

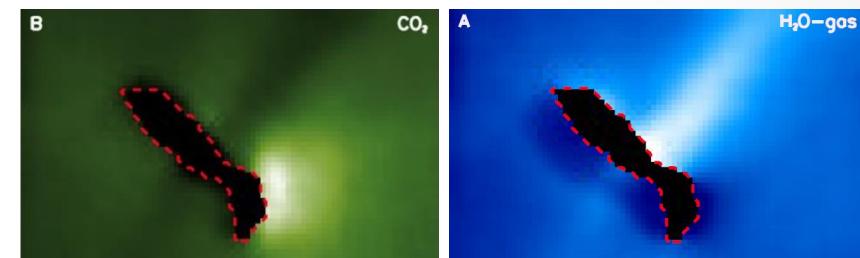
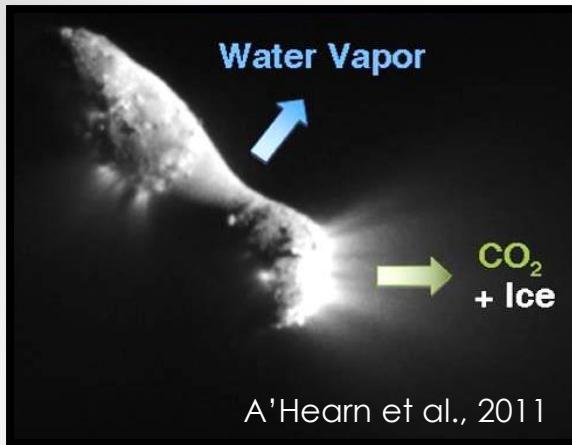
OH Fluorescence and Prompt Emission in comet 103P/Hartley 2 observed by EPOXI mission (and expected results for 67P/Churyumov-Gerasimenko observed by ROSETTA)

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S. Magrin, D. Bodewits, I. Bertini, M. Pajola,
C. Barbieri and H. Sierks

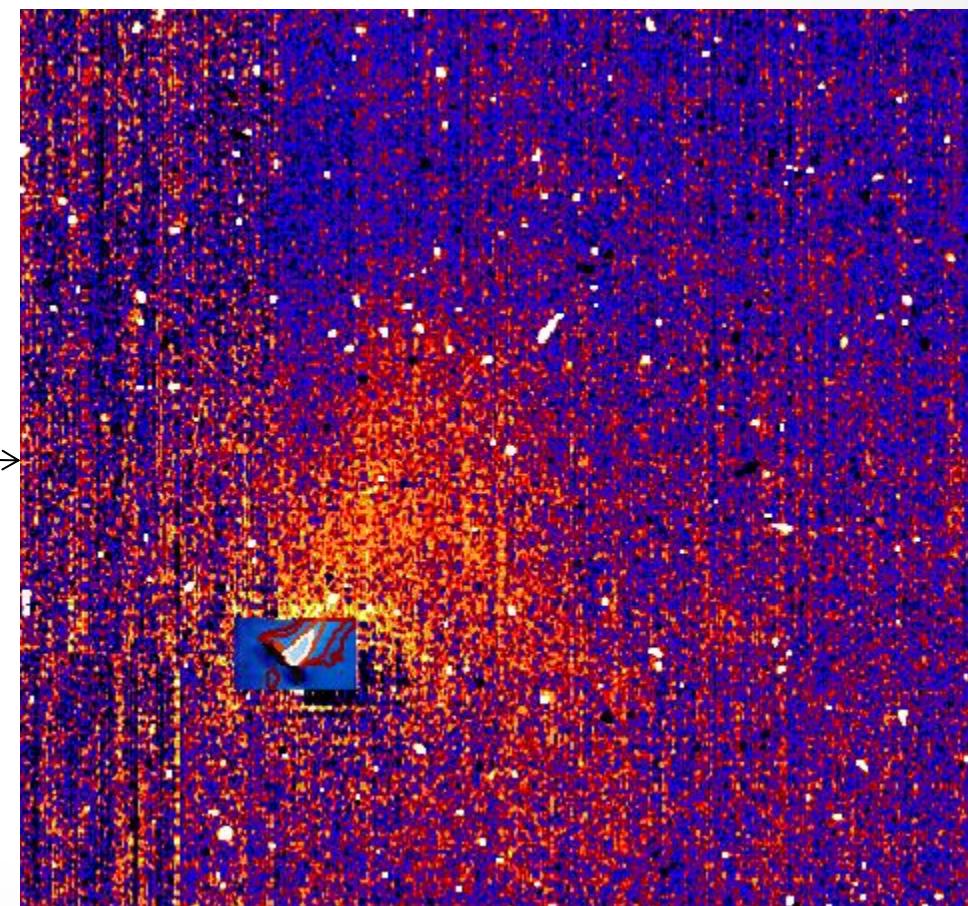
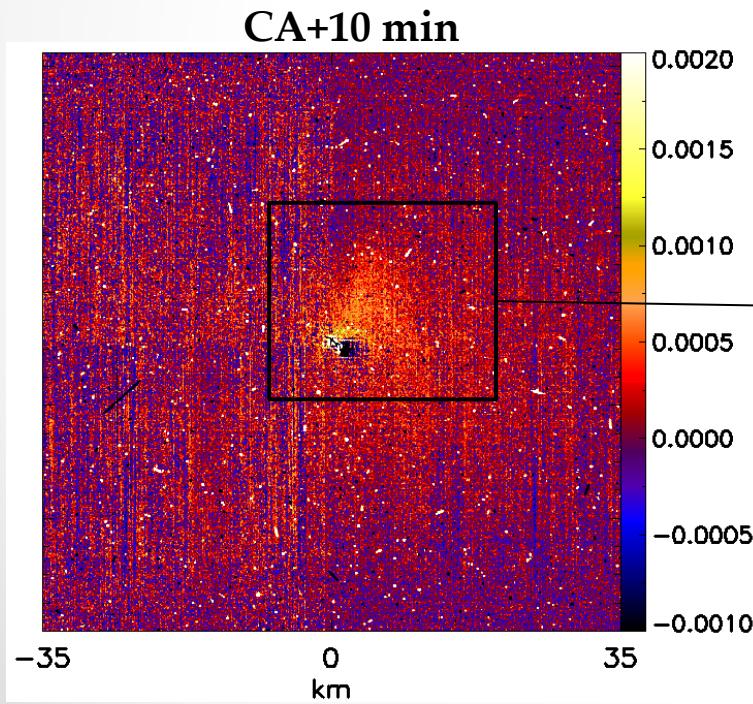
- EPSC 2014, Estoril, Portugal



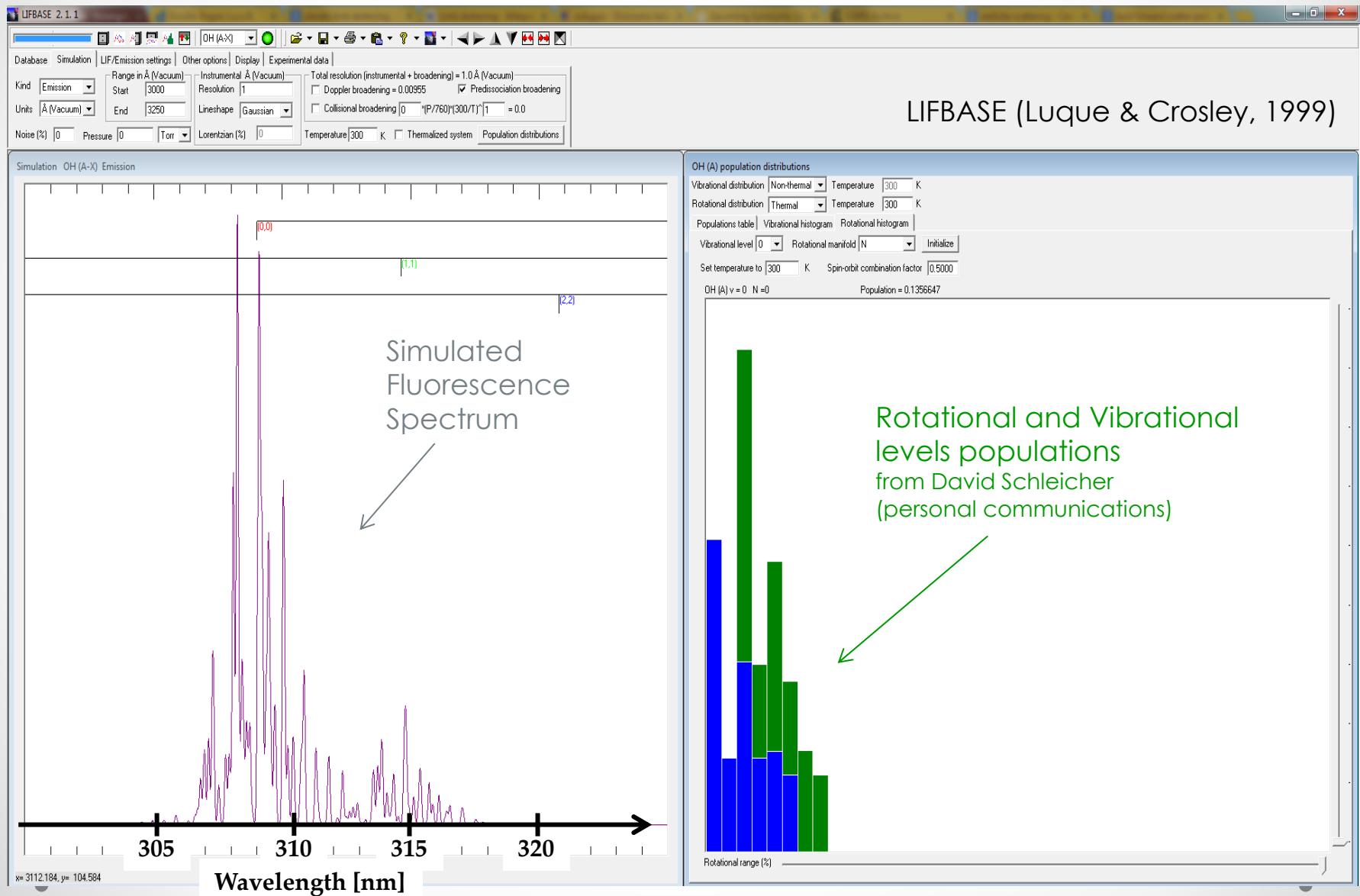
EPOXI @ HARTLEY 2



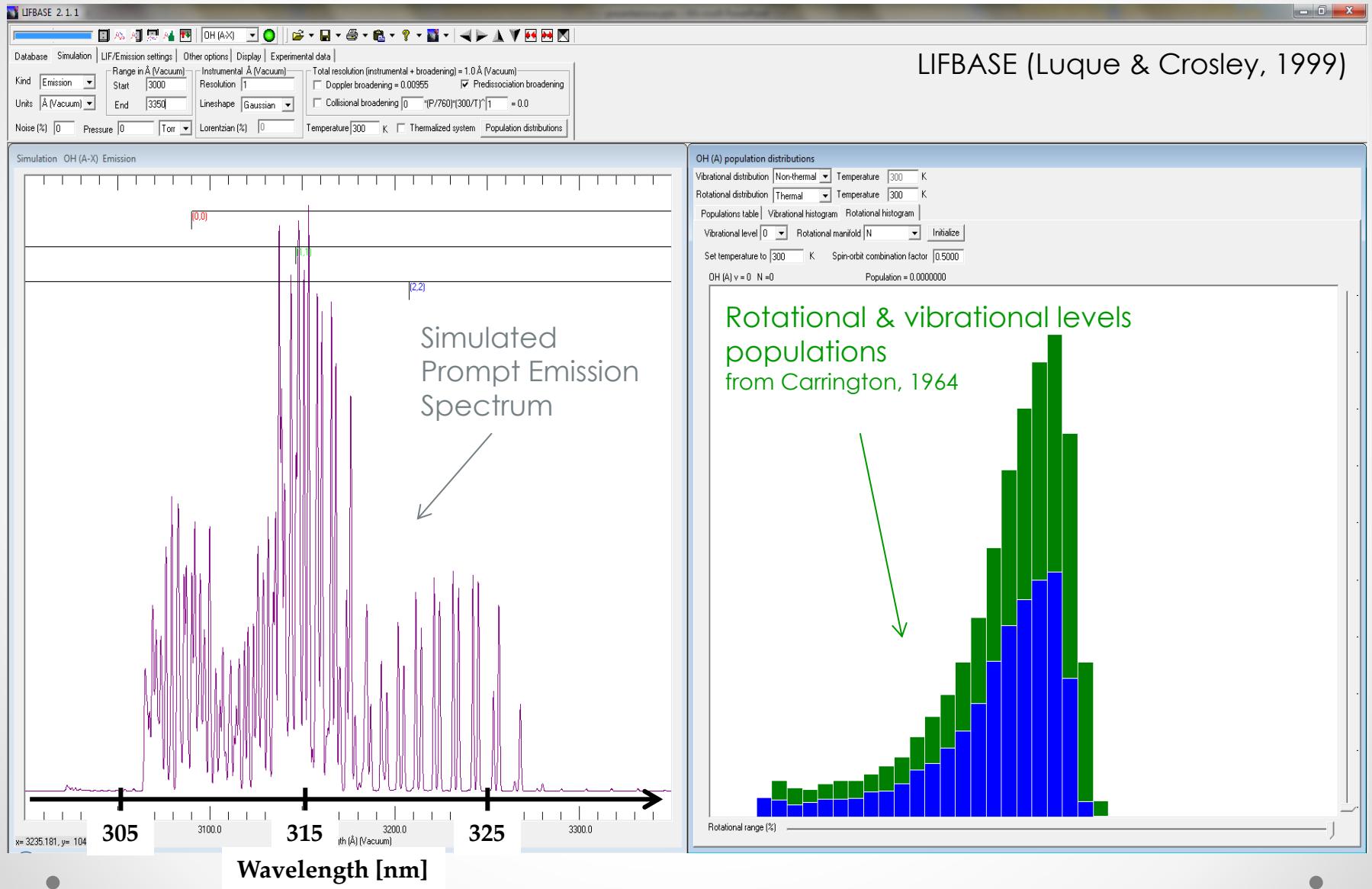
CA+7 min
Protopapa et al., 2014



OH FLUORESCENCE



OH PROMPT EMISSION



PE/Fluorescence Relative Strength

total Water Photodestruction Rate:

$1.040 \cdot 10^{-5}$ mol/s (quiet Sun)

$1.411 \cdot 10^{-5}$ mol/s (active Sun)

Combi et al., 2004 (Comets II)

Branching ratio for OH^* :

0.036 (quiet Sun)

0.041 (active Sun)

Combi et al., 2004 (Comets II)

Adjusted Haser Model
(Combi et al. 2004)

$$\frac{S_{PE}}{S_{fl}}(\rho) = \frac{N_{H_2O}(\rho) \cdot D \cdot Br(OH^*) \cdot f_{OH}}{N_{OH}(\rho) \cdot g(r_h, \dot{r}_h)}$$

$$g(\lambda) = \frac{\pi e^2}{mc^2} \lambda^2 f_\lambda \pi F_\odot}{r_h^2}$$

From Schleicher & A'Hearn, 1988

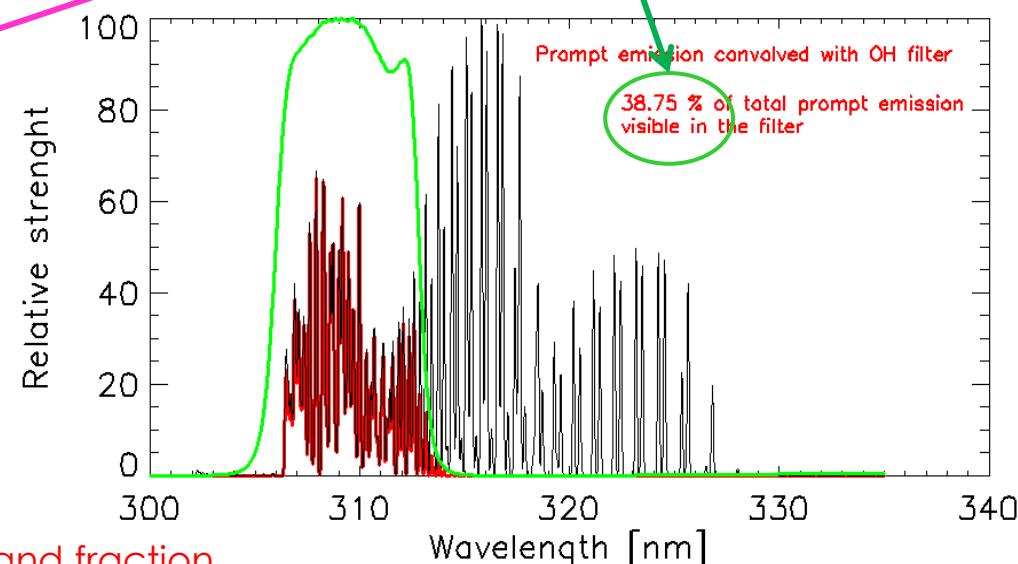
@ $r_h = 1.064 AU$

$\dot{r}_h = 1 - 2 km/s$

$$g_{tot} = \frac{g_{00}(\dot{r}_h)f_{00} + g_{11}(\dot{r}_h)f_{11}}{r_h^2}$$

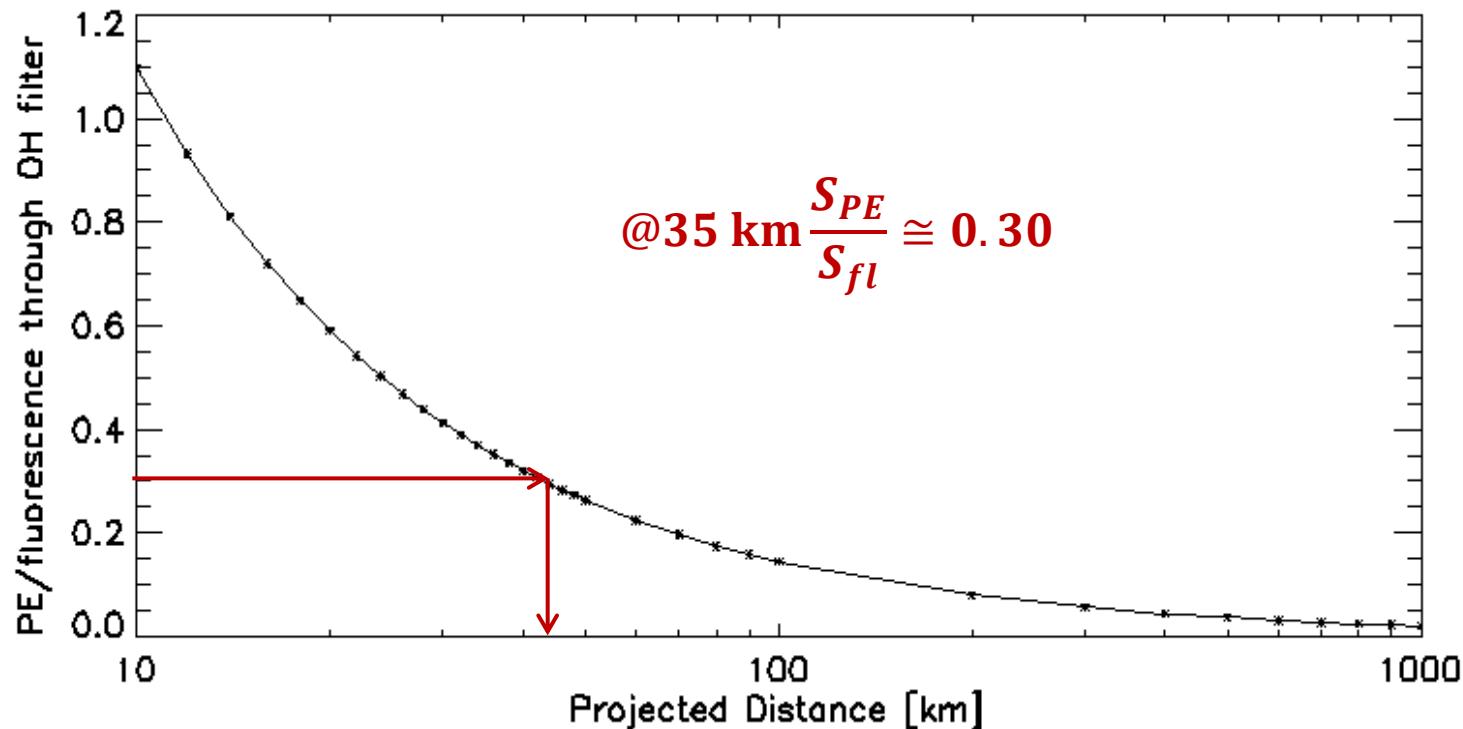
- (0,0) band fraction through OH filter: 97.2%

- (1,1) band fraction through OH filter: 6.5%

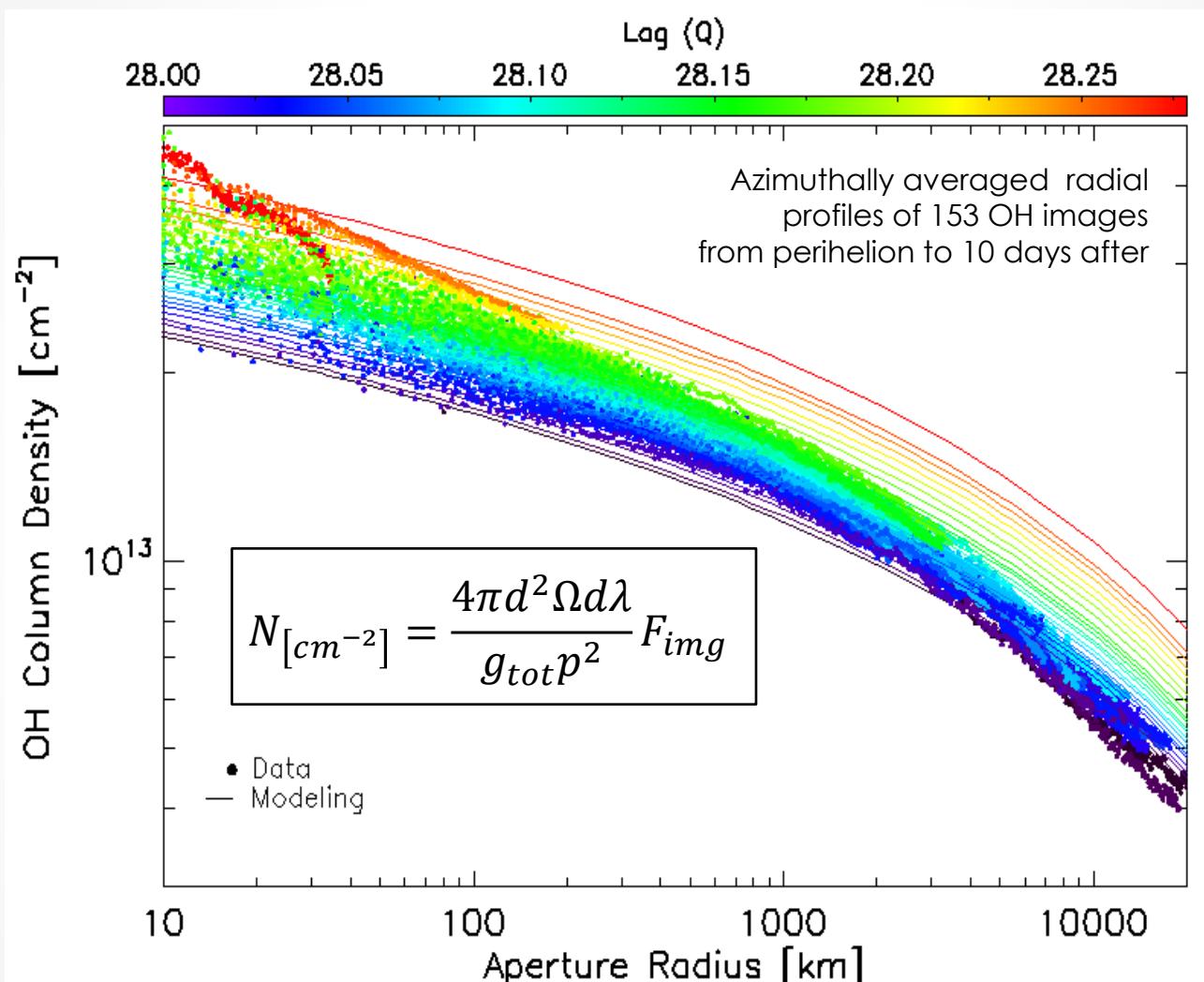


PE/Fluorescence Relative Strength

$$\frac{S_{PE}}{S_{fl}}(\rho) = \frac{N_{H_2O}(\rho) \cdot D \cdot Br(OH^*) \cdot f_{OH}}{N_{OH}(\rho) \cdot g(r_h, \dot{r}_h)}$$

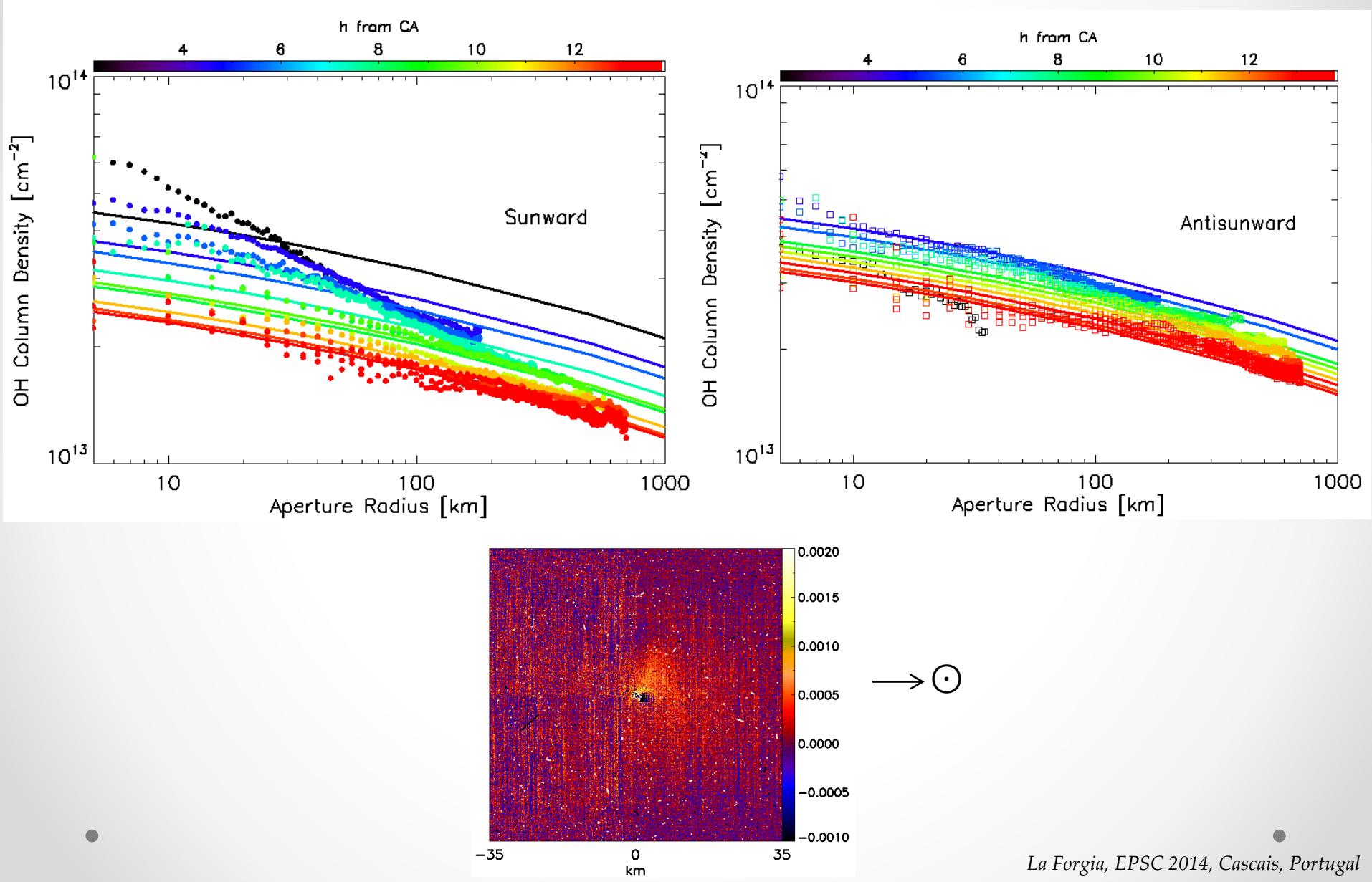


OH Fluorescence Column Density

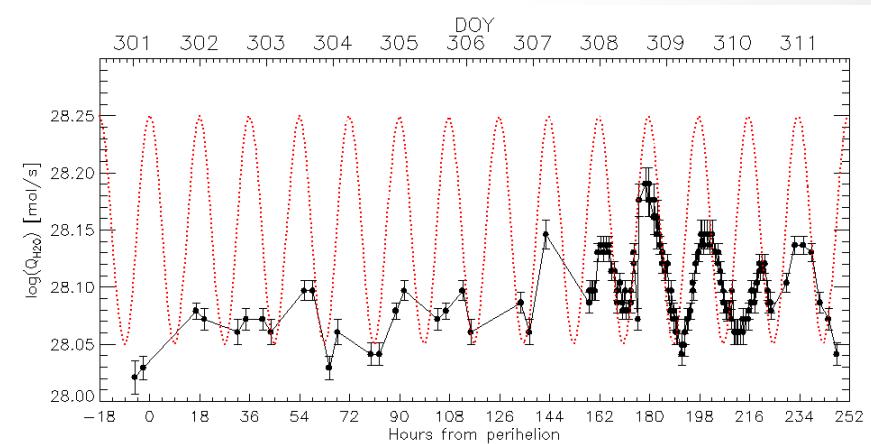
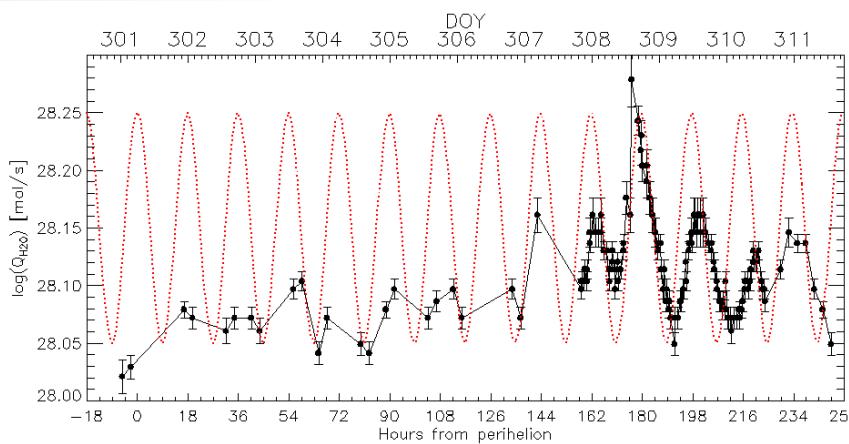
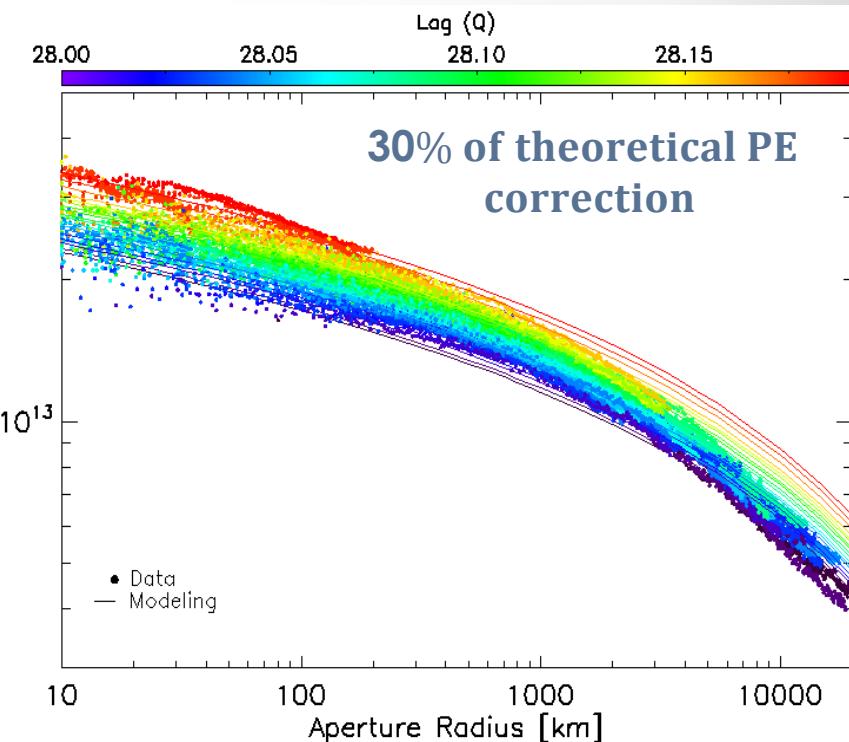
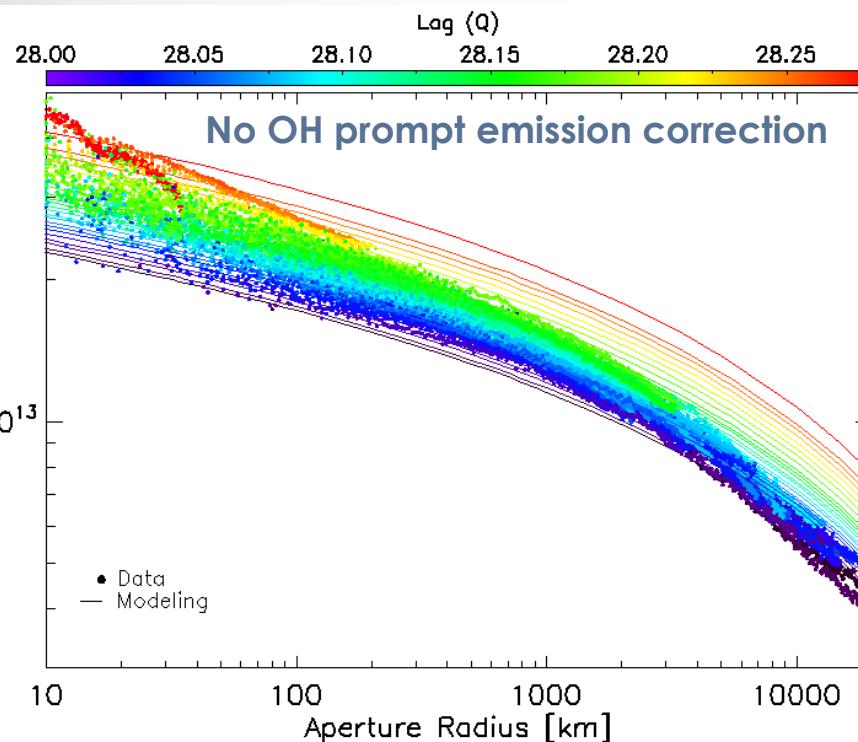


Column Density Models computed with Haser Adjusted Model
(Transformations equations in Combi et al., 2004, Comets II)

OH Fluorescence Column Density

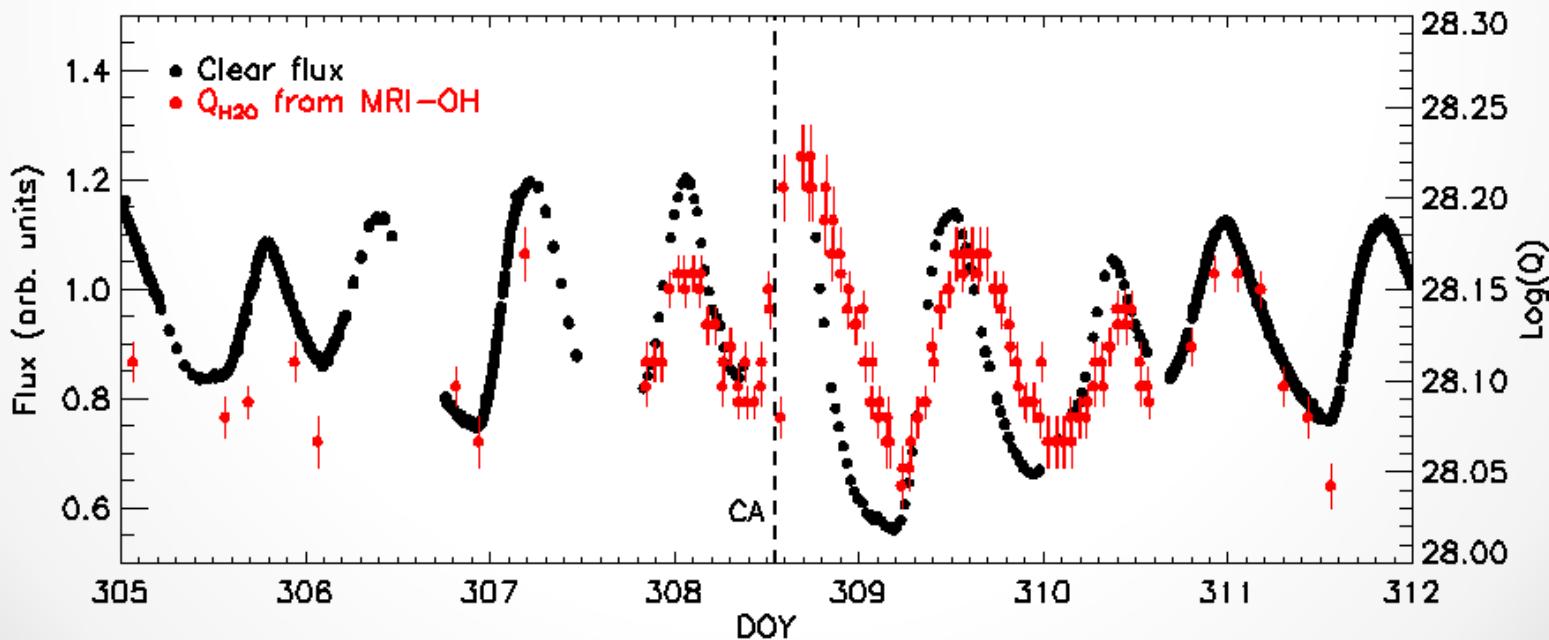
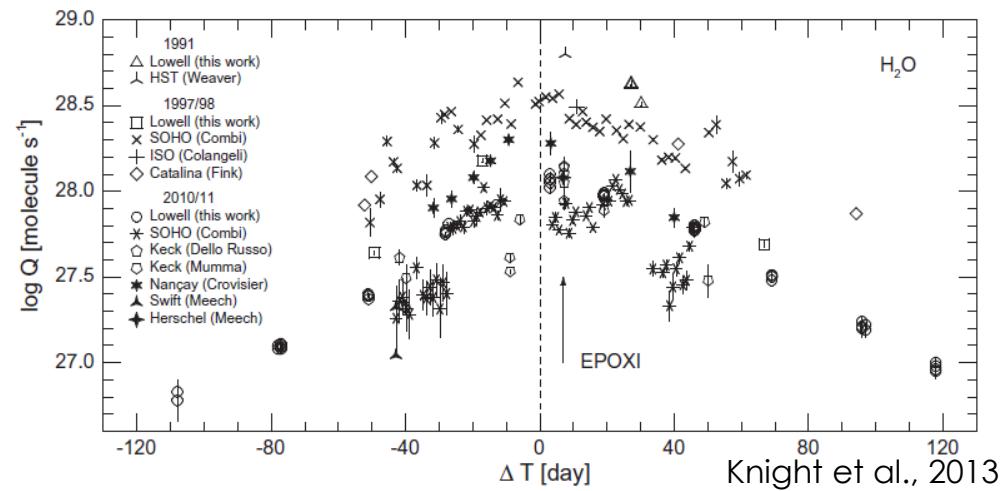


PE Correction

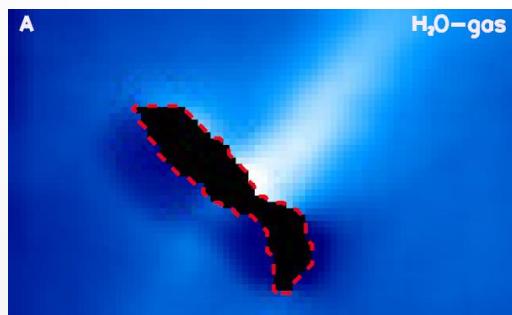
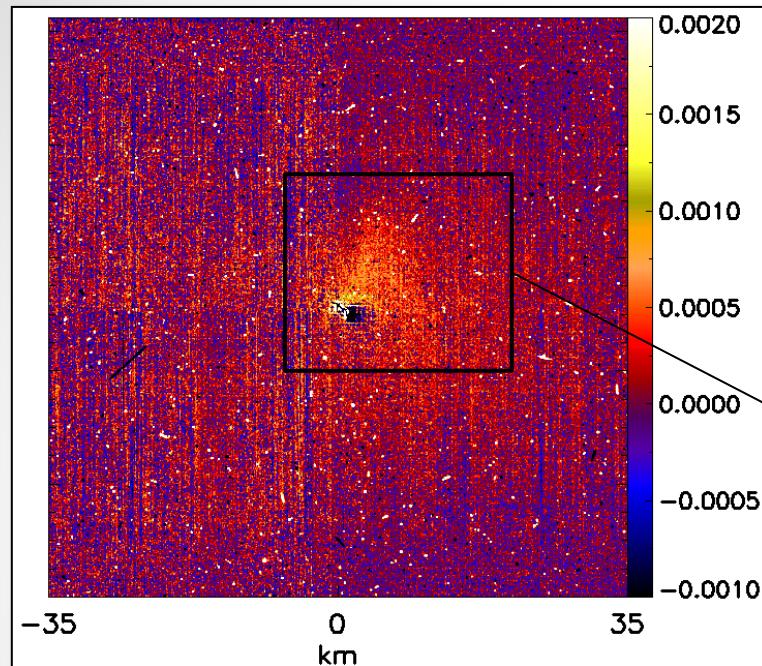


Light Curve Comparison

$$\log(Q) \cong 28.12$$

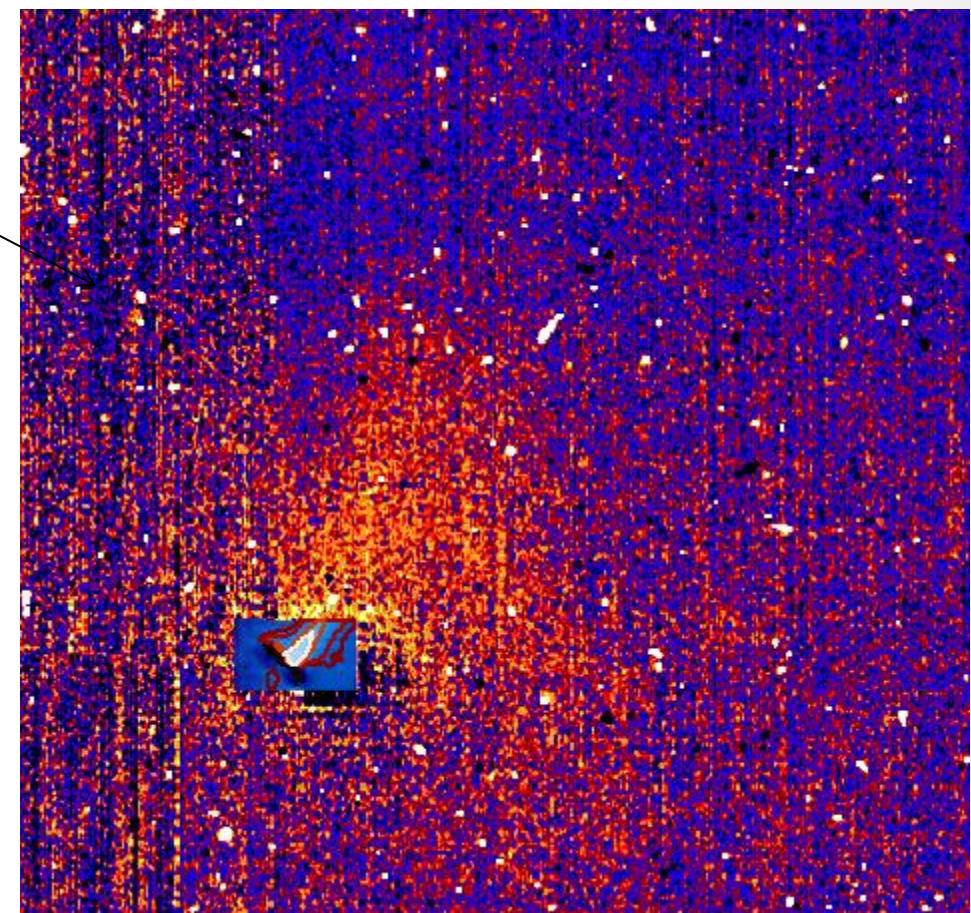


OH & WATER GAS



Protopapa et al., 2014

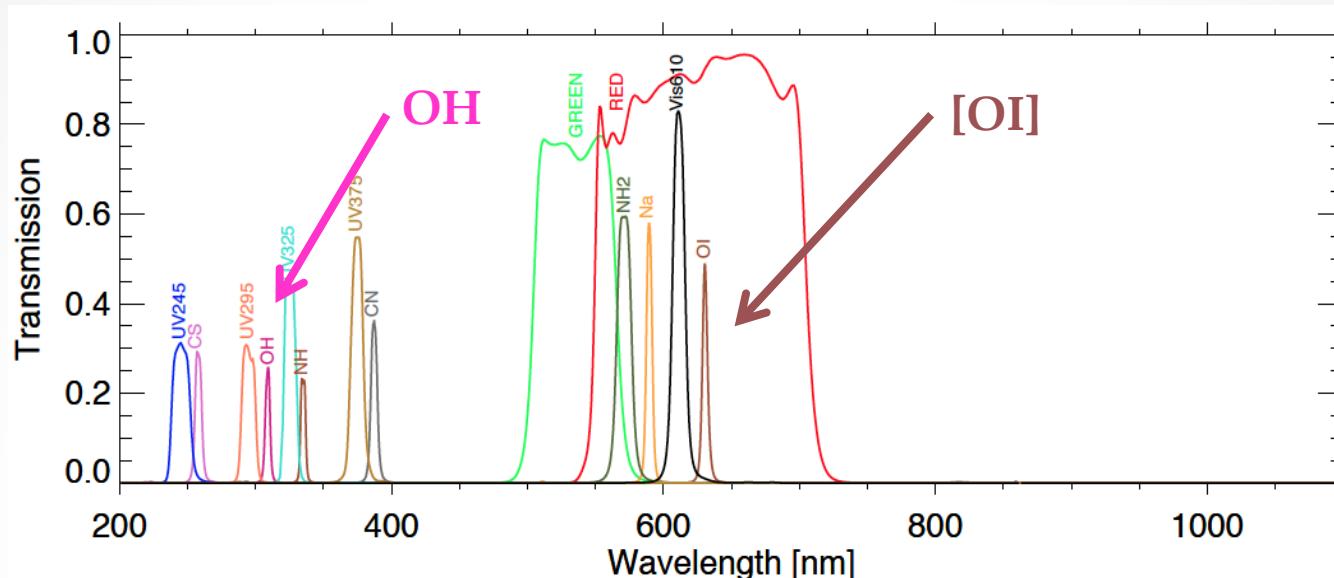
La Forgia et al., in preparation



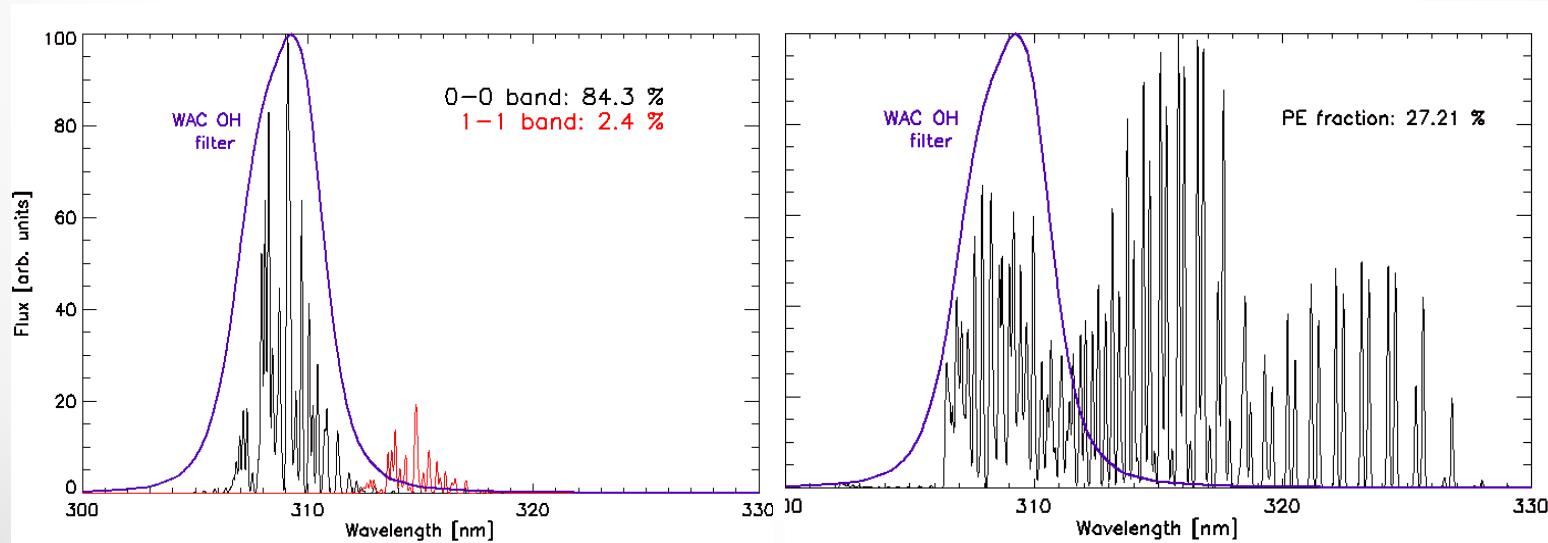


Previsions for 67P/Churyumov-Gerasimenko observed by ROSETTA-OSIRIS

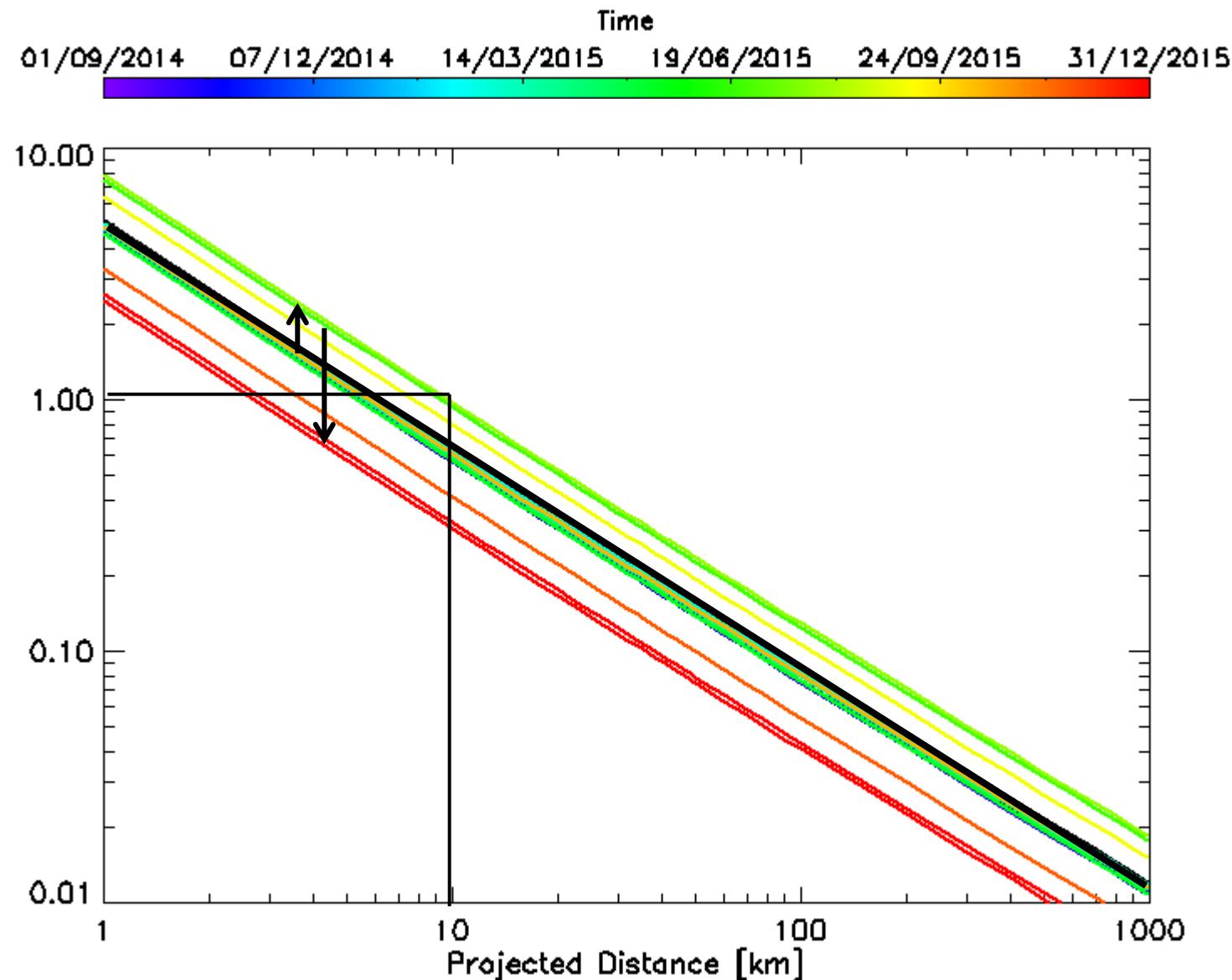
OSIRIS WAC Camera Filters



OH and [OI] narrowband filters for water daughter molecules detection



OH Fluorescence & PE



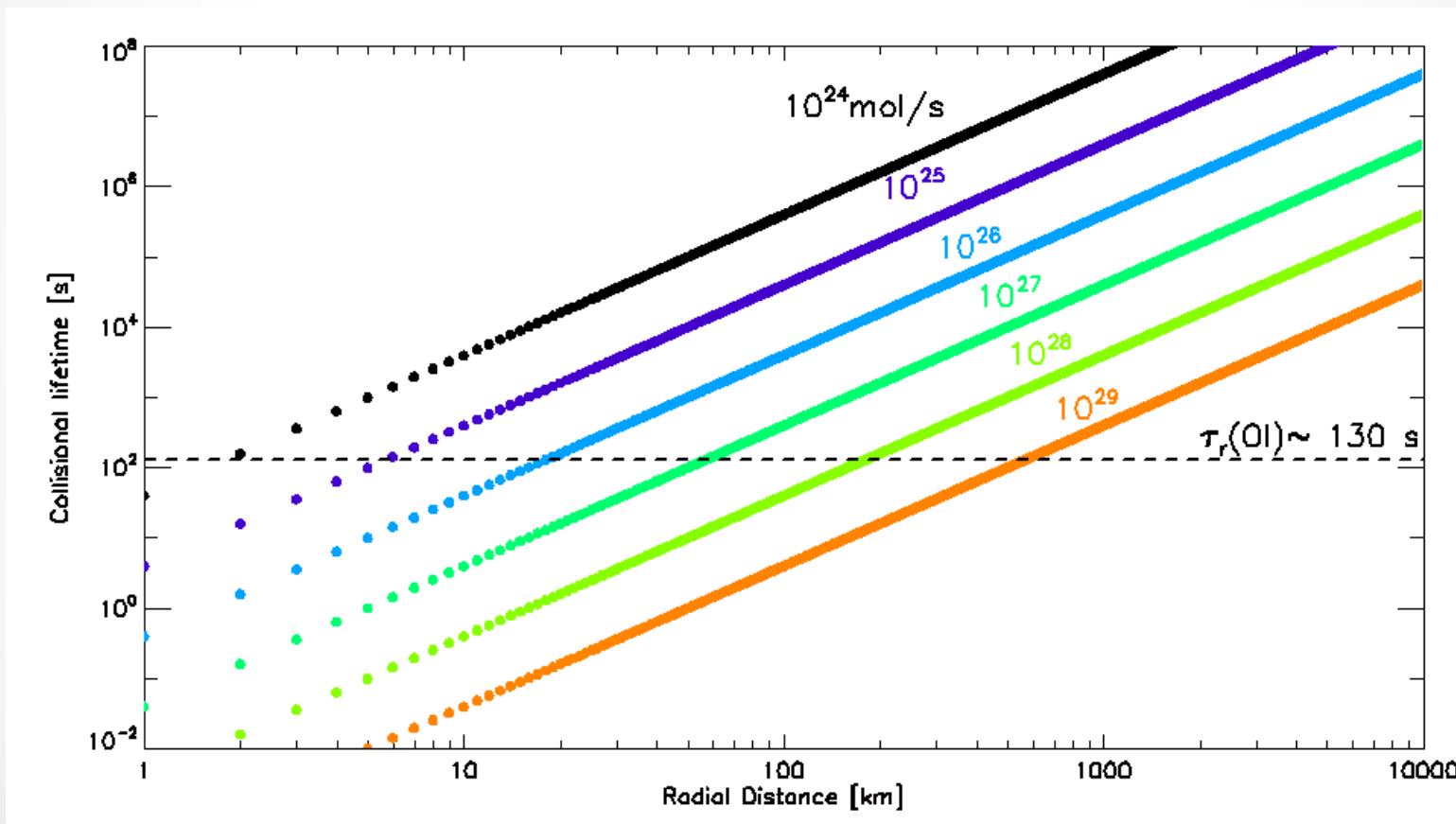
Collisional Lifetime

$$\tau_c = \frac{1}{\sigma_c n(r) v}$$

$\sigma_c = 3.2 \cdot 10^{-15} \text{ cm}^2$ (Tenishev, 2008)

$n(r)$ from Haser adjusted model (Combi et al, 2004)

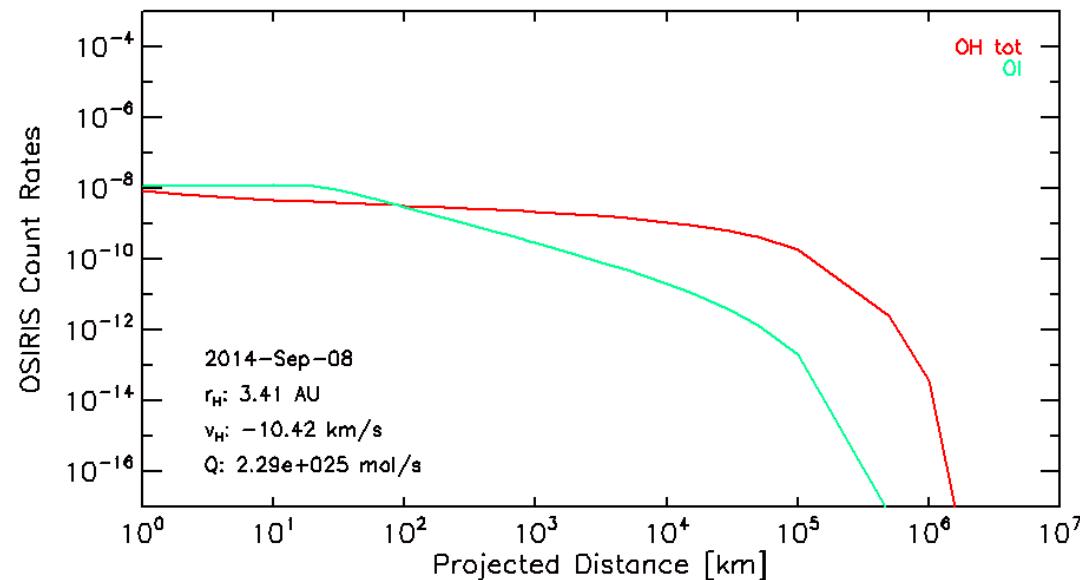
v = collisional partners velocity



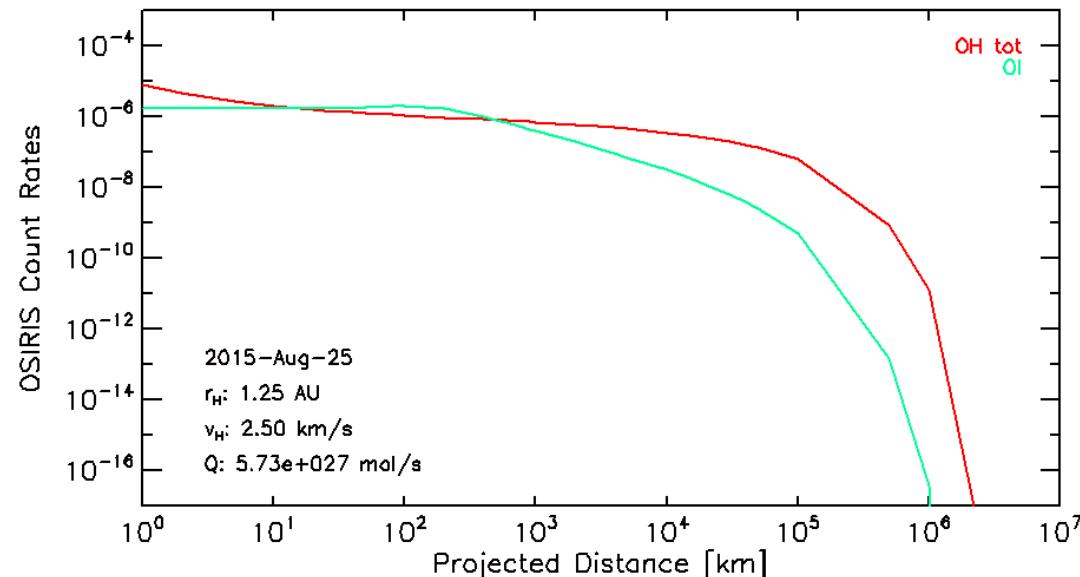
$$\tau_c \gg \tau_r(\text{OH}^*) \approx 10^{-6} \text{ s}$$

OSIRIS Count Rates – OH & OI

8/9/2014



25/8/2015



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