

We're very indebted to the referee and we've tried to apply all changes that he or she kindly suggest. We will follow the referee report explaining our modify to the original submitted paper.

General comments

Section organization is changed as follow: Introduction, Translating the SDSS Colors to the Bus Taxonomy, Taxonomic Assignment of SDSS Objects, Observational Verification of V-types, Discussion and Comparison with other work

Figure 3 and 4 was replaced with the only Figure 4 while we would like to maintain both pictures 6 and 7 because it is the first time that such distributions involve more than 40,000 asteroids.

Figures

All figures are corrected with axes, axes labels and larger text; tick marks were moved to the interior of the plotted region.

The following suggestion were adopted:

Figure 1 caption: Bus 1999 is the reference used in the text "five SDSS filter band" "five SDSS filters,"

Figure 2 caption: "(Panel A) Linear" "Panel A shows the linear" Delete "(division)"

Figures 3 and 4: These figures are not clearly presented. The dashed lines are hard to follow and the over-plot of the Celle spectrum is very difficult to see. Figure 3 caption: Remove quotes from the words standards and complexes.

These pictures are replaced with the original Figure 4.

Figures 6 and 7: These two figures covey the same information. One is probably sufficient to indicate the spatial distribution of the various complexes.

As previously mentioned this is the first time that we have these distributions involving more than 40,000 asteroids.

Figure 8 caption: "New spectroscopic characterization" . "Spectra". "Table 3 summarizes the results, where only 4483 Petofi fails the prediction, having" . "Table 4 summarizes the data. 4483 Petofi is found to have"

Figure 9: It is not clear why this figure is included. We already know that the method of mapping SDSS colors to SMASSII taxonomies is reliable. It seems that this figure is more a check on the effectiveness of the Ivezić et al. principle component analysis than contributing to the results of this paper.

This comparison was requested by Ivezić (private communication) and it would be considered as a confirmation of robustness of the presented classification of asteroids in the SDSS MOC.

Tables

Column headers is repeated for multiple page tables.

Table 1: The bold text is not clearly distinguishable from the plain text. This may be fixed in the final formatting for publication.

Is the final column in this table meant to be in boldface?

No

Is the SMASSII Class column essential?

Yes, from SMASSII Class we derive the SMASSII Complex.

Table 1 caption: "Listing of 149 asteroids" . "List of 149 asteroids"

"The SMASSII classification and the larger scale taxonomic complex" . "The SMASSII classification and complex"

"Here we treat the V-types as part of a "V-complex", noting that this is for convenience purposes only." . "We treat the V-types as part of a V-complex."

Table 2 caption: "relative to three" . "for the three"

Table 3 caption: "Classification scores for asteroid Cella shown as an example" . "Example classification scores for asteroid Cella."

Remove quotes from "1"

"within the mean and one-sigma values" . "within one sigma of the mean"

The final column is not scorero

Table 4 caption: "Observational verification for six candidate V-type objects predicted by this work" . "Observational data for six candidate V-type asteroids."

Table 5: Cat. No. . Designation

Do not need last column, include this information as table footnotes.

Are the orbital elements proper or osculating?

They are proper elements

Equations

The notation used for variables is very awkward and should be reworked. For instance the equation for svband contains the same variable twice, however it references two different quantities.

Avoid multiple character names for the variables (e.g. use m instead of *Slope*, use σ_g instead of *gsd*, use j as an index instead of *band*).

Most of the equations are hard to read because of the notation. For instance the equation for q could be improved by writing it as follows:

$$q = \sqrt{\sum_j (s_j - \bar{s}_j)^2}$$

Equations should be numbered.

All the suggestions were applied

Abstract

Use one consistent format for referencing papers.

"such as V-types, where" "such as V-types, for which"

“1995 WV7 located far from Vesta across the 3:1 mean motion resonance at 2.54 AU.” “1995 WV7, which is located at 2.54 AU, far from the Vesta, on the far side of the 3:1 mean motion resonance.”

“basaltic achondrite asteroid” This may not be technically correct. Achondrite is typically in reference to meteorites, not asteroids.

All the suggestions were applied

Introduction

The introduction should discuss why this work is important. What is achieved by extending taxonomic characterization from 1300 objects to 43000? How does this work fit into a broader context, outside of asteroid taxonomy? Why are V-type asteroids interesting?

“Of these 67637...are also listed”

Awkward sentence needs to be reworked. Also should include a citation for ASTORB.

“As we describe in the following...era of asteroid taxonomy.”

Awkward wording needs to be reworked.

“the most common groups into unusual categories.” “the most common taxonomic groups.”

“that may potentially be V-types” “that may be V-types”

“that they have basaltic compositions” “that they have basaltic surface compositions”

All the suggestions were applied

Translating the SDSS Colors to the Bus Taxonomy

“as described in the system of Bus and illustrated in Figure 1” □ “as described by the system of Bus (Figure 1)”

“and its SMASSII class. Column 3” □ “and its SMASSII classification. Column 4”

Clear definitions for both a class and a complex need to be given. How are the cores of each SMASSII complex defined? There needs to be clarification about what specifically defines a core and how objects are excluded from it.

Delete the sentence “Thus we are trying to most strongly...”

Are SDSS colors incapable of resolving between C-type and X-type asteroids because the photometric errors are too large? If so what is a typical error bar and how badly does that effect the translation from SDSS to SMASS?

“For convenience of language in this work, we also” □ “We also”

“We fully note that within the Bus taxonomy that V objects are spectrally unique and occupy their own spectral space as V-types and are not grouped into a complex” □ “We note that within the Bus taxonomy, V-type objects are not grouped into a complex”

Why didn't Bus group V-types into their own complex?

Probably also other complexes would be introduced (such as D type) by the suggested taxonomic scheme would lose its simple formulation in three major complex (C, S and X). Complexes are formed by several classes and V-type is a single class.

“for each object using the SDSS MOC3 g, r, i, and z band measurements. We do not use the SDSS u-band because this wavelength is not covered within the SMASSII spectral window. We compute a normalization factor: (eqn) thus making a normalization at the 0.5426 micron wavelength, close to the one adopted in SMASSII” □ “for each object by dividing the SDSS MOC3 g, r, i, and z band measurements by a normalization factor. We do not use the SDSS u-band because the SMASSII spectral window does not cover these wavelengths. We define: (eqn), which normalizes the data points at 0.5426 microns, close to the wavelength adopted in SMASS”

Remove quotes around spectrum band value. Better term might be spectral band value. Again need to come up with better notation for this quantity.

Where does the equation for svband come from?

In order to obtain synthetic spectra similar in shape with the SMASS spectra.

The calculations for the u-band are not needed and should be removed.

“Table 2 reports the obtained values for the average definition for the C-” □ “Table 2 reports the calculated values for the C-“

“Within Table 2 gmed is the mean” Is it the median or the mean values? The notation suggests median while the text states the mean. Move this sentence to the figure caption

It is the mean values

Delete the sentence: “Table 2 gives similar information for...and V-complexes.”

All the suggestions were applied

Taxonomic Assignment of SDSS Objects

“how the spectrum of the unknown object” □ “how the spectrum of an unknown object”

“We compute the difference of each” □ “We compute the difference between each”

Last 2 sentences on pg 7 should read: “Robustness scores are computed for each band by taking the average of the scores:”

Delete the sentence: “Within the table, we see...”

“Thus the most robust” □ “The most robust”

“fit to this taxonomy category assignment” □ “fit to this taxonomic assignment”

“often indicative of the presence of a significant” □ “often an indicator of a significant”

“We compute: (eqn) and we compare the obtained slope result with the min/max values for each taxonomic category based on our” □ “For each asteroid we compute: (eqn) and compare this to the min/max values for each of our SDSS taxonomic standards.”

What are the min/max values? How are they defined?

We've added these answer in the text

“Thus according to the slope criterion, slope = 1 is the best obtained, yielding V as the best taxonomy category assignment for Celle.” □ “This result confirms that the best taxonomic classification for Celle is V-type.”

Delete the sentence: “Happily this assignment...”

“To summarize our method” □ “To summarize”

The terms for the different types of assignments are not intuitive. Other possible names: band+slope assignment, band assignment and slope assignment. These terms should be shown in italics rather than in quotes.

Is there a reason that a difference in the robustness factor of 0.5 was used as the cutoff?

It is the 50% of the band assignment

“This later outcome is something we refer” □ “This later outcome is referred”

“what the correct outcome is supposed to be in each case. (The correct outcome is the complex assigned by SMASSII.)” □ “what the correct complex should be in each case.”

Move the following sentence to Table 1 caption: “Noting again that a SDSS...”

“Our SDSS classification approach was applied to the 43,870 SDSS MOC3 minor planets to place each into one of the possible broad taxonomic complexes C, S, and V.” □ “Our classification approach was applied to the 43,870 SDSS MOC3 asteroids.”

“were categorized using the robustness criterion (match assignment); 24% were classified using the second criterion (selection assignment) and 16% were classified using the slope criterion (forced assignment).” □ “were categorized using match assignment, 24% were classified using selection assignment and 16% with a forced assignment.”

“we compute a residual that gives a measure of the quality of fit within the category” □ “we compute a residual that measures the quality of fit”

Where does the threshold of $q < 0.0075$ come from? Why this value?

It resides just lower the curved point of distributions

“The greater difficulty for these objects maintaining a classification” □ “This lower fraction”

“Most likely the latter are asteroids that occupy the outlying regions away from the “cores” of the SMASSII complexes, that we used...” □ “Most likely the unclassified asteroids occupy the outlying regions away from the cores of the SMASSII complexes that were used...” Has this been checked? Are these other unusual objects for spectroscopic follow-up?

They should be interesting targets for follow-up but not treat in this paper. We've presented results for another spectroscopic verification searching for Q-type asteroids using the present SDSS MOC classification in:

*Searching for V-type and Q-type Main-Belt Asteroids Based on SDSS Colors
38th Lunar and Planetary Science Conference, (Lunar and Planetary Science XXXVIII), 2007
Binzel R. P., Masi G., Foglia S., Vernazza P., Burbine T. H., Thomas C. A., Demeo F. E., Nesvorny D., Birlan M., Fulchignoni, M.*

All the suggestions were applied

Observational Verification of V-types

Some statement should be made about the spectral features that define a V-type and what produces those features. In particular what distinguishes an S-type from a V-type.

The first sentence of this section is not clear and needs to be re-written.

Delete the text: “inferred as being similar to basaltic achondrites (howardite, eucrite, diogenite meteorites)”

Should mention the difficulty an object would have in crossing the 3:1 resonance in the discussion about Magnya.

“for Vesta and Magnya also argue” □ “for Vesta and Magnya also argues”

“in order to verify the quality of the taxonomic predictions made by this work” □ “to test our taxonomic predictions.”

Should include the citation for SpeX, Rayner et al. 1998

“88% reliability figure found above in comparing our SDSS characterizations to SMASS objects outside of our reference set.” □ “88% reliability of our SDSS characterizations.”

“1995 WV7 having a semi-major axis” □ “1995 WV7 which has a semi-major axis”

“its ejection velocity must exceed 1 km/sec” □ “its ejection velocity would have to exceed 1 km/s, an unreasonable value for the expected ejection speeds for the Vestoid family” A reference would be required here.

“We note that Hammergran et al also independently predicted and reported” □ “We not that Hammergren et al. independently predict and report”

“in the outer asteroid belt, in Table 5 we present...beyond 2.5 AU” □ “in the outer asteroid belt, we present...beyond 2.5 AU (Table 5).”

“for follow-up verification by detailed spectroscopic measurements” □ “for follow-up spectroscopy.”

All the suggestions were applied

Discussion and Comparison with Other Work

The comparison of these author’s results to other works should be incorporated into a single Discussion section. This would include Figures 6, 7 and 9.

The reference to the web version of the results should be made in the Results section as a footnote. Comparison to other works should be treated in more detail. For instance are there any differences between Figure 7 and the Gradie and Tedesco version of the same figure? If so what are they and what do mean?

No difference but it would se an important confirmation of the right assignment of the presented method.

How do the specific methods of MOC taxonomic classification presented by Ivezić et al, Hammergren et al, Roig & Gil-Hutton and Moskovitz et al compare to this analysis? Is there a reason why there is so little overlap between the V-type predictions of the various studies?

Probably it would be due to the unique behaviour of the V-type spectra discriminated by the z-band SDSS color

The observational biases that are present in the SDSS data set are not primarily due to albedo effects. SDSS is a magnitude limited survey, thus objects further away (like C-type asteroids) are more difficult to detect.

“We’ve compared our” □ “We have compared our”

“and the boundaries are” □ “and that the boundaries are”

“Of these, we are in agreement in our V-type categorization for 195 of these, while 157” □ “195 of these are in agreement with our V-type classifications, while 157”

“for objects beyond 2.5 AU from the Sun.” □ “for objects beyond 2.5 AU.”

“We directly compare within Table 5 our predictions” □ In Table 5 we compare our predictions”

“five objects are also candidate” □ “five objects are also candidates”

All the suggestions were applied

References

Check that all listed references are cited within the text.

Nesvorny et al, 2005 and Szabo et al 2002 are not cited anywhere

Check spelling of author's names

Roig & Gil-Hutton 2006 is cited as Roig & Hutton 2006 in the abstract Hammergren et al 2006 is misspelled on page 13

Bibliography should conform to A&A standard

Multiple references by the same author within the same year should be indicated with "a" and "b" (ie 2002a, 2002b)

All the suggestions were applied