PHYS 480/581 Homework #3

Fall 2024 Due Monday, October 14 in class

1) Problem 4.5 from the **second** edition of *Planetary Sciences* (de Pater & Lissauer).

2) Firestorms sparked by a major nuclear war would release large amount of soot into the atmosphere. Explain qualitatively why surface temperatures would be expected to drop well below freezing. (This scenario is widely known as nuclear winter.). Your answer should be at least about 100 words.

3) Problem 4.16 from the **second** edition of *Planetary Sciences* (de Pater & Lissauer). ***In addition: (****Mandatory for PHYS 581 students; optional for* ***PHYS 480 students, who may choose to do this question for bonus points.)***
- determine the ratio of the number density of CH4 to the number density of hydrogen (H2). (In the literature, mixing ratios are often expressed relative to H2 for consistent comparison with the mixing ratios of other bodies.)
- can we assume that this mixing ratio value is representative of all of Uranus' atmosphere? Why or why not?

4) Problem 6.3 (a, b and c) from the **second** edition of *Planetary Sciences* (de Pater & Lissauer).

5) **Essay question.** The textbook covers the topic of plate tectonics with a focus on Earth. Discuss the prospect/detection/evidence of (past) active plate tectonics on other planets and satellites in the solar system, and contrast with Earth. Research this a bit and discuss briefly what you think the implications of plate tectonics are on terrestrial exoplanets (including super-Earths). You may wish to address the role of surface water in your discussion.

Write approximately 1 page (single-spaced, Times fontsize 11, 1 inch margins), **plus** references (you should be using references).

6) Read Journal Club paper 5 and submit four questions you have about **each** paper. IMPORTANT: please type these questions and send them by email (dragomir@unm.edu) directly to me.