Homework–Module 2 Name:

1) The length of day has steadily increased throughout the earth's history. Geological evidence[1] suggests that the day was only 21.9 hours 620 million years ago (Mya). In other words, the earth rotated nearly 10% faster 620 Mya. If we assume the earth's atmosphere had the same temperature distribution then as it does now (which it did not), what change in the geostrophic wind speed would you expect 620 Mya relative to today's conditions over the middle latitudes? Use concepts of chapter 6 of the textbook to defend your answer. There is a 600-character limit to the fillable box of each problem.

The most recent assessment from International Panel on Climate Change (IPCC 2103) states that during the next 20 years (2016-2036; see Fig. 11-10 of AR5-WG1), the average surface temperatures over high latitudes of the wintertime Northern Hemisphere are expected to warm by 3˚C, which is more than any other region of the world. On the other hand, the tropics are expected to warm the least, 1˚C or less. If the IPCC temperature projections materialize, it follows that weather features of the global circulation during northern hemisphere winter would change too. Answer the last two questions based on the IPCC projections.

2) What changes in the intensity (i.e. average speed) of the polar jet stream (increase or decrease) would you expect if the polar troposphere warms 2˚C more than the tropics? Explain your answer using concepts of module 2. Material in chapter 6 of the textbook should prove most useful.

3) What changes in the intensity of extratropical cyclones during winter might you expect if the tropics-to-pole temperature difference decreases by 2˚C? Again, explain your answer using concepts of module 2. Material in chapters 6 and 8 of the textbook are needed to answer the problem.

1 https://www.scientificamerican.com/article/earth-rotation-summer-solstice/