

Planetary Geology 4460
Homework #6
Due Friday Oct. 13, 2017

There are two main planetary science meetings each year: the "LPSC" (Lunar and Planetary Science Conference) in Houston in March, and the "DPS" (Division for Planetary Sciences of the American Astronomical Society) Meeting in October or November, which moves in location. This October it will be in Provo, UT. The DPS meeting tends to concentrate on more "astronomically" oriented subjects while the LPSC is somewhat more lunar and geology oriented, although there is considerable overlap.

1) DPS: (25 points) The web page for access to information about the papers to be presented at the DPS 2017 meeting as at

<https://aas.org/meetings/dps49/schedule>. You can also download a block schedule for the entire meeting at <https://aas.org/files/dps49-block-schedule-11august2017.pdf>.

While the sessions listed below contain some lunar "geology" papers, other related ones can be found in sessions on the formation of planetary bodies.

a) Find when the "regular" oral session on "Mercury and the Moon") will be given. List the three digit section number and date and time. (The first digit, 1-5, gives the day.)

404 Thursday 10:00 AM

b) In addition to oral talks there are poster "talks" or presentation. Find the session number for the "Mercury, Venus and the Moon Poster" talks. Note while there is a designated time at which presenters will be at their posters, at DPS the posters are left up for the full meeting so people can go by them at other times.

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c) There are also "Plenary Sessions" (that is -- a single session in a large hall, rather than the usual 3-5 simultaneous small sessions) covering new mission results or science topics. Find the Plenary Session covering the just ended Cassini Mission to Saturn. List the three digit section number and date and time.

108 Monday 1:30 - 2:30 PM

d) In the oral session on the moon there is a talk by Viranga Perera related to the cooling of the Lunar Magma Ocean. They consider an effect which might change the cooling time. In a sentence or two, describe that effect and explain whether it speeds up or slows down the cooling. (You will need to look at the abstract for this talk, using either the on-line system or the downloadable program+abstracts pdf file.)

They believe that material placed into Earth orbit by the giant impact will still be falling on the moon during the solidification of the magma ocean, punching holes in the crust which would otherwise insulate and slow the cooling of the ocean. Disrupting that insulating crust causes cooling to occur more rapidly.

2) LPSC: Part A (10 points) The web page for access to information about the LPSC 2017 meeting (held in Houston in March) is at

<https://www.hou.usra.edu/meetings/lpsc2017/programAbstracts/view/>.

It tends to have many more lunar specific papers than the DPS meeting. While most conference abstracts are just a short paragraph, like those on the DPS site, the LPSC allows extended 2-page abstracts which are really short papers.

a) What oral session is devoted to the Lunar Magma Ocean Crystallization? Give the session number and day and time. For LPSC the session "number" is first a letter (MTWRF) giving the day, then 3 digits.

M151, Monday, starting at 2:30 pm

b) Within that session find the paper by Boukare et al. and read the abstract. You don't need to go into the mathematical details, but describe in a few sentences what causes the simple cumulate layering model we have discussed for the moon (anorthosite on top, olivine on the bottom) to become gravitationally unstable. In simple models that instability causes an overturn later in lunar history, after the magma ocean has completely crystallized, as the interior heats up from radioactive decay. What alternative to that late overturn do they propose?

Because Fe is slightly more incompatible than Mg, the later melts to crystallize are richer in iron. Since the magma ocean has been crystallizing from the bottom up, this results in denser solids sitting on top of less dense solids. That is unstable if they can overturn, allowing the denser iron rich material to sink to the bottom. Rather than having this overturn happen long after crystallization is complete, Boukare et al propose that it takes place AS crystallization is still progressing.

3) LPSC: Part B (15 points) Look through the LPSC abstracts for 2017, find one paper you are particularly interested in, list the author, title, day and time and 4 digit abstract number, then write a one or two paragraph summary of that paper, based on the two page LPSC abstract. Don't just copy part of their words. Summarize it in your own words.