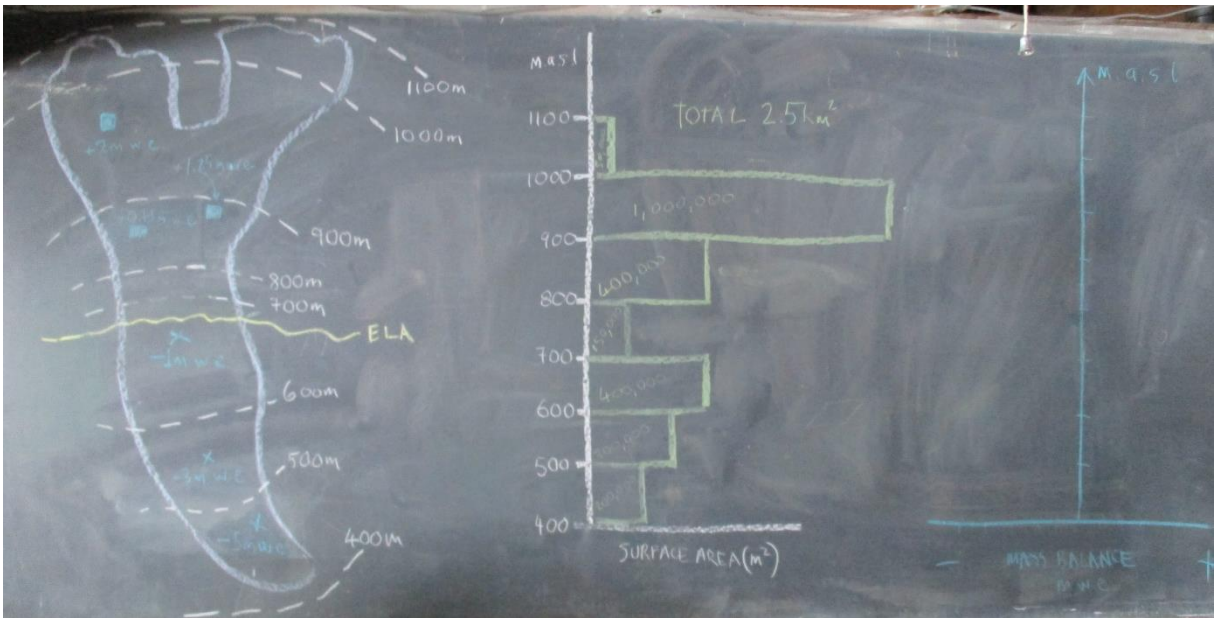
Glacier mass balance problems
Credit: Sketched out with Matt Beedle

Supplemental info on board:

Provide students with plan view sketch of glacier (on board), ~5 point measurements (pits or stakes), ELA, a hypsometry with surface areas by elevation bin.



3 pits: 900-1000m:+2, 800-900:(+1.25, +0.75)
3 stakes: 600-700m: -1, 500-600m:-3, 400-500m:-5

Areas (m^2):		
	1000-1100	50,000
	900-1000	1,000,000
	800-900	400,000
	700-800	150,000
	600-700	400,000
	500-600	300,000
	400-500	200,000

Divide students into groups of ~3 to do exercise below:

1. Have students plot mass-balance gradient w/ respect to elevation
    a. Have students interpolate/extrapolate from five points – and note the assumptions/decisions made in process.
2. Have students integrate MB gradient with hypsometry and calculate:
    a. Volume balance (m^3 w.e.)
    b. Specific balance (m w.e.)

Post-exercise discussion:

1. Assumptions/decisions – how did these impact results?
2. If you could reposition any of the five points, where would you locate them and why?
3. If you could add observations – pits, stakes, probing – where would you locate them and why?
4. Discuss spatial variability and the physical properties that lead to it.
5. Have a student sketch an elevation profile from contours:
    a. Discuss slope angle and measurement challenges
    b. Discuss influence of glacier shape and relation to ELA rise/fall