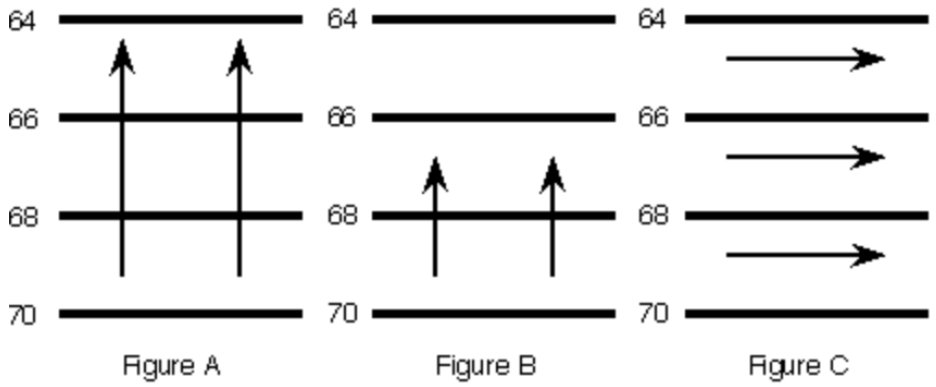
Department of Earth & Climate Sciences Name _____
San Francisco State University Fall 2017

ERTH 465
October 3, 2017
Quiz 2 – 50 pts

1. Examine the Figures A, B, and C below. The arrows represent horizontal wind vectors, with a length proportional to wind speed, and the solid lines are isotherms.



(a) Which figure shows a case of zero temperature advection and why? (5 pts)

(b) Which figure shows the maximum temperature advection of the three figures shown and why? (5 pts)

(c) What is the nature of the temperature advection shown by Figure B and why? (warm or cold). (5 pts)

2. Explain why there is no (or little) temperature advection associated with warm core lows (like hurricanes). (5 pts)

3. The simplified temperature tendency equation is:

$$\partial T/\partial t = dT/dt - u\,\partial T/\partial x - v\,\partial T/\partial y - w\,\partial T/\partial z$$

Say that (i) the air parcels themselves are experiencing no temperature changes, (ii) at the ground there is no vertical wind, and (iii) there is no north-south component ot the wind.

(a) Simplify the equation above by considering the constraints of the problem. (5 pts)

(b) Say that for the conditions described, the temperature on a weather map **increases** 5°C per 100 km (100 km = 1.0×10^5 m) distance towards the east. Say also that there is a purely **east*** wind of 20 m s^{-1}.

*Meaning the way a meteorologist indicates a wind direction—an east wind.

What is the local temperature change at the station due to this temperature advection? Your answer should be in ^{o}C/hr. Show all steps. (25 pts)