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Rosetta mission full comet phase results Special issue

Solar wind charge exchange in cometary atmospheres

III. Results from the Rosetta mission to comet 67P/Churyumov-Gerasimenko *(Corrigendum)*

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Key words. comets: general – comets: individual: 67P/Churyumov-Gerasimenko – instrumentation: detectors – solar wind – methods: analytical – errata, addenda

The original article shows figures with incorrect column densities (Fig. 3A), outgassing rates from the ROSINA-COPS instrument (Fig. 5A, black line and Fig. 6, black line), and energetic neutral atom (ENA) predictions (Figs. 9 and 10). These are all corrected below; their unchanged caption is given here for convenience.

Because this mistake was only made for figures, the results and conclusions of the original article remain unchanged except for the following sentences:

Section 4.4, p. 12. Regarding Fig. 9, pertaining to the helium species and the importance of ENAs, the sentence should read: "In extremely rare events, we predict that ENAs could reach 50% of the He^{2+} signal and dominate over He^{+} ions: this may have occurred once on 24 April 2015 and after perihelion on 12 and 31 December 2015 as well as on 6-7 February 2016."

Correspondingly, when discussing the hydrogen species in the next paragraph, the dates should be amended so that: "the ENA flux may even become higher than the proton flux in very rare events (ratio above 1, as in February and March 2015, and after perihelion in December 2015, occasionally in January and February 2016, and large periods of time in March and May 2016). The highest predicted ENA fluxes are immediately after Rosetta exited the solar wind ion cavity (SWIC)."

Section 4.4, p. 13. Regarding Fig. 10, the predicted dates for a favorable detection of H^{-} should be changed and the sentence should read as follows: "Our model predicts the most favorable detection conditions for H^{-} in December 2015, around mid-March 2016, and in May 2016."

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References

Hansen, K. C., Altwegg, K., Berthelier, J.-J., et al. 2016, MNRAS, 462, S491
Marshall, D. W., Hartogh, P., Rezac, L., et al. 2017, A&A, 603, A87

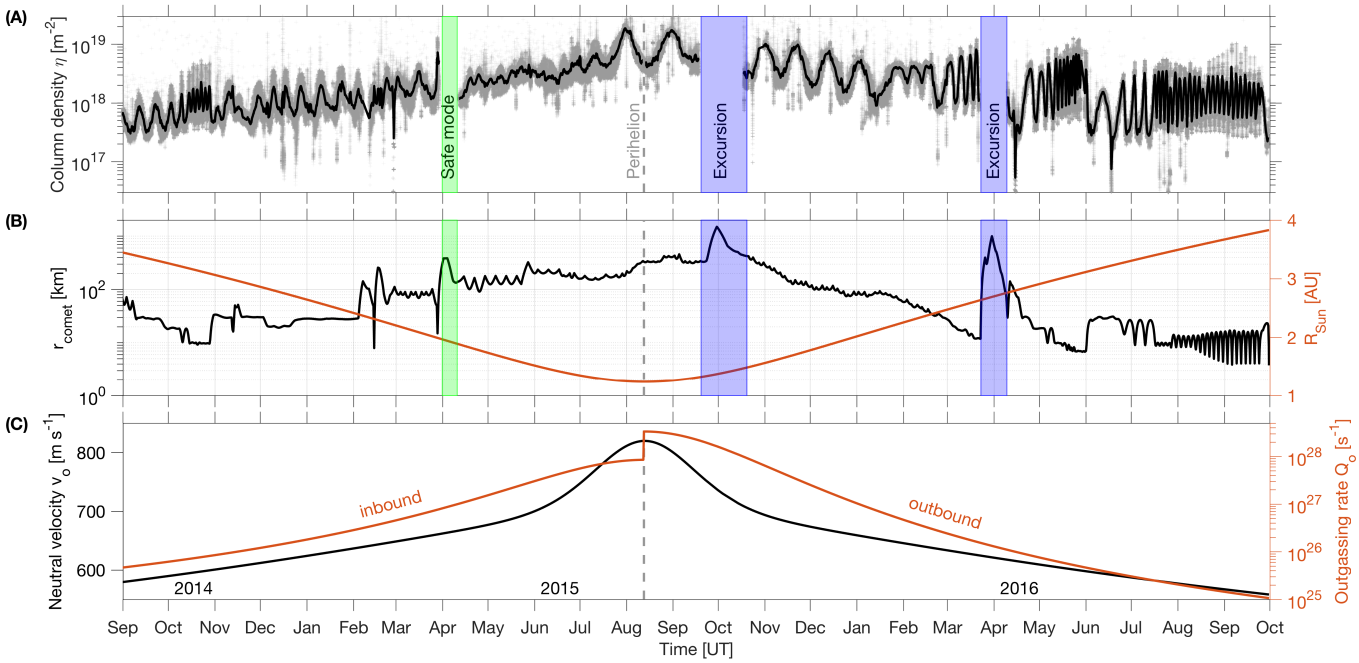

Fig. 3. ROSINA-COPS-derived local neutral measurements at comet 67P during the Rosetta mission. (*A*) Time series of the local estimated "upstream" column density of neutral species (gray crosses), from Eq. (2), and 24 h moving-averaged values (black line). (*B*) Cometocentric distance of Rosetta (left) and heliocentric distance of comet 67P during the mission (right). (*C*) Empirically derived neutral outgassing speed (left axis) and outgassing rate (right axis) from Eqs. (9) and (7). Safe mode and excursions are indicated.

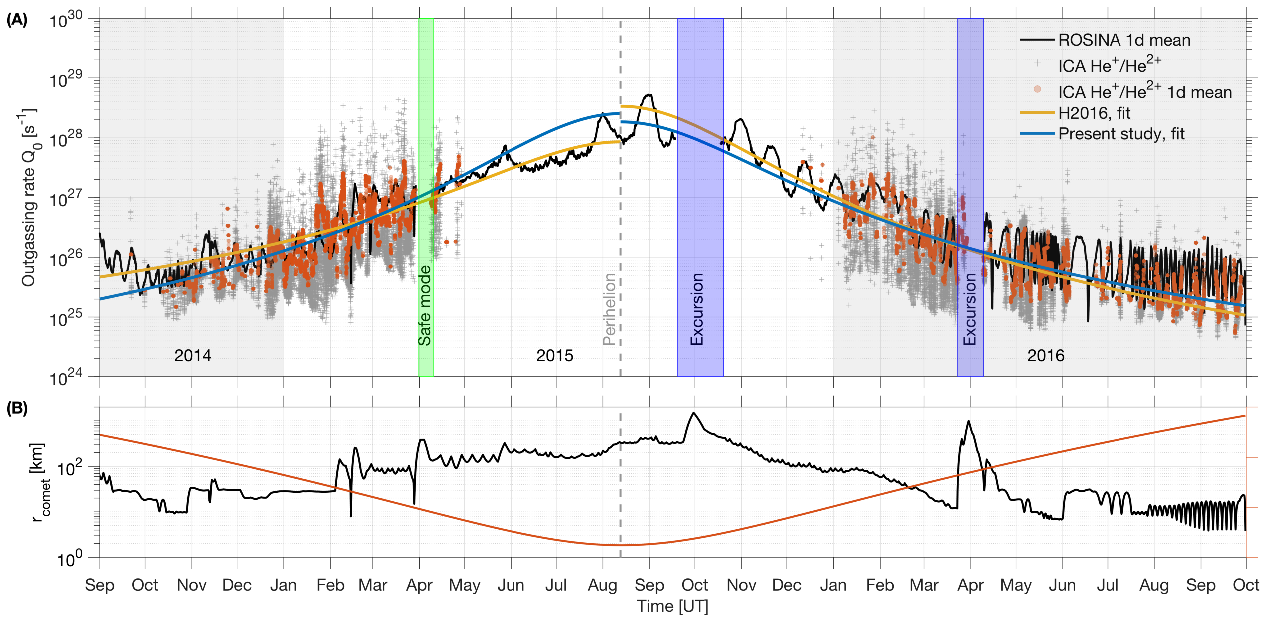

Fig. 5. (*A*) Local water outgassing rate of comet 67P during the Rosetta mission (2014–2016), as measured by ROSINA (black line, one-day moving average) and retrieved from RPC-ICA. RPC-ICA one-day moving averages are presented as red circles, whereas the full non-averaged time series is shown as gray pluses. Safe mode and excursions are indicated: at these dates, the outgassing rate from ROSINA-COPS yields unreliable results. Inbound and outbound fits to the ROSINA data of Hansen et al. (2016) (orange line, corrected for latitude/longitude effects) and to the RPC-ICA data (blue line, present study) are shown. (*B*) Cometocentric (left axis) and heliocentric distances (right axis) during the mission. Instrumental uncertainties are estimated to be 15% for ROSINA-COPS.

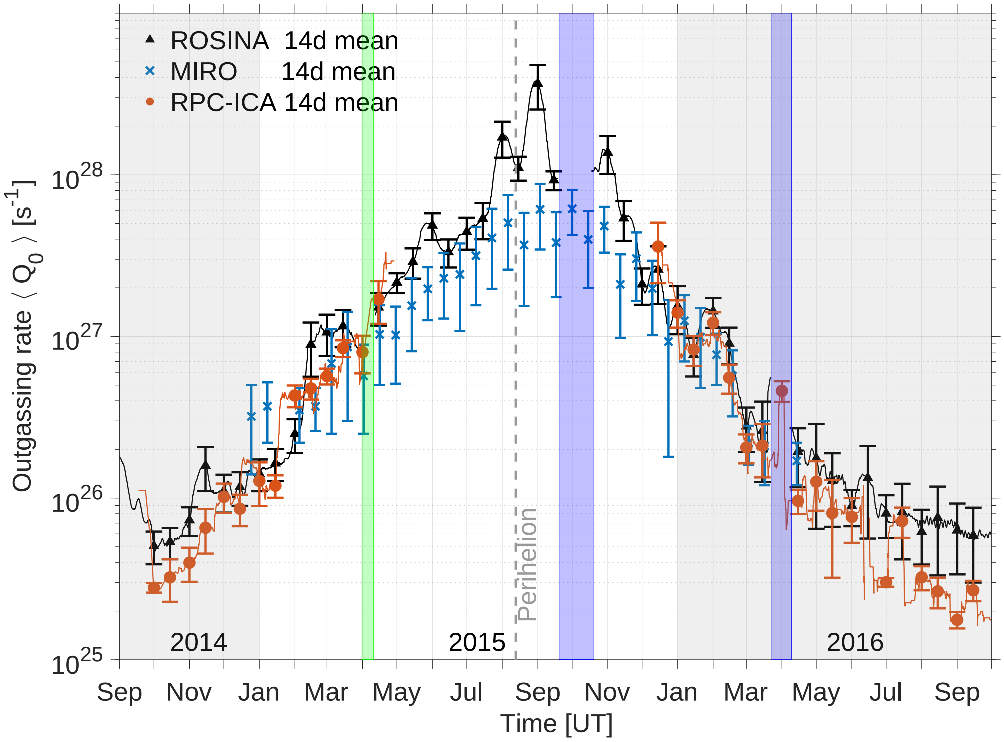

Fig. 6. Local 14-day averaged water outgassing rate of comet 67P during the Rosetta mission (2014-2016), as measured by ROSINA-COPS (black line and triangles), MIRO (blue crosses, from Marshall et al. 2017), and retrieved from RPC-ICA (red line and circles, tabulated in Table 1). Error bars correspond to the median absolute standard deviations. Colored regions denote spacecraft excursions and safe modes, as in Fig. 5.

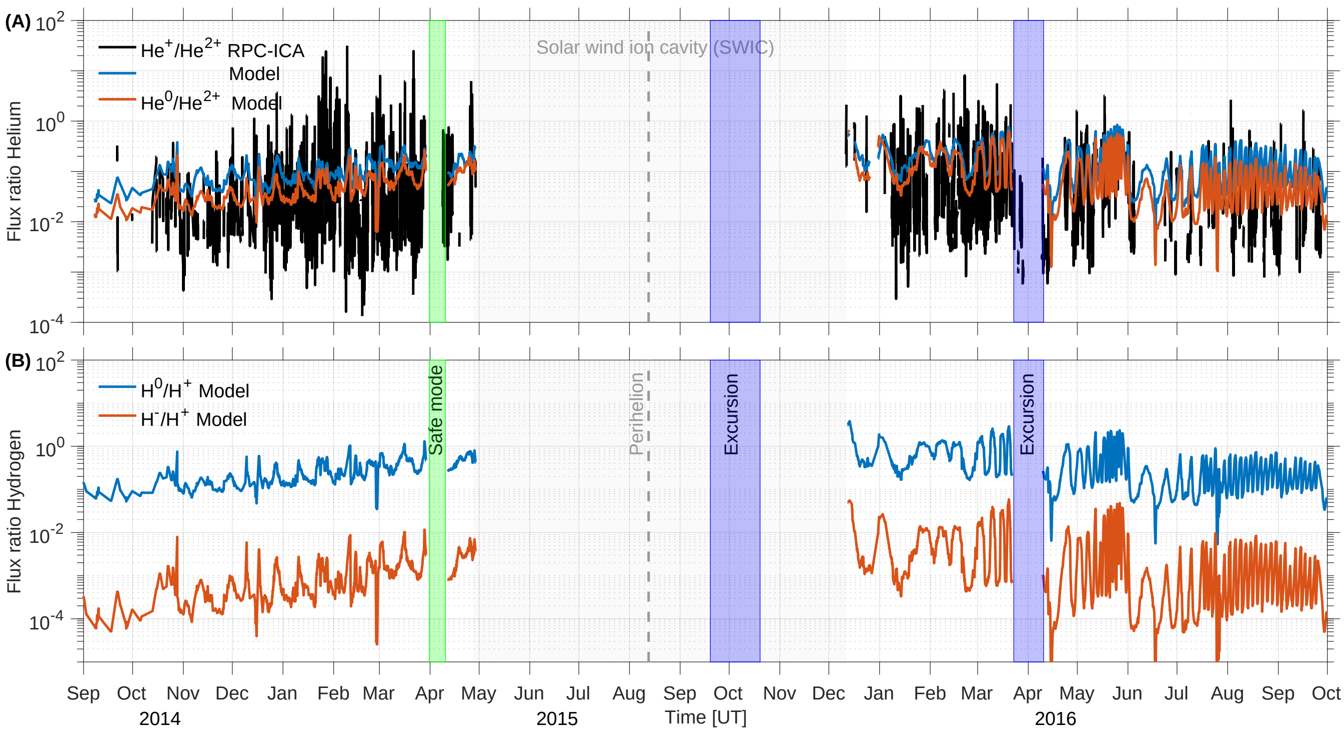

Fig. 9. Particle flux ratios during the *Rosetta* mission 2014–2016. (*A*) Helium species. The 1 h averaged He^+/He^{2+} ratio measured by RPC-ICA (black) is compared to the daily averaged analytical forward model solution (blue), with mean speed $U_{sw} = U_{ICA}(He^{2+})$. The column density is derived from ROSINA data. Modeled He^0/He^{2+} flux ratios are shown in red. (*B*) Hydrogen species, with modeled H^0/H^+ (blue) and H^-/H^+ (red) ratios for a solar wind mean speed of $U_{sw} = U_{ICA}(H^+)$. The solar wind ion cavity is designated as a gradually denser gray-shaded region. Safe mode and excursions where ROSINA data were excluded from the analysis are indicated.

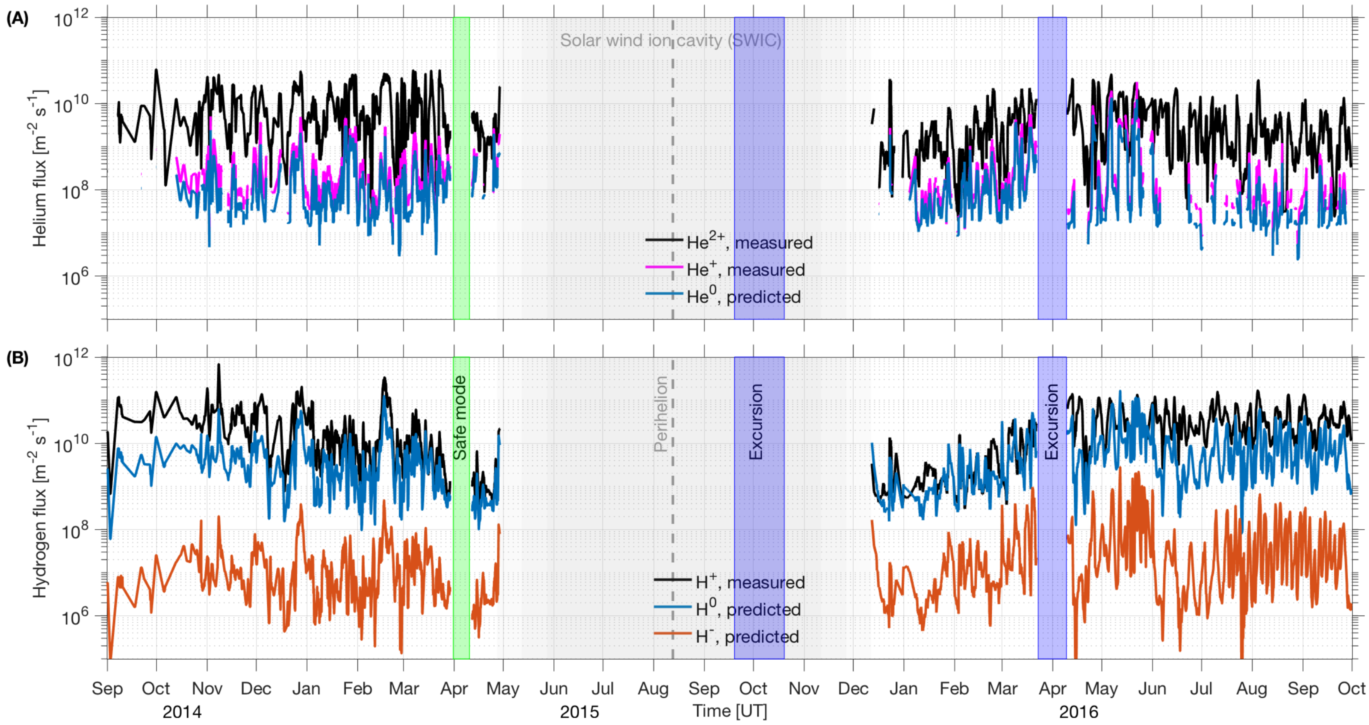

Fig. 10. Solar wind ion and ENA fluxes during the Rosetta mission 2014–2016. The fluxes are measured when available by RPC-ICA, and when unavailable, are predicted by the analytical model using ROSINA-COPS and RPC-ICA data. All fluxes are averaged over 24 h. (*A*) Helium species. (*B*) Hydrogen species. ENA fluxes are drawn in blue for clarity. The solar wind ion cavity is indicated as a gray-shaded region. Safe mode and excursions where ROSINA data were excluded from the analysis are indicated.