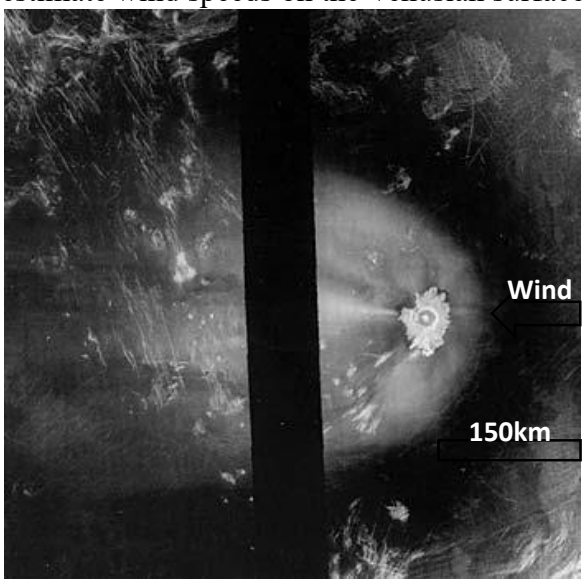
Lab 5 (part 1….the rest to be posted on collab)
If you haven't yet come talk to me about a final project idea!

The surface of Venus can best be described as "hellish" (surface temperature 465 C/870 F and surface pressure 95 times that of Earth), and we have very little data from the surface (The Soviet Union landed a few as part of the Venera program, Venera 13 survived on the surface for 128 minutes and Venera 14 for 57 minutes). The image below is of Adivar crater. Note the parabolic halo, presumably formed by the wind, that surrounds the crater. Here we will use the halo to estimate wind speeds on the Venusian surface.



a) Ejecta exits the crater with velocity v_i at an angle of 45°. The surface gravity on Venus is g. Sketch this situation, and then write down an expression for the time taken before the ejecta hits the ground again (recall from physics the kinematics equations, namely $v_f=v_i+a*t$).

b) Suppose there is a wind moving from left to right at velocity v_w. Add this to your sketch from part (a) and write down an expression for the velocity of ejecta traveling in the upwind direction in terms of v_i and v_w.

c) Now write down an expression for the total distance d traveled by ejecta in the upwind direction in terms of v_i, v_w, and g.

d) The surface gravity of Venus is 9 ms^{-2}. If the initial ejecta velocity is 1 km/s, what is the wind velocity (estimate d using the image above)?

e) The Venera landers measured surface wind speeds of only a few m/s. Compare this with your estimates. How might you explain the discrepancy?

f) Why don't we get parabolic halos on Mars?