<u>Questions to accompany</u>: Robock, A. and Toon, OB. (2010). Local nuclear war, global suffering. *Scientific American* 302(1): 74-81. **<u>Please answer thoroughly and thoughtfully on your OWN paper.</u>**

1. Describe, in your own carefully-chosen words, the concept of nuclear winter to an intelligent extraterrestrial (or, if you like, to an intelligent aquatic Earthian).
2. What was the Cold War and how did nuclear weapons play a role (again, describe to ET . . .)?
3. Why is nuclear winter relevant now that the Cold War is over?
4. How have modern computing and modeling techniques updated our understanding of nuclear winter and its consequences?
5. (a) Approximately how many known nuclear warheads are on Earth currently, and
   (b) name the countries that have them.
6. Explain the Robock, Oman, and Stenchikov's climate model of the upper atmospheric effects of particles, distinguishing between those from volcanic eruptions and those from the smoke of nuclear fires.
7. How would nuclear winter caused by a regional nuclear war alter the global water cycle?
8. Provide (indirect) evidence that nuclear winter could trigger agricultural collapse.
9. (a) What is the biological importance of the stratospheric ozone layer?
   (b) Explain why nuclear winter could threaten that function.
10. Although nuclear winter is untestable by direct experimentation, there are several analogues that can be used to verify it. Discuss, by giving examples, four such analogues.
11. Discuss recent efforts to reduce the number of nuclear weapons in the world.
12. Give two reasons why it is important for the <u>United States and Russia</u> to reduce their nuclear arsenals.
13. The authors contend that "abolition" is the only policy with regard o nuclear weapons and the future of humanity. However, can you propose at least two alternative potentially useful and/or peaceful ways in which humanity might use its collective nuclear arsenal?