Interactive comment on "Analysis of COSIMA spectra: Bayesian approach" by H. J. Lehto et al.

Anonymous Referee #2

Received and published: 9 March 2015

Comments

The paper describes a useful approach for the analysis of data from a mass spectrometer. It has a special consideration and application to the COmetary Secondary Ion Mass Analyzer (COSIMA) instrument that is flying on the Rosetta mission currently observing comet 67P/Churyumov–Gerasimenko.

The content appears to be of sufficient detail but the organization seems a bit confusing. The section headings appear to be understated, e.g., section 4, is just called "Calculation" but appears to contain the main results of the work and therefore requires a more prominent title. In section 5 there appears to be some material that is more relevant for section 3.

The paper would benefit from better section titles and a moderate amount of reorganization, i.e. deleting or moving repeated material. Also the content of the abstract and conclusions need rewriting to better reflect the work in the paper, i.e., the abstract and conclusions need to distinguish between the results and the assessment of the results more clearly. The paper would benefit from a complete and thorough read through by one of the authors in order to make the paper more coherent.

Comments on the paper's structure:

1. Introduction

- ok

2. Time of flight spectrum

- ok

3. Method (mathematics and statistics)

-ok but perhaps the title needs changing to Mathematics and statistics

4. Calculations

- Needs a better title. perhaps rename this section something like 4. Results of calculations

5. Full COSIMA Spectra

- The text in the first paragraph appears to describe in words what is described in mathematics in section 3. Could this text be moved to section 3? The remaining text describing the application of this technique to the real COSIMA spectra could then be included in an assessments and discussions section together with sections 6 and 7. Then the old section 5 could be removed and replaced with the new assessment and discussions section 5.

6. Normalization issues, and isotope issues

- Sections 6 and 7 could be included as subsections together in a discussions section as described above.

7. Line identifications of specific lines

- see above comment for section 5 and 6

Some comments and language corrections:

P565 Line 11 Change "For short ..." to "In short ..."

P565 line 21 Rewrite "Bayesian methods can be extended to the interpretation of these cases too, but this is beyond our scope here."

e.g. "Bayesian methods can be extended to the interpretation of these cases but is beyond the scope of this paper."

P565 line 24 What is meant by "raw time"?

"We measure the raw time of flight spectrum, the number of secondary ions as a function of time. This is the coordinate space we are working in."

Could these sentences be combined? Perhaps something like this?

"We measure the number of secondary ions as a function of time which defines the coordinates space for our subsequent analysis of the spectra."

p566 line 7 Something is amiss in this sentence "... at mass m∼1 to 0.0013 u and at ...". Perhaps for each occurrences of "at" in this sentence the words "to a" should be used.

e.g. "... to a mass m∼1 to 0.0013 u and to a ...". Alternatively I suggest replacing the word "corresponds" to "occurs"

p566 line 12 This sentence needs rewriting "The distinction is based on the fact that most minerals due to their internal structure shows elemental masses.".

C317

I suggest changing the word "shows elemental masses" to "produces elemental masses in the spectra."

P567 line 12 change "recorder" to "recorded"

P567 line 21 Rewrite the sentence that starts "Note also as .." e.g. remove "as".

P570 line 18 replace "an" with "a"

P573 line 10 it would be useful to the reader if the effects of dead time are restated here.

p576 line 10 what does the word "dex" refer to?

p576 line 17 rewrite "subbins" as "sub-bins"

p576 line 19 what is meant by "line parameters lines"?

p576 line 21 The results from the application of the method to a real example should be made more prominent. I suggest rewriting the sentence, "As an example we show an example of a real line ..." as "We show an example of a real line ..." and starting this sentence on a new paragraph.

p576 line 22 remove "of line" from "The example of line shown in Fig. 2 ..."

P576 line 26 need to remove "of" from this sentence "... mass of 19.0056 u is within of 0.0077 ...."

P577 line 3 this sentence needs rewriting "Both test cases have a peak with an amplitude of 1000 and a second an amplitude of 100 and and total line counts of 5250 and 525."

e.g. 1. insert "peak with" between "second" and "an" 2. delete one of the "and"s

p577 line 6 replace "if" with "of"

p577 line 21 the sentence needs rewriting. e.g. change "model" to "models" and "by"

to "using"

P577 line 28 the sentence doesn't seem to make sense and needs rewriting.

C319