

## ***Interactive comment on “Picroilmenites in Yakutian kimberlites: variations and genetic models” by I. V. Ashchepkov et al.***

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@@Answer to reviewer #1

The discussion paper proposed to SED “Picroilmenites in Yakutian kimberlites: variations and genetic models” by I. V. Ashchepkov and numerous co-workers is, on the whole, a monumental work (Thanks) and it took me quite a long while reading and re-reading the entire manuscript and deciphering the 22 (22!) figures, most of them including multidagrams with cloudy groups of symbols in a messy frame (i.e. Figs 11-12 and 13 and 22).

@@Nearly the same figures were presented in many international publications (see reference list) and conferences and people commonly accept them. If to look at the

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pdf it high scale it is possible to see all details. 22 is not too much for the electronic publication.

After an intensive work on it, I have to admit I was not able to fully understand the aim of this paper and the potential results and conclusions.

@@THE AIM IS TO SHOW THE VARIATIONS OF THE MAJOR AND TRACE ELEMENT COMPOSITIONS OF PicroILMENITES FROM DIFFERENT KIMBERLITIC FIELDS AND TO GIVE THE EXPLANATION OF THEIR ORIGIN

The first chapters dedicated to the introduction and sample (ilmenite) descriptions, which should introduce and present the topic, are difficult simply to read. This encyclopedic paper reports data (results?) and discussion covering various aspects of the “mantle-melt” systematics, without any logical sequence, leaving the reader disarmed in front of the huge amount of information, most of them not each other related and easy to understand. @@I have shown this paper to academician N.V. Sobolev and here agreed with the content and advised to give several sentences about diamond bearing associations. If the reviewer possibly could not follow the information given in the first chapter possibly he is not so familiar with the picroilmenites. Of course may be it is necessary to follow the sequence of developing of the knowledge of this problem but it will be historical paper. I think that huge amount of information is better than absence. Cap. 5 treats the calibration of a (new?) geothermometer or, at least, proposal of an improvement of the previous formulation.

@@There is no new thermometer. I transformed W. Taylor's Ilm-Ol thermometer and oxybarometer from the extended abstract of 7IKC which is the best for ilmenites to the . The regular paper did not appear as it common for W. Taylor.

Ol-ilmen equilibria are accounted for ol-ilmen geothermometer, and oxygeobarometer, but I don't really understand the formulation used for determining pressure. Is a new cpx-ilmen (with ol correction) geobarometer is here proposed??

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@@There are no ilm-ol barometers. I transformed the equation of the ol- ilm thermometer containing correction to the pressure (Bishop, 1980) to barometer, But it is not working at all.

My equations for calculation of pressure are simple

$P_0 = (TiO_2 - 23.1) * 2.152 - (T_{OK} - 700) / 20.1 * MgO * Cr_2O_3$  and yielded a further correction  $P = P_0 + 8.1 * (6.0 - P_0) / Fe\#Ol$

(note: pag. 1273: I wan't able to find the definition of "esklaite" component in any of known mineralogical database; may be the authors thought ESKOLAITE. If it is the case, I suggest to the authors to pay much more attention to the draft of the paper)

@@Thank you this is definitely regrettable mistake  $Esk(esklaite) = Cr/2$ ;

I think that the geothermometry-geobarometry- redox conditions (oxygeobarometry)

theoretical aspects mentioned in Chapter 5 and the results obscurely reported in Chapter 6 themselves, might be good for well constrained future paper.

@@If I'll make better solution of the monomineral Ilm thermobarometer I'll write separate papers. Here in this one mainly the applications were shown. Small paper on this topic was published 7 years ago in "Herald of the Department of Earth Sciences RAS" (Ashchepkov, 2006) and is on-line and it possible to find in ResearchGate . The monomineral barometer which was formulated several years ago is nearly the same. It was found as empirical formula and works mainly for the mantle associations with  $Mg' > 83$ . It is necessary to introduce the corrections to Fe# but nowadays not enough material to do this. Published associations are scares and lack of the good experimental material. The experiments of (N.Semytkivska, 2010) were made for the restricted and Fe rich systems that are far from the protokimberlites. But the empirical formulations proposed for picroilmenites could be not bad. According to Law of Mathematic Induction if the equation is working for the k and possible to prove that it works for k+1 and further numbers it must be correct. I checked it for the >120 kimberlite pipes of

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Yakutia and comparable amount Worldwide Ashchepkov et al 2013a,b,c, Here I tried to show the explanation of the formula. In my work I am trying to make the models which are not controversial with the others/ But sometimes I see thermobarometry which is showing very strange results though the authors are well known and wrote a lot of papers. For example: garnet thermobarometry of (Ryan et al., 1996) and (Grutter et al., 2006) give the conditions which are not correlating with those produced by pyroxene methods and even Cr contents of garnets (see supplement in Batumike et al., 2009) are not correlating with the determined pressures Nevertheless papers were published in many good journals.

The same consideration could be applied for Chapters 8 and 9. The geochemical characteristics and modeling constitute enough material for a future paper.

@@I do not think that without good isotopic data it possible make the good geochemical model of picroilmenite origin. As for the division of paper I had an example. In 1994 we made a good analytical work in Belgium with the Vitim pyroxenites. I wrote two large paper in Brussels that year and shown to our Academicians, they told that papers should be divided to many because contain too much materials. ... And they appeared but without me. My student after diploma became PHD student of academician N.L. Dobretsov and published about 5 papers next year with nearly the same material in Russian Journals. I did not new about the preparation of such publications when waiting for the publishing our article with Luc Andre in international journals. May be such way growth of students on the material which partly or mostly prepared is common But I was a leader of two projects before Here are some the result of 3 projects with ALROSA company and 3 RBRF projects where I was also leader and made practically all analytic work (with analytical workers).

These latter comments are supported by the fact that a huge amount of data is available for each of the topic considered in this paper (geothermobarometry; geochemistry, mineral chemistry: : :) It was hard work to read all the manuscript. The various, potential interesting aspects are buried in a "muddle-headed" text and crowded diagrams.

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@@The paper was written 5 years ago. Nowadays I have much more analyses material >40000 minerals grains from kimberlite concentrates and ~1400 LAM ICP MS. SO better to publish at least those analyzed before. Also without thermobarometry the division on the groups will not be complete.

A reader that wants to learn about the importance of picroilmenites in the complex kimberlitic magmatic system doesn't find anything in this paper that can help to disclose this topic.

@@It is not correct. It is not possible to find in Literature more than 15 ICP analyses of ilmenites and of course the variations between the different kimberlite phases were not described. Completely new statements are: 1. Polibarc mainly AVC fractionation of the protokimberlite magmas including remelting former metasomatites. (instead of the fractionation of the asthenospheric melts in lithosphere base (Nixon & Boyd, 1973) in pegmatite like bodies (Moore & Look, 2002) or fluid precipitation (Kopylova et al, 2009) 2. Reconstruction of the TRE patterns of the parental melts for the ilmenites and tendency of their evolution toward carbonatites. 3. Division to the several groups according to the PT and geochemistry and their transformation during the evolution of parental melts. 4. Comparison of ilmenites from different region of kimberlite magmatism. 5. Reconstruction of the PTFO2 conditions of ilmenite bearing associations by monomineral methods

I am aware that this is discussion paper, and that SE is a "non-conventional" publication, but in my opinion, I don't think that this manuscript, in the current form, can be published in whatever publication. Sometimes this is I have highlighted in the text the evident grammar, syntax errors as well as incomprehensible phrases.

@@It was checked twice by prof. Hilary Downes. I did not change much the text. May be you use another English?

I don't know if the editors want to keep this manuscripts available for open comments, may be other researchers with different scientific perception might find aspects not

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revealed to me.

@@Thank you. I had such comments for several of my paper that were published later in good journals also. Sometimes I changed content sometimes not so much. For example for the paper about Vitim pyroxenites (Ashchepkov et al., 2011) there were close variant for three Journals. Interesting to see comments of another reviewers.

Best wishes Igor Ashchepkov.

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/5/C613/2013/sed-5-C613-2013-supplement.pdf>

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Interactive comment on Solid Earth Discuss., 5, 1259, 2013.

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