

## GEOL 415 Assignment 1

### Part 2

1. The snow line as defined by Hartmann refers to the temperature at which water vapour converts into snowflakes in the near vacuum of space. The initial or original snow line was located about 4 to 5 AU distance from the Sun, which is the same reference snow line that was used in figure 2, page 23.
2. With regards to the moons composition, it is deemed to be slightly unusual in chemical composition compared to other terrestrial counterparts. Lunar basalts have been depleted of highly volatile elements and even some modest depletion with regards to moderate volatile elements relative to Earth's mantle. Specifically in terms of density, the moon has a lower than expected value. This is because it has a low iron content and a small metallic core, leading to that lower density value.
3. Mercury has a much higher than expected uncompressed density value which indicates it is metal rich. Hughes explains that due to asteroid bombardment in the early days of the solar system, Mercury lost a considerable amount of its outer rocky mantle. This led to Mercury being slightly smaller and mostly metallic, which explains its highly dense uncompressed value. Hughes believes that if we consider Mercury an outlier and get the mean as indicated by the figure 2, Mercury should be roughly around  $3750\text{kg/m}^3$  uncompressed density.
4. There is a trend between the inner and outer solar system bodies that fluctuate about their mean values as indicated in figure 2. Inner bodies tend to have a slightly higher uncompressed density mean value while outer bodies have lower density mean values. This same trend was actually seen in my own chart with linear distance which makes sense since essentially we are simply changing the x axis. There are, however, some outliers to the case as well which should be noted.

Apart from that specific observation, there does not seem to be a clear density trend with distance away from the sun.