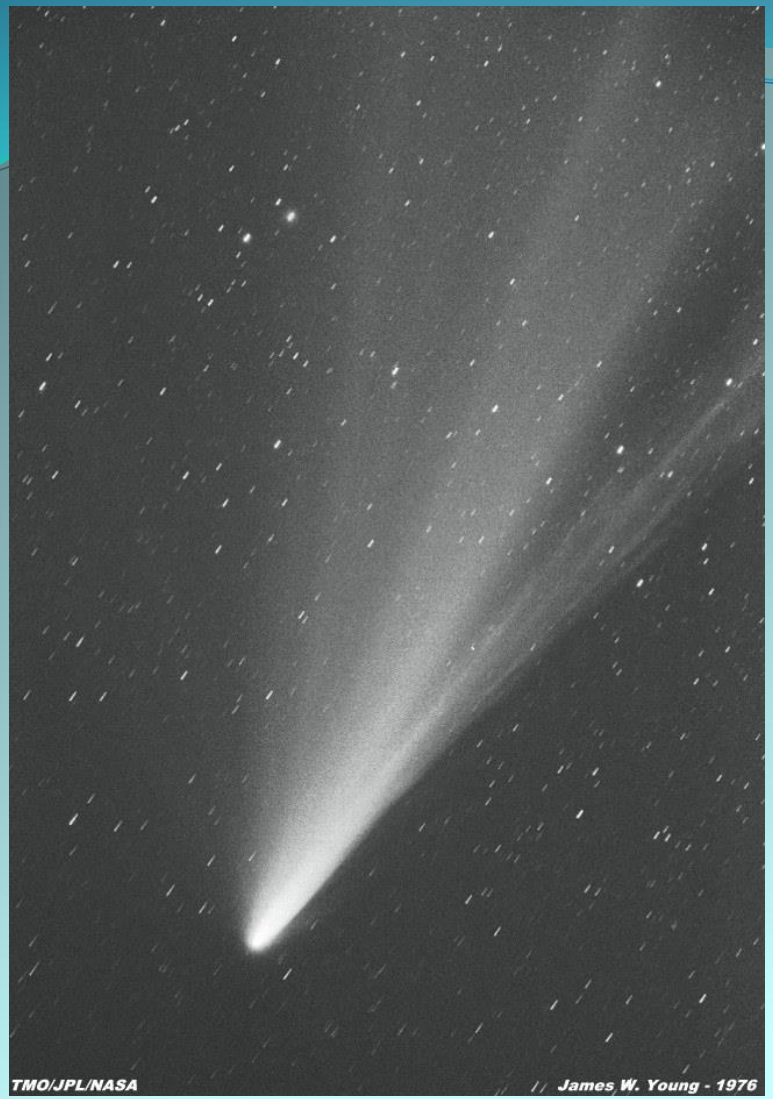

NASA
www.jpl.nasa.gov

….ma com'e' fatta davvero una cometa ?

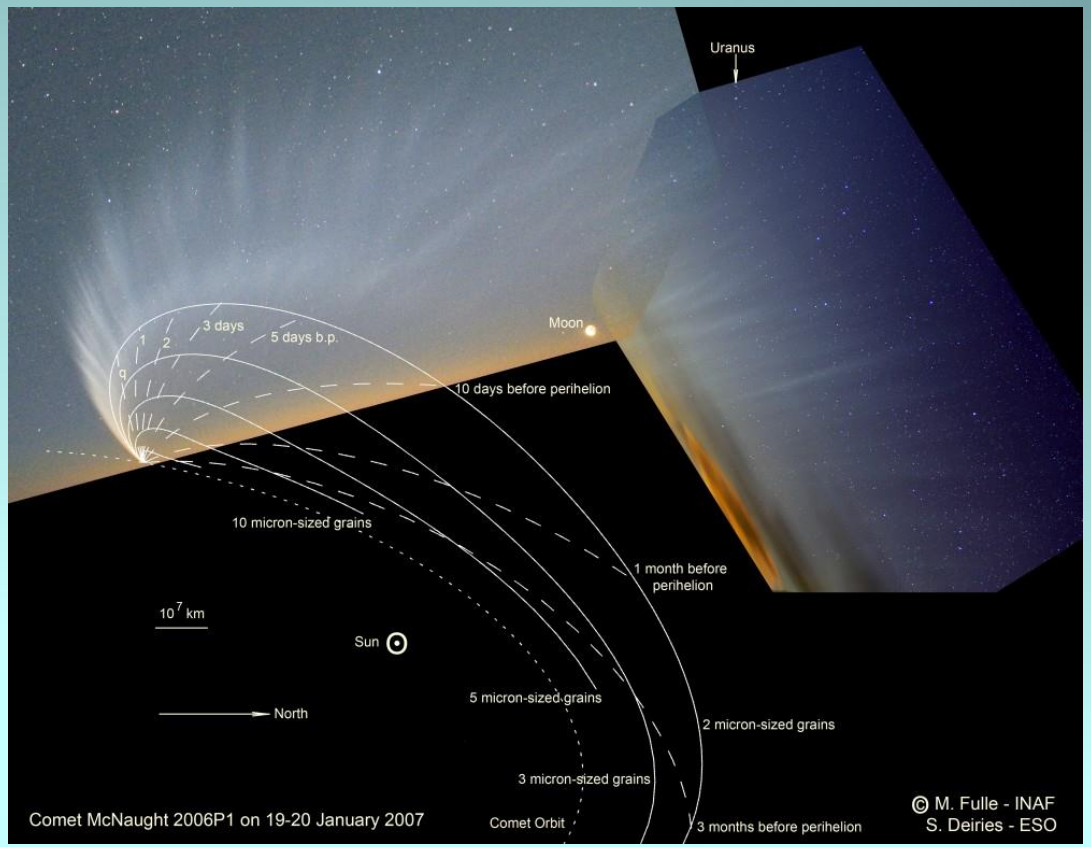


Hale-Bopp: la cometa-porcospino

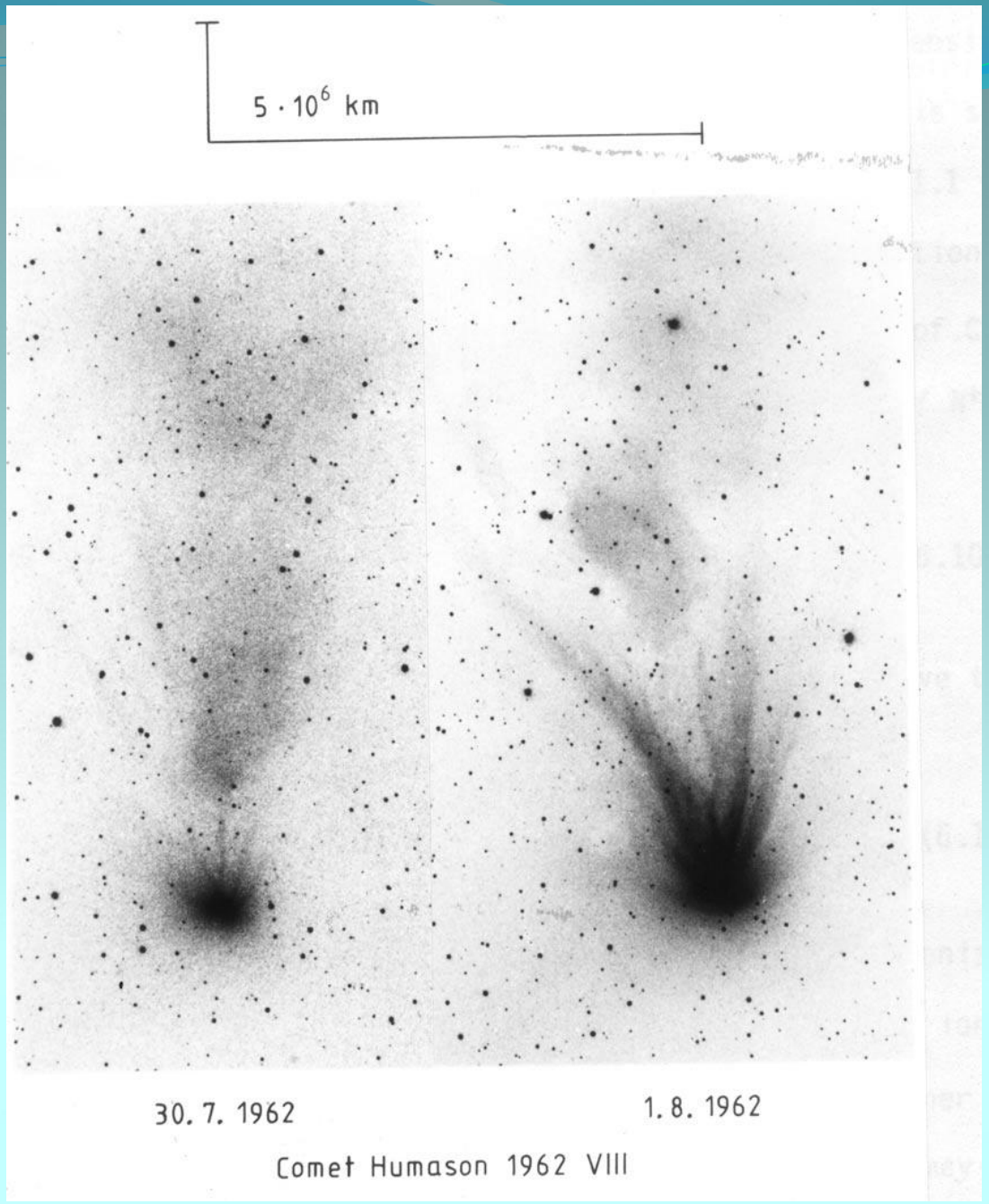
Le comete offrono un'ampia varietà di forme:



Code a ventaglio e ricurve



aspetti irregolari

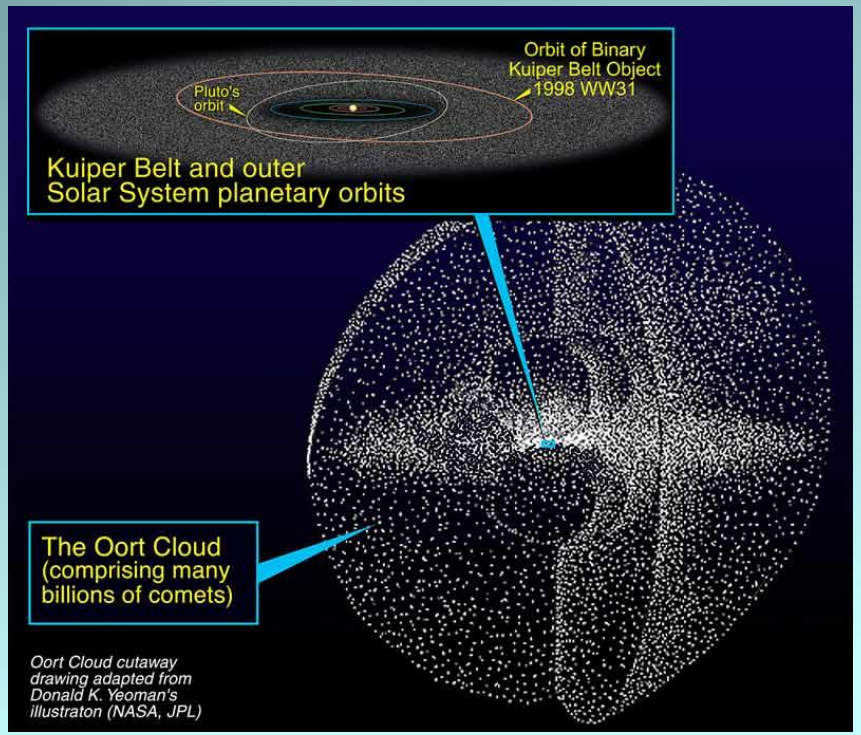


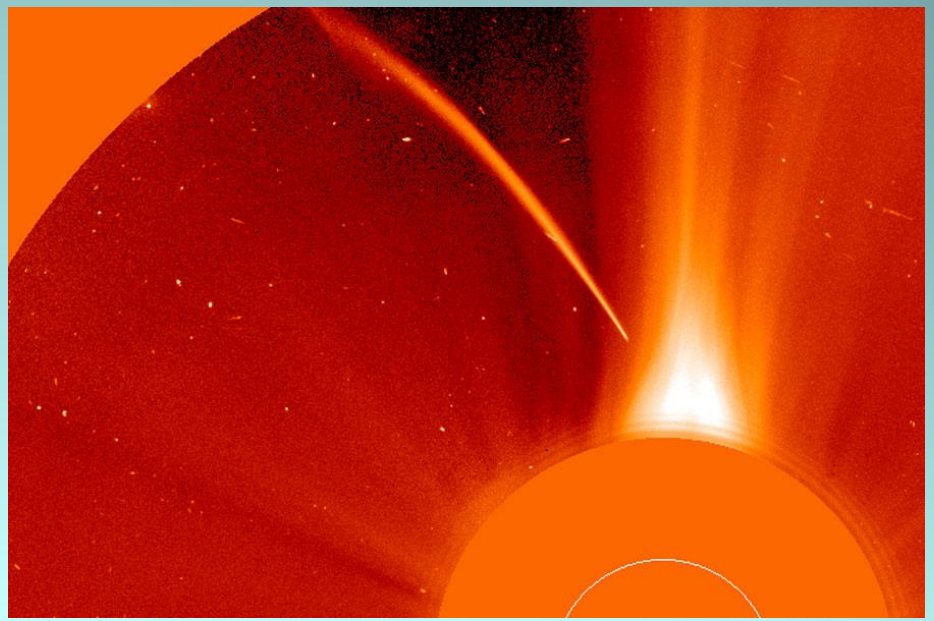
comete senza coda

comete ad aculeo (anticoda)

Comet C/2007 N3(LULIN) - 22 febr. 2009 - Erik Bryssinck - Belgium- remote observatory Austr.

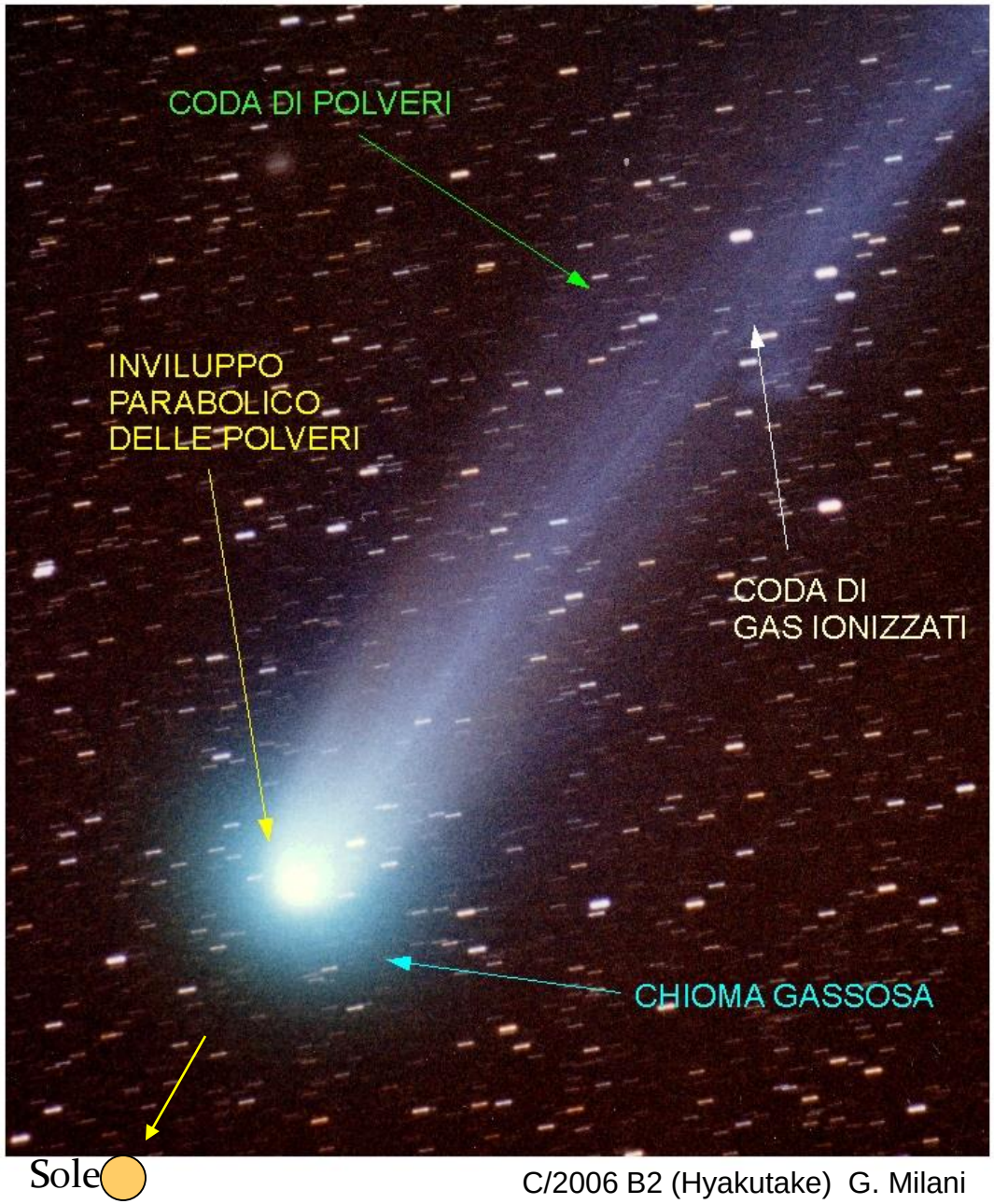
Le comete sono gli oggetti che si muovono nel Sistema Solare in un'ampia gamma di distanze: dagli estremi confini fino a sfiorare la superficie del Sole





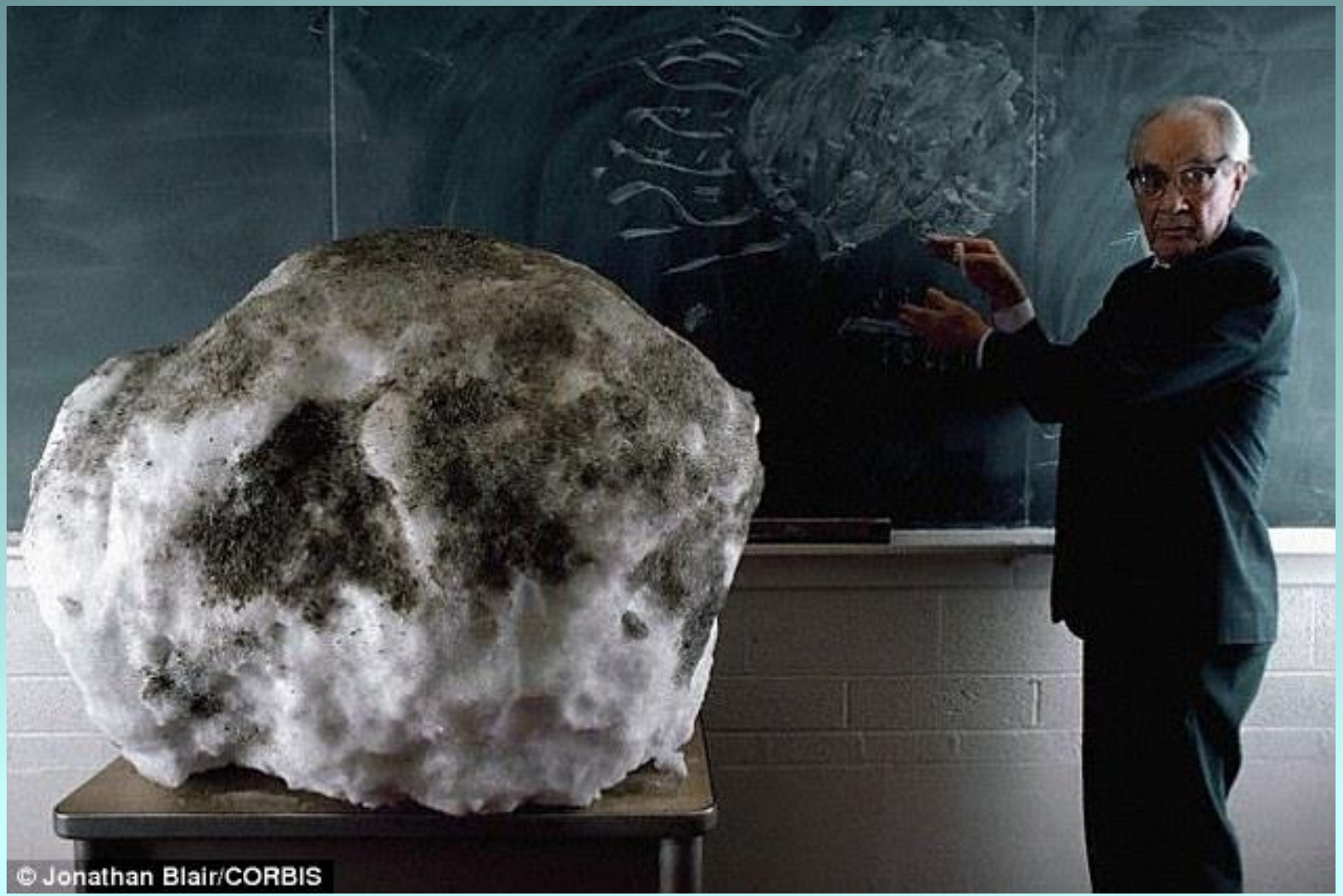
morfologia “classica”

- **chioma gassosa** (nel visibile può estendersi per oltre 200000 km)
- **inviluppo di polveri** (esteso circa fino a 50000 km + nella coda)
- Coda di **gas ionizati**

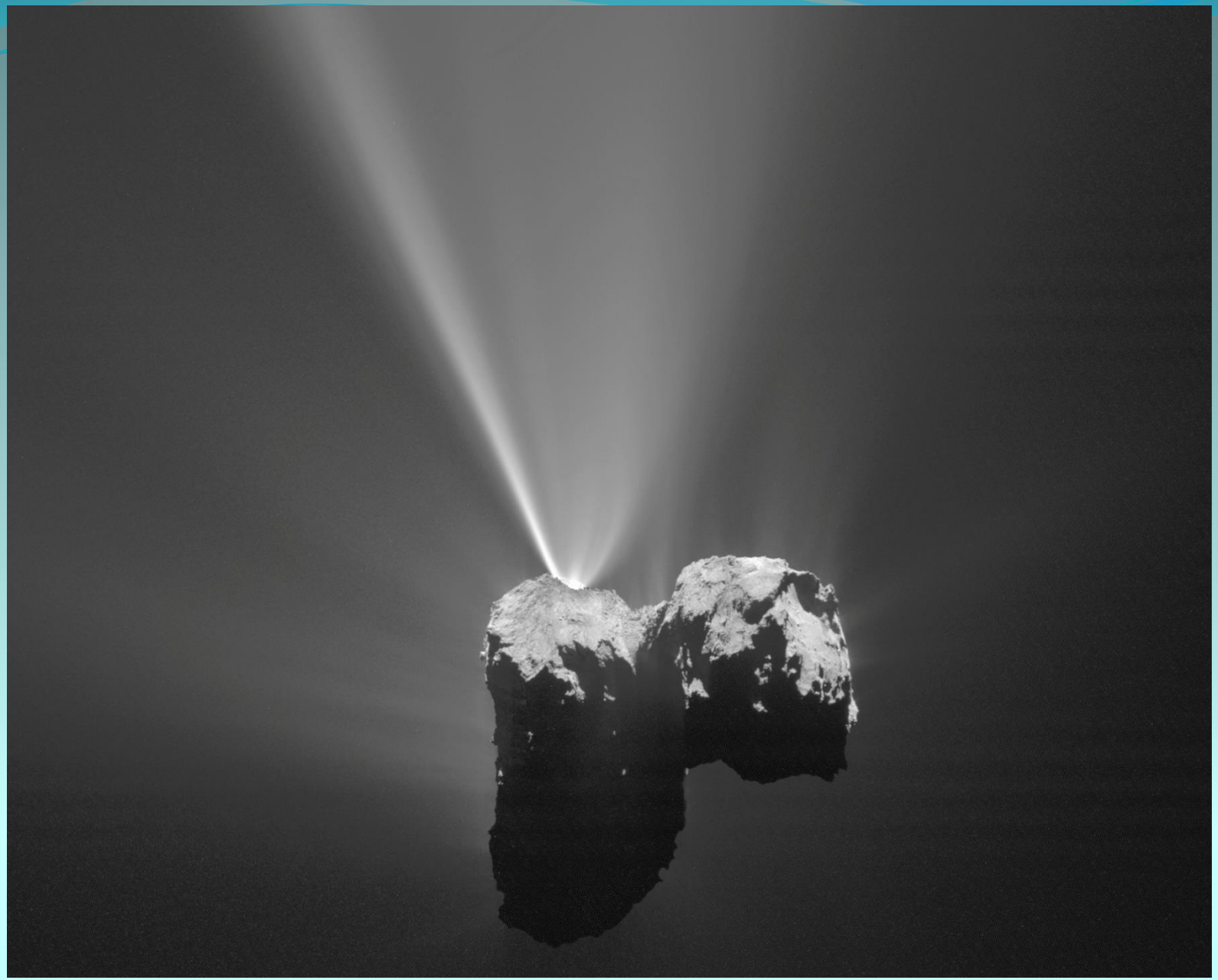


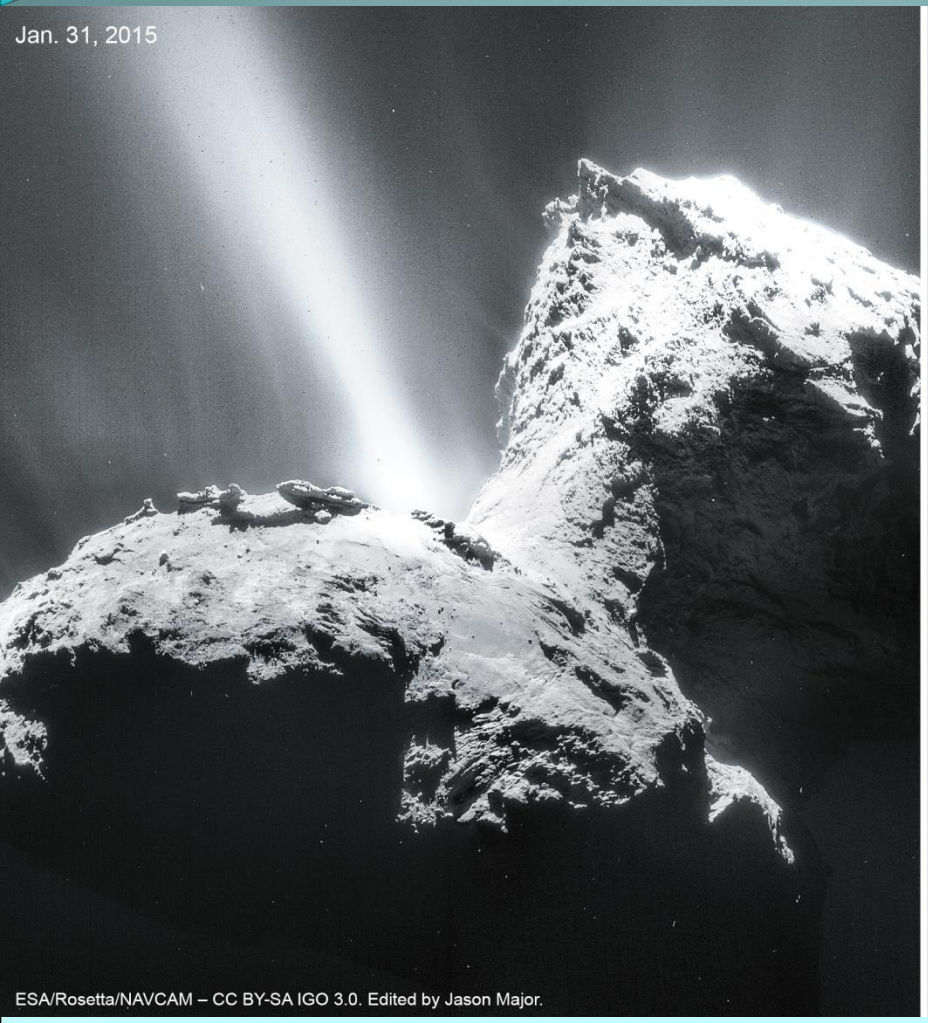
C/2006 B2 (Hyakutake) G. Milani

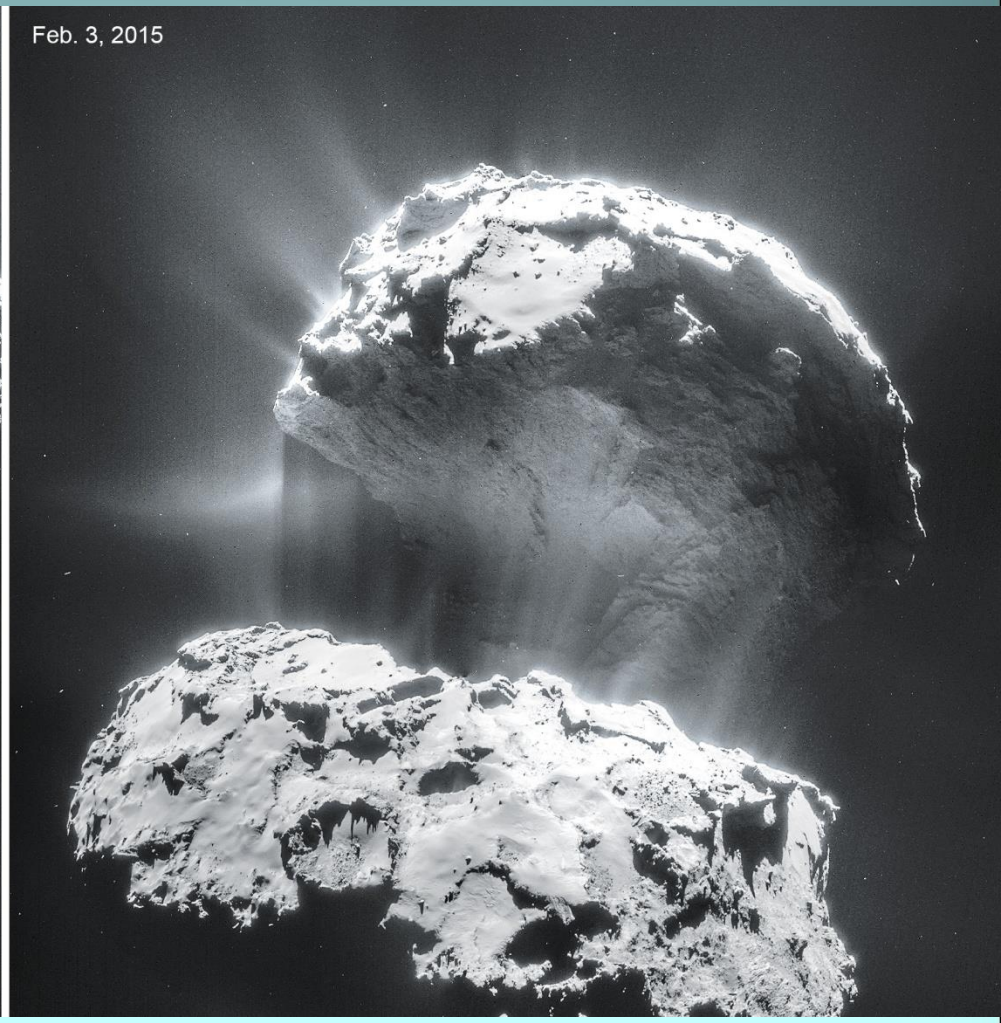
DALLA PALLA DI NEVE SPORCA ALLA PALLA DI POLVERI GHIACCIATE

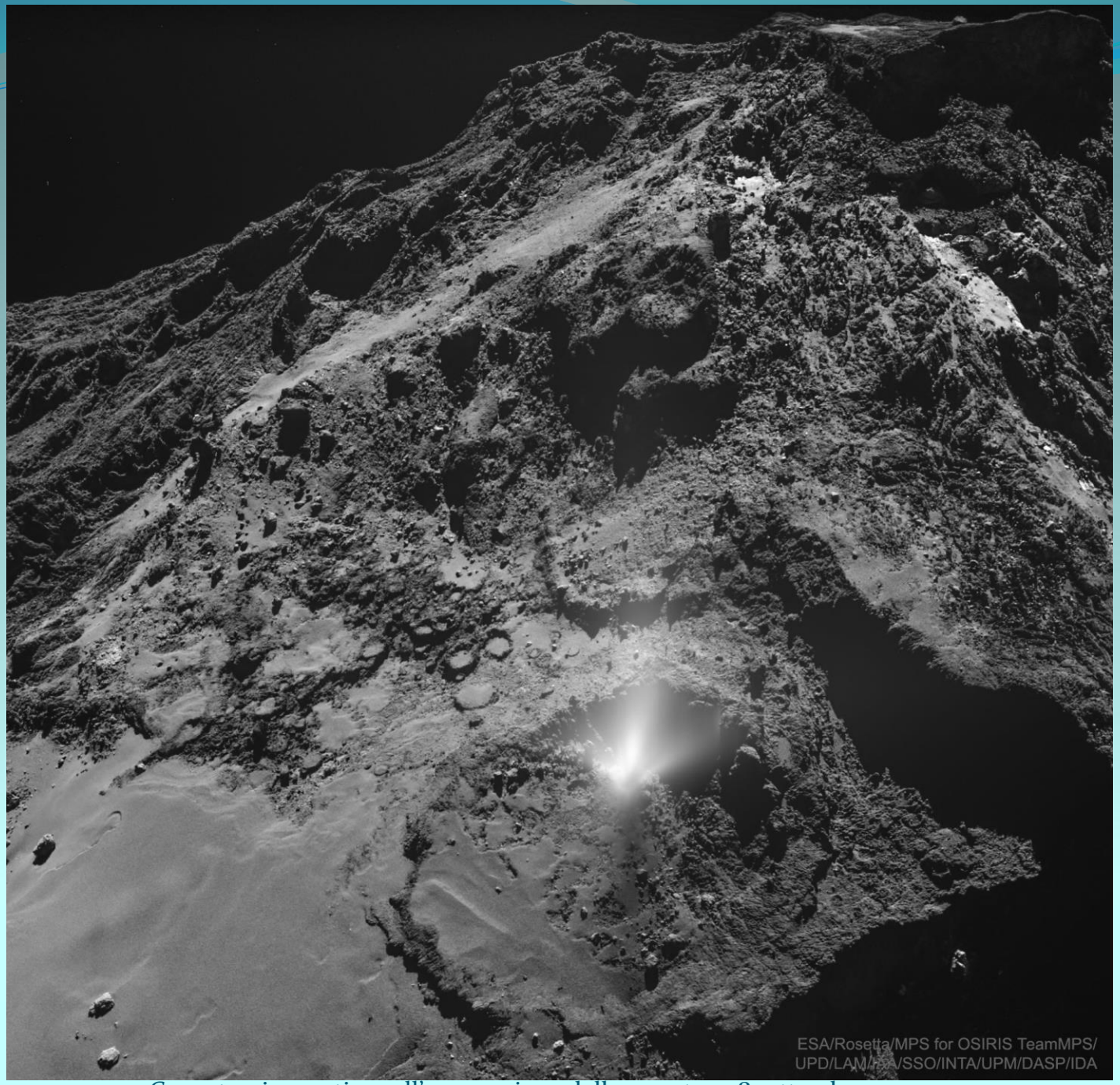


67P - ROSETTA

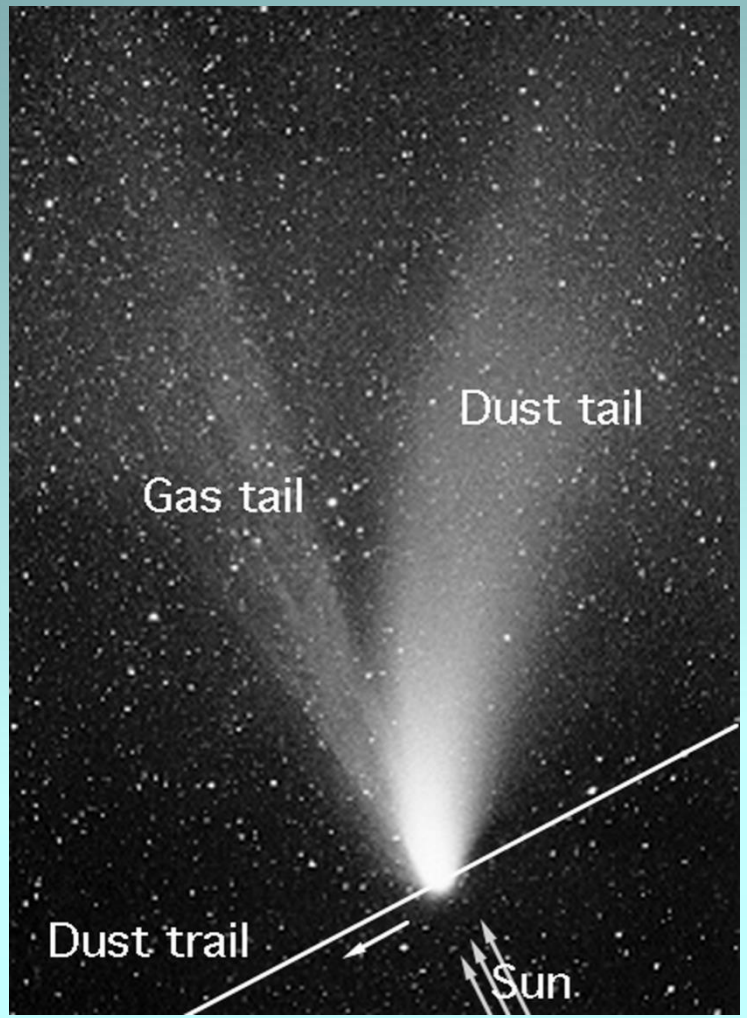



Jan. 31, 2015
ESA/Rosetta/NAVCAM – CC BY-SA IGO 3.0. Edited by Jason Major.


Feb. 3, 2015


ESA/Rosetta/MPS for OSIRIS TeamMPS/
UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

Non possiamo interpretare una immagine cometaria senza considerare le condizioni geometriche dell'osservazione

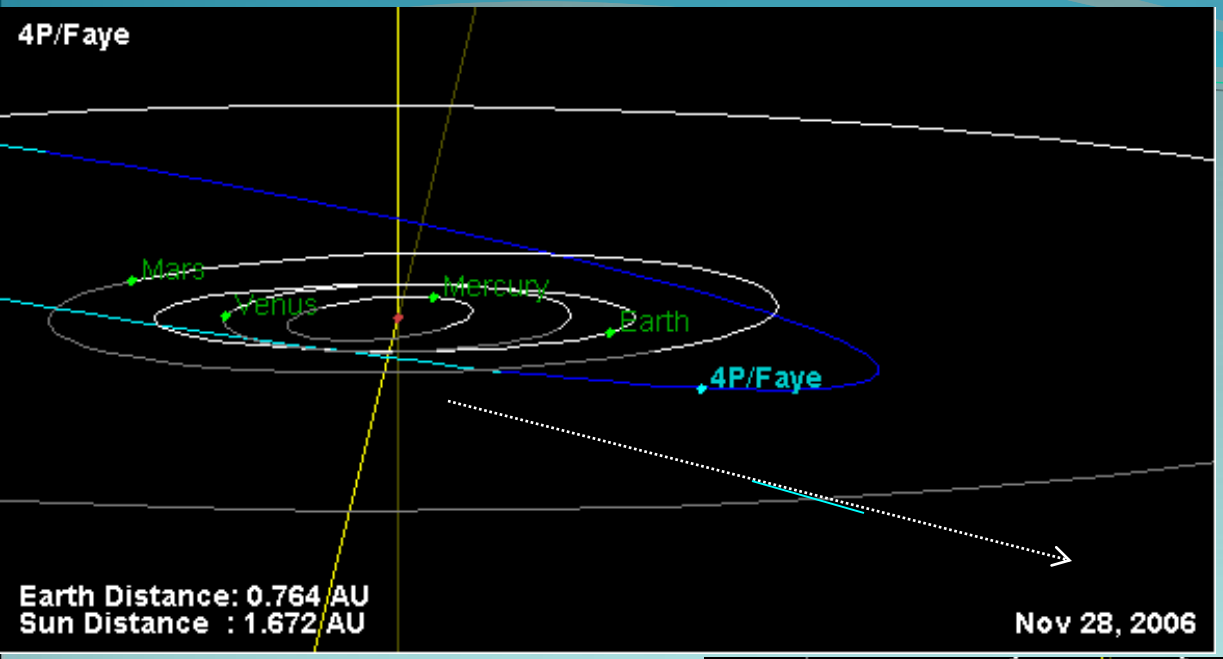


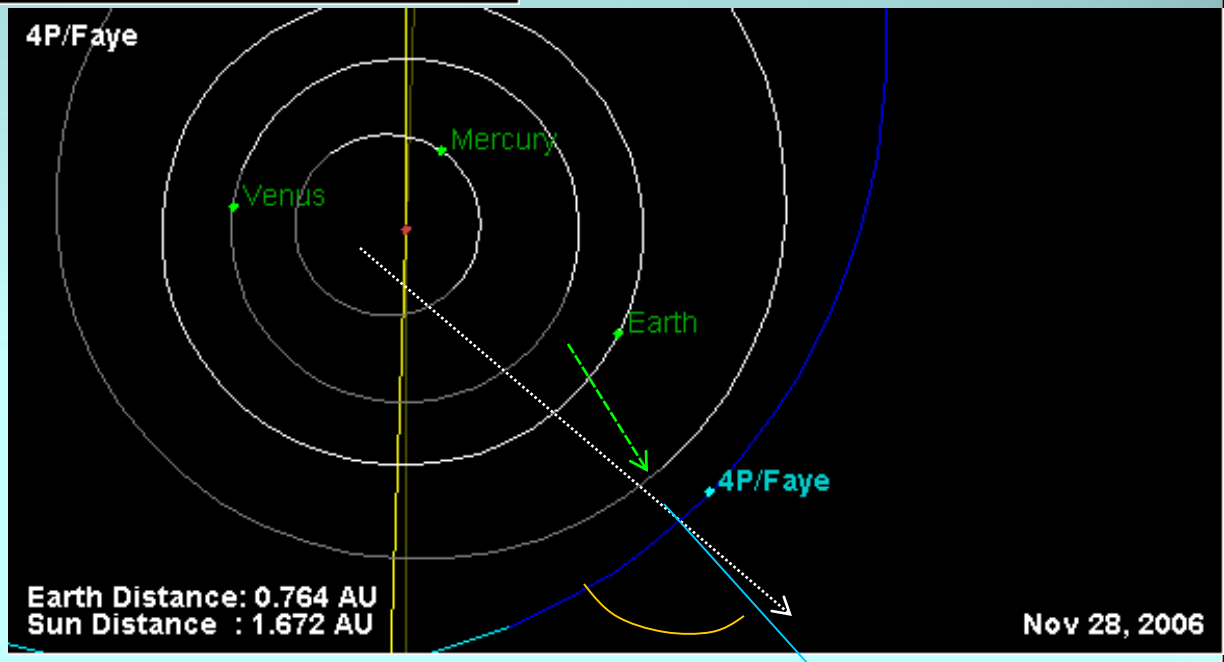
Come è orientata la cometa nello spazio?

Come la vediamo proiettata sul piano del cielo?

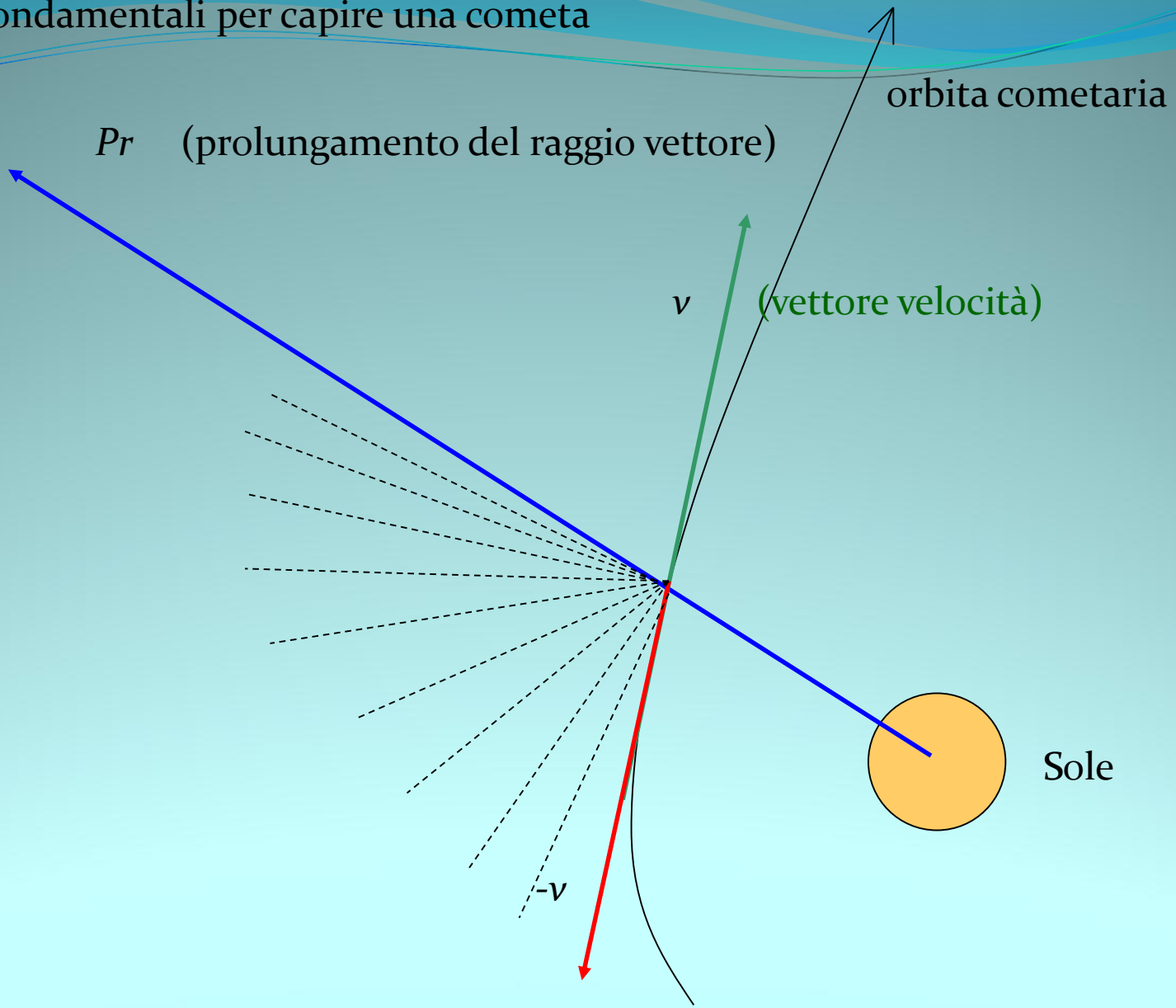
Una prima valutazione può essere fatta mediante l'angolo di fase e la direzione del prolungamento del raggio vettore (congiungente Sole-nucleo)

Come “capire” una cometa?





gli angoli fondamentali per capire una cometa



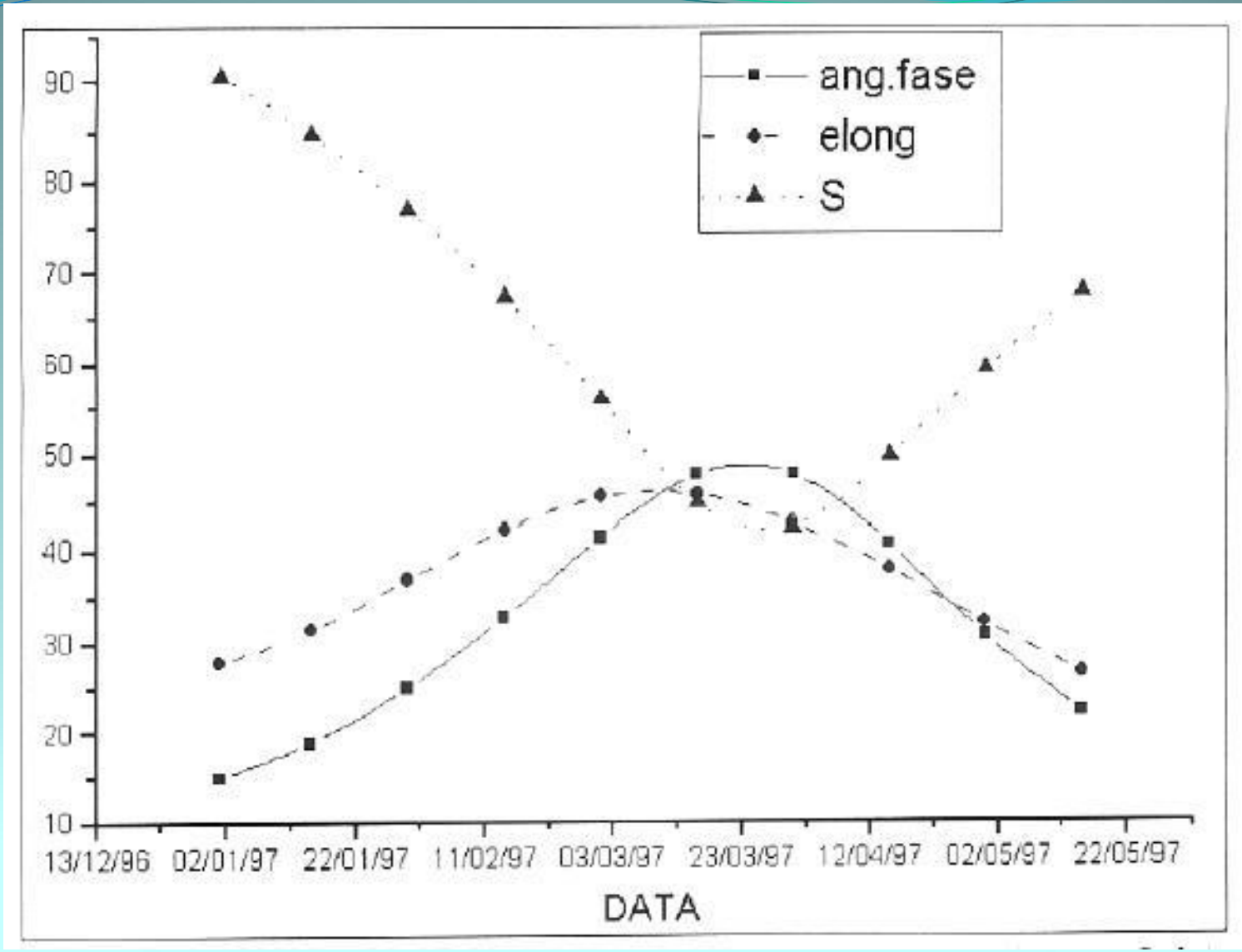
...alcuni degli angoli fondamentali

- *Ps* - prolungamento del raggio vettore
- angolo di fase - Terra-Sole-Cometa
- *S* - angolo tra piano del cielo e piano orbitale della cometa

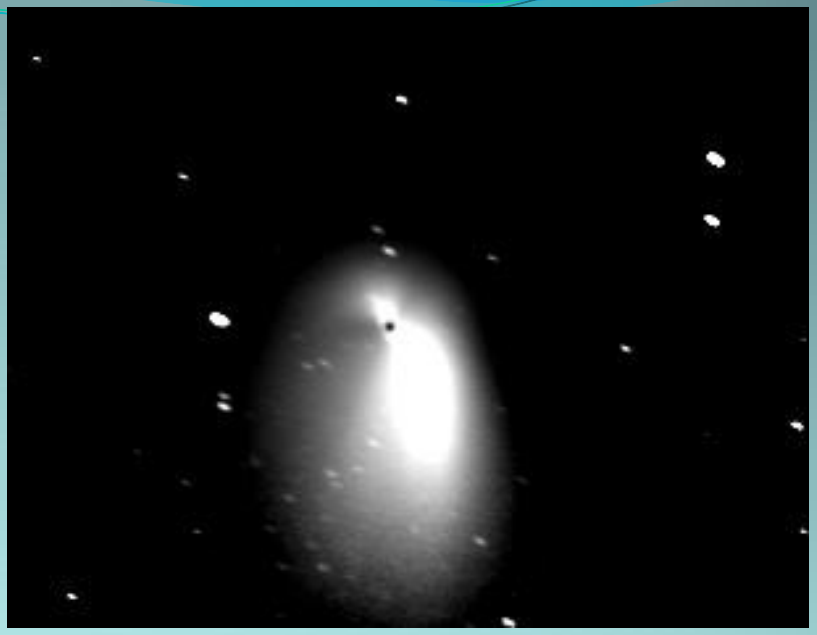
$$\tan\left(p_s\right)=\frac{-\sin\left(\alpha-\alpha'\right)}{\cos\delta\ tg\,\delta'-\sin\delta\ \cos\left(\alpha-\alpha\right)}$$

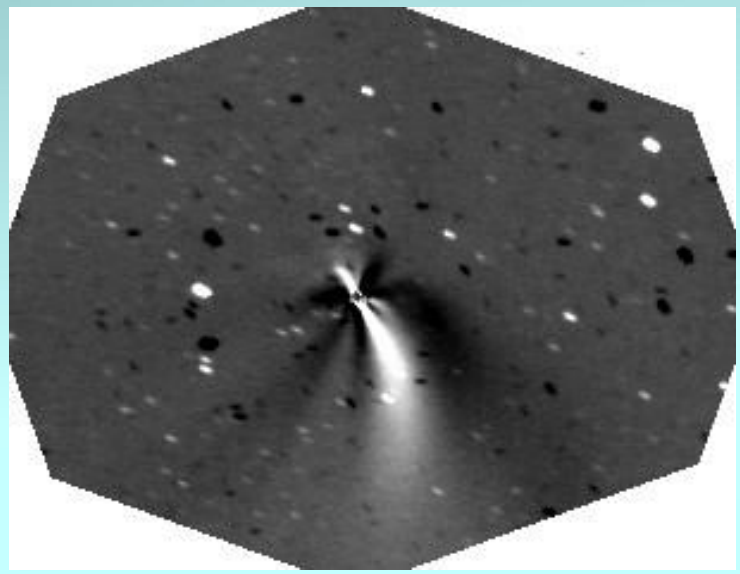
$$\cos\left(S\right)=-\cos i'\sin\delta+\sin i'\cos\delta\sin\left(\alpha-\Omega'\right)$$

Cometa Hale-Bopp

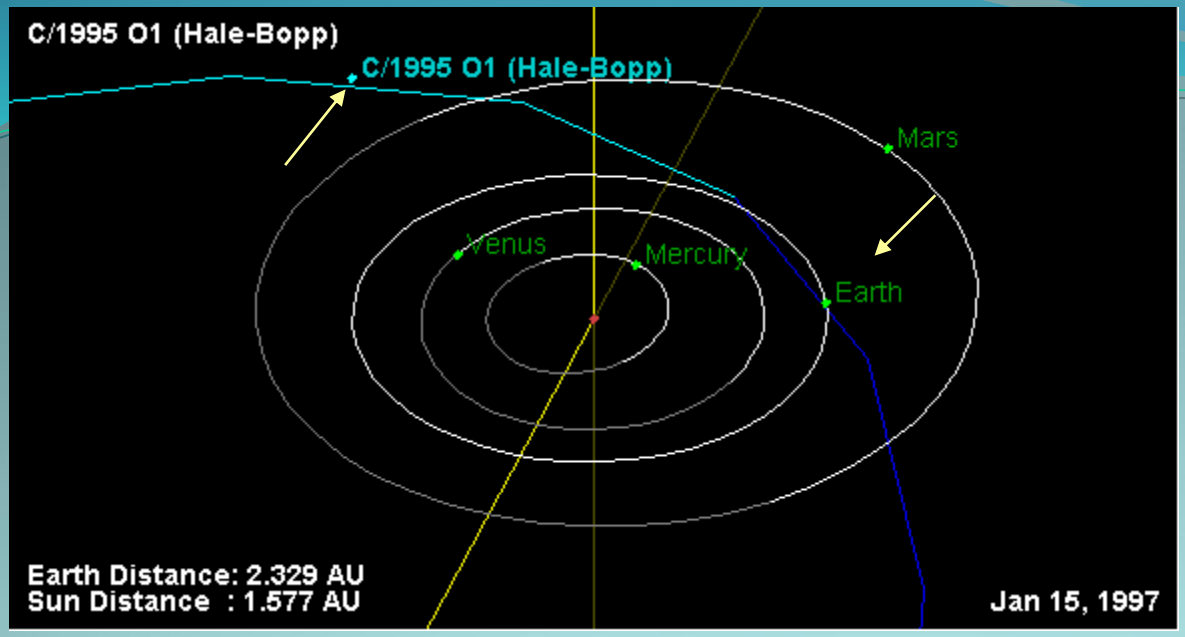


.....analizziamo un caso reale





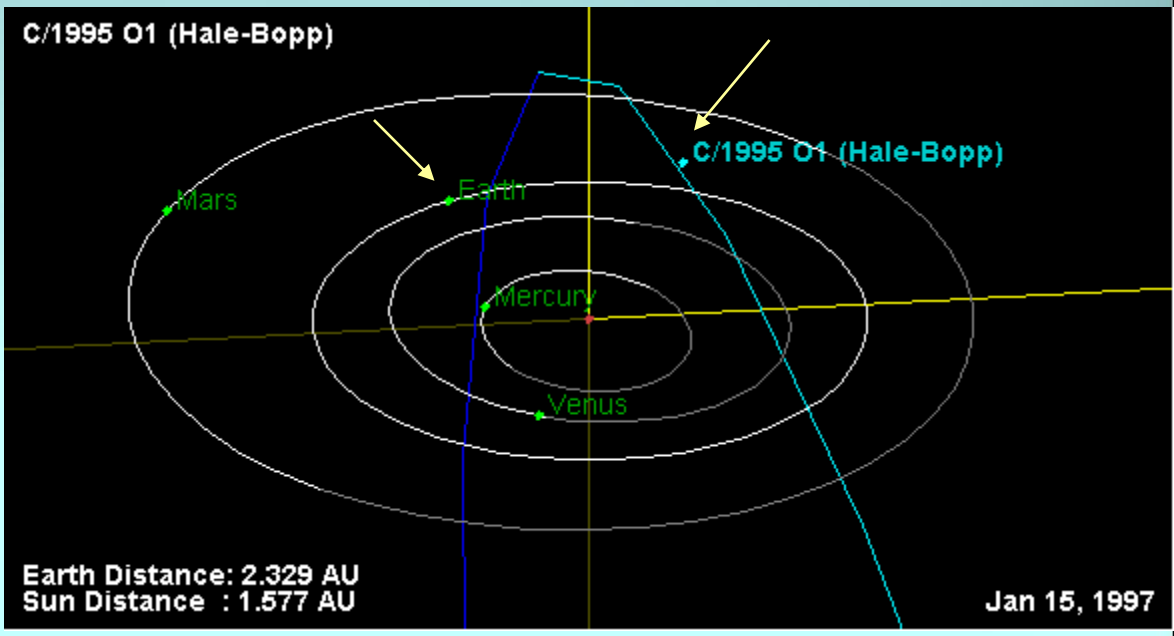
Cometa Hale-Bopp 17 gennaio 1997

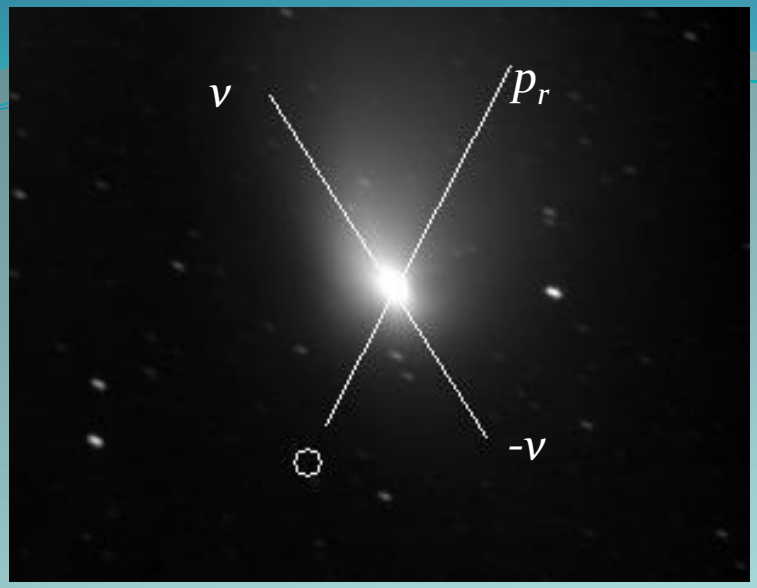


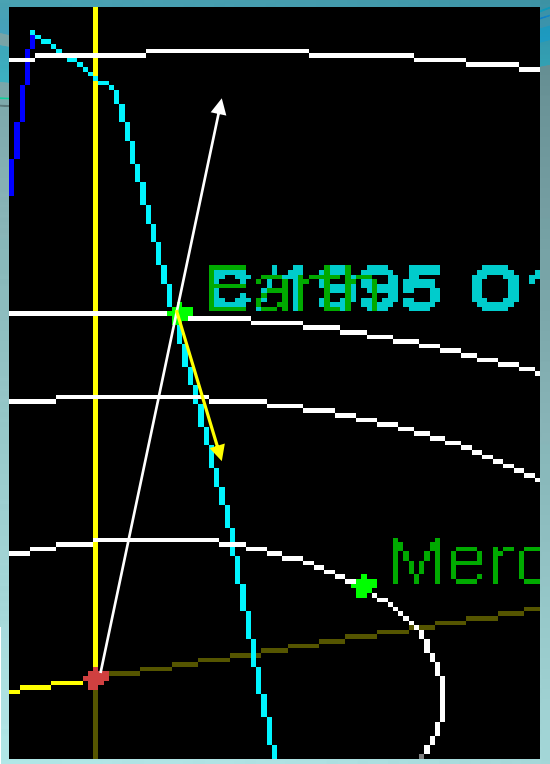
un metodo approssimativo

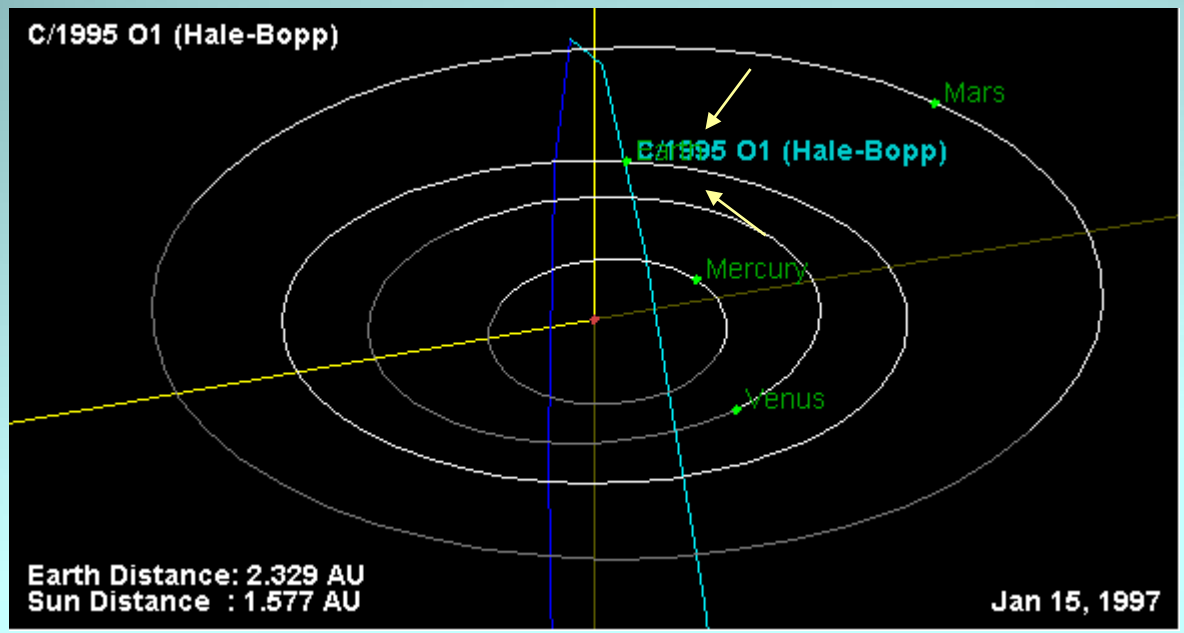
Per una valutazione “spiccola”:
Orbit diagrams

http:
//neo.jpl.nasa.gov/orbits/



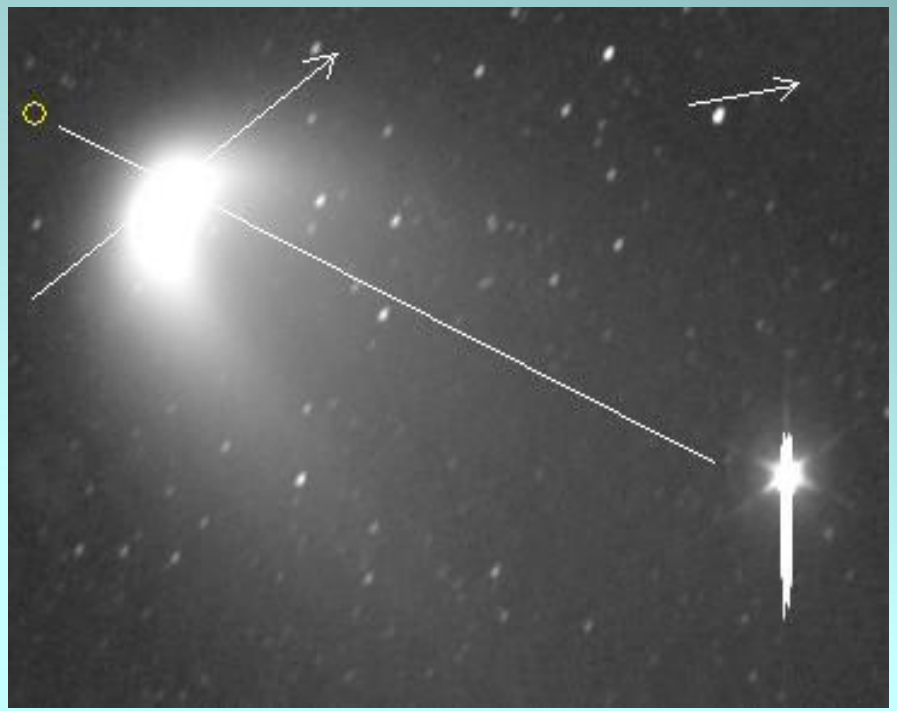






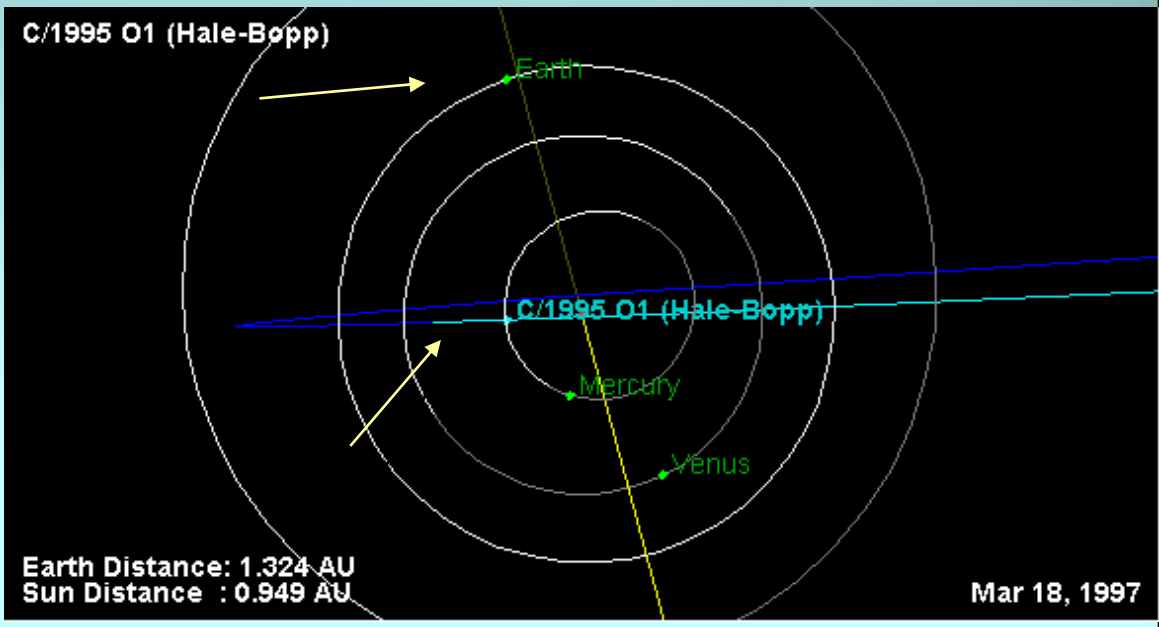
n.b. la rappresentazione è rispetto al piano dell'eclittica

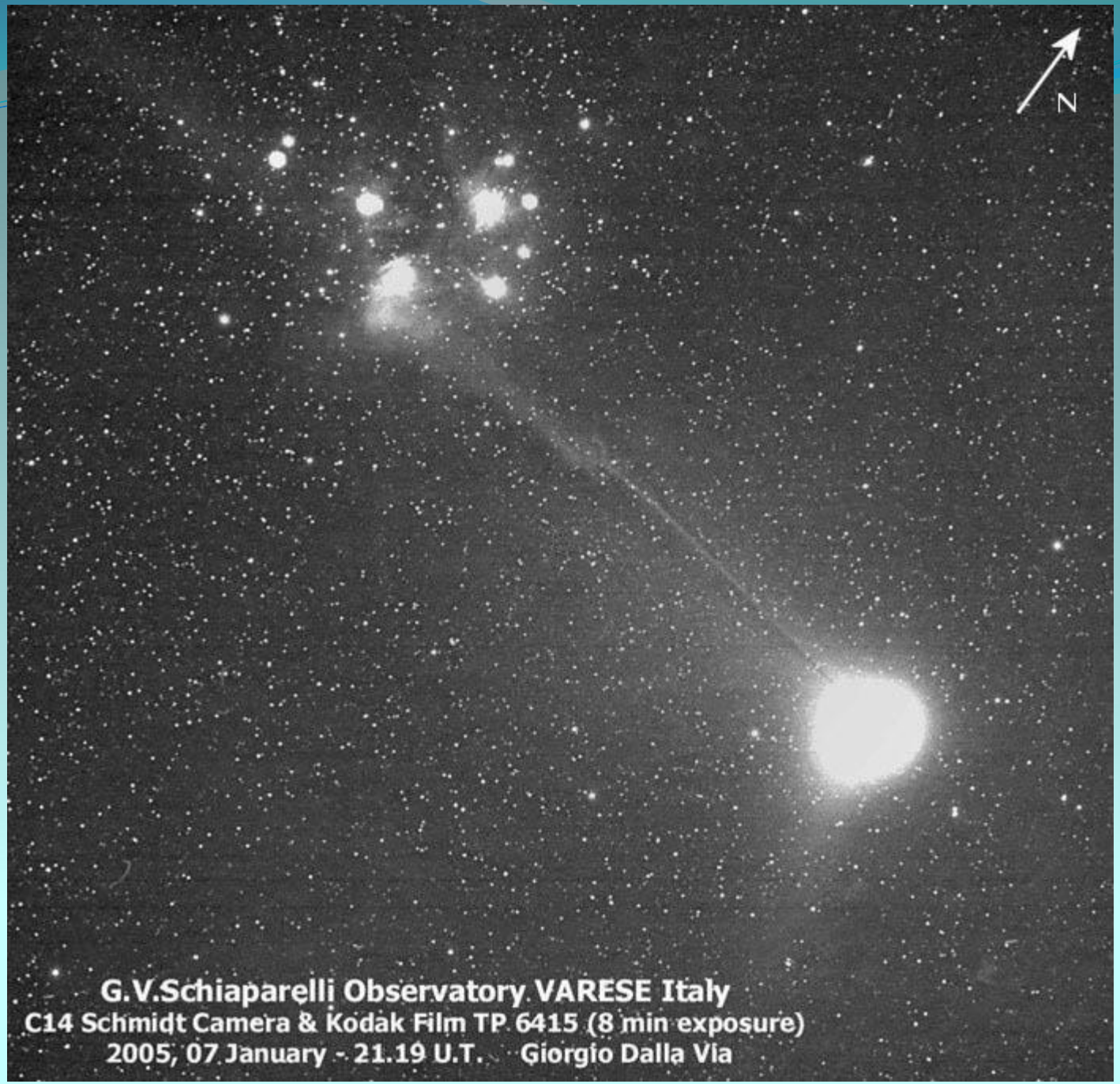
Hale-Bopp 8 febbraio



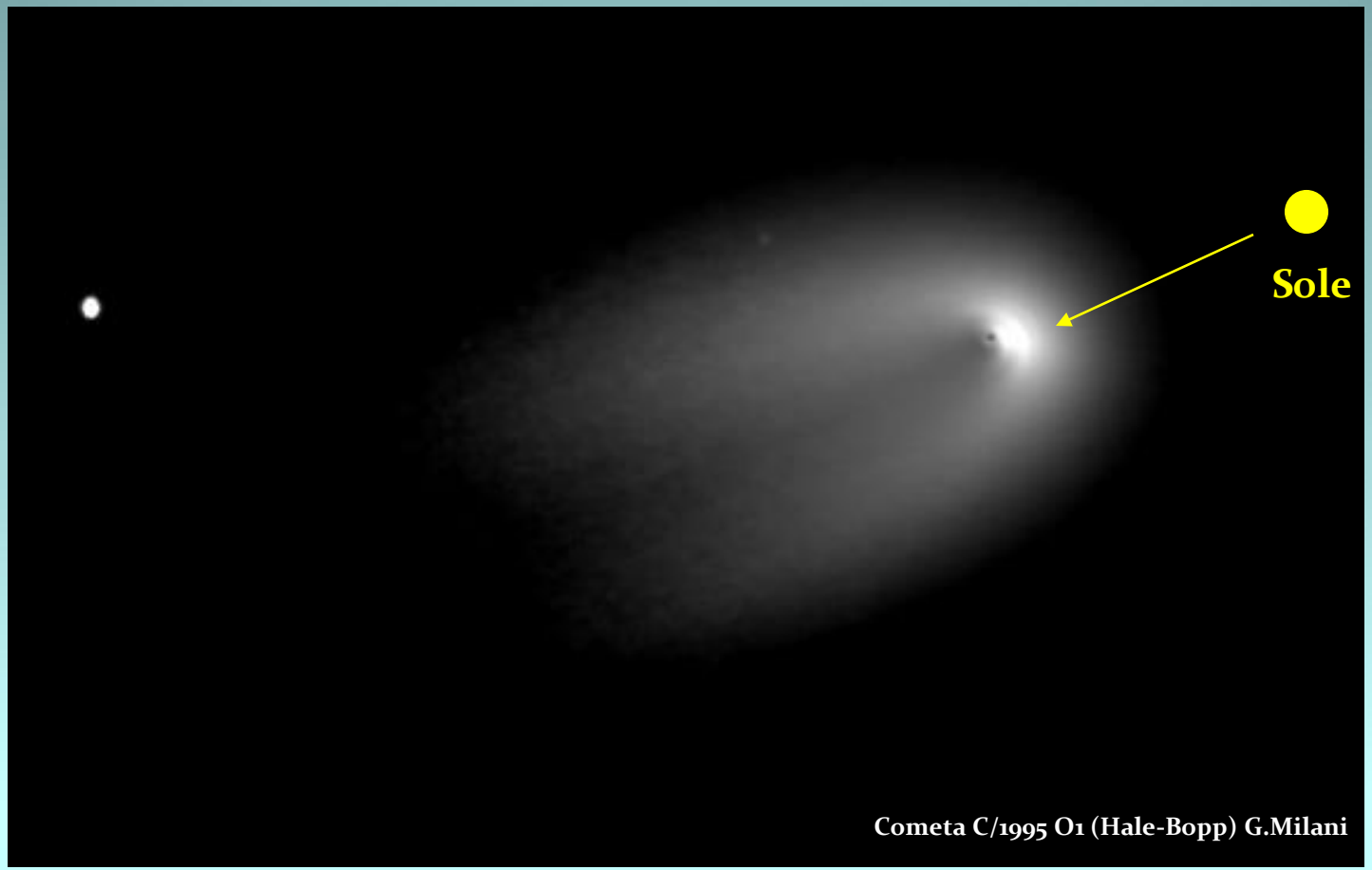
Hale-Bopp fine marzo:
Terra all'incirca perpendicolare al piano dell'orbita

In questo periodo abbiamo osservato al meglio la coda, le sue strie, ed anche gli aloni concentrici nella chioma



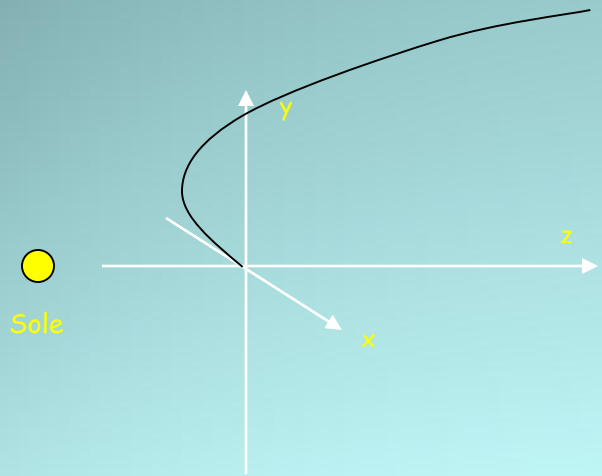

N
G.V.Schiaparelli Observatory VARESE Italy
C14 Schmidt Camera & Kodak Film TP 6415 (8 min exposure)
2005, 07 January - 21.19 U.T. Giorgio Dalla Via

L'inviluppo parabolico delle polveri



modello a "fontana" (Eddigton), descrive il moto di grani di polvere (moto uniformemente accelerato)

la posizione di un grano di polvere in un sistema di assi x,y,z, è data da

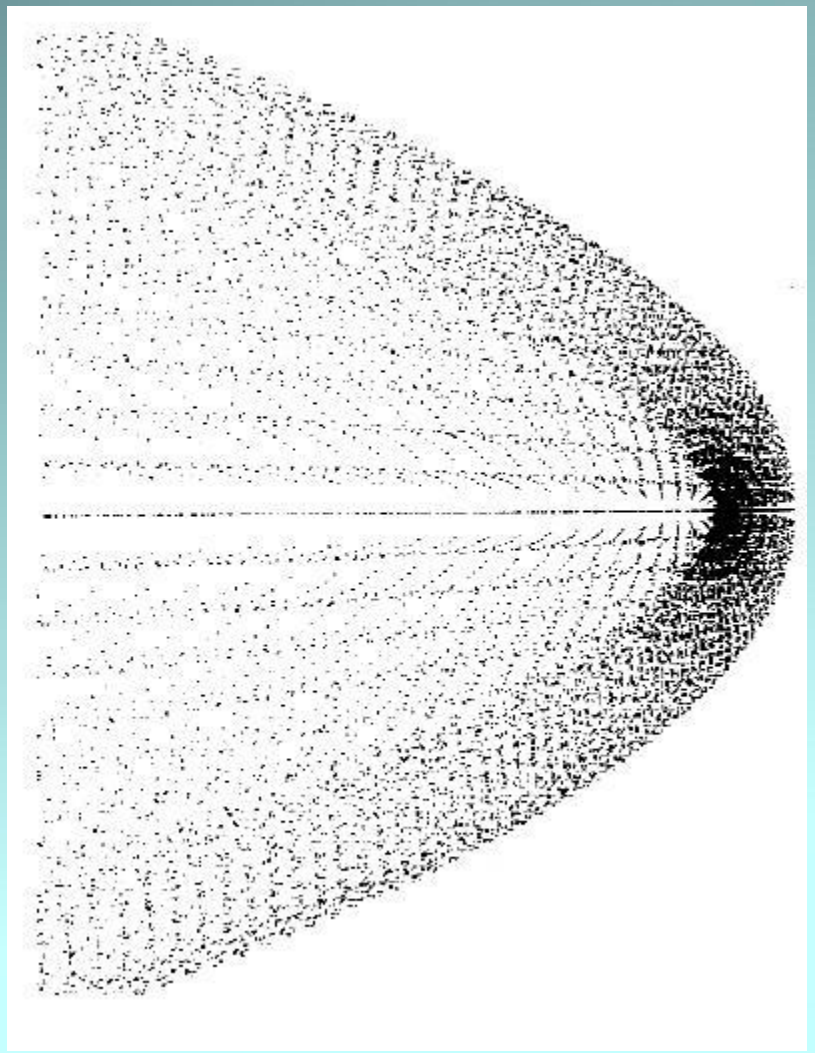


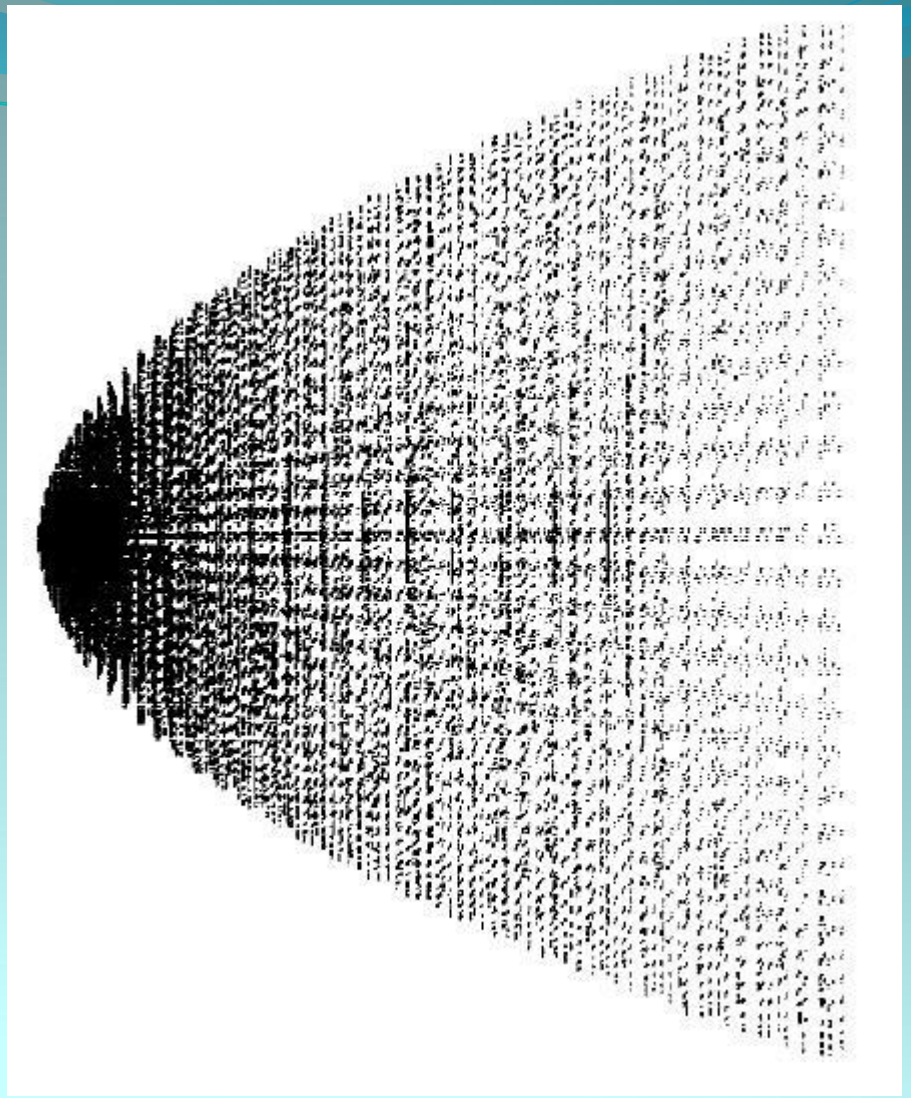
$$x = V_d \sin(\theta) \cos(\phi)\, t$$

$$y = V_d \sin(\theta) \sin(\phi)\, t$$

$$z = V_d \cos(\theta)\, t + 1/2\, g_r\, t^2$$

V_d = velocità di emissione del grano
θ, ϕ = angolo di emissione del grano
g_r = accelerazione (repulsiva)
t = tempo





Simulazioni della cometa Hale-Bopp

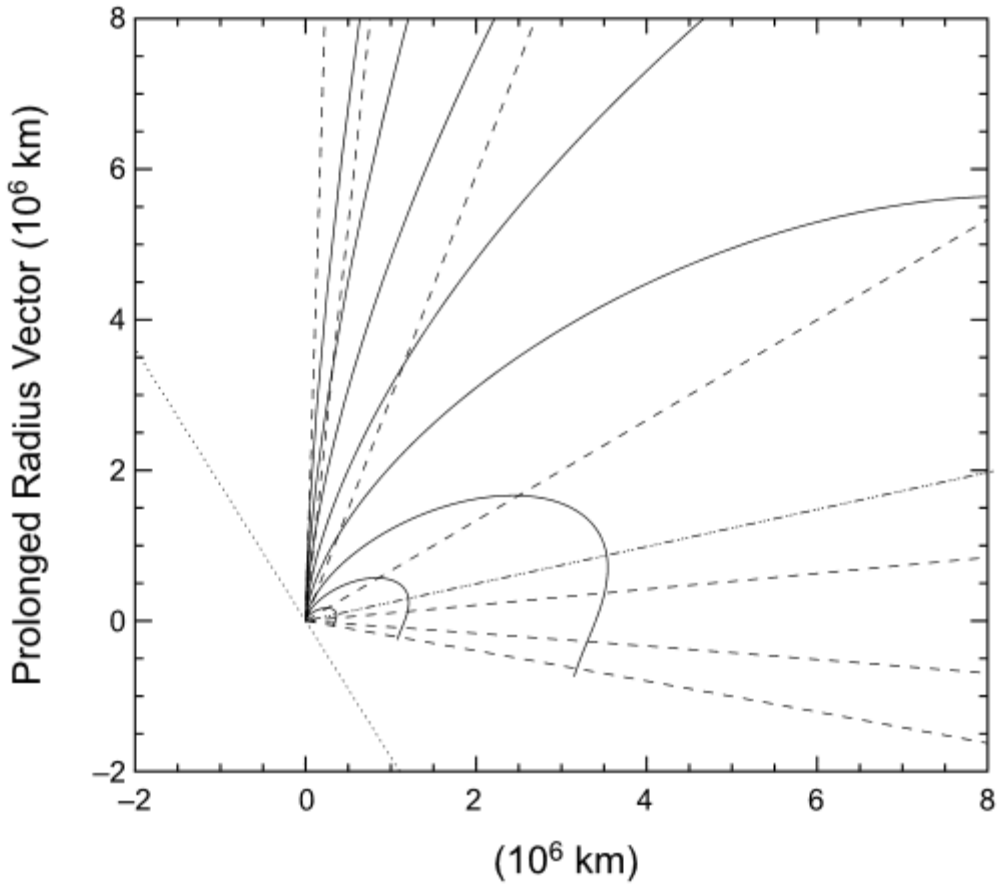


Fig. 1. Synchrone-syndyne network for Comet Hale-Bopp 1995O1 on 3 January 1998, when a neck-line was observed during the Earth crossing of the comet orbital plane (Fig. 2). The Sun was

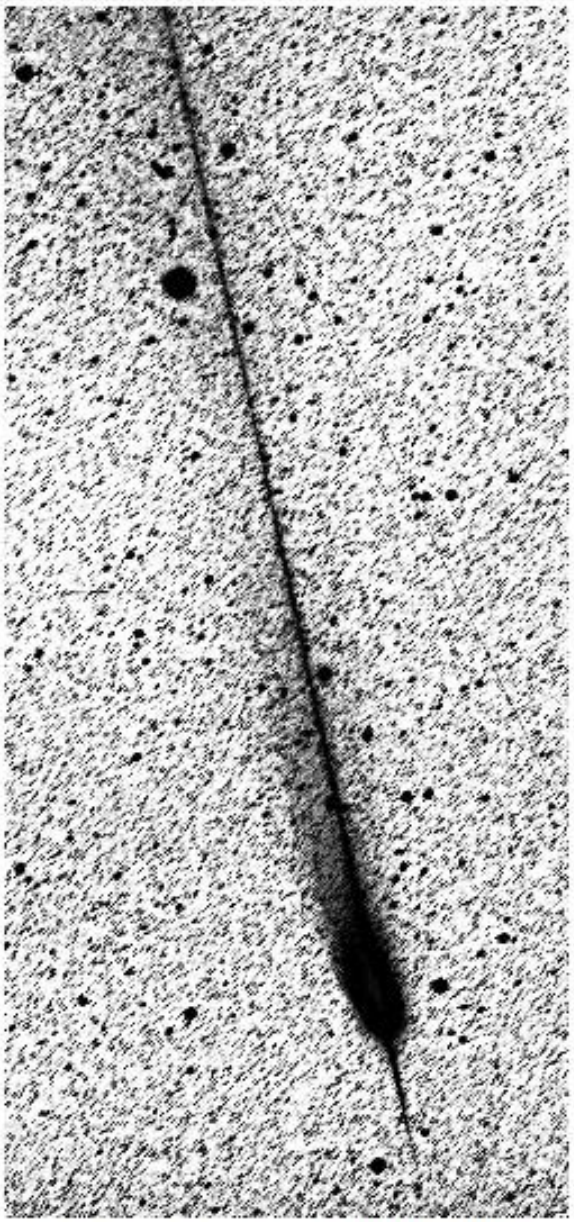
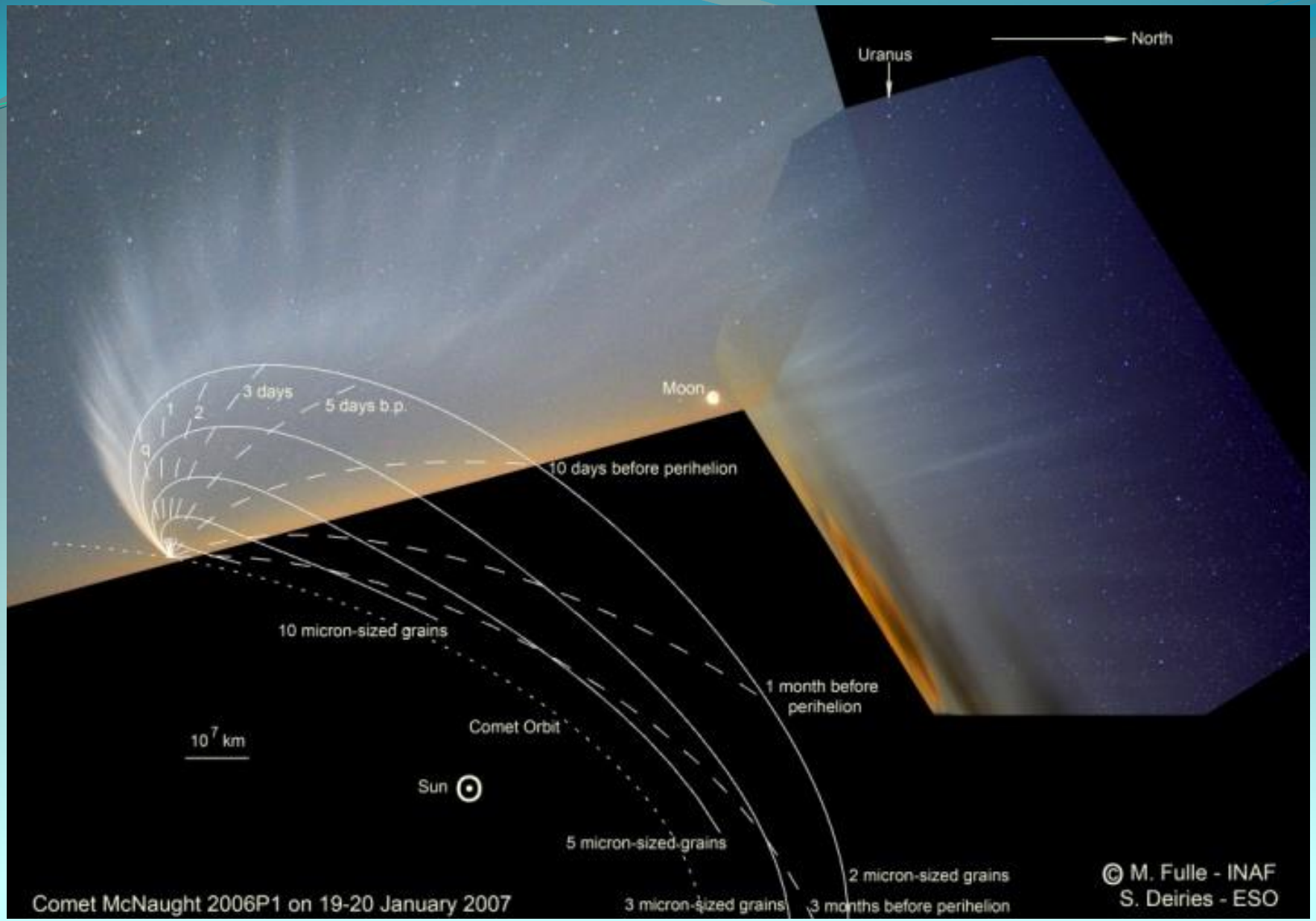
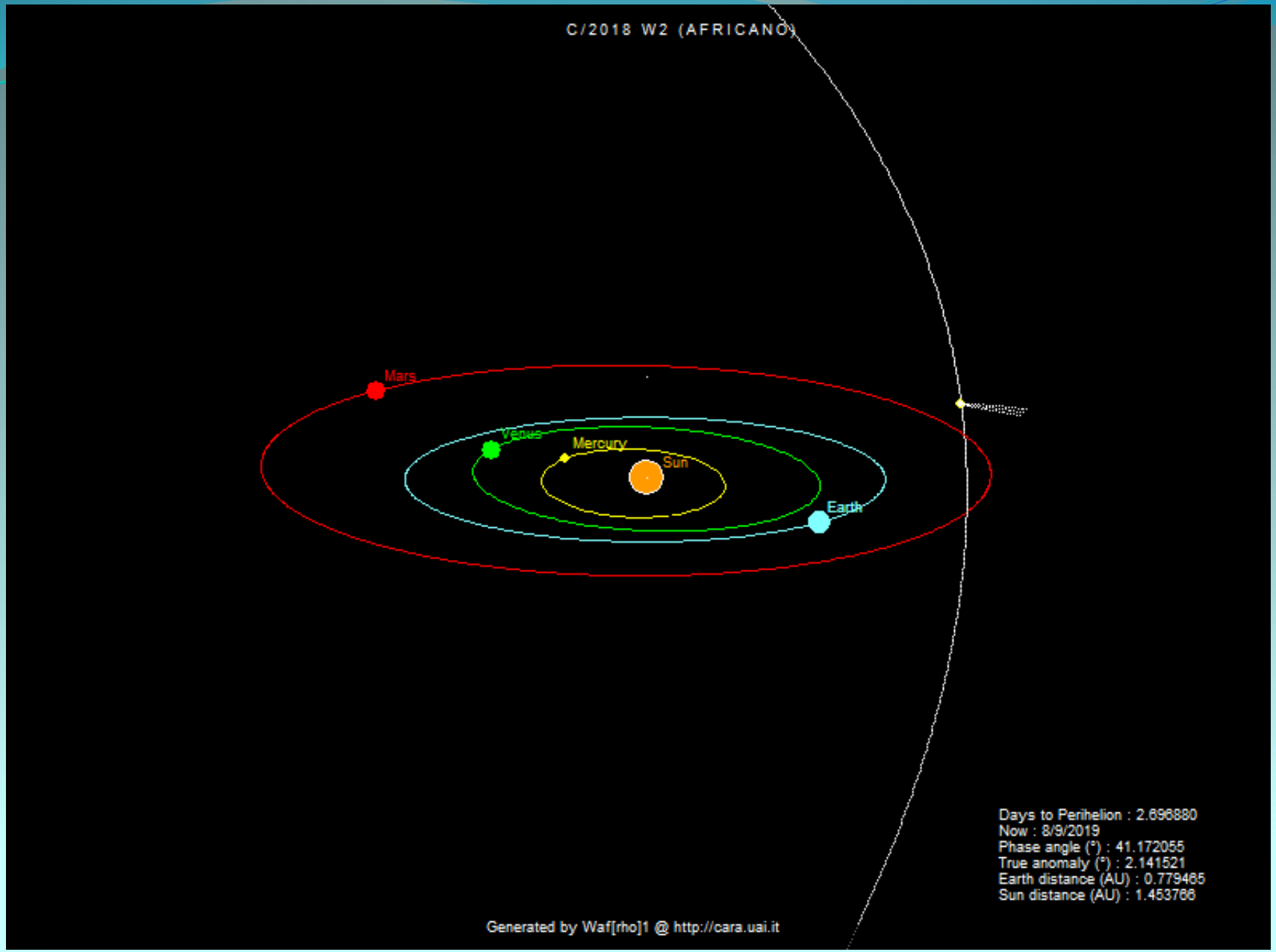


Fig. 2. Neck-line observed in Comet Hale-Bopp 1995O1 on 5 January 1998 with the ESO 1-m Schmidt Telescope. The original image was filtered (unsharp masking) to enhance the spike features: the real antitail pointing toward the Sun (bottom) and the neck-line pointing in the opposite direction. ESO Press Photo 05a/98, courtesy of the European Southern Observatory (observer Guido Pizarro).

STRUTTURE DI POLVERI : LA “NECK LINE”



S. Deiries – M. Fulle


C/2018 W2 (AFRICANO)
Mars
Venus
Mercury
Sun
Earth
Days to Perihelion : 2.696880
Now : 8/9/2019
Phase angle (°) : 41.172055
True anomaly (°) : 2.141521
Earth distance (AU) : 0.779465
Sun distance (AU) : 1.453766
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