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1 **Dual storage and release of molecular oxygen in comet 67P/Churyumov-**
2 **Gerasimenko**

3
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26 **One of the biggest surprises of the *Rosetta* mission was the detection of O₂ in the**
27 **coma of 67P/Churyumov-Gerasimenko in remarkably high abundances. The**
28 **measured levels of O₂ in the coma are generally assumed to reflect the overall**
29 **abundance and chemical origin of cometary O₂ in the nucleus. Along with its strong**
30 **association with H₂O and weak association with CO and CO₂, these measurements**
31 **led to the consensus that the source and release of cometary O₂ are linked to H₂O.**
32 **We analyzed ROSINA observations and found a previously unrecognized change in**
33 **the correlations of O₂ with H₂O, CO₂ and CO that contradict the prevailing notion**
34 **that the release of O₂ is linked to H₂O at all times. These findings can be explained**
35 **by the presence of two distinct reservoirs of O₂: a pristine source in the deeper**
36 **nucleus layers dating back prior to nucleus formation, and a water-trapped**
37 **secondary reservoir formed during the thermal evolution of the nucleus. These**
38 **results imply that O₂ must have been incorporated into the nucleus in a solid and**
39 **distinct phase during accretion in significantly lower abundances than previously**
40 **assumed.**

41 **Main**

42 The Rosetta Orbiter Spectrometer for Ion and Neutral Analysis/Double Focusing Mass
43 Spectrometer (ROSINA/DFMS¹) detected O₂ for the first time in a cometary
44 environment². The detected levels of O₂ in the coma of 67P/Churyumov-Gerasimenko
45 (67P) were about an order of magnitude higher than predicted by models describing the
46 chemistry in molecular clouds^{2,3}, and well over 2 orders of magnitude higher than the O₂
47 observed in the gas phase in ρ Oph^{4,5}.

48 The first measurements of O₂ in the coma of 67P were taken over a six-month period
49 (September 2014-March 2015) early in the mission². Over this time, the *in situ* O₂
50 abundance relative to H₂O was between 1 and 10%, which made it the fourth most
51 abundant coma species following H₂O, CO₂ and CO. O₂ had a persistently high
52 abundance relative to H₂O, the O₂/H₂O ratio remained fairly constant, and O₂ showed a
53 strong correlation with H₂O, but it weakly correlated with CO and N₂ – two molecules
54 with similar volatility². These observations led to the initial conclusion that the origin
55 and/or the release of O₂ and H₂O were linked, and that cometary O₂ is likely primordial².
56 The O₂-H₂O correlation was found to extend through later parts of the comet's orbit⁶⁻⁸,
57 further suggesting that O₂ is controlled by H₂O.

58 The high relative O₂ abundance, the strong O₂ -H₂O correlation, and the weak O₂ - CO
59 correlation were key requirements that all proposed formation and production hypotheses
60 needed to satisfy⁹. While the strong association of O₂ with H₂O provides a very
61 important clue to the mystery of cometary O₂, the details of *when, where, and for how*
62 *long* this association is truly present make the interpretation less obvious. 67P
63 experiences strong hemispheric differences in outgassing, largely due to the seasons, with
64 the majority of CO₂ coming from the southern hemisphere^{6,8}. The minor species also
65 showed strong latitudinal heterogeneity, with the less volatile species typically following
66 H₂O and the more volatile species following CO₂ (refs. 10-14). However, the correlations
67 between the major and minor volatiles appear to be very different when looking at shorter
68 (several days) versus longer (months to entire orbital segments) time intervals^{8,13}. This
69 makes the interpretation of the observations potentially dependent on the location and the
70 time interval considered.

71 This study presents abundances (count rates) from ROSINA/DFMS¹ of the four most
72 abundant species in the innermost coma (< 35 km) over significant time intervals at ~2.5
73 – 3.7 au. We looked at short- and long-term correlations over the southern hemisphere
74 only (sub-spacecraft latitudes between 25 and 90°S) 3-7 months before the pre-perihelion
75 equinox (May 2015) and after the post-perihelion equinox (March 2016). The southern
76 hemisphere was poorly illuminated at these times, which resulted in lower temperatures,
77 hence lower H₂O production rates over the southern hemisphere compared to the
78 northern hemisphere^{9-13,15-17}. That, along with the stronger erosion experienced by the
79 southern hemisphere¹⁸ provided a unique opportunity to see relationships otherwise
80 masked by the strong H₂O outgassing¹¹⁻¹³.

81 **Correlations with the major cometary species**

82 Figs. 1 and 2 show the correlations between the major cometary species before the pre-
83 perihelion and after the post-perihelion equinox over the southern hemisphere. The strong
84 O₂-H₂O correlation before the pre-perihelion equinox (Fig. 1) is consistent with previous
85 results^{2,7}. At the same time, the Pearson correlation coefficients suggest a moderate
86 correlation between O₂-CO₂ and O₂-CO. These data are strongly heteroscedastic (non-
87 equal variance), so the Pearson coefficient of correlation is meaningless and misleading
88 as an indicator of a relationship between two species. Looking at shorter time intervals,
89 there is a moderate correlation early on in the mission at ~3.3-3.2 au (September 2014)
90 between O₂ and CO₂ as well as O₂ and CO. That correlation weakens and disappears by
91 ~3.17 au (mid-October of 2014), and the species remain uncorrelated/weakly correlated
92 all the way to the end of our pre-perihelion equinox interval at ~2.4 au in January 2015
93 (Table 1).

94 O₂ and H₂O seem to be well-correlated again at first glance after the post-perihelion
95 equinox (Fig. 2). However, when divided into shorter time intervals O₂ and H₂O only
96 correlate for the earlier three periods, but show no correlation over the short intervals past
97 ~3.3 au post-perihelion equinox (Table 1). This is key because before the pre-perihelion
98 equinox, when the O₂-H₂O correlation was this strong over the whole interval (Fig. 1),
99 the correlations over the shorter time periods were also very strong. Moreover, when O₂
100 does not correlate with H₂O, it strongly correlates with CO and CO₂ (Table 1). While the
101 count rates of all species have decreased by this time, H₂O production decreases even
102 more rapidly and drops below those of CO₂ and CO in the southern hemisphere^{8,13}. This
103 also happens to be around the same time that the correlation between O₂ and H₂O begins
104 to weaken. For O₂-CO₂ and O₂-CO it is the exact opposite: they do not correlate up to
105 ~3.3 au following the post-perihelion equinox, but they correlate very strongly beyond
106 (Table 1). The correlations between O₂, CO₂ and CO and the lack of correlation between
107 O₂ and H₂O are key because they show a previously unrecognized change in outgassing
108 that comes with important consequences.

109 This shift in correlations may happen because the measurements over the time interval
110 after the post-perihelion equinox span different sublimation regimes. Over the time
111 intervals, or distances covered by the yellow and dark blue dots (Fig. 2), the comet still
112 experienced an appreciable H₂O sublimation, albeit decreasing over time. After that
113 point, the H₂O sublimation began to turn off due to the low surface temperatures over the
114 poorly illuminated southern hemisphere. That is precisely where the transition in
115 correlations after the post-perihelion equinox occurs, and where the shorter time intervals
116 indicated by the purple, green and light-blue markers in Fig. 2 begin to show no

117 correlation between O₂ and H₂O. Thus, in Figure 2 we are mixing two different regimes
118 of sublimation and outgassing. When mixing data for different time intervals driven by
119 different physical processes, as is the case in Fig. 2, relationships revealing key
120 information may be masked, and the linear regression may lead to inadvertently
121 misconstrued interpretations. In order to get a true sense of the changes occurring
122 between the two sublimation regimes, we honed in on this later time interval between
123 ~3.3 – 3.7 au, starting where the correlation between O₂ and H₂O declines and where
124 H₂O production is lower than it was at any time before the pre-perihelion equinox (Fig.
125 3). The interesting thing to notice here is that despite the lack of correlation between O₂
126 and H₂O for the shorter time periods (Table 1), there is still a moderate correlation for the
127 whole interval (Fig. 3).

128 Diurnal re-freezing of sublimating volatiles from the subsurface onto the nucleus surface
129 can be considered as a possible mechanism at play to explain the O₂-CO-CO₂
130 correlations. Diurnal refreezing and subsequent sublimation of H₂O was invoked as an
131 explanation of outbursts observed on comet 9P/Tempel 1 (ref. 19). Surface ice patches of
132 H₂O and CO₂ detected on 67P were attributed to the refreezing of volatiles coming from
133 deeper layers, providing a source of localized activity^{20,21}. However, the measured
134 amounts of CO₂ and CO at >3.3 au post-perihelion (Fig. 3) are simply too high to explain
135 the observed strong correlations between O₂, CO and CO₂. The strong correlation with
136 O₂ extends all the way to the highest measured CO and CO₂ counts and the observations
137 suggest a continuous background activity instead of short-lived surges or mini-
138 outbursts²². The high observed fluxes of CO and CO₂ indicate that these species come

139 out together from the interior of the nucleus, suggesting that significant surface
140 contribution to the observed correlations is unlikely.

141 **Two distinct O₂ nucleus reservoirs**

142 Instead, our observations can be explained by the following. As the nucleus cools near
143 the post-perihelion equinox following an intense southern hemisphere summer, the
144 surface and near-surface temperatures drop until they become low enough that H₂O
145 sublimation declines precipitously. After the post-perihelion equinox when the H₂O
146 counts were well below the pre-perihelion equinox levels (Fig. 3), the hypervolatile
147 species CO, CO₂ and O₂ still leave the porous nucleus from the deeper, colder, and more
148 volatile-rich layers. The subsurface temperature is too low for H₂O to sublimate at these
149 depths. During this release, some of the O₂ leaves the nucleus and enters the coma, but
150 some of it gets trapped in the porous near-surface-H₂O ice depleted in the more volatile
151 species (Fig. 4a). O₂ can be (re-)trapped in porous H₂O very easily because O₂ attaches to
152 the surrounding solid water with significant stabilization energy but without actually
153 modifying the ice environment. A related scenario was considered for the radiolytic
154 production of O₂ from and incorporation into H₂O ice grains in the ISM²³. In that case,
155 H₂O molecules are removed by radiolysis of icy grains, creating voids for the trapping of
156 O₂. Here, we propose that macroscopic cavities pocket the H₂O ice consistent with the
157 high porosity of the nucleus²⁴ and as a result of the H₂O ice in the upper layers being
158 depleted in the more volatile species due to sublimation; the latter process leaving voids
159 behind. Hence, O₂ trapping in porous H₂O ice as proposed here is a process that could be
160 happening in the current-day nucleus of 67P (Methods).

161 Since H₂O sublimation beyond ~3.3 au is low (Fig. 3), the trapped O₂ may be bound to
162 the H₂O structure and unable to leave until the next onset of H₂O sublimation. In that
163 case, the O₂ measured in the coma by ROSINA/DFMS at distances >3.3 au post-
164 perihelion is O₂ released from depth together with CO and CO₂. This O₂ coming from the
165 deeper nucleus layers may either leave the nucleus or keep accumulating in the near-
166 surface H₂O ice while away from the Sun. This accumulation can happen as long as there
167 is O₂ release happening at depth and there are enough cavities in the near-surface H₂O
168 ice to trap it. This mechanism leads to two O₂ reservoirs with distinct ice properties: a
169 polar-ice dominated source with O₂ trapped in H₂O closer to the surface, and a non-polar
170 (or weakly polar) source, where O₂ is released from together with CO and CO₂.

171 As 67P makes its way back toward the next pre-perihelion equinox, H₂O sublimation in
172 the southern hemisphere gradually turns on and the trapped O₂ is released together with
173 the sublimating H₂O (Fig. 4b). The release of accumulated O₂ from the secondary, water-
174 trapped reservoir closer to the surface by the sublimation of H₂O ice explains the
175 surprisingly high O₂ relative abundances measured by ROSINA/DFMS early in the
176 mission². While O₂ at depth continues to be released along with CO₂ and CO, the
177 accumulated O₂ source in H₂O ice is significantly stronger; hence the strong correlation
178 between O₂ and H₂O up until the H₂O sublimation begins to turn off.

179 Since the dominant source of O₂ measured in the coma of 67P is the water-trapped O₂
180 reservoir, the relatively small correlation between O₂ and H₂O in Fig. 3 can be explained
181 by the general decrease of H₂O as sublimation ceases. When H₂O sublimation stops, O₂
182 release from the trapped reservoir stops with it. With the dominant source of O₂ cut off,
183 the O₂ density in the coma also dramatically decreases with the decreasing H₂O.

184 However, looking at the short time intervals individually, especially where the spread of
185 H₂O counts is large enough (purple dots in Fig. 3), it becomes clear that O₂ does not truly
186 follow H₂O. Combining several uncorrelated time intervals into a longer period makes it
187 appear as if the O₂-H₂O data were moderately correlated due to the decline of the
188 dominant O₂ source, when in fact the correlation in this case does not imply a true
189 association related to the formation of comet 67P.

190 This dominant water-trapped reservoir explains the key pre-equinox observations²: the
191 strong correlation of O₂ with H₂O pre-equinox, the small scatter in the O₂/H₂O ratio, and
192 the persistently high O₂ abundance relative to H₂O pre-perihelion. Consequently, the
193 surprisingly high O₂ abundance is not indicative of the true abundance of O₂ overall in
194 the nucleus, but rather of the amount of O₂ accumulated in and then released from the
195 secondary, trapped H₂O ice reservoir. That means that trying to reproduce these high
196 relative abundances with chemical models of the origin of O₂ is unnecessary, as these
197 values overestimate the true importance of O₂ relative to the major species. At the same
198 time, the O₂ coming from depth beyond 3.3 au. after the post-perihelion equinox does not
199 represent the bulk O₂ content of the nucleus either, as some of that O₂ gets trapped in the
200 porous, volatile-depleted, near-surface H₂O ice. However, the strong erosion in the
201 southern hemisphere around perihelion likely exposed fresh, more volatile-rich
202 layers^{12,20,25,26}, so one might argue that the relative O₂ abundances measured farther than
203 ~3.3 au may be used to derive a lower limit for the bulk nucleus O₂ content.

204 CO and CO₂ can also incorporate into to the porous H₂O ice via inclusion with a similar,
205 but somewhat higher propensity (Methods, Table 3). Both of these molecules are able to
206 fill the holes in the overlying H₂O ice, but the large difference between their bulk

207 abundances must be considered when evaluating their outgassing. CO is the second most
208 abundant species in the ISM after H₂, and it is one of the most abundant cometary
209 species. While our interpretation suggests that the large count rates of O₂ observed by
210 ROSINA/DFMS closer than 3.3 au can be attributed to the accumulation and subsequent
211 release of water-trapped O₂, the majority of CO comes from the deeper and colder layers
212 instead, as the bulk abundance of CO in the nucleus is much higher than that of O₂. Thus,
213 CO sublimating from depth at any time will overpower the CO that may be trapped and
214 released from the H₂O ice in the shallower nucleus layers upon H₂O sublimation. The
215 difference between the bulk abundances and the dominant source of O₂ and CO leads to
216 their fundamentally different correlations with H₂O.

217 **Implications for origin**

218 Because of the association of O₂ with CO and CO₂, at least some and perhaps all of the
219 comet's O₂ is primordial, incorporated into the nucleus pre-agglomeration. Were the bulk
220 of the O₂ formed from H₂O after nucleus agglomeration, i.e., via *in situ* reactions, we
221 would see a much stronger correlated signal of co-sublimation of the two species. We
222 cannot rule out, of course, that a minority of the O₂ formed in this way. Recent
223 experimental work indicates that high abundances of O₂ can be formed from the
224 photolysis of H₂O:CO₂ ices²⁷. However, the fact that the isotopic ratios of O₂ do not
225 match the isotopic ratios of H₂O in comet 67P (ref. 28) makes it less likely that O₂
226 formed from H₂O by radiolysis of ISM grains prior to their agglomeration into the
227 nucleus. Instead, O₂ in the comet nucleus largely or entirely originates from a solid phase
228 independent of and distinct from H₂O, and the O₂ in comet 67P must have formed either
229 during the PSN phase, or in the ISM via various chemical routes prior to nucleus

230 agglomeration²⁹⁻³¹. Once formed, O₂ (and other volatiles) could have been adsorbed by
231 amorphous grains in the ISM before being agglomerated by forming comets, if the PSN
232 was cold enough to prevent the destabilization of amorphous ice. If the PSN was warm
233 enough to destabilize the amorphous ice, then O₂ was released in the gas phase of the
234 disk. Subsequently, O₂ either condensed or it was trapped in clathrates during the cooling
235 of the disk. This implies that the primordial O₂ may have been supplied either in the form
236 of pure condensate, clathrates, or amorphous ice in the forming nucleus. Whatever the
237 O₂-bearing solid phase that has been incorporated into the cometary nucleus, its thermal
238 evolution led to the progressive release of O₂, and then to the formation of a secondary
239 accumulated reservoir in the voids and pores of the overlying H₂O matrix. This process
240 could very well be happening on other comets too e.g., on 1P/Halley, where the presence
241 of O₂ was confirmed in comparable levels to 67P (ref. 32). A flyby, however, does not
242 provide the same temporal and spatial resolution necessary for constraining the
243 observations to specific times and locations with low H₂O outgassing, as we did in this
244 paper. Further analysis of O₂ correlations with various minor volatile species (e.g., CH₄,
245 C₂H₆, N₂) may narrow how O₂ was supplied to the nucleus, and consequently, may
246 unravel the origin of O₂ in comet 67P.

247 **Materials and Methods**

248 **ROSINA/DFMS Data Treatment**

249 We used ROSINA/DFMS¹ mass spectra taken in high resolution mode for the analysis
250 for masses 32 (O₂), 18 (H₂O), 28 (CO), and 44 (CO₂). The L3 spectra have been
251 corrected for the ageing of the Micro Channel Plate (MCP) by calibration measurements
252 that were performed every few weeks throughout the mission.

253 For each individual mass spectrum, we performed a spectral fit to the species of interest
254 by fitting a Gaussian to the pass peak. On some occasions, based on the shape of the peak
255 two Gaussians were necessary to properly fit the shape (Supplementary Information). The
256 area under the Gaussian(s) fitted to the mass peaks provides the abundance of a species at
257 a given time. We then produced time series files containing the count rates (signal) of
258 each species for each time a measurement was taken. We emphasize that we used count
259 rates and not densities or concentrations.

260 The measurements have an associated ion statistical counting uncertainty given by \sqrt{n} ,
261 where n is the number of ions hitting the detector. Because the data were not corrected
262 for instrument sensitivity, the counts in the figures and the slopes of the linear fits of the
263 species do not represent absolute abundances¹¹. Since we look at correlations between
264 count rates and not absolute ratios or densities, any uncertainties in the absolute number
265 stemming from using different gains for the different species is not important for the
266 purpose of this study. Because the ion beam typically falls at the center of the MCP it
267 causes a preferential degradation of these center pixels over time compared to the pixels
268 along the edges of the MCP. The uncertainty in the individual pixel gains (i.e., mass
269 peaks do not always fall on the same pixel) is important when determining
270 concentrations, but it is less important when trying to get an idea about the correlation
271 between two species. The individual pixel gain uncertainty was around 4% for the studied
272 time intervals. We note that the major cometary species were well-measured throughout
273 the mission; thus, the expected uncertainties are significantly lower than for other
274 cometary species. Nevertheless, we applied a 10% uncertainty² in addition to the ion
275 statistical counting uncertainty in order to quantify the possible variation of the Pearson

276 correlation coefficients. The consistently small standard deviations around the mean
277 correlation coefficients show that even with this more conservative uncertainty our
278 determined correlations are robust.

279 The measurements used in this work are orders of magnitude higher than the background²
280 and well above the limiting sensitivity of ROSINA/DFMS. ROSINA/DFMS scanned
281 through successive masses covering a mass range of 1-150 amu, with a maximum
282 cadence of a high-resolution measurement at mass 32 every 45 minutes. In order to be
283 able to make direct comparisons between species located on different masses, we
284 restricted our data to measurements where the time difference between the measurements
285 of two different species were less than 20 minutes. In addition, we discarded the first
286 measurement following a data gap in the acquisition of longer than 2 hours (e.g., due to
287 reaction wheel offloading), and only considered measurements when the instrument was
288 pointing directly to the comet (nadir angle <10 deg). Lastly, we restricted our analysis to
289 measurements that were taken within a distance of 40 km from the nucleus in order to
290 exclude potential reactions between species in the coma. Reactions in the coma were
291 minimal at heliocentric distances $>\sim 3$ au during the time that a molecule propagates from
292 the comet to Rosetta, and collisions were negligible within ~ 100 km (ref. 33).
293 Furthermore, the measurements show a $1/r^2$ dependence as expected for a species that is
294 not affected by any significant loss processes. In addition, the diurnal, longitudinal and
295 latitudinal variations were clearly visible within this distance, indicating that the coma
296 measurements by ROSINA/DFMS do reflect outgassing from the nucleus, and not that of
297 a point source. This variation was visible to even larger spacecraft distances from the
298 nucleus; thus, our approach weighing in the number of measurements vs. nucleus

299 proximity was rather conservative. The above constraints on our data treatment then
300 defined our pre-inbound and post-inbound equinox time intervals as: September 2014
301 through February 2015, and May 2016 through the end of mission in September 2016.

302 **Statistical Analysis of the Derived Data:** When looking at correlations for the shorter
303 time intervals within the long (pre- and post-equinox) time periods, we selected the
304 length of the short time periods making sure that: 1. there was homoscedasticity in the
305 data; i.e., the data showed fairly equal variability in the scatter plots; 2. no visibly
306 discontinuous distribution of data was present; 3. multiple slopes were not visually
307 present. These steps allowed us to rely on the derived Pearson correlation coefficients as
308 indicators of a true link between two species, and ensured that we do not miss potential
309 changes in outgassing. We have extensively tested the possibilities by splitting up the
310 long time periods into several short ones and visually examining the scatter plots. We
311 selected the data used in the short time intervals listed in Table 1 by ensuring all the
312 above was true and the correlation was statistically significant at $p < 0.01$.

313 The Pearson correlation coefficient for each time interval was determined by performing
314 Monte Carlo simulations: we took 10,000 samples with a normal distribution within the
315 boundaries of the uncertainties (discussed above) on each measurement point, and
316 calculated the Pearson correlation coefficient 10,000 times. We report the mean of the
317 resulting distribution of the correlation coefficients. Considering the overall small
318 standard deviations, the correlations listed in Table 1 are robust.

319 **Modeling gas trapping in solid H₂O:** To determine whether O₂ could be trapped and
320 remain stable in the porous ice of the bulk nucleus, we modeled the interactions of H₂O
321 ice structures with O₂ either adsorbed on the surface, or trapped in the voids or cracks of

322 the H₂O ice. We employed a method based on the first principle periodic density
323 functional theory (DFT) to quantify these interactions between O₂ and the icy bulk, using
324 the Vienna ab initio simulation package³⁴⁻³⁶ (VASP). VASP is well adapted to model
325 bulk and surface ice structures interacting with atomic and molecular volatiles, and has
326 been used many times for various planetary applications^{30, 37-39}.

327 The stabilization energy (E_{stab}) of O₂ is defined as the difference between the energy of
328 the whole system, [O₂ interacting with the ice], and the sum of the energies of the
329 isolated O₂ and H₂O ice:

$$330 \quad E_{stab} = E_{[ice+O_2]} - (E_{ice} + E_{O_2}).$$

331 A negative value of E_{stab} means repulsion, whereas a positive E_{stab} indicates an effective
332 trapping in that particular environment. In all cases of adsorption or insertion into the
333 perfect crystalline ice or into the cavities found inside the bulk, the neighboring shells of
334 water molecules are relaxed in order to allow O₂ to fit into the void. At the same time, the
335 outer shells are kept frozen to maintain a global bulk structure. In the cases when O₂
336 inclusion is possible, that is when the hole is large enough (at least two neighboring H₂O
337 molecules extracted), the stabilization energy of O₂ interacting with the ice is around 0.2-
338 0.3 eV (Supplementary Table S1). While these values are lower than the ice cohesion
339 energy (~0.55 eV), they stay in the order of that of an H₂O dimer. Thus, O₂ can
340 effectively be stabilized in the ice cavities and pores, and the presence of O₂ will not
341 disturb the structure of the surrounding ice until the onset of H₂O sublimation.

342 Taking into account the fact that several O₂ molecules can be present in the same cavity,
343 we consider the possibility that these O₂ molecules could agglomerate, and eventually
344 form dimers. According to high-level ab-initio calculations, the ground state of the O₂

345 dimer is a singlet state contrary to the monomer that is a triplet⁴⁰. To make space large
346 enough for a dimer, a large cavity is needed. Therefore, we considered only those
347 obtained following the loss of 4 H₂O molecules. The order of magnitude of the values
348 reported in Table 2 indicates that a couple of the O₂ molecules can also easily be trapped
349 in the same cavity within the ice either in the form of two O₂ molecules in triplet state or
350 as a proper O₂ dimer in its ground singlet state. It can be noted that the dimer seems to be
351 stabilized the most strongly of all; this might be a first step toward bigger structures,
352 possibly a route to the construction of pure condensate. For comparison, some identical
353 situations have been evaluated for the CO and CO₂ molecules (see Supplementary Table
354 S2). The strength of the interaction is systematically larger, but is within the same order
355 of magnitude. It stays in the same order of magnitude. CO and CO₂ stick slightly better
356 than O₂ but the difference seems too small to induce significantly different behaviors.

357 **Data Availability:** All data processed as described above are included in this published
358 article and in a supplementary source file. The ROSINA/DFMS spectra used to derive
359 count rates are available in the NASA Planetary Data System (PDS) and ESA Planetary
360 Science Archive.

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367 **Author contributions:**

368 AL-K conceptualized and led the study, performed the data analysis, interpreted the
 369 results and wrote the manuscript. OM contributed to the conceptualization and
 370 methodology of gas trapping, and the implications of the results for cometary origin. FP,
 371 YE and OO performed the chemical modeling of gas trapping in H₂O ice and assisted in
 372 the interpretation. JIL contributed to the interpretation of the results and to the chemistry
 373 of ice trapping. SAF supported all steps of data analysis and assisted the correlation
 374 study. KEM contributed to the data analysis and interpretation. KJT and SMP developed
 375 the fitting routine, performed the spectral fits to the ROSINA/DFMS mass spectra and
 376 provided the time series files of the count rates of the analyzed species. All authors
 377 contributed to the discussion of the results and the interpretation, and the writing of the
 378 manuscript.

379 **Competing interests:** The authors declare no competing interests.

380 **Table 1. Short-term correlations over the southern hemisphere before the pre-perihelion equinox**
 381 **(top half of the table above the line) and after the post-perihelion equinox (bottom half).** Pearson
 382 correlation coefficients for shorter time intervals before the pre-perihelion equinox and after the post-
 383 perihelion equinox. The coefficients were determined as the mean of 10,000 Monte Carlo simulations for
 384 each time interval, assuming a normal distribution within the measurement uncertainties (Methods). The
 385 standard deviations of the correlation coefficients are smaller than 0.02 for each time period. The dates in
 386 the table are color-coded to match the appropriate data in Figs. 1, 2 and 3. Time intervals after the post-
 387 perihelion equinox are listed below the horizontal line in the middle of the table.

	Time interval	Heliocentric distance (au)	Average cometocentric distance (km)	Sub-spacecraft latitude (°S)	No. data points	O ₂ -H ₂ O	O ₂ -CO ₂	O ₂ -CO
1	09/27-10/12/2014	3.29-3.19	17.9	25.6 - 56	128	0.94	0.51	0.69
2	10/15-10/27/2014	3.17-3.10	9.9	25.1 - 50.1	48	0.97	0.12	0.32

3	10/30-11/05/2014	3.08-3.03	32.6	25.3 - 66.6	127	0.80	0.02	0.46
4	11/20-11/25/2014	2.94-2.91	30.8	29.6 - 56.9	86	0.96	0.19	0.26
5	12/04-12/23/2014	2.85-2.70	21.6	25.4 - 56.2	158	0.95	0.13	0.10
6	01/01-01/31/2015	2.65-2.43	28.2	25 - 64.8	167	0.93	-0.21	0.24
7	05/01-05/08/2016	2.91-2.97	17.1	25 - 85.6	99	0.71	0.25	0.22
8	06/09-06/14/2016	3.17-3.21	29.4	26 - 78.4	105	0.83	-0.20	0.00
9	06/23-06/25/2016	3.26-3.27	20.8	25.3 - 74.6	147	0.51	0.32	0.36
10	07/02-07/09/2016	3.32-3.36	14.4	25.4 - 77.2	115	0.27	0.67	0.65
11	07/10-07/27/2016	3.36-3.47	11.2	26.2 - 80.3	72	0.33	0.79	0.74
12	07/29-09/05/2016	3.48-3.70	11.9	25.5 - 80	75	-0.22	0.69	0.87

388 **Figure legends**

389 **Fig. 1. Correlation of O₂ with H₂O (left), CO₂ (middle), and CO (right) prior to the pre-**
390 **perihelion equinox.** The data were taken between 3.29-2.43 au. The colored dots indicate the
391 short time intervals listed in Table 1 (rows 1-6). The uncertainty on the correlation coefficients is
392 < 0.01.

393 **Fig. 2. Correlations of O₂ with H₂O (left), CO₂ (middle), and CO (right) after the post-**
394 **perihelion equinox.** The data were taken between 2.91-3.70 au. The different colors designate
395 different short time periods as indicated in Table 1 (rows 7-12). The uncertainty on the
396 correlation coefficients is < 0.01.

397 **Fig. 3. O₂ correlations with the major cometary volatile species during low H₂O**
398 **production.** The heliocentric distance for the corresponding time period was between 3.32-3.70
399 au. The different colors correspond to different short time periods as shown in Table 1 (rows 10,
400 11, 12). The uncertainty on the correlation coefficients is < 0.01.

401 **Fig. 4. O₂ trapping in and release from the two distinct nucleus reservoirs (arbitrary**
402 **scales).** (a) Trapping of O₂ in the porous near-surface H₂O ice beyond 3.3 au. O₂ is released
403 from a deep, primordial reservoir. The wavy blue lines indicate O₂ released from depth getting
404 trapped in the overlying H₂O ice. (b) Release of large amounts of accumulated, water-trapped O₂
405 with H₂O sublimation closer than 3.3 au. The wavy blue lines indicate O₂ released from the
406 secondary, H₂O-trapped reservoir. The insets show one possible calculated arrangement of the
407 H₂O ice molecules on a microscopic scale based on the first principle DFT periodic model
408 (Methods). The red dashed circles indicate locations of missing H₂O molecules where O₂ from
409 source ‘a’ can incorporate and stabilize, and subsequently be released via H₂O sublimation
410 (source ‘b’).

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FIG 1

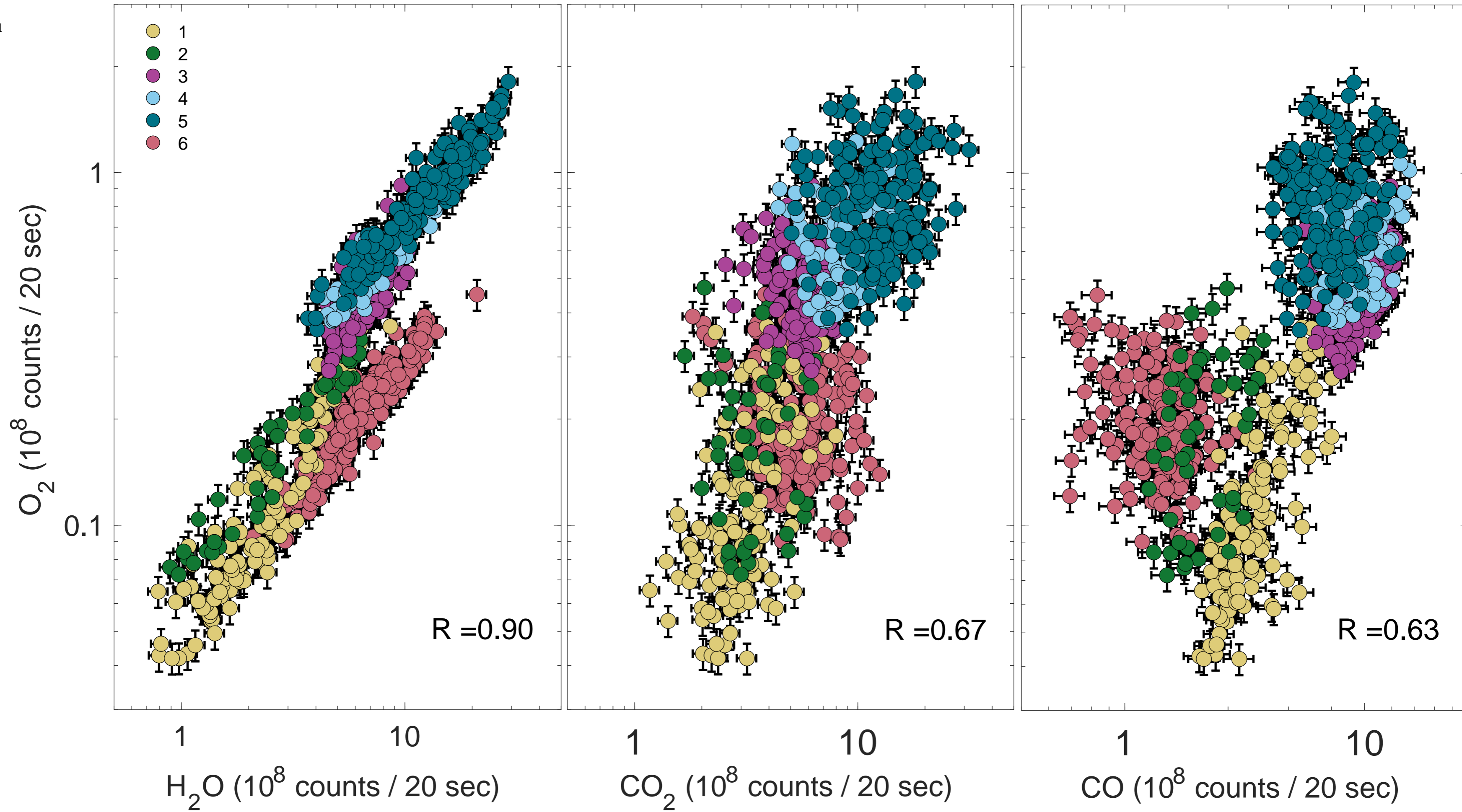


FIG 2

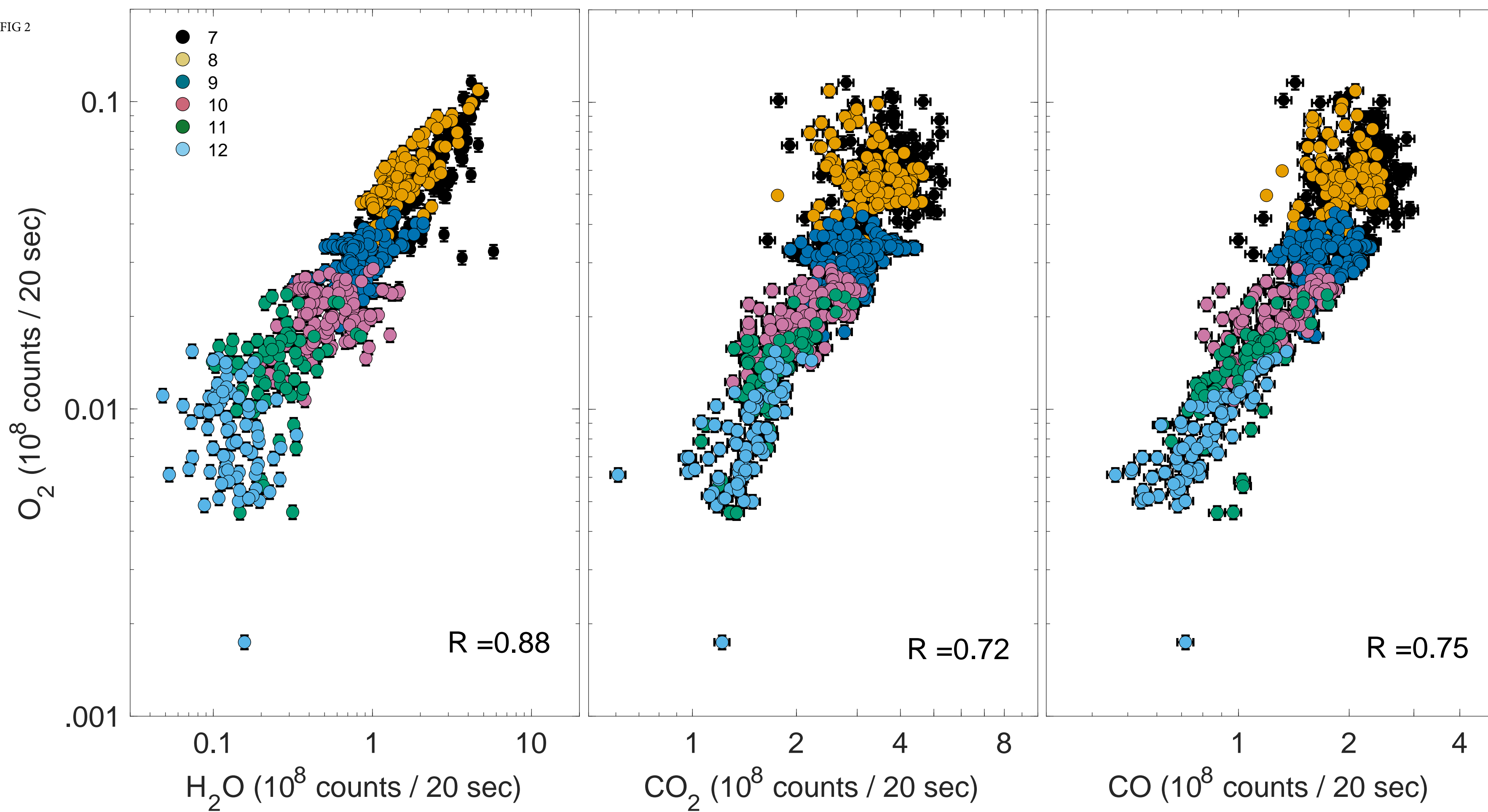
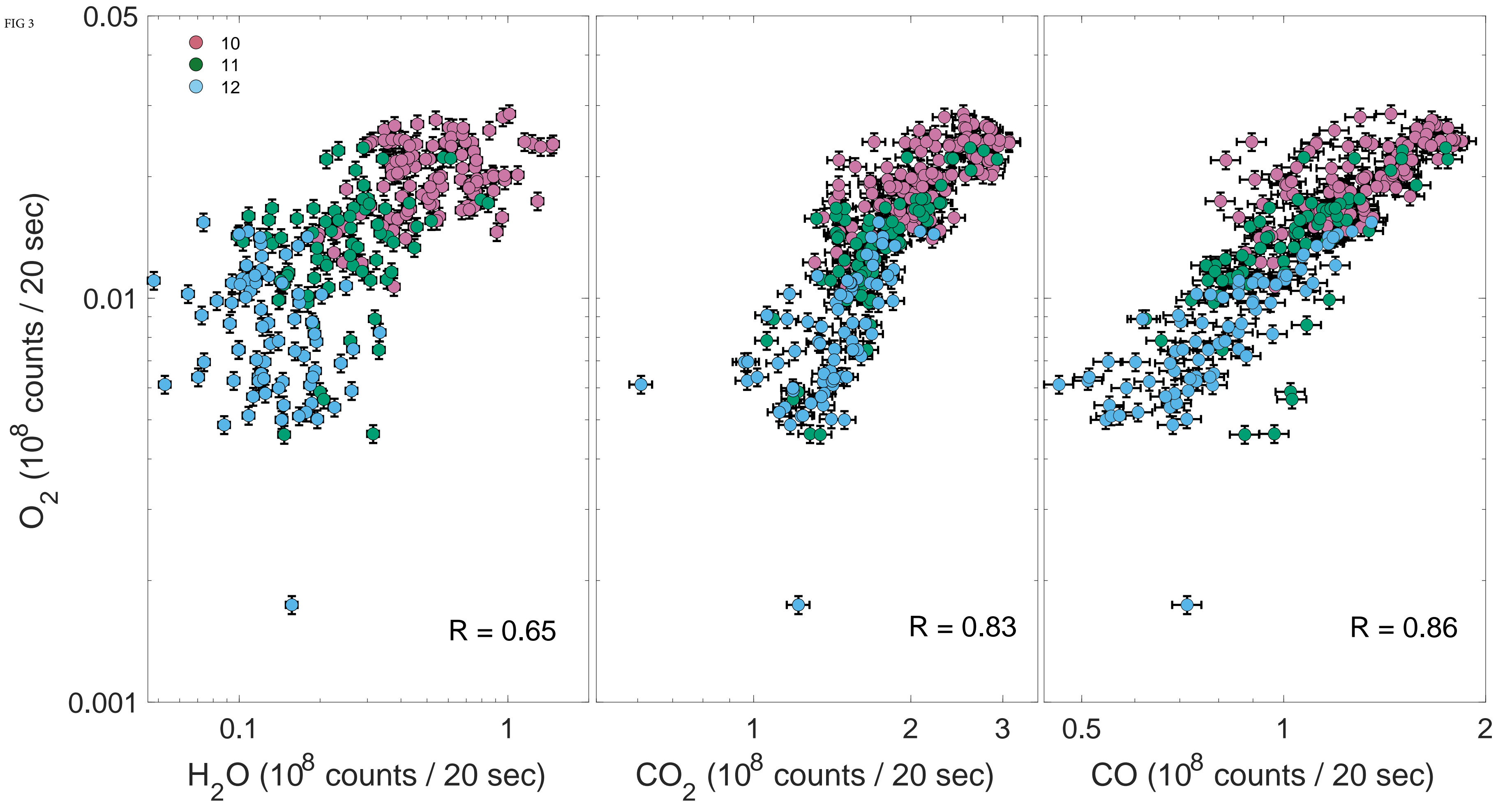


FIG 3



Datetime				ft distance from comet in km at the time of species measurement				longitude at time of species measurement (db-scaled)				latitude at time of species measurement (db-scaled)				derived 'abundance' from spectra (particles/20s)				abundance scaled by cometocentric distance (particles/ounting stations+10% uncertainty in signa								
time_O2	time_H2O	time_CO2	time_CO	d_O2	d_H2O	d_CO2	d_CO	lon_O2	lon_H2O	lon_CO2	lon_CO	lat_O2	lat_H2O	lat_CO2	lat_CO	O2 signal	H2O signal	CO2 signal	CO signal	O2_scaled	H2O_scaled	CO2_scaled	CO_scaled					
'2014-09-27 1'	'2014-09-27 1'	'2014-09-27 1'	'2014-09-27 1'	22,357	-127,13	-123,874	-129,812	-126,169	-25,612	-25,465	-25,732	-25,568	19980,3	59520,0	31990,0	45800,0	9983288,94	297741631	159665878	222826643	1001488,53	29971418,3	15979493,8	22297591,7				
'2014-09-27 1'	'2014-09-27 1'	'2014-09-27 1'	'2014-09-27 1'	22,23	-156,035	-152,83	-157,714	-155,106	-26,916	-26,771	-27,038	-26,874	11409,9	38465,0	31856,0	39280,0	7100770,4	190283519	157267963	194200751	71274,71	19042146,7	1579336,9	19340401,7				
'2014-09-27 1'	'2014-09-27 1'	'2014-09-27 1'	'2014-09-27 1'	22,108	-175,139	-178,285	-173,433	-176,066	-28,224	-28,081	-28,347	-28,182	11365,9	41369,0	38670,0	40760,0	5891971,31	164755642	196683107	199140954	584329,427	14688399,9	15797839,6	19928117,1				
'2014-09-27 2'	'2014-09-27 2'	'2014-09-27 2'	'2014-09-27 2'	21,621	-161,634	-161,634	-161,634	-161,634	-33,584	-33,44	-33,704	-33,542	23013	54260,0	33370,0	42690,0	10757832,8	255665683	155832644	199663841	1079063,2	25816577,6	1596609,0	19805141,7				
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	21,486	-21,499	21,475	21,49	24,949	28,127	22,285	25,826	-35,103	-34,957	-35,226	-35,063	17096,7	47960,0	30060,0	46590,0	7892660,71	221424886	209966508	792075,495	22157368,9	13682524,2	12011141,1		
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	21,369	-21,382	21,359	21,373	-0,403	-0,91	-6,677	-3,141	-36,434	-36,29	-36,555	-36,393	14324,7	36179,0	25670,0	36724,0	6541147,37	10546743	111708306	16757116	656672,303	16535335,3	1712652,3	1678866,7	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	21,255	-21,267	21,244	21,258	-32,818	-29,566	-32,423	-31,942	-37,751	-37,607	-37,87	-37,711	11863,0	30050,0	31322,0	36930,0	4533680,23	135934344	141395856	198588582	359752,408	16030093,4	14174744,1	19872950,3	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	21,141	-21,153	21,131	21,145	-61,661	-58,462	-60,259	-60,688	-39,066	-38,92	-39,184	-39,022	16458,5	54163,0	56442,0	47640,0	705955,925	242340734	252024345	213003667	73811,488	24249874,8	25218309,8	24114963,9	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	21,039	-21,041	21,019	21,032	-90,537	-87,799	-91,139	-89,587	-40,373	-40,227	-40,491	-40,321	23271	74089,0	66004,0	60094,0	10298794,6	324009548	273607261	24773907	1032395,4	3281965,8	2772726,9	2478883,1	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	20,92	-20,932	20,91	20,923	-118,894	-115,723	-121,491	-117,988	-41,647	-41,505	-41,763	-41,606	18471,7	55703,0	43320,0	46250,0	8084073,01	244061928	28941957	182457028	811250,511	24421815,3	18955358,6	2026291,6	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	20,813	-20,824	20,803	20,816	-147,364	-144,623	-150,004	-146,476	-42,911	-42,774	-43,027	-42,871	15957,1	42440,0	40750,0	44070,0	6130210,04	184026381	176351660	190858230	693630,332	18417204,1	17648485,1	19099638,2	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	20,707	-20,719	20,698	20,71	-175,836	-172,687	-178,437	-174,906	-44,156	-44,019	-44,269	-44,116	12601	32080,0	47082,0	44737,0	542054,08	13754680	120761680	191878827	546229,935	12014470,2	18014470,2	19201734,8	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	20,605	-20,616	20,596	20,608	-156,048	-159,088	-163,495	-156,944	-45,364	-45,234	-45,472	-45,326	10173,5	25085,0	47180,0	43321,0	432326,38	10661631	202417473	183979809	436066,365	16071938,6	2025974,7	18411544,8	
'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	'2014-09-28 0'	19,473	-19,479	19,468	19,475	-129,092	-131,947	-136,294	-129,941	-56,028	-56,02	-56,033	-56,026	11282,5	47388,0	53880,0	45075,0	427471,784	79475709,6	221929286	150638661	42954,736	7956485,8	22144101,4	16513231,4	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,455	-19,461	19,45	19,457	-120,096	-123,006	-117,685	-120,924	-56,042	-56,039	-56,043	-56,041	11093,8	25750,0	62560,0	46950,0	4189970,3	9753407,6	236681176	169999036	421946,169	976521,7	23683502,1	1701292,5	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,437	-19,443	19,433	19,439	-111,117	-114,04	-109,706	-111,986	-56,041	-56,043	-56,039	-56,042	12096,8	30647,0	62640,0	46931,0	4570134,37	115476900	253639130	177340380	459151,225	11558436	25379839	1774735,5	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,42	-19,426	19,416	19,422	-102,182	-105,076	-99,771	-103,023	-56,026	-56,033	-56,02	-56,028	13092,1	37400,0	71152,0	50270,0	497507,46	141151279	268229561	187808890	495972,797	14127008,6	26839333,8	1888462,1	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,387	-19,392	19,383	19,389	-83,864	-86,828	-81,467	-84,747	-55,95	-55,967	-55,936	-55,955	18033,1	40645,0	72820,0	50020,0	694572,05	190045032	273592756	19058836,5	27375816,2	19752052,3			
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,372	-19,377	19,368	19,373	-75,207	-78,13	-72,838	-76,049	-55,893	-55,914	-55,875	-55,899	21029,8	56819,0	70976,0	60760,0	529690	7898915,24	213337236	266244762	198799611	792003,785	21348329,7	26640793,2	1994806,0
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,357	-19,362	19,353	19,358	-66,224	-69,206	-63,87	-67,11	-55,819	-55,845	-55,797	-55,829	21029,8	64231,0	70976,0	60760,0	529690	7898915,24	213337236	266244762	198799611	792003,785	21348329,7	26640793,2	1994806,0
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,342	-19,347	19,338	19,344	-57,227	-60,223	-54,87	-58,14	-55,731	-55,761	-55,705	-55,74	25844	68477,0	59202,0	50780	50533894,77	256313800	221390760	189744436	956477,178	25647389,8	22153955,2	18988281,6	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,328	-19,333	19,324	19,329	-48,322	-51,207	-45,893	-49,151	-55,628	-55,663	-55,598	-55,638	25844	69356,0	54000,0	50780	50576	2567541,84	259228376	201757192	189745433	959847,328	2593893,2	20189923,3	18988381,1
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,314	-19,319	19,311	19,316	-39,257	-42,172	-37,868	-40,107	-55,509	-55,549	-55,476	-55,521	26352	66710,0	52025,0	49470	4981002,27	248977571	194109571	184591381	986145,326	24913536,1	19424889,4	18472724,5	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,302	-19,306	19,298	19,303	-30,375	-33,271	-29,963	-31,218	-55,379	-55,423	-55,392	-55,392	26352	61626,0	47208,0	48174,0	8831705,57	22836729	175808637	179491922	886142,376	22848787,3	17594122,9	1796332,0	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,289	-19,293	19,285	19,29	-21,323	-24,222	-18,853	-21,153	-55,232	-55,28	-55,189	-55,246	22952	55036,0	48074,0	47880	8539647,84	204854916	178792602	178118791	868870,051	20499804,4	17892615,6	1782522,2	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,277	-19,281	19,274	19,278	-12,27	-15,249	-9,861	-13,179	-55,07	-55,125	-55,025	-55,087	19936,1	47801,0	50760,0	48004,0	7480399,17	177703545	177703545	186768842	743552,737	17783685	18690550,6	17853624,9	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,265	-19,269	19,262	19,266	-3,285	-6,225	-0,773	-1,138	-54,896	-54,955	-54,847	-54,913	18185	41077,0	58400,0	49370,0	6749184,99	152516585	216789699	182386105	677544,419	15424008,2	21693693,7	18252115,6	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,254	-19,257	19,251	19,255	-5,795	-9,215	-6,388	-8,962	-54,707	-54,768	-54,653	-54,725	18514	46820,0	66820,0	53610,0	6247092,3	14066771	247658881	198761769	62708,608	14078632,5	2477622,4	1988027,5,2	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,243	-19,247	19,241	19,244	-14,853	-11,847	-17,249	-13,967	-54,504	-54,573	-54,447	-54,524	15987,6	35625,0	79708,0	60090,0	5920097,15	131971747	259091834	228263662	1937815,42	13208662,6	22822121,2		
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,233	-19,237	19,231	19,234	-23,833	-20,904	-26,226	-22,998	-54,29	-54,361	-54,231	-54,31	15590,4	35578,0	72540,0	54425,0	5760718,19	313660778	268290463	201343522	57903,281	31377546,2	26845425,8	2014854,18	
'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	'2014-09-29 0'	19,224	-19,227	19,221	19,225	-32,893	-29,966	-35,316	-32,069	-54,061	-54,136	-53,998	-54,082	1												

'2014-10-06 0' '2014-10-06 0' '2014-10-06 0' '2014-10-06 0	18,47	18,471	18,469	18,471	37,728	40,695	35,292	38,617	-50,013	-49,952	-50,063	-49,995	51724	1110980	734660	669190	17645171.9	379041758	250595436	228312799	1768717,81	37923644,8	25075373,8	22846390
'2014-10-06 2' '2014-10-06 2' '2014-10-07 0' '2014-10-06 2	18,349	18,349	18,348	18,349	19,857	22,855	17,336	20,726	-47,392	-47,489	-47,309	-47,42	34041	656570	1024800	750000	11461121,4	221057796	350815298	252514351	11494957,56	221206447,6	35100259,9	25267325,8
'2014-10-07 0' '2014-10-07 0' '2014-10-07 0' '2014-10-07 0	18,346	18,347	18,346	18,346	1,856	4,145	-1,439	1,931	-46,762	-46,868	-46,792	-46,792	27281	534950	742360	57010	918221,111	180070808	243128834	191903576	921242,412	18020499,9	24228476	25043920,6
'2014-10-07 0' '2014-10-07 0' '2014-10-07 0' '2014-10-07 0	18,344	18,344	18,344	18,344	-17,619	-14,606	-20,11	-16,746	-46,101	-46,21	-46,011	-46,133	23563	431800	735620	662990	9759852,25	145301709	247537848	189447450	798176,487	15442225	24769518,2	18958509
'2014-10-07 0' '2014-10-07 0' '2014-10-07 0' '2014-10-07 0	18,342	18,342	18,342	18,342	-36,501	-33,501	-39,056	-35,632	-45,4	-45,514	-45,302	-45,433	23659	490790	706190	680100	8692988	165115971	337081636	228805338	872427,147	16524446,9	24760798,4	22895660
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'2014-10-07 0' '2014-10-07 0' '2014-10-07 0' '2014-10-07 0	18,34	18,34	18,339	18,34	-74,073	-71,08	-76,641	-73,207	-43,911	-44,034	-43,872	-43,947	46611	1116040	1817200	1016640	15677870,9	375386304	609645308	342986124	157146,62	375580005,3	69899222,3	34114681,6
'2014-10-07 1' '2014-10-07 1' '2014-10-07 1' '2014-10-07 1	18,355	18,355	18,356	18,355	45,663	49,727	43,94	47,482	-32,331	-32,501	-32,19	-32,38	59890	1299130	1127080	814930	1219355,4	437684724	379761419	274554827	2022222,1	43739933,3	37995629,3	247472052,4
'2014-10-07 1' '2014-10-07 1' '2014-10-07 1' '2014-10-07 1	18,359	18,358	18,359	18,358	27,123	30,262	24,572	28,028	-31,28	-31,45	-31,141	-31,229	50164	1068320	897120	713360	1690792,07	360041108	302367881	240413857	16994904	36203890,3	30255077,4	24065890,4
'2014-10-07 1' '2014-10-07 1' '2014-10-07 1' '2014-10-07 1	18,362	18,362	18,363	18,362	7,668	10,782	5,076	8,575	-30,217	-30,388	-30,075	-30,267	38437	782530	733840	612170	12959535,9	26384917	247450678	206401120	1895953,25	26400262,8	24760798,4	20564467,7
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'2014-10-07 1' '2014-10-07 1' '2014-10-07 1' '2014-10-07 1	18,37	18,37	18,371	18,37	-31,317	-28,164	-33,977	-30,377	-28,056	-28,232	-27,907	-28,109	28357	542790	831880	564300	9569265,31	183168231	207954210	220798050	9600159,54	18330357	28092176,7	22094662,7
'2014-10-07 1' '2014-10-07 1' '2014-10-07 1' '2014-10-07 1	18,375	18,374	18,376	18,375	-50,814	-47,65	-53,394	-49,873	-26,962	-27,14	-26,816	-27,015	34682	783790	1081120	710600	1710052,2	264610522	365097665	239927428	1744427,21	26477321,1	36526083,3	24008232,4
'2014-10-07 1' '2014-10-07 1' '2014-10-07 1' '2014-10-07 1	18,38	18,379	18,38	18,38	-70,335	-67,205	-73,017	-69,423	-25,858	-26,035	-25,705	-25,909	51881	1189340	1458640	922930	12756667,7	401744353	492764183	311788273	11788273,5	11788273,5	49256116,6	31196428,2
'2014-10-10 2' '2014-10-10 2' '2014-10-10 2' '2014-10-10 2	11,019	10,999	11,035	11,013	101,038	103,96	98,652	101,898	-26,268	-25,855	-26,603	-26,146	165025	3100400	2547800	1272980	20307065	375080194	310248727	209580074	200818,72	37527386,4	31042486,6	20972484,3
'2014-10-10 2' '2014-10-10 2' '2014-10-10 2' '2014-10-10 2	11,564	11,554	11,558	11,557	29,272	32,127	26,911	30,105	-35,463	-35,135	-35,732	-35,368	263520	4428600	3262500	1649240	325390580	589763748	230837382	22079502	3529886,37	35009931,5	23008931,5	22042790
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	11,713	11,689	11,733	11,706	5,143	14,458	9,333	12,486	-37,416	-37,112	-37,662	-37,325	176714	3012600	1423000	1452920	2424165,7	411619735	195984860	199094261	2429340,41	41182126,1	19003482,3	21992385,4
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	11,865	11,841	11,886	11,858	-5,747	-9,29	-8,051	-4,905	-39,209	-38,93	-39,441	-39,128	112199	1614760	1484640	1358520	15795176,1	246975844	187836759	1583491,92	24713299,9	20989030,3	18973561,2	18973561,2
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	12,022	11,997	12,043	12,014	-23,13	-20,36	-25,433	-22,335	-40,875	-40,62	-41,086	-40,802	88026	1242510	2200000	1409800	12722264,3	205026888	319074468	203485169	1275793,26	20517007,6	31925309,4	20362781,7
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	12,821	12,155	12,203	12,173	-40,441	-37,232	-42,781	-39,636	-42,396	-42,158	-42,591	-42,328	162496	2638000	1949590	7101520	14577234,3	250365547	392833045	252134516	1461560,37	25052377,7	39253124,6	25229393,7
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	12,342	12,316	12,364	12,335	-57,635	-54,881	-59,934	-56,833	-43,769	-43,558	-43,942	-43,708	117684	2229600	2586000	1599320	19762211,1	338194325	395317931	242158474	1796855,04	33837822,6	39516577,5	24267402,7
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'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	12,67	12,643	12,692	12,662	-91,719	-88,968	-94,031	-90,922	-46,078	-45,912	-46,214	-46,03	174256	3065700	3162400	1765510	27973124	490038139	509421099	283057587	2802601,36	49042596,9	50964680	2821255,8
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	12,836	12,809	12,859	12,828	-108,738	-105,945	-110,019	-107,915	-47,023	-46,877	-47,138	-46,98	198931	3438700	3164000	2144700	32776447,7	564189163	693497328	352926605	3283369,84	56442666,1	36936059,5	3531145,4
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'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	13,674	13,647	13,696	13,666	-166,338	-163,115	-168,046	-165,144	-49,727	-49,689	-49,757	-49,717	14449	604860	1773880	1122440	77500256,6	112649495	332745148	205626396	777790,56	11275563,1	33292756,1	20977118,1
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'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	14,627	14,601	14,649	14,62	-65,409	-68,261	-62,987	-66,232	-49,309	-49,362	-49,263	-49,324	124276	2688300	1400700	1239270	26588742	573116529	300580697	264887023	2664030,62	5735592,8	30075406,9	2650497,2
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	14,785	14,76	14,806	14,778	-47,756	-50,625	-45,401	-48,584	-48,943	-49,007	-48,889	-48,961	123272	2389300	1515900	1153200	2820302,8	51930733	333212014	251846522	2833341	51937862,1	30794930,9	25020512,9
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	14,941	14,916	14,962	14,934	-29,949	-32,837	-27,599	-30,782	-48,508	-48,582	-48,445	-48,529	98424	1807560	2259800	1266800	17181789,1	405187043	508582091	282366677	211390,02	40235924,2	50651700,9	2823471,4
'2014-10-11 0' '2014-10-11 0' '2014-10-11 0' '2014-10-11 0	15,095	15,07	15,115	15,087	-12,141	-15,019	-9,736	-12,98	-48,014	-48,098	-47,943	-48,029	74184	1394030	2046000	1529410								

'2014-10-24 1 '2014-10-24 1 '2014-10-24 1 '2014-10-24 1	9,828	9,828	9,828	9,828	-9,609	-6,878	-11,933	-8,814	-31,687	-32,094	-31,34	-31,806	155305	2540200	2969800	1367490	15000845,3	245356861	286851747	132085290	1503957,63	24551350	28702111,4	13220021,9
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'2014-10-27 1 '2014-10-27 1 '2014-10-27 1 '2014-10-27 1	9,838	9,838	9,838	9,838	35,468	37,95	33,445	36,174	-48,335	-48,153	-48,185	-48,386	282380	5020300	4401200	1655710	27330499,6	485895981	425957617	152595522	2738277,82	48611641,2	146218200,9	16037654,2
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'2014-11-03 0'2014-11-03 0'2014-11-03 0'2014-11-03 0	32,545	32,549	32,541	32,546	-69,569	-66,377	-72,234	-68,639	-55,974	-56,045	-55,914	-55,994	48049	552590	683520	541320	50928396,9	588252167	914395732	573388942	5096373,38	58849515,6	91469812,2	5762829,8
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'2014-11-03 0'2014-11-03 0'2014-11-03 0'2014-11-03 0	32,494	32,498	32,491	32,495	-109,705	-106,493	-112,406	-108,759	-55,069	-55,142	-55,007	-55,09	43297	601190	805020	482440	44715572	634827858	849831504	509420469	4578318,53	63518076,3	85012302,2	5096461,7,3
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'2014-11-03 0'2014-11-03 0'2014-11-03 0'2014-11-03 0	32,443	32,444	32,444	32,444	-149,969	-146,69	-152,62	-149,021	-54,14	-54,217	-54,078	-54,154	37648	499000	704200	491490	39646233,5	512520352	74167405	512489930	3968928,59	512489930	74133963,1	5127636,17
'2014-11-03 0'2014-11-03 0'2014-11-03 0'2014-11-03 0	32,418	32,422	32,414	32,419	-170,059	-166,808	-172,688	-169,125	-53,67	-53,746	-53,608	-53,692	35811	477640	719980	450470	3764736,9	502088521	756455912	477223738	37696840,1	5201259,4	75673435	4774219,3
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'2014-11-04 0'2014-11-04 0'2014-11-04 0'2014-11-04 0	32,058	32,062	32,054	32,059	-89,493	-86,325	-92,231	-88,599	-46,691	-46,774	-46,619	-46,715	39877	702070	794740	499170	40992248,7	721708193	816562699	513036684	4105650,81	7219763,8	8168448,5	51326318,7
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'2014-11-04 0'2014-11-04 0'2014-11-04 0'2014-11-04 0	31,658	31,662	31,654	31,659	-38,233	-35,046	-40,971	-37,334	-38,262	-38,352	-38,184	-38,287	34683	550190	514400	427380	34760307,7	515555706	515416308	428359675	381926,5	55179055,8	5156433,6	4285664,4
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'2014-11-04 0'2014-11-04 0'2014-11-04 0'2014-11-04 0	31,605	31,609	31,602	31,606	-79,061	-75,84	-81,792	-78,161	-37,103	-37,195	-37,025	-37,129	40337	725570	590000	468840	40591325	724937942	589224978	468342671	4065503,63	72507718,9	58946771,8	46857900,3
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'2014-11-22 0'2014-11-22 0'2014-11-22 0'2014-11-22 0	30,996	30,997	30,995	30,997	-120,199	-122,709	-129,209	-125,224	-56,848	-56,854	-56,843	-56,85	80509	1150400	1124400	602180	77349184,1	1105512599	1079854016	581465422	7743713,24	110268509	108018855	61770658,0
'2014-11-22 0'2014-11-22 0'2014-11-22 0'2014-11-22 0	30,989	30,99	30,988	30,989	-148,237	-144,748	-151,145	-147,262	-56,805	-56,812	-56,798	-56,807	62423	846810	1110700	584350	59493988,1	813259472	106656499	561161894	6002336,28	81354465	106688308	56139878,3
'2014-11-22 0'2014-11-22 0'2014-11-22 0'2014-11-22 0	30,973	30,974	30,972	30,973	-167,344	-170,841	-164,403	-168,319	-56,679	-56,691	-56,669	-56,682	42461	513410	798760	407920	40733972,2	49255979,40	766222339	451161767	4079797,5	4925979,7	76649914,6	45137317,9
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'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,837	30,838	30,835	30,837	-152,426	-155,94	-149,465	-153,488	-53,701	-53,744	-53,665	-53,714	46402	455590	786120	517800	44124616,9	433172412	79532140	492386671	4419194,26	43338054	7951410,3	45260855,9
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,829	30,83	30,828	30,829	-130,691	-134,118	-127,791	-131,658	-53,475	-53,495	-53,444	-53,476	508730	761100	1016100	473750	45202319,8	483200042	450093829	450093829	450093829	48341986	72359219,3	45030598,3
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,821	30,822	30,82	30,821	-108,57	-112,346	-106,105	-109,936	-53,152	-53,197	-53,114	-53,165	54012	723220	862680	464940	5107837,4	687055879	819435922	441662333	51379466,9	68571799,6	81972218	44817249,1
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,813	30,814	30,812	30,813	-87,185	-90,607	-84,254	-88,15	-52,862	-52,908	-52,822	-52,875	63391	933390	918660	501090	60186012,5	886256228	872156829	475755375	6026359,21	88633929	87245251,1	475793749,3
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,805	30,806	30,803	30,805	-65,422	-68,85	-62,526	-66,387	-52,563	-52,611	-52,523	-52,577	75387	1112970	910660	448090	7158384,8	1056219255	788150816	456339616	7162925,51	105654225	78843155,6	10565532,7
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,759	30,761	30,758	30,76	-53,273	-56,184	-56,184	-52,311	-50,778	-50,833	-50,731	-50,794	69210	879380	1031640	549020	65584766,7	832103758	960850857	519470426	6566575,25	83239222	106616083,3	51968834,5
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,751	30,752	30,75	30,751	-75,117	-71,643	-78	-74,156	-50,422	-50,48	-50,375	-50,438	74935	1045990	895640	486470	7080634,5	989177580	846883558	460017708	7094551,31	98949209	84717461	46023218,8
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,742	30,744	30,741	30,743	-96,804	-93,298	-99,71	-95,843	-50,061	-50,12	-50,012	-50,058	47540	1209670	1056400	510090	80969372,6	1143372265	80377958	482102407	8108632,56	114371040	8108632,56	4822219,5
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,734	30,735	30,733	30,734	-118,519	-115,05	-121,466	-117,559	-49,692	-49,752	-49,642	-49,709	87153	1365640	903220	527220	82322872,3	1289868442	853106906	498008210	14231360,43	12902579	85339898,6	48222397,1
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'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,717	30,718	30,716	30,717	-161,986	-158,529	-164,828	-161,019	-48,931	-48,992	-48,88	-48,948	61606	845050	809940	473330	58127361,1	797385398	764156243	446602900	5802360,24	7967777,8	76443267,7	44691121,9
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,708	30,71	30,707	30,709	-176,337	-179,726	-173,489	-177,288	-48,54	-48,602	-48,488	-48,548	48858	845600	807560	481120	45528078,4	543906997	803540012	45376695	4595555,29	5444021,5	80387748,5	45392970,1
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,7	30,701	30,699	30,7	-154,692	-158,137	-151,82	-156,667	-48,143	-48,207	-48,09	-48,161	41995	478870	847560	490970	39579867,6	513395589	798764785	462734315	3964278,01	45157204,2	799047409	46294942,8
'2014-11-23 0'2014-11-23 0'2014-11-23 0'2014-11-23 0	30,691	30,693	30,69	30,692	-133,076	-136,453	-130,238	-134,033	-47,74	-47,804	-47,687	-47,758	42009	595770	742500	444920	39598516,6	527242860	679450581	419711435	3963275,01	45772427,7	67971124,4	41931857,4
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,616	30,618	30,615	30,617	-89,595	-95,546	-81,804	-85,002	-43,877	-43,96	-43,827	-43,908	75314	1022610	938260	592890	70594783,8	988584340	879410667	55575495	7067880,45	95915508,3	87970721,6	55601124,4
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,607	30,609	30,606	30,608	-112,479	-79,536	-86,782	-81,924	-43,376	-43,448	-43,314	-43,397	82928	1296700	757360	471000	77498634,8	1214864232	709439739	55775922	7738666,81	121512776	70970609,3	44116623,5
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,598	30,599	30,597	30,598	-106,985	-103,58	-109,806	-106,034	-42,855	-42,929	-42,794	-42,876	94895	1487590	681840	466960	88844267,4	139288841	638322523	437185512	8893852,47	139328513	63857511,3	43729460,1
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,589	30,59	30,588	30,589	-131,047	-127,611	-133,867	-130,096	-42,329	-42,405	-42,267	-42,345	92894	1491650	751880	461710	86919700,8	1328097921	703478284	432016008	8701293,16	132846235	70347351,6	43222381,8
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,572	30,573	30,571	30,572	-176,651	-173,218	-179,509	-175,668	-41,316	-41,393	-41,251	-41,338	52773	704200	624920	411640	49324133,8	658230952	584041509	384738167	4939436,7	65848751,2	58428317,8	38494943,4
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,564	30,565	30,563	30,564	-161,937	-165,319	-159,056	-162,887	-40,833	-40,909	-40,767	-40,854	40542	503400	565380	36520	37872637,5	470285958	705632265	40778692	3795411,8	47050281,9	70579807,2	47080676,3
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,556	30,557	30,555	30,556	-140,486	-143,833	-137,605	-141,435	-40,345	-40,421	-40,279	-40,366	40865	516420	782840	450740	38154389,2	480534935	730865706	3821615,85	480754116,3	71131605,2	42079051,9	
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'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,532	30,533	30,531	30,532	-76,085	-79,477	-73,216	-77,033	-38,854	-38,934	-38,787	-38,877	75432	1393050	593480	395690	7017938,5	129860489	532076121	368863415	7040179,43	129950506	5344281,5	36905547,2
'2014-11-24 0'2014-11-24 0'2014-11-24 0'2014-11-24 0	30,524	30,525	30,523	30,524	-54,618	-58,011	-51,676	-55,566	-38,35	-38,43	-38,28	-38,372	83606	1465000	531080	400100	7796928,8	1365051291	439944068	372779008	77985811,8	136542076	94416631,7	

'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,31	19,312	19,309	19,311	107,25	110,802	104,341	108,299	-26,8	-26,618	-26,949	-26,746	216556	2921300	2811400	894580	80748556,7	1089508604	1048195294	333602051	8083841,69	108983868	104851905	33378469,9
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,301	19,302	19,299	19,301	85,067	86,63	82,155	86,15	-27,935	-27,753	-28,084	-27,88	271920	4562400	3075200	839110	101297977	1699800612	1145362548	312592474	110139862,4	100702190	114577000	3126792,7
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,291	19,293	19,29	19,292	63,284	66,817	60,352	64,236	-29,042	-28,863	-29,191	-28,989	2931200	5063100	2922400	958870	109082463	1884586317	1087437022	356873449	180012600	114057000	18077678	3570623,6
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,283	19,284	19,282	19,283	41,419	44,964	38,475	42,544	-30,145	-29,967	-30,293	-30,093	3154100	5428300	2456400	827510	117280190	2018636339	813278252	307696247	117388486	201908665	93807301	30781784
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,274	19,276	19,273	19,275	19,52	23,053	16,633	20,573	-31,241	-31,065	-31,385	-31,189	2394900	3937100	2236200	814590	870761199	1462885317	830632201	30641059	8718591,38	146326779	813021408	30215012,8
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,267	19,268	19,265	19,267	-2,438	1,099	-5,346	-1,418	-32,33	-32,156	-32,474	-32,28	174709	2307720	2409400	821120	648500531	856754490	894225258	304847350	8465953,39	85074791,9	89452429,4	30502190,9
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,259	19,262	19,265	19,259	26,305	-20,764	-27,234	-23,284	-33,405	-33,231	-33,548	-33,355	152422	1973890	3137800	921570	56534703,9	732209758	1163717656	367782317	5660983,59	72348035,2	116448925,4	36797409,4
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,252	19,253	19,251	19,252	-46,15	-42,646	-49,117	-45,136	-34,467	-34,297	-34,61	-34,418	178333	2495370	3536000	968800	60967254,7	924978783	1310451440	358080691	8617855,49	925289291,8	131080714	35899811,3
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,245	19,246	19,244	19,245	-68,136	-64,602	-71,116	-67,129	-55,524	-55,354	-55,666	-55,475	247280	3940400	4042200	1073120	91585099,8	1459557716	1496954135	397481111	91680799,5	959739104	107794104	39768048
'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	'2014-12-12 1'	19,239	19,24	19,238	19,239	-90,129	-86,607	-93,088	-89,069	-76,568	-76,402	-76,707	-76,518	319000	5759900	5014400	133450	118074380	2138854360	1855832669	499529028	11818304,2	21293157,1	185626346	4915239,5
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,198	19,198	19,198	19,198	17,775	21,421	14,748	18,843	-47,295	-47,16	-47,405	-47,25	289501	3046200	4184200	1167160	110016485	123571400	1542142158	427592287	1102137,4	112390650	15423386	42779507
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,198	19,198	19,198	19,198	-4,954	-1,254	-8,007	-3,849	-48,114	-47,983	-48,222	-48,075	180561	1854420	3323000	1007120	6654814,07	683407977	1228052596	371187374	6662971,7	14637337,1	12840303	37138003,6
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,197	19,197	19,197	19,197	-27,723	-24,102	-30,801	-26,668	-48,905	-48,781	-49,009	-48,869	166577	1854130	4560000	1063570	6317757,1	683292904	1659835740	39195193	6146610,4	68354340,3	1660213,5	39214990,9
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,198	19,198	19,198	19,198	50,463	-46,832	-53,495	-49,405	-49,661	-49,543	-49,76	-49,627	213884	2501970	7466200	1520090	78829772,3	922134080	9271766594	546671999	7819555,85	92437740,6	175229117	56490962
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,198	19,198	19,198	19,198	-73,172	-69,946	-76,195	-72,076	-50,383	-50,269	-50,477	-50,349	318410	4114500	7185800	1520140	117354210	1516453303	2648421471	560267669	11746254	151684272	264893610	56005463,9
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,199	19,199	19,199	19,199	-96,206	-92,361	-99,245	-95,054	-51,079	-50,966	-51,168	-51,049	356510	5241400	7308000	6325510	13410157	1931988431	270246112	601760544	13152479	159242798	27029456	6000585,2
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,201	19,201	19,201	19,201	-119,149	-115,463	-122,294	-118,083	-51,734	-51,623	-51,821	-51,705	314300	3928700	8558600	1712920	115875621	1448426834	3155370963	634834712	115983216	144887424	215592669	63508667,2
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,212	19,212	19,212	19,212	149,181	153,586	146,815	150,986	-53,928	-53,852	-53,99	-53,906	1656300	5546000	1344640	1346020	61303237,6	577593917	2047033835	496307893	6138153,4	71783424,9	24048628	49530677,7
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,216	19,216	19,217	19,216	121,711	125,55	118,636	122,826	-54,467	-54,397	-54,521	-54,447	4079400	4079400	330250	1330250	121078602	1506337444	1984433343	491201006	12118863,7	15067256	198487881	49142263,7
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,221	19,221	19,221	19,221	98,174	102,029	95,074	99,345	-54,862	-54,801	-54,911	-54,844	271500	3374300	4304200	1241060	100304817	1246494764	159013093	458457989	10044097	12646782	159057186	45867210
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,225	19,225	19,226	19,225	74,953	78,653	71,776	76,018	-55,203	-55,152	-55,246	-55,188	249360	3304100	2660200	845510	92126611,9	1221197425	983313870	312501024	9225961,37	121254688	98362744,8	31267780,1
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,236	19,235	19,237	19,236	28,449	32,178	25,291	29,535	-55,733	-55,698	-55,761	-55,723	177482	2407330	5403300	1097140	65672545,6	890676532	2010843841	440373774	6573538,42	89097497,4	201129224	44328426,7
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,242	19,241	19,243	19,242	5,133	8,865	2,043	6,202	-55,92	-55,893	-55,941	-55,912	132606	1583910	4836300	3321850	49097976,7	586389593	1789848482	489420995	49160024,7	58663110,6	119071255	48964222,4
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,255	19,254	19,256	19,255	-41,889	-37,771	-44,618	-40,419	-56,134	-56,125	-56,141	-56,132	343600	4129400	3129400	937140	49959610,4	684379760	1160361292	347449364	5903029,25	68464136,7	17607193	34763576,4
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,262	19,261	19,263	19,262	-64,943	-61,143	-68,172	-63,873	-56,161	-56,161	-56,161	-56,161	199969	3075000	4712200	975010	74193427	1140040350	1288034472	361752738	7427956,26	114037299	12889336	36194293,6
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,27	19,269	19,271	19,27	-88,259	-84,523	-91,378	-87,171	-56,314	-56,314	-56,314	-56,314	247162	3831000	3475600	1318210	11779382,2	1430634302	1766094025	489494427	91875138,38	114011754	176653147	48971596,7
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,278	19,277	19,279	19,278	-111,584	-107,886	-114,701	-110,496	-56,054	-56,07	-56,039	-56,059	241737	3452000	3871400	1118626	8939449,1	1654375350	1438921336	415725373	8994232,37	165478020	143990607	41592926,7
'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	'2014-12-13 0'	19,286	19,285	19,288	19,286	-131,992	-131,261	-138,143	-133,887	-55,919	-55,944	-55,987	-55,927	316630	3926600	1096300	79033086,3	1170144287	1460800998	40768561	7311854,57	110748636	146118320	4077049,4	
'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	19,343	19,343	19,343	19,343	91,39	95,139	88,27	92,502	-54,169	-54,24	-54,11	-54,19	175384	2389280	3298000	1008400	65620212,8	893768198	1233758250	372974523	6570121,91	8940671,5	123410950	37748876,4
'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	19,356	19,364	19,368	19,366	45,239	49,006	42,125	46,292	-53,202	-53,208	-53,226	-53,176	3721300	4644400	792590	8691072,7	139535379	718698893	287254504	8703694,86	139572892	71923763,9	2974691,5	
'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	19,391	19,389	19,395	19,391	-9,925	7,275	-3,943	0,105	-52,068	-52,163	-51,988	-52,029	137628	1923320	3114400	901170	51614261,6	723040075	1171169074	338814777	51686140,7	72330896,9	11711300	3389988,7
'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	19,403	19,401	19,405	19,403	-23,678	-19,967	-26,724	-22,589	-51,451	-51,554	-51,265	-51,481	112750	1415140	4285200	1286420	42447715,1	532656999	1613609308	484306782	4521286,7	5328779,3	16140110	4845268,2
'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	'2014-12-14 0'	19,416	19,414	19																					

'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	23,405	23,396	23,413	23,402	150,667	154,242	147,634	151,661	-52,326	-52,363	-52,294	-52,336	93762	1135160	2135600	825700	51362263,4	621355776	1170668796	452197581	5143393,08	62160499,6	117101095	45241023
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'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	23,643	23,634	23,651	23,641	80,841	64,45	57,849	61,865	-51,224	-51,274	-51,181	-51,238	1943740	2335600	2356000	766260	10765202	1862649893	1306464107	428260256	18629940,3	143090148	163407556	42846272,6
'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	23,703	23,693	23,711	23,7	38,511	42,011	35,331	39,448	-50,899	-50,951	-50,854	-50,913	206595	3399800	3583000	645750	116071725	1908505775	87328156	362711318	11617946,2	190984264	87357866	36291072,7
'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	23,762	23,753	23,777	23,759	16,123	19,671	13,182	17,198	-50,554	-50,61	-50,507	-50,57	156157	2301860	1756300	647560	88171339,8	1298720942	1008333322	381234027	8826253,61	129891832	107850609	38142927,3
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'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	23,888	23,871	23,888	23,878	-8,785	-25,23	-31,718	-27,784	-49,808	-49,869	-49,757	-49,825	103948	1331870	3694800	1106920	59226804,4	758881060	2108387903	627699319	5935379,58	75915653,8	120884707	627949874
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'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	24,465	24,456	24,472	24,462	106,382	109,865	103,487	107,353	-45,172	-45,254	-45,105	-45,195	149401	1904720	1923480	111650	89421910,6	1139205291	1151931369	434197364	8951647,37	113954247	115270706	43440573,8
'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	24,521	24,512	24,528	24,518	84,486	87,939	81,594	85,455	-44,656	-44,738	-44,587	-44,679	192579	3082500	2058400	728490	115793793	1852083579	1252097338	437918887	115900441	185251394	125245199	43812815,2
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'2014-12-22 0' '2014-12-22 0' '2014-12-22 0' '2014-12-22 0	24,629	24,619	24,639	24,629	40,556	45,809	37,671	41,523	-43,593	-43,722	-43,522	-43,617	238373	4099600	1562400	641590	144629343	248474722	849801445	389180565	14474960,5	248523494	150510963,4	38937784,1
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'2014-12-23 0' '2014-12-23 0' '2014-12-23 0' '2014-12-23 0	25,264	25,256	25,271	25,262	137,969	141,36	135,083	138,926	-36,66	-36,754	-36,579	-36,686	96789	1117720	1634920	695320	61777485,6	712955067	1044088236	443731422	16185608,43	113207209	104442136	44394207,1
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'2014-12-23 0' '2014-12-23 0' '2014-12-23 0' '2014-12-23 0	25,505	25,498	25,512	25,503	29,703	33,14	28,809	30,665	-33,604	-33,702	-33,521	-33,631	235844	3806600	1593380	516920	152116697	2474853392	754596533	386206323	15224003,2	247535087	15243752,3	3368986,3
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'2015-01-30 0 '2015-01-30 0 '2015-01-30 0 '2015-01-30 0	27,832	27,832	27,833	27,832	-94,273	-90,796	-97,226	-93,295	-63,417	-63,457	-63,384	-63,429	32940	1264680	714160	166567	25515990,2	979646705	553242533	129026167	2556650,35	97995969,8	55347774,4	12913975,7
'2015-01-30 0 '2015-01-30 0 '2015-01-30 0 '2015-01-30 0	27,837	27,836	27,837	27,836	-116,838	-113,314	-119,787	-115,827	-63,15	-63,194	-63,114	-63,163	38708	1405690	811980	180117	29984773,8	1089188910	629202140	139562378	3004954,13	108951894	62945297,9	1396805,4
'2015-01-30 1 '2015-01-30 1 '2015-01-30 1 '2015-01-30 1	27,841	27,84	27,841	27,84	-139,449	-135,799	-142,463	-138,456	-62,862	-62,91	-62,822	-62,875	31996,2	1024640	728900	159165	24800935,5	794163216	564985902	123363316	2485073,61	79444502,5	56522359,6	12347438,5
'2015-01-30 1 '2015-01-30 1 '2015-01-30 1 '2015-01-30 1	27,845	27,844	27,845	27,845	-161,861	-158,347	-164,835	-160,887	-62,557	-62,606	-62,515	-62,571	15357,8	535610	619180	134020	11907578,5	415252186	480077513	103911606	1194208,58	41545596,3	48029662	10401354,3
'2015-01-30 1 '2015-01-30 1 '2015-01-30 1 '2015-01-30 1	27,849	27,848	27,849	27,849	175,711	179,219	172,776	176,718	-62,232	-62,284	-62,188	-62,247	11629,4	375520	589220	144945	9019376,56	291219930	456979470	112414530	904940,883	29139058,1	45719324,1	11252055,6
'2015-01-30 1 '2015-01-30 1 '2015-01-30 1 '2015-01-30 1	27,878	27,877	27,878	27,877	30,957	34,395	28,053	31,919	-59,712	-59,779	-59,654	-59,731	36593	1161650	802280	183984	28439453,3	902749729	623518284	142978958	2849278,19	90305018,7	62376798,8	14309853,2
'2015-01-30 1 '2015-01-30 1 '2015-01-30 1 '2015-01-30 1	27,882	27,881	27,883	27,882	8,944	12,384	5,941	9,905	-59,27	-59,34	-59,209	-59,29	32441	895360	746000	187906	25219825,6	696008240	579986420	140551881	2527004,49	69627206	58022724,9	14067043,6
'2015-01-30 1 '2015-01-30 1 '2015-01-30 1 '2015-01-30 1	27,887	27,886	27,887	27,887	-13,283	-7,938	-16,246	-12,307	-58,81	-58,922	-58,748	-58,831	21563,6	608600	1210780	229163	16769683,3	473265007	941605165	178216575	1681063,41	47348255,4	94191202	17835007,2
'2015-01-30 1 '2015-01-30 1 '2015-01-30 1 '2015-01-30 1	27,892	27,891	27,892	27,891	-35,407	-31,951	-38,391	-34,432	-58,339	-58,414	-58,275	-58,36	17910,9	462870	1612520	308195	13934029,4	360070221	1254481967	239747319	1397135,77	36025997,6	125483615	23990215,7
'2015-01-30 2 '2015-01-30 2 '2015-01-30 2 '2015-01-30 2	27,896	27,896	27,897	27,896	-57,436	-53,952	-60,373	-56,429	-57,858	-57,935	-57,792	-57,88	22355,8	647680	1372220	255295	17396988,8	504016037	1067920073	198667203	1743869,85	50424054	106824686	19880815,3
'2015-01-30 2 '2015-01-30 2 '2015-01-30 2 '2015-01-30 2	27,901	27,9	27,902	27,901	-79,322	-75,877	-82,203	-78,367	-57,445	-57,501	-57,389	-57,489	28887,3	963930	781540	197406	22487775,1	750332751	608445774	153673820	2253519,64	75060667,3	60869244,1	15379778,5
'2015-01-30 2 '2015-01-30 2 '2015-01-30 2 '2015-01-30 2	27,906	27,905	27,907	27,906	-101,252	-97,846	-104,129	-100,298	-56,864	-56,943	-56,797	-56,886	42509	1589190	590600	155551	33813664,2	1237484812	459959663	121134538	3316120	123783659	46017413	12124459,9
'2015-01-30 2 '2015-01-30 2 '2015-01-30 2 '2015-01-30 2	27,911	27,91	27,912	27,911	-123,252	-119,851	-126,126	-122,3	-56,348	-56,428	-56,28	-56,37	43415	1507160	616960	156564	3381323,5	1174029562	480661039	121967101	3387947,96	117437220	48088027,9	12207754
'2015-01-30 2 '2015-01-30 2 '2015-01-30 2 '2015-01-30 2	27,916	27,915	27,917	27,916	-145,095	-141,715	-147,964	-144,144	-55,825	-55,907	-55,756	-55,848	39969	1331500	692300	178606	31147963,8	1037567680	539550159	139188202	3120377,42	103788979	53978244,1	13930618
'2015-01-31 0 '2015-01-31 0 '2015-01-31 0 '2015-01-31 0	27,964	27,963	27,964	27,964	3,641	7,032	0,754	4,615	-50,319	-50,413	-50,238	-50,346	24377,5	682870	431320	101240	19062846,6	5393956108	387285898	79168191,4	1910650,76	53418718,3	33746955,1	7925716,79
'2015-01-31 0 '2015-01-31 0 '2015-01-31 0 '2015-01-31 0	27,969	27,968	27,969	27,969	-17,911	-14,557	-20,745	-16,972	-49,718	-49,812	-49,638	-49,744	495600	507820	507820	88528	12153894,2	387662792	397249792	69252352,5	1218875,55	38785968,4	39744910,4	6933557,05
'2015-01-31 0 '2015-01-31 0 '2015-01-31 0 '2015-01-31 0	27,974	27,973	27,975	27,974	-39,56	-36,125	-42,399	-38,605	-49,108	-49,205	-49,028	-49,135	16275,4	362778	1277800	169344	12736227,6	283869696	100007079	132519246	1277191,55	28403818	100032331	13263436,3
'2015-01-31 0 '2015-01-31 0 '2015-01-31 0 '2015-01-31 0	27,979	27,978	27,979	27,979	-61,155	-57,773	-64,026	-60,184	-48,494	-48,591	-48,412	-48,522	25151,1	735130	1255880	221447	19688895,8	575436596	983203837	173354124	1973326,8	57567647,8	98351739,8	17348578,8
'2015-01-31 0 '2015-01-31 0 '2015-01-31 0 '2015-01-31 0	27,984	27,983	27,985	27,984	-82,823	-79,419	-85,733	-81,887	-47,872	-47,97	-47,788	-47,899	34127,5	1194740	664040	129041	26725390,5	935539113	520049716	101052556	2677708,71	93584497,9	52027776,2	10115308,1

Datetime				ft distance from comet in km at the time of species measurement (db-spectra)												longitude at time of species measurement (db-spectra)												latitude at time of species measurement (db-spectra)												derived 'abundance' from spectra (particles/20s)												abundance scaled by cometary distance (particles/counting statistical uncertainties+10% uncertainty in sign)											
time_O2	time_H2O	time_CO2	time_CO	d_O2	d_H2O	d_CO2	d_CO	lon_O2	lon_H2O	lon_CO2	lon_CO	lat_O2	lat_H2O	lat_CO2	lat_CO	O2 signal	H2O signal	CO2 signal	CO signal	O2 scaled	H2O scaled	CO2 scaled	CO scaled	O2 scaled	H2O scaled	CO2 scaled	CO scaled	O2 scaled	H2O scaled	CO2 scaled	CO scaled	O2 scaled	H2O scaled	CO2 scaled	CO scaled																												
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,686	18,685	18,687	18,686	75,627	79,289	72,688	76,702	-39,207	-38,958	-39,407	-39,134	29061	1105140	508960	380021	100214730	385836672	177730852	132690639	1107988,5	38603309,9	17786416,8	13280583																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,692	18,691	18,692	18,691	53,919	57,341	51,028	54,961	-40,561	-40,443	-40,877	-40,61	33130,5	1197320	797280	408346	11575494	418287910	278562348	142688538	1160955,18	41849243,1	37772925	14280799,1																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,697	18,696	18,698	18,697	32,165	35,688	29,306	33,174	-42,166	-41,917	-42,35	-42,088	29309	1058000	109820	533980	11254776	369813760	380912755	186667558	10027778,5	37000660,4	38117927,2	18680418,5																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,713	18,712	18,714	18,713	-33,423	-29,96	-36,304	-32,429	-46,587	-46,354	-46,781	-46,52	19502,9	576625	1063420	612790	6829454,71	201898869	372424355	214339454	685558,793	20204096,9	37261733,8	214488018,5																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,718	18,717	18,719	18,718	-55,245	-51,788	-58,196	-54,243	-48,055	-47,823	-48,254	-47,987	21602,9	751840	1177600	607780	7584284,17	263389167	412442955	214940439	681182,375	26355145,9	42164604,2	21380663,4																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,723	18,723	18,724	18,723	-77,111	-73,617	-80,048	-76,098	-49,524	-49,289	-49,721	-49,456	22117,2	965290	1236560	692770	7732003,58	338383113	433523315	220044198	78104,515	3386760,5	43373152,7	21209252,7																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,728	18,728	18,729	18,728	-99,083	-95,527	-101,973	-98,036	-50,996	-50,758	-51,189	-50,925	189867,6	808620	1225500	592770	6659762,54	283613749	378892818	429879370	68847,889	28387215,7	43003607,2	20803360,2																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,733	18,733	18,734	18,733	-120,953	-117,468	-123,863	-119,921	-52,457	-52,224	-52,651	-52,388	16355,2	652700	1075880	50680	5802619,84	239048936	373586791	178115366	582670,847	23920000,3	37781107,2	17624807,4																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,738	18,738	18,739	18,738	-142,800	-138,318	-145,705	-141,825	-53,913	-53,681	-54,105	-53,848	16564,3	777300	1001640	534660	5815935,17	272019859	351736007	189224466	58005,142	37008506,1	35191355,1	18383161,6																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,743	18,742	18,744	18,743	-164,667	-161,122	-167,045	-163,683	-55,365	-55,133	-55,563	-55,3	18455,5	10547,0	96174,0	534620	6483418,05	370480139	337895362	187812032	580880,064	37067261,7	33807918,1	18794901,7																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,762	18,761	18,762	18,762	106,903	110,426	103,866	107,913	-61,184	-60,954	-61,374	-61,118	20935,8	85971,0	774860	47350	3769666,31	302596531	27270517	168095698	739681,34	30277048,4	2725657,2	16821625																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,771	18,771	18,771	18,771	62,468	66,09	59,507	63,501	-64,064	-63,83	-64,254	-63,997	28216,2	158550,8	842160	47730	9941990,51	443403400	296373440	166827368	97352,144	44361397,2	29690770,2	16695652,5																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,775	18,774	18,776	18,775	40,263	43,908	37,23	41,283	-65,488	-65,255	-65,682	-65,423	29950,7	1418300	1062800	566430	10576540,5	499898381	374677573	195666299	105031,3	50012196,7	4787113,9	1980828,3																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,779	18,779	18,78	18,779	17,833	21,46	14,793	18,892	-66,915	-66,685	-67,107	-66,848	28465,2	1248340	1319740	694870	10382787,6	440228151	465456989	250466490	1006996	44001796,7	46567273,4	24520302,9																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,783	18,783	18,784	18,783	-4,713	-1,074	-7,787	-3,683	-68,335	-68,107	-68,527	-68,27	24764,8	1034010	1473220	661180	8737048,41	344799854	519808965	232365024	87666091	369949085,1	52003695,8	23641775,4																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,787	18,787	18,788	18,787	-27,371	-23,7	-30,449	-26,317	-69,745	-69,518	-69,935	-69,68	22322,2	848620	1474200	670080	787048,05	299521591	522225963	236447741	790671,998	29696465,8	32631195,5																																					
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,791	18,79	18,792	18,791	-50,101	-46,444	-53,239	-49,038	-71,139	-70,917	-71,33	-71,075	20354,3	714600	1384740	703710	7187137,15	252296906	489006604	248481184	712394,638	2524584,4	48922719,9	24863881,7																																				
'2016-05-01	'2016-05-01	'2016-05-01	'2016-05-01	18,795	18,794	18,795	18,795	-73,152	-69,397	-76,206	-72,043	-72,529	-72,304	-72,711	-72,463	190840	679830	1329200	681080	6720549,13	240125770	469542592	240592889	674647,315	24028073,5	46979528,1	24074800																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,798	18,798	18,799	18,798	-96,508	-92,561	-99,646	-95,421	-73,906	-73,676	-74,089	-73,843	17461,3	631230	1260540	754770	6170102,84	232054465	454547863	266709153	619494,253	22320381,5	44658892,6	26687246,5																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,802	18,801	18,802	18,802	-120,247	-116,405	-123,999	-119,143	-75,268	-75,035	-75,445	-75,205	16097,4	612300	1206240	702600	6509675,64	205769858	425054070	254602861	625405,078	20250203,5	4225163,2	25472823																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,811	18,81	18,811	18,811	171,411	175,566	168,036	172,594	-78,882	-78,678	-79,045	-78,824	18981,3	702730	955540	656760	6716497,48	248637188	338121385	232396970	674241,368	24879487	33830526,5	23254941,2																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,814	18,814	18,814	18,814	139,931	144,23	136,382	141,174	-80,498	-80,275	-80,643	-80,411	-80,186	63499	1085100	166690	6552294,69	224588265	384089153	238205167	674833,347	24743812,8	38428513,5	23623521																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,819	18,819	18,82	18,819	82,939	87,77	78,798	84,315	-82,436	-82,287	-82,559	-82,394	18980,2	785850	1018540	631720	671928,19	278321519	360759127	232726646	64785,488	24879394,6	36049064,4	22387622,1																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,822	18,821	18,822	18,822	51,254	56,492	49,495	52,807	-83,257	-83,14	-83,347	-83,223	22830,4	1090770	970880	64090	8800729,3	386383502	343848129	213442737	811651,247	38768006,8	34304055,9	21358822,4																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,824	18,824	18,824	18,824	17,604	23,161	12,996	19,204	-83,823	-83,751	-83,875	-83,803	25104,3	1182470	994680	624830	8995532,47	418999939	352457871	221404122	89235,575	41920643,4	35264651	2155291,8																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,826	18,826	18,826	18,826	-17,713	-11,905	-22,551	-16,032	-84,07	-84,054	-84,076	-84,066	25694,1	1163970	1061960	651330	910648,63	412532241	376378032	230843256	313663,575	41273355	36072601,7	23095915,9																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,828	18,828	18,828	18,828	-53,305	-47,612	-58,072	-51,646	-83,961	-84,002	-83,919	-83,974	25699,3	1146600	1087200	674480	9110236,96	406720977	385405425	239998833	914042,013	40647247,9	38650174,2	23295346,1																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,83	18,829	18,83	18,83	87,923	82,53	92,436	86,391	-83,508	-83,508	-83,424	-83,536	25045,3	1169940	1059680	685820	8800284,47	414780280	375725572	241710441	891008,428	41498394,2	375923490	24332362,2																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,831	18,831	18,832	18,831	-120,008	-115,033	-124,071	-118,565	-82,788	-82,918	-82,677	-82,827	116940	1038360	1083660	684960	8444104,19	363035559	384207367	242891310	847316,294	38232609,4	38440337,9	24304716																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,833	18,833	18,833	18,833	-150,051	-145,315	-153,893	-148,703	-81,863	-82,024	-81,729	-81,91	20795,8	820400	111180	694810	7375899,63	290881022	394115421	246463523	740305,22	29116503,3	39431294,5	24669350,6																																				
'2016-05-02	'2016-05-02	'2016-05-02	'2016-05-02	18,834	18,834	18,834	18,834	-178,235	-173,92	-178,147	-177,006	-80,798	-80,973	-80,649	-80,848	17983,5	6																																														

'2016-05-07 1' '2016-05-07 1' '2016-05-07 1' '2016-05-07 1	15,458	15,432	15,479	15,45	24,504	28,155	21,558	25,567	-63,307	-63,602	-63,069	-63,393	18326,6	416971	2134200	1037830	4379136,74	99300236	511353127	247732616	440006,313	9939988,55	51157925,8	24789001,1
'2016-05-07 1' '2016-05-07 1' '2016-05-07 1' '2016-05-07 1	15,615	15,59	15,636	15,608	2,181	5,749	-0,779	3,222	-61,517	-61,801	-61,282	-61,6	16390,4	339375	1723500	1101220	3996442,14	82484448,9	421124544	268267834	401643,324	8253264,99	42132975,8	2684361,2
'2016-05-07 1' '2016-05-07 1' '2016-05-07 1' '2016-05-07 1	15,771	15,746	15,791	15,764	-20,119	-65,979	-23,129	-19,081	-59,755	-60,032	-59,52	-59,837	17183	416247	1722500	1081850	4723832,07	102028331	446475986	268884730	429450,532	10370549,2	4468885,9	26809768,8
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'2016-06-25 13	'2016-06-25 13	'2016-06-25 13	'2016-06-25 13	'2016-06-25 13	18,429	18,467	18,397	18,44	81,585	-78,094	-84,492	-80,568	-27,162	-26,965	-27,327	-27,105	8419,1	296653	744560	424988	2895962,44	101269908	251996041	144510200	287627,209	130137054,1	25125478,5	14463041,2
'2016-06-25 14	'2016-06-25 14	'2016-06-25 14	'2016-06-25 14	'2016-06-25 14	18,189	18,228	18,156	18,2	103,341	-99,796	-106,243	-102,29	-28,41	-28,204	-28,579	-28,349	6846	20024	794260	46100	2264928,73	67319195,4	261820134	147766144	277997,841	6740112,34	26198194,2	14788727,3
'2016-06-25 15	'2016-06-25 15	'2016-06-25 15	'2016-06-25 15	'2016-06-25 15	18,069	18,107	18,035	18,08	114,092	-110,655	-117,063	-113,091	-29,038	-28,836	-29,212	-28,979	6051,4	163378	712200	399702	1970200,04	53566574,6	231651044	130657148	191908,07	5363886,31	23180324,5	13077145,3
'2016-06-25 16	'2016-06-25 16	'2016-06-25 16	'2016-06-25 16	'2016-06-25 16	17,947	17,986	17,873	17,935	124,943	-121,478	-127,907	-134,806	-29,679	-29,473	-29,855	-30,269	6501,7	142148	720000	17115	1804281,71	47990337,2	201574032	100876592	181771,407	4805961,22	201716009	10097702,9
'2016-06-25 17	'2016-06-25 17	'2016-06-25 17	'2016-06-25 17	'2016-06-25 17	17,701	17,74	17,668	17,712	146,597	-143,178	-149,522	-145,627	-30,982	-30,774	-31,161	-30,923	5459,55	167826	572100	296608	1710615,69	5281611,77	178857200	93050362,1	173968,474	5288879,44	17719395,6	93014682,47
'2016-06-25 18	'2016-06-25 18	'2016-06-25 18	'2016-06-25 18	'2016-06-25 18	17,575	17,615	17,54	17,587	157,664	-154,133	-160,694	-156,643	-31,661	-31,444	-31,849	-31,598	6364,23	156595	581640	29203	1968583,85	6689589,59	180326909	90564721,0	17299,069	6897388,02	180461115	9065988,56
'2016-06-25 19	'2016-06-25 19	'2016-06-25 19	'2016-06-25 19	'2016-06-25 19	17,45	17,49	17,416	17,462	168,535	-165,026	-171,43	-167,513	-32,337	-32,118	-32,518	-32,273	6656,1	638760	630600	302070	2026799,09	87707370,8	191350598	97687683	204103,566	8780102,3	19148892,7	978652,01
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'2016-06-25 21	'2016-06-25 21	'2016-06-25 21	'2016-06-25 21	'2016-06-25 21	17,149	17,191	17,114	17,162	165,57	169,187	162,583	166,593	-33,98	-33,747	-34,172	-33,914	8068,7	488650	760600	42355	2372909,47	144410970	222771370	124735442	238831,732	14453114,1	22292062,6	1248471,27
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'2016-06-25 28	'2016-06-25 28	'2016-06-25 28	'2016-06-25 28	'2016-06-25 28	16,236	16,279	16,199	16,248	88,88	92,455	85,836	89,911	-39,156	-38,903	-39,371	-39,083	7215,4	271943	636360	380600	1912579,28	72066483,4	166985701	100477450	196640,888	715137,54	16711492,4	10057696,7
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'2016-06-25 30	'2016-06-25 30	'2016-06-25 30	'2016-06-25 30	'2016-06-25 30	15,969	16,011	15,933	15,981	66,877	70,393	63,97	67,984	-40,732	-40,477	-40,948	-40,658	9050,1	29512	323860	427670	2307855,6	74729719,5	209145502	109228651	74816,58	2092901,4	10932816,1	
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'2016-07-27 1 '2016-07-27 1 '2016-07-27 1 '2016-07-27 1	9,742	9,745	9,748	9,745	134,634	-130,779	-137,722	-133,472	-40,153	-41,039	-39,437	-40,421	12532,4	495994	5499540	97859	888502,043	31988407	12921886,7	89792,8082	10024496,53	1029350,29	7290178,19	
'2016-07-29 1 '2016-07-29 1 '2016-07-29 1 '2016-07-29 1	13,125	13,142	13,111	13,13	115,08	118,54	112,146	116,115	-29,426	-29,078	-29,722	-29,322	4343,03	153751	830860	496950	748154,77	26554667,9	142826877	85672639,5	75680,4371	26606191,9	14294638,7	8576519,9
'2016-07-29 1 '2016-07-29 1 '2016-07-29 1 '2016-07-29 1	12,62	12,641	12,603	12,626	21,643	25,147	18,735	22,703	-39,214	-38,883	-39,531	-39,099	9190,67	67504	1318068	792960	1463735,39	10786793,6	208179479	12641013	147583,889	1081963,69	12652284,5	
'2016-07-29 1 '2016-07-29 1 '2016-07-29 1 '2016-07-29 1	11,845	11,87	11,825	11,853	-100,477	-96,876	-103,466	-99,423	-53,054	-52,633	-53,404	-52,931	9048,9	86239	1209900	759060	1269597,09	12150807,8	169181073	106643079	128086,473	1182566,58	16931144,6	1067463,47
'2016-07-30 1 '2016-07-30 1 '2016-07-30 1 '2016-07-30 1	11,775	11,779	11,729	11,757	-114,504	-110,884	-117,511	-113,444	-54,701	-54,275	-55,063	-54,576	7555	79459	1118600	780620	1043062,19	11017040	153888177	107902979	105237,523	1105023,7	10040922,7	10800667,2
'2016-07-30 1 '2016-07-30 1 '2016-07-30 1 '2016-07-30 1	11,035	11,062	11,013	11,043	141,767	145,7	138,497	142,898	-66,951	-66,495	-67,329	-66,82	8001,6	136909	1185380	783500	974364,634	16752329,2	143770199	95464898	98423,5625	1679418,99	14389011,3	9574149,56
'2016-07-30 1 '2016-07-30 1 '2016-07-30 1 '2016-07-30 1	10,308	10,334	10,285	10,315	-19,52	25,091	14,682	21,142	-78,513	-78,173	-78,788	-78,417	12681	155226	1761780	1052740	1347411,93	16573683	18636247	112010720	135092,536	18647554,07	18649876,2	1121455,55
'2016-07-30 1 '2016-07-30 1 '2016-07-30 1 '2016-07-30 1	9,361	9,365	9,34	9,368	160,168	164,683	156,655	161,511	-71,333	-71,933	-70,826	-71,513	10700,9	136884	1663100	7845100	937701,9	12057380,5	145081526	90844167,8	94738,5401	1209210,43	14520197,6	9093948
'2016-07-30 1 '2016-07-30 1 '2016-07-30 1 '2016-07-30 1	8,363	8,374	8,354	8,366	-46,651	-43,089	-49,807	-45,634	-30,384	-31,239	-29,624	-30,629	16240,9	189395	1897740	1427310	1135884,79	12898235,1	132441977	99897364,1	114654,258	1293414,92	13255706	999731,28
'2016-08-01 1 '2016-08-01 1 '2016-08-01 1 '2016-08-01 1	12,951	12,931	12,939	12,956	-33,85	-38,637	-36,814	-32,829	-26,358	-26,853	-26,665	-26,252	5207,6	111770	75820	48113	87342,462	18689146,8	126939464	12016988,9	18082,8342	1873237,77	1270521,32	703078,45
'2016-08-01 1 '2016-08-01 1 '2016-08-01 1 '2016-08-01 1	12,809	12,825	12,796	12,814	-66,092	-62,627	-68,994	-65,068	-29,715	-29,352	-30,019	-29,607	6539,1	125988	943000	521160	1072873,28	24999801,2	154040572	85573740,3	108823,124	2504908,03	15452883,2	6856224,64
'2016-08-02 1 '2016-08-02 1 '2016-08-02 1 '2016-08-02 1	12,328	12,348	12,312	12,334	-161,508	-157,972	-164,442	-160,473	-39,932	-39,945	-40,254	-39,818	4347,26	151965	923500	521160	660694,766	19165106,8	140292236	68868834,1	166828,308	1920888,48	15401086,1	687711,27
'2016-08-02 1 '2016-08-02 1 '2016-08-02 1 '2016-08-02 1	11,127	11,151																						

'2016-08-29 1 '2016-08-29 1 '2016-08-29 1 '2016-08-29 1	15,402	15,422	15,385	15,408	168,605	171,988	165,678	169,586	-29,71	-29,511	-29,882	-29,652	2316,81	78207	543680	291785	549597,384	18600603	128688091	69271645,1	55701,0868	1864373,15	12880153,2	6935487,47
'2016-08-29 2 '2016-08-29 2 '2016-08-29 2 '2016-08-29 2	14,777	14,803	14,754	14,785	75,791	79,22	72,862	76,792	-35,413	-35,192	-35,602	-35,348	2488,54	66817	624660	251484	543396,92	14641529,6	135976311	54973453	55076,8466	1467979,39	13609292	5504759,71
'2016-08-30 0 '2016-08-30 0 '2016-08-30 0 '2016-08-30 0	13,964	13,997	13,935	13,974	-17,626	-14,159	-20,64	-16,598	-41,783	-41,535	-42	-41,71	4992,7	47866	892580	459990	973543,029	9377715,69	173324956	89823478,2	98340,9857	940833,874	17345660,8	8991825,35
'2016-08-30 1 '2016-08-30 1 '2016-08-30 1 '2016-08-30 1	12,105	12,153	12,065	12,12	179,448	-176,896	176,392	-179,451	-54,581	-54,266	-54,846	-54,486	3966,52	84644	938020	467880	581218,241	12501530,2	136542154	68728951,9	58884,2008	1253688,77	13665900,6	6881185,48
'2016-08-30 2 '2016-08-30 2 '2016-08-30 2 '2016-08-30 2	8,926	8,989	8,872	8,944	-59,115	-53,582	-63,873	-57,546	-75,018	-74,732	-75,247	-74,939	12863,2	79843	1487680	927020	1024855,86	6451483,75	117098839	74157091	103497,937	647688,352	11720705,2	7424320,55
'2016-08-31 1 '2016-08-31 1 '2016-08-31 1 '2016-08-31 1	7,125	7,195	7,066	7,145	135,428	140,971	130,865	136,974	-70,634	-71,318	-70,033	-70,83	12558,3	135873	2035000	1004910	637529,948	7033876,86	101604204	51301685,5	64551,4496	706039,832	10170500,3	5137331,07
'2016-09-01 1 '2016-09-01 1 '2016-09-01 1 '2016-09-01 1	15,521	15,541	15,503	15,527	65,784	-176,812	176,809	-179,22	-26,707	-26,512	-26,877	-26,65	2166,66	73507	466080	251612	521951,516	17753607,7	112019070	60660565,7	52917,6137	1779574,27	11212490,9	6073845,06
'2016-09-01 2 '2016-09-01 2 '2016-09-01 2 '2016-09-01 2	14,876	14,903	14,852	14,884	87,131	90,487	84,114	88,097	-32,253	-32,042	-32,443	-32,192	2308,02	75201	558840	249740	510754,154	16702097,7	123269991	55325765,3	51790,086	1674296,59	12338101,8	5540014,66
'2016-09-02 0 '2016-09-02 0 '2016-09-02 0 '2016-09-02 0	12,133	12,182	12,092	12,148	-168,103	-164,508	-171,166	-167,039	-51,126	-50,815	-51,393	-51,034	3877,51	75908	921180	451672	570807,041	11264832,5	134691682	66655000,4	57836,2219	1129839,56	13480773,9	6673664,29
'2016-09-02 1 '2016-09-02 1 '2016-09-02 1 '2016-09-02 1	6,97	7,046	6,907	6,992	149,014	155,346	143,791	150,831	-73,122	-73,703	-72,594	-73,295	12584,3	106463	1276340	946080	611356,62	5285474,45	60889904,4	46252019,6	61917,555	530846,461	6096793,64	4632002,84
'2016-09-05 0 '2016-09-05 0 '2016-09-05 0 '2016-09-05 0	14,803	14,837	14,775	14,813	5,348	8,788	2,467	6,314	-32,819	-32,608	-32,997	-32,76	3400,22	45168	708960	351695	745086,159	9943128,55	154766411	9717064,5	75371,7996	997466,128	15489081,6	7725851,13
'2016-09-05 1 '2016-09-05 1 '2016-09-05 1 '2016-09-05 1	12,905	12,953	12,864	12,919	-154,646	-151,131	-157,577	-153,612	-43,746	-43,479	-43,97	-43,667	3075,97	64579	751420	341123	512269,045	10835078,1	124346857	56933620,1	51942,6342	1086799,48	12445836,8	5700807,44
'2016-09-05 2 '2016-09-05 2 '2016-09-05 2 '2016-09-05 2	9,637	9,704	9,582	9,657	-5,621	-1,55	-9,015	-4,455	-63,505	-63,061	-63,876	-63,378	11904,2	51071	1646360	919650	1105564,11	4809234,32	1511160089	85764396,9	111607,869	483116,428	15128303,6	8585700,6

Datetime				ft distance from comet in km at the time of species measspacercraft longitude at time of species measurement (dub-spacercraft latitude at time of species measurement (deg								derived 'abundance' on spectra (particles/20s)				abundance scaled by comocentric distance (particles/zouting statistical uncertainty+10% uncertainty in signi											
time_O2	time_H2O	time_CO2	time_CO	d_O2	d_H2O	d_CO2	d_CO	lon_O2	lon_H2O	lon_CO2	lon_CO	lat_O2	lat_H2O	lat_CO2	lat_CO	O2 signal	H2O signal	CO2 signal	CO signal	O2_scaled	H2O_scaled	CO2_scaled	CO_scaled	Uncertainty_1	Uncertainty_2	Uncertainty_3	Uncertainty_4
2016-07-02	2016-07-02	2016-07-02	2016-07-02	18.783	18.82	18.751	18.793	-49.067	-45.547	-52.004	-48.051	-25.352	-25.16	-25.13	-25.296	6884.2	208039	554480	317049	2428753.26	73685832.7	194955169	111974367	2444433.771	7737176.32	19509479.5	11208081.5
2016-07-02	2016-07-02	2016-07-02	2016-07-02	18.666	18.703	18.634	18.677	-59.893	-56.405	-62.806	-58.877	-25.948	-25.755	-26.109	-25.891	7467.3	224407	597560	341242	2601753.35	85389167.8	207488342	119035559	261788.33	8548157.41	2073263.47	11914466.3
2016-07-02	2016-07-02	2016-07-02	2016-07-02	18.548	18.586	18.516	18.559	-70.707	-67.234	-73.621	-69.707	-26.55	-26.355	-26.713	-26.494	8157.9	274747	676120	377443	2806548.5	95772036.2	23180256	130005139	28230.126	3598899.94	2313954.75	11301915.8
2016-07-02	2016-07-02	2016-07-02	2016-07-02	18.429	18.467	18.397	18.44	-81.585	-78.094	-84.492	-80.528	-27.162	-26.965	-27.327	-27.105	8419.1	296953	744560	424988	289362.44	101269908	251966041	144510200	286727.209	101370564.1	25215478.5	14463041.0
2016-07-02	2016-07-02	2016-07-02	2016-07-02	18.189	18.228	18.156	18.2	-103.341	-99.796	-106.243	-102.529	-28.41	-28.204	-28.579	-28.349	6846	202610	794260	446100	2664928.73	67319195.4	261820133	147766124	272997.841	6740214.36	26198194.2	1478772.3
2016-07-02	2016-07-02	2016-07-02	2016-07-02	18.069	18.107	18.035	18.08	-114.092	-110.655	-117.063	-113.091	-29.038	-28.836	-29.212	-28.979	6055.4	163378	712200	399702	197020.04	53565674.6	231651044	130657148	199107.08	9363886.31	23180324.3	13071745.3
2016-07-02	2016-07-02	2016-07-02	2016-07-02	17.947	17.986	17.874	17.935	-124.943	-121.478	-127.907	-124.806	-29.679	-29.473	-29.855	-29.609	5601.71	148439	628200	317135	1804281.71	47999037.2	201574032	100876592	18171.407	3403686.21	20711600.9	10097702.9
2016-07-02	2016-07-02	2016-07-02	2016-07-02	17.701	17.74	17.668	17.712	-146.597	-143.178	-149.522	-145.627	-30.982	-30.774	-31.161	-30.923	5459.55	167826	572100	296608	1710615.69	52816117.7	178585720	93050362.1	172369.874	428897.24	17871935.6	9314682.47
2016-07-02	2016-07-02	2016-07-02	2016-07-02	17.575	17.615	17.54	17.587	-157.554	-154.133	-160.694	-156.643	-31.651	-31.444	-31.849	-31.598	6364.4	215595	585140	322893	198339.85	66896590.8	180326099	9056470.1	107906.069	6697836.02	18046119.5	9065988.56
2016-07-02	2016-07-02	2016-07-02	2016-07-02	17.45	17.49	17.418	17.462	-168.535	-165.026	-171.43	-167.513	-32.337	-32.118	-32.518	-32.273	6656.1	286719	630806	320370	2026799.09	87073707.8	31550598	187150598	240103.566	8870102.3	91148892.7	132550062.01
2016-07-02	2016-07-02	2016-07-02	2016-07-02	17.293	17.333	17.258	17.305	-177.91	-174.579	-179.943	-176.933	-33.19	-32.968	-33.379	-33.125	8067	410139	685700	373233	2412419	123219245	204227903	11769483	242795.906	12333014.9	20437081.2	1187520.54
2016-07-02	2016-07-02	2016-07-02	2016-07-02	17.149	17.191	17.114	17.161	-165.57	-169.187	-172.583	-166.593	-33.98	-33.747	-34.172	-33.914	8068.7	488650	760606	423550	2372909.47	144410925	22277170	124735462	238831.372	14433014.4	2242026.26	1248471.72
2016-07-02	2016-07-02	2016-07-02	2016-07-02	17.02	17.063	16.985	17.032	-154.618	-158.264	-151.646	-155.643	-34.69	-34.452	-34.884	-34.623	8307.2	506300	821000	467124	24069133.02	147407204	236850475	135507545	242194.57	14752861.5	23700437.4	13562395.3
2016-07-02	2016-07-02	2016-07-02	2016-07-02	16.892	16.935	16.858	16.904	-143.776	-147.391	-140.869	-144.81	-35.402	-35.164	-35.595	-35.334	8305.6	462135	869940	501400	236647.11	132537649	246945929	143277651	283511.65	13265277.1	24710308.4	13592324.8
2016-07-02	2016-07-02	2016-07-02	2016-07-02	16.761	16.803	16.725	16.773	-132.71	-136.251	-129.697	-133.736	-36.139	-35.902	-36.341	-36.07	7191.1	385552	855780	507780	2020203.78	108857064	239385595	142855539	203441.71	10896135.8	23953831.6	14295706.0
2016-07-02	2016-07-02	2016-07-02	2016-07-02	16.631	16.674	16.595	16.643	-121.76	-125.374	-118.796	-122.771	-36.877	-36.632	-37.079	-36.809	7140.6	296504	799740	451590	1975019.7	82434716.9	220243618	130625454	198097.324	1025259.0	23209202.4	13073974.6
2016-07-02	2016-07-02	2016-07-02	2016-07-02	16.5	16.543	16.465	16.512	-110.85	-114.434	-107.934	-111.862	-37.623	-37.377	-37.824	-37.554	6775.2	725280	831870	433187	1844548.2	73137166	196620670	118106765	185126.361	7322268.63	19676008.2	1182544.2
2016-07-02	2016-07-02	2016-07-02	2016-07-02	16.369	16.411	16.333	16.381	-99.919	-103.456	-96.922	-100.949	-38.38	-38.134	-38.59	-38.309	6315.7	262598	651780	401325	1692254.94	70723135.2	17387323	107690411	170526.361	8080723.3	17400518.4	10779418.5
2016-07-02	2016-07-02	2016-07-02	2016-07-02	16.238	16.279	16.199	16.248	-88.88	-92.455	-85.836	-89.911	-39.156	-38.903	-39.371	-39.083	7255.4	271943	636360	380600	1912579.28	72066483.4	166985701	100477540	192640.888	7215137.54	16711492.4	105007768.8
2016-07-02	2016-07-02	2016-07-02	2016-07-02	16.102	16.146	16.067	16.115	-77.77	-81.475	-74.95	-78.91	-39.938	-39.681	-40.149	-39.865	8129.5	289638	636360	420445	2107771.27	75506690.7	180001778	104512240	212228.943	7559358.52	18013594.3	10461447.1
2016-07-02	2016-07-02	2016-07-02	2016-07-02	15.969	16.011	15.933	15.981	-66.877	-70.393	-63.91	-67.894	-40.732	-40.477	-40.948	-40.658	9050.1	295112	823860	427670	2307856.6	74729719.5	209145502	109223651	232403.824	7846116.58	20929021.1	10932816.1
2016-07-02	2016-07-02	2016-07-02	2016-07-02	15.833	15.877	15.797	15.846	-55.781	-59.389	-52.801	-56.84	-41.543	-41.278	-41.763	-41.468	9727.5	275642	858160	400445	2438527.53	69483595.3	214149717	132437924	254544.332	6956695.21	212429605.5	132550062.01
2016-07-02	2016-07-02	2016-07-02	2016-07-02	15.698	15.743	15.662	15.711	-44.728	-48.359	-41.786	-45.783	-42.362	-42.092	-42.582	-42.283	9833.6	234849	1039960	607650	2423266.55	58205457.4	247741415	149989604	234883.34	582814.96	27498881.3	15011207.5
2016-07-02	2016-07-02	2016-07-02	2016-07-02	15.564	15.607	15.527	15.576	-33.744	-37.379	-30.794	-34.764	-43.187	-42.919	-43.41	-43.11	9934.2	187370	1107900	672780	2406441.69	45639294	274333727	163224951	242195.44	4570685.08	24789981.9	16352211
2016-07-02	2016-07-02	2016-07-02	2016-07-02	15.427	15.471	15.391	15.441	-22.647	-26.215	-19.694	-23.724	-44.031	-43.758	-44.257	-43.948	10245.3	155379	1233720	724110	2438302.81	37190249.7	292247148	172645551	245391.787	3725123.35	2942180	1727694.6
2016-07-02	2016-07-02	2016-07-02	2016-07-02	15.291	15.335	15.254	15.304	-11.608	-15.14	-8.553	-12.635	-44.802	-44.608	-45.119	-44.802	10465.7	133698	1324360	786710	2447034.31	31440719.2	308158066	184257250	346627.71	3149679.12	30835531.1	18439299.1
2016-07-02	2016-07-02	2016-07-02	2016-07-02	15.153	15.197	15.116	15.166	-0.432	-3.989	-2.639	-1.461	-45.754	-45.475	-45.996	-45.673	10555.7	133370	1350060	701740	2423730.26	30801642.7	308479875	161405502	349295.86	3085714.19	30865551.1	16152545.8
2016-07-02	2016-07-02	2016-07-02	2016-07-02	14.86	14.905	14.823	14.873	-23.285	-19.656	-26.285	-22.233	-47.643	-47.35	-47.885	-47.558	11825.6	156174	1295950	734990	2611334.26	3405495.6	28554545	16258429	3475436.64	28571442.6	16271800.1	16271800.1
2016-07-02	2016-07-02	2016-07-02	2016-07-02	14.725	14.771	14.688	14.738	-34.219	-30.553	-37.329	-33.164	-48.53	-48.231	-48.776	-48.444	12326	173600	1288460	779590	2672592.65	37876471.8	277968368	169333687	268894.702	378930.56	27813566.5	16964381.5
2016-07-02	2016-07-02	2016-07-02	2016-07-02	14.591	14.636	14.553	14.604	-45.108	-41.439	-48.153	-44.049	-49.424	-49.122	-49.676	-49.337	12675.4	215005	1242380	785960	2688558.42	46056757.7	261324230	167627046	271498.548	4612462.28	26328563.4	16775651.7
2016-07-02	2016-07-02	2016-07-02	2016-07-02	14.455	14.5	14.418	14.468	-56.058	-52.413	-59.07	-55.014	-50.333	-50.029	-50.585	-50.246	13214.9	256464	1218720	793950	2611214.04	53921556	253459929	166192015	277783.904	5399498.73	26352051.8	17662109.3
2016-07-02	2016-07-02	2016-07-02	2016-07-02	14.317	14.363	14.28	14.33	-67.262	-63.585	-70.285	-66.213	-51.273	-50.963	-51.528	-51.185	12909.5	292174	1239060	801470	2464143.98	60274260	256267133	164580983	266214.906	60351810.5	25282608.8	1647097.2
2016-07-02	2016-07-02	2016-07-02	2016-07-02	14.176	14.222	14.138	14.189	-78.724	-75.005	-81.832	-77.653	-52.245	-51.928	-52.514	-52.154	13112.2	309648	1275840	784330	2635014.29	62631040.7	255018783	157907371	265124.701	6271018.04	26511847.6	1580303.3
2016-07-02	2016-07-02	2016-07-02	2016-07-02	14.036	14.082	13.996	14.049	-90.176	-86.394	-93.416	-89.064	-53															

'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	15,485	15,529	15,449	15,498	-144,956	-141,43	-147,88	-143,924	-43,794	-43,516	-44,025	-43,713	5856,89	172441	920860	490428	1404395,69	41584119,7	219783130	117794922	141624,641	4164860,55	21993138,1	11790345,6
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	15,316	15,36	15,278	15,328	-158,584	-155,017	-161,584	-157,567	-44,88	-44,594	-45,122	-44,798	6633,1	230242	934900	499921	1555991,64	54320903	218221819	117455231	156846,528	5349460,57	12383654,2	11756360,8
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	15,16	15,204	15,122	15,173	-171,069	-167,494	-174,093	-170,032	-45,892	-45,601	-46,14	-45,808	7214,3	310822	823540	531470	1658030,83	71850115,8	188322914	122354986	16060,758	7193488,03	1884601,45	1224660,5
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	15,022	15,067	14,984	15,035	-177,924	-178,485	-174,912	-178,963	-46,798	-46,501	-47,048	-46,712	8184	389642	1035660	586950	1848605,4	88454379,5	232531139	132680767	186039,512	885484,297	23268362,8	13279595,4
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	14,881	14,927	14,842	14,895	-166,686	-170,371	-163,596	-167,839	-47,736	-47,427	-47,997	-47,639	8846,5	438130	925600	632600	1959005,77	97622080,1	203776809	142701011	97300,222	9772088,4	12391955,9	1428260,7
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	14,744	14,789	14,707	14,757	-155,811	-159,375	-152,854	-156,838	-48,657	-48,354	-48,91	-48,57	9265,2	443596	981480	667620	2014210,47	97020886,7	212290050	145256311	208831,244	9711938,58	2124357,5	1453763,8
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	14,459	14,505	14,422	14,473	-133,12	-136,713	-130,145	-134,17	-50,619	-50,305	-50,88	-50,527	8967,3	340447	932480	701960	1874277,78	71628355,1	193950323	147037967	188881,985	7171298,8	9409858,9	14715922,6
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	14,233	14,268	14,184	14,236	-122,222	-125,835	-119,167	-123,275	-51,58	-51,26	-51,852	-51,487	9212,3	275836	919200	685770	1889887,95	56943425	187546817	104900605	190323,527	5701888,58	18768376,5	14015878,3
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	14,18	14,226	14,142	14,193	-110,803	-114,518	-107,807	-111,86	-52,401	-52,267	-52,871	-52,506	8495,3	253302	872540	65140	1708170,36	51263024,7	17450465,9	131569337	17214,006	53136975,9	17463675,3	13168404,1
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	14,039	14	14,052	14,085	-99,534	-103,228	-96,455	-100,578	-53,62	-53,285	-53,901	-53,226	8954	254124	1018780	617080	1764775,39	50144955,2	199680880	121847817	177805,987	5048595,87	19982218,8	12195820,2
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	13,898	13,944	13,859	13,911	-88,235	-91,954	-85,16	-89,283	-54,555	-54,313	-54,939	-54,559	9401,8	279871	877660	626690	1815998,08	52646839,7	168612221	121274493	182947,498	527394,15	18874207,2	12138461,7
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	13,756	13,802	13,718	13,769	-76,82	-80,566	-73,738	-77,891	-55,712	-55,364	-56	-55,613	9973	269523	967460	637900	181766,22	51342838,9	182060032	120839813	190090,363	1541448,28	18219496,2	12094974
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	13,613	13,66	13,575	13,627	-65,318	-69,12	-62,227	-66,431	-56,789	-56,432	-57,08	-56,684	10703,7	296962	1087740	709530	198254,97	5541802,6	200494407	131756265	199762,682	548624,17	20059987,0	13187105
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	13,189	13,235	13,151	13,202	-30,55	-34,378	-27,391	-31,622	-60,097	-59,729	-60,4	-59,993	12784,1	243875	1544920	860090	2223790,63	42718415,2	267192062	149907498	232760,760	425837,86	20735952,2	1500293,5
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	13,049	13,094	13,011	13,062	-18,859	-22,666	-15,671	-19,969	-61,221	-60,855	-61,529	-61,115	14233,8	207881	1695680	948500	2423680,24	35641787	287055000	161829128	34924,841	350147,86	23722451,7	16195634
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	12,764	12,811	12,725	12,777	-5,261	-9,227	-8,599	-14,164	-63,546	-63,158	-63,867	-63,444	14619,6	180549	1815220	109460	238120,79	2963210,67	293930633	78672487	23929,394	2968644,79	2941002,7	17808615,6
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	12,624	12,67	12,586	12,638	-17,441	-13,42	-20,759	-16,195	-64,714	-64,329	-65,031	-64,595	15443,1	215463	1864680	1126360	2461095,44	34588038,4	295379103	779901142	247678,332	3464685	29550000	18003527
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	12,484	12,53	12,446	12,498	-29,574	-25,69	-33,155	-28,527	-65,885	-65,5	-66,205	-65,768	15854,7	235752	1825300	1148780	247059,05	3701327,62	282744293	179439441	248667,834	370741,47	28291244,3	17953739,6
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	12,344	12,39	12,307	12,358	-42,397	-38,239	-45,823	-41,147	-67,07	-66,682	-67,387	-66,954	16217,9	257140	1753400	1163200	247191,74	39474101,4	265270983	177640095	248691,177	39539298	2654385,8	1777737,8
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	12,207	12,252	12,17	12,22	-55,111	-50,917	-56,611	-53,895	-68,238	-67,856	-68,554	-68,127	16483,5	275715	1702230	1147020	2456220,33	41387993,3	25128743	171282661	247189,266	414523,628	2522875,8	17414353,6
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	12,067	12,112	12,03	12,081	-68,459	-64,089	-72,007	-67,108	-69,429	-69,044	-69,738	-69,31	16372,2	293451	1636180	1131710	2383996,79	4309421,3	236789442	165970599	239943,699	4311503,34	23694332	16609942,9
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	11,931	11,975	11,894	11,944	-81,797	-77,39	-85,493	-80,537	-70,209	-70,201	-70,888	-70,467	15425,9	280397	1599280	1088620	2198587,59	4200910,6	226245721	155018579	16027,618	402725,51	23699631,6	15456220,9
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	11,795	11,839	11,759	11,808	-95,723	-91,129	-99,5	-94,377	-71,706	-71,34	-72	-71,599	14670,5	276796	1587200	1046460	204089,67	38796259,1	219468621	145652968	200525,599	388554,52	21961676,6	14577365,5
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	11,66	11,703	11,624	11,672	-110,102	-105,415	-114,117	-108,75	-72,996	-72,45	-73,084	-72,697	13887,7	251699	1557700	1010060	1888110,59	34454942,8	210472337	137606114	190185,144	345136,12	21061741,3	13772342
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	11,526	11,569	11,49	11,539	-125,181	-120,201	-129,275	-123,676	-73,836	-73,505	-74,099	-73,738	17222,7	230009	1571180	986510	1690193,85	30784809,6	207427341	131352347	170319,46	3884029,37	2075136,4	13416695,7
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	11,362	11,405	11,327	11,374	-144,747	-139,441	-149,083	-143,204	-75,006	-74,711	-75,235	-74,922	12499,6	217240	1582780	972460	1613636,41	28257281,2	203072144	125805085	162633,93	3034028,3	20231464,8	12591724,6
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	11,099	11,129	11,054	11,1	-179,176	-175,16	-174,355	-179,206	-76,545	-76,36	-76,685	-76,494	12099,2	276244	1629000	941950	1507463,82	34214101,4	191717547	116057660	151974,17	3427259,43	19186609	11616539
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	10,962	11,002	10,929	10,976	-160,919	-166,777	-159,967	-162,599	-76,989	-76,872	-77,07	-76,958	12368,6	320804	1563180	930100	1570394,12	38831400,7	193877555	112010712	158292,566	3889371,55	19401795,5	11216541,6
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	10,838	10,877	10,805	10,849	-142,088	-148,133	-137,028	-143,81	-77,7	-77,16	-77,213	-77,191	13738,6	353589	1610300	953420	1613766,79	41832806,6	187999345	112218298	162647,02	4189748,49	18813645,8	11232421,1
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	10,716	10,755	10,683	10,727	-122,936	-128,443	-117,796	-124,701	-77,447	-77,195	-77,086	-77,164	14488,8	374271	1635000	989150	1662868,73	4301935,9	186516010	113820035	167976,395	4335771,25	18673241	11328721,8
'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	'2016-07-09 1'	10,595	10,634	10,563	10,606	-105,619	-109,901	-98,555	-105,482	-76,81	-76,52	-76,763	-76,855	14674,2	375592	1708920	1007140	1647280,01	12476788	180676114	12476788	166007,249	18253784,91	19081419,9	11339683,3
'2016-07-10 1'	'2016-07-10 1'	'2016-07-10 1'	'2016-07-10 1'	'2016-07-10 1'	9,934	9,933	9,933	9,935	-155,064	-149,913	-151,912	-156,137	-81,453	-80,739	-80,735	-81,697	17187,19	244750	1490720	1254170	586566,259	19970398	12163541	102379433	59422,800	2001508,63	1214752	10248061,6
'2016-07-10 1'	'2016-07-10 1'	'2016-07-10 1'	'2016-07-10 1'	'2016-07-10 1'	9,933																							

'2016-07-19 1'	'2016-07-19 1'	'2016-07-19 1'	'2016-07-19 1'	'2016-07-19 1'	8,983	8,988	8,98	8,985	-88,39	-84,708	-91,437	-87,334	-27,256	-27,973	-26,662	-27,462	12282,8	174755	2078800	1448780	991151,813	14117433,1	167635264	116960335	100110,747	1415500,63	16776473,8	11706848,4
'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	10,006	10,01	10,003	10,007	-125,138	-121,259	-128,237	-124,094	-39,931	-39,375	-40,408	-39,771	10129,4	179719	1606020	799880	1014155,89	18007861,8	160698376	80100022,4	102422,642	1805029,74	16028514,34	8018952,1
'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	9,892	9,897	9,888	9,894	136,123	140,089	132,89	137,292	54,703	-54,131	-55,168	-54,535	11866,6	376545	1674100	799880	1014155,89	18007861,8	160698376	80100022,4	117194,23	3694354,33	16380954,3	8701281,69
'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	9,732	9,739	9,727	9,734	23,328	27,985	19,517	24,755	-69,273	-68,772	-69,674	-69,121	16476,5	246896	1581160	1116480	1560519,37	23417621,7	14960079	105783734	157301,144	3246601,34	14972302	10589071,7
'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	'2016-07-21 1'	9,68	9,687	9,667	9,682	-15,237	-10,251	-25,424	-13,917	-72,905	-72,486	-73,973	-72,79	17791,3	201467	1600600	1258350	1667087,51	18905254,1	149527029	117537308	147289,908	1384667,43	14964973,43	111764572,3
'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	9,498	9,505	9,493	9,5	-171,905	-166,136	-176,696	-170,256	-75,756	-76,005	-75,528	-75,83	12602,7	167175	1782020	946210	1136914,82	15103429,6	160590384	85395452,5	114757,744	1514228,27	16071710,8	8548786,78
'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	9,312	9,319	9,307	9,314	58,538	62,841	55,109	59,854	-63,186	-63,785	-62,702	-63,37	15345	224130	2067400	1064160	1330616,26	19464292,2	179078703	102316514,2	134215,15	1950841,05	19271252,3	1429259,57
'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	9,134	9,14	9,129	9,136	-50,035	-46,302	-53,197	-48,979	-45,662	-46,324	-45,099	-45,85	19146,9	129773	1724540	1483140	1597425,02	10841184,5	143720820	120036590	161006,395	1087411,05	14384070,4	12014606,8
'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	'2016-07-22 1'	8,998	9,003	8,995	9	-149,411	-145,425	-152,447	-148,232	-27,021	-27,76	-26,427	-27,252	9696,3	139793	1307920	811000	785051,272	25942384,5	105969478	6591000	79391,1584	2957514,9	10670214,9	5572705
'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	9,692	9,698	9,687	9,693	-25,371	-20,803	-29,111	-24,002	-68,753	-68,243	-69,162	-68,602	16758,4	174383	1406020	1205530	1574198,02	16400931,1	131938061	113226466	158674,473	1644142,32	13205292,5	11337109,7
'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	9,531	9,537	9,525	9,533	-169,686	-163,353	-174,889	-167,157	-77,055	-77,039	-77,045	-77,053	12165,7	155571	1763260	891590	1105222,55	14240816,5	159882140	81025995,4	111573,551	142785,35	16000858,4	8116009,58
'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	9,362	9,369	9,357	9,364	44,831	49,359	41,015	46,151	-68,41	-68,931	-67,96	-68,563	16059,9	1633340	1074570	1407570	1410582,76	14321007	194321007	9422128,9	1445885,01	14487593,4	942019,75	
'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	9,196	9,201	9,191	9,197	-68,999	-65,147	-72,729	-67,921	-51,746	-52,395	-51,198	-51,928	19762,5	16703180	1073180	1411260	1617243,8	13257167	143875247	119371158	1684714,16	1329357,44	14399591,5	11948041,5
'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	9,152	9,158	9,148	9,154	99,888	-95,932	-103,108	-98,704	-46,392	-47,092	-45,82	-46,602	10247	225196	1998440	1291610	85279,539	18886955,2	167241258	108231385	188474,376	1893045,74	1637058	10833541,9
'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	'2016-07-24 1'	9,03	9,034	9,027	9,031	162,238	165,988	159,15	163,382	-28,121	-28,848	-27,521	-28,343	5636,41	180203	1646820	1072850	49997,944	14706935,6	134193975	87005031,3	46637,31	1474258,52	13430981,7	8759403,7
'2016-07-26 1'	'2016-07-26 1'	'2016-07-26 1'	'2016-07-26 1'	'2016-07-26 1'	9,572	9,577	9,567	9,573	-166,255	-160,38	-171,139	-164,456	-75,956	-75,696	-76,159	-75,882	10795	152814	1646180	794570	85997,271	14015936,4	150670722	72816245,4	49607,743	1405331,7	15079347	7290157,78
'2016-07-27 1'	'2016-07-27 1'	'2016-07-27 1'	'2016-07-27 1'	'2016-07-27 1'	8,42	8,435	8,408	8,425	-134,634	-130,79	-137,722	-133,472	-40,153	-41,039	-39,427	-40,421	12532,4	449596	1544520	877590	888504,043	31988407	109189014	62291886,7	57892,8082	320496,53	1029360,7	6237081,97
'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	13,125	13,142	13,111	13,123	115,08	118,54	112,146	116,115	-29,426	-29,078	-29,737	-29,322	4343,03	153751	83080	876590	748514,777	26554667,9	142826877	85672639,5	76800,431	2606619,91	14929638,7	8057819,19
'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	12,62	12,641	12,603	12,626	21,643	25,147	18,735	22,703	-39,214	-38,833	-39,531	-39,099	9190,6	67504	310660	729260	1463735,39	10786793,6	280179479	126410413	147583,389	1801963,69	2032376,4	12652284,5
'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	'2016-07-29 1'	11,845	11,87	11,825	11,835	-100,477	-96,176	-103,466	-99,423	-53,054	-52,633	-53,404	-52,931	9048,9	86239	1209900	759060	1269597,09	12150807,8	169181073	106643079	128086,473	1218656,58	16933111,4	10674626,45
'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	11,75	11,775	11,729	11,757	-114,504	-110,884	-117,581	-113,444	-54,701	-54,275	-55,063	-54,576	7555	79459	1118600	780620	1430662,19	11017040	153885177	107902799	105327,523	1105023,19	15400922,7	10800665,7
'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	11,035	11,062	11,013	11,043	141,767	145,7	138,497	142,898	-66,951	-66,495	-67,329	-66,82	8001,6	136909	1185380	780630	974364,634	16753252,6	143770199	9564698	98422,5625	1679418,99	14389001,3	9574140,56
'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	10,308	10,334	10,285	10,315	19,52	25,091	14,682	21,142	-78,513	-78,173	-78,788	-78,417	12681	155226	1671780	1052740	1347417,93	16576826,1	186363247	12100720	135902,576	1661754,07	18649976,2	112116655,8
'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	9,361	9,385	9,34	9,368	160,168	164,683	156,455	161,511	-71,333	-71,933	-70,788	-71,513	10709,9	136894	1663100	1035150	937701,9	12057380,5	145081526	90844167,8	94738,5401	1290210,43	14520197,6	909958,49
'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	'2016-07-30 1'	8,363	8,374	8,354	8,366	-46,651	-43,089	-49,807	-45,634	-30,384	-31,239	-29,624	-30,629	16240,9	183935	1897740	1273310	1135884,79	12898235,1	132441977	99897364,1	1146458,258	1293414,92	1325706	9999731,28
'2016-08-01 1'	'2016-08-01 1'	'2016-08-01 1'	'2016-08-01 1'	'2016-08-01 1'	12,951	12,931	12,939	12,956	-36,85	-36,637	-36,814	-37,003	-28,229	-28,365	-28,665	-28,252	5207,6	111770	758220	418312	873462,41	18689146,8	126939464	70216988,9	188280,8342	1782327,77	12705213,2	7030078,45
'2016-08-01 1'	'2016-08-01 1'	'2016-08-01 1'	'2016-08-01 1'	'2016-08-01 1'	12,809	12,825	12,796	12,816	-66,092	-62,627	-68,994	-65,068	-29,119	-29,352	-30,019	-29,607	6539,1	151988	943000	521160	1297823,28	24999081,2	154404572	85573740,3	108323,124	2504908,03	15452883,2	8566624,64
'2016-08-02 1'	'2016-08-02 1'	'2016-08-02 1'	'2016-08-02 1'	'2016-08-02 1'	12,328	12,348	12,312	12,334	-161,508	-157,972	-164,442	-160,473	-39,932	-39,545	-40,254	-39,818	4347,26	125695	925500	451520	660694,766	19165106,8	140292236	68688634,1	66882,308	1920808,3	14504068,1	887751,27
'2016-08-02 1'	'2016-08-02 1'	'2016-08-02 1'	'2016-08-02 1'	'2016-08-02 1'	11,127	11,151	11,107	11,134	1,297	5,116	1,994	2,425	-62,724	-62,275	-63,103	-62,592	11639,5	80236	1794500	970610	1441088	9976929,45	221379298	120325597	145309,253	1000851,57	22152808,6	12043228,8
'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	10,446	10,471	10,425	10,454	-114,172	-109,338	-117,827	-112,776	-74,59	-74,208	-74,907	-74,481	10248,1	93809	1452620	118261	118261,55	15781649	9148122	112883,635	1031746,23	15799729,6	9157666,78	
'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	12,863	12,867	12,852	12,867	176,657	177,864	173,723	177,664	-32,17	-31,814	-32,472	-32,069	4973,26	201199	903100	517100	822859,531	33357059,1	49168553	86510915,2	3341481,45	14929068,7	8570344,13	
'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	12,469	12,486	12,456	12,474	81,515	85,043	78,588	82,53	-42,181	-41,8	-42,499	-42,071	5020,77	124427	856820	474851	780609,041	19398193,7	132937282	73887136,6	7894,4294	1944223,71	1303258	793790,42
'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	'2016-08-05 1'	11,443	11,465	11,424	11,449	-112,954	-109,																		

'2016-09-01 2'	'2016-09-01 2'	'2016-09-01 2'	'2016-09-01 2'	14,876	14,903	14,852	14,884	87,131	90,487	84,114	88,097	-32,253	-32,042	-32,443	-32,192	2308,02	75201	558840	249740	510754,154	16702097,7	123269991	55325765,3	51790,086	1674296,59	12338101,8	5540014,66
'2016-09-02 0'	'2016-09-02 0'	'2016-09-02 0'	'2016-09-02 0'	12,133	12,182	12,092	12,148	-168,103	-164,508	-171,166	-167,039	-51,126	-50,815	-51,393	-51,034	3877,51	75908	921180	451672	570807,041	11264832,5	134691682	66655000,4	57836,2219	1129839,56	13480773,9	6673664,29
'2016-09-02 1'	'2016-09-02 1'	'2016-09-02 1'	'2016-09-02 1'	6,97	7,046	6,907	6,992	149,014	155,346	143,791	150,831	-73,122	-73,703	-72,594	-73,295	12584,3	106463	1276340	946080	611356,62	5285474,45	60889904,4	46252019,6	61917,555	530846,461	6096793,64	4632002,84
'2016-09-05 0'	'2016-09-05 0'	'2016-09-05 0'	'2016-09-05 0'	14,803	14,837	14,775	14,813	5,348	8,788	2,467	6,314	-32,819	-32,608	-32,997	-32,76	3400,22	45168	708960	351695	745086,159	9943128,55	154766411	77170664,5	75371,7996	997466,128	15489081,6	7725851,13
'2016-09-05 0'	'2016-09-05 0'	'2016-09-05 0'	'2016-09-05 0'	12,905	12,953	12,864	12,919	-154,646	-151,131	-157,577	-153,612	-43,746	-43,479	-43,97	-43,667	3075,97	64579	751420	341123	512269,045	10835078,1	124346857	56933620,1	51942,6342	1086799,48	12445836,8	5700907,44
'2016-09-05 1'	'2016-09-05 1'	'2016-09-05 1'	'2016-09-05 1'	9,637	9,704	9,582	9,657	-5,621	-1,55	-9,015	-4,455	-63,505	-63,061	-63,876	-63,378	11904,2	51071	1646360	919650	1105564,11	4809234,32	151160089	85764396,9	111607,869	483116,428	15128303,6	8585700,6