Wx Proj Component 1: Wind

Weather Observation & Analysis Project (WxProj) — **Screen X** — **Instrument #** — *Example Data Collection Sheet*

DATE	TIME	TEMPERATURE			HUMIDITY (Note wick state & instrument type in RH column)				PRECIPITATION (Note when precip is from melted rain gauge)			SKY Condition & CLOUD						WIND				PRESSURE			COMMENTS
Entered from earliest to latest date & time		Max Temp. (°C)	Min Temp. (°C)	Present Air Temp. (°C)	Wet bulb Temp. (°C) F = wick is frozen	Dry bulb Temp. (°C)	e (hPa)	RH (%) A = Assmann B = Bacharach W = Weksler	Snow Depth (mm) Ruler measurement	Snow Water Equivalent (mm)	Rain gauge (mm) T = Trace M = from melted rain gauge	SKY CLR FEW SCT BKN OVC OBSCD MISG	Amount (8ths) low	Amount (8ths) mid	Amount (8ths) high	Cloud type: Use 2-letter cloud abbreviations & double dashes for layers you cannot see. low	Cloud type: Use 2-letter cloud abbreviations & double dashes for layers you cannot see. mid	Cloud type: Use 2-letter cloud abbreviations & double dashes for layers you cannot see. high	Visual Observation: Direction Bearing as an 8 point compass	Visual Observation: Beaufort number	UNBC Weather Station: Direction Azimuth as degrees (°) from north	UNBC Weather Station: Speed (m/s)	Barometer (mm Hg)	Barometer Temp. (°C)	Corrected Pressure (hPa)	

Each student will calculate their own *e* (hPa) & *RH* (%) values from recorded observations.

Each student will calculate their own SWE values from recorded observations.

Each student will calculate their own pressures from recorded observations.

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The WxProj data collection sheet remains on the roof top clipboard at all times!

Measuring Wind: Speed & Direction

See handout
WxProj-21 to WxProj-22

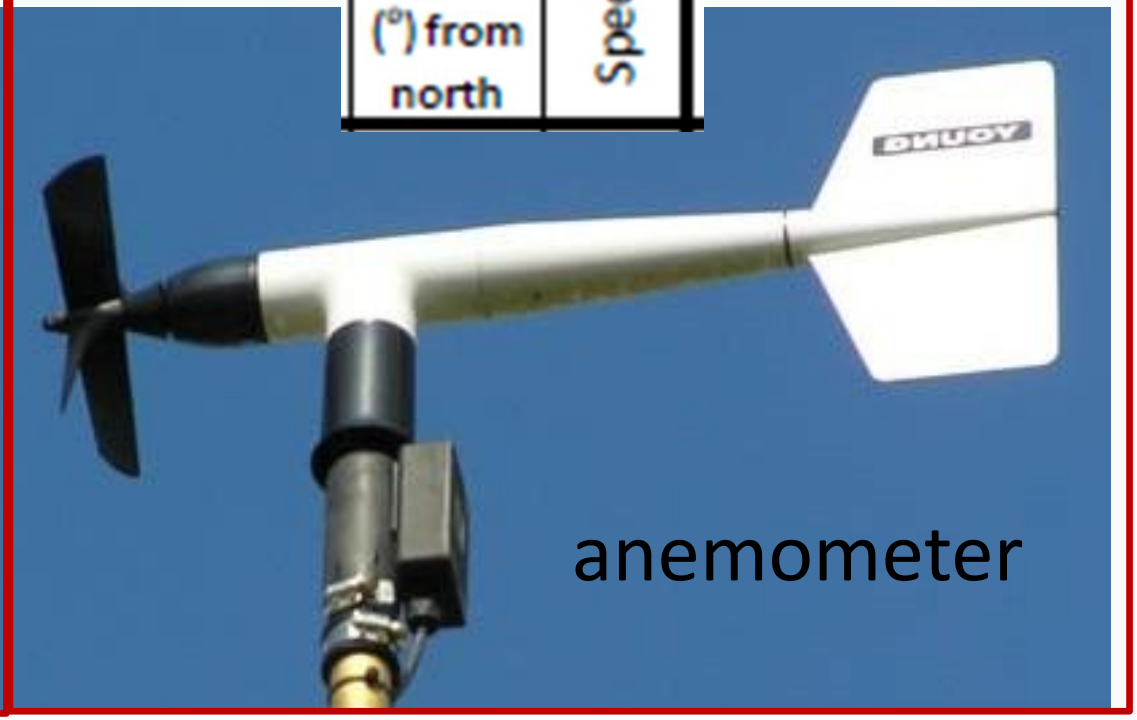
Observed by a trained person who reports the conditions using standardized codes/ indexes

Visual Observation	
Direction Bearing as an 8 point compass	Beaufort number

Aviation wind sock

UNBC Weather Station	
Direction Azimuth as degrees (°) from north	Speed (m/s)

Measured using an instrument that produces a numerical value.



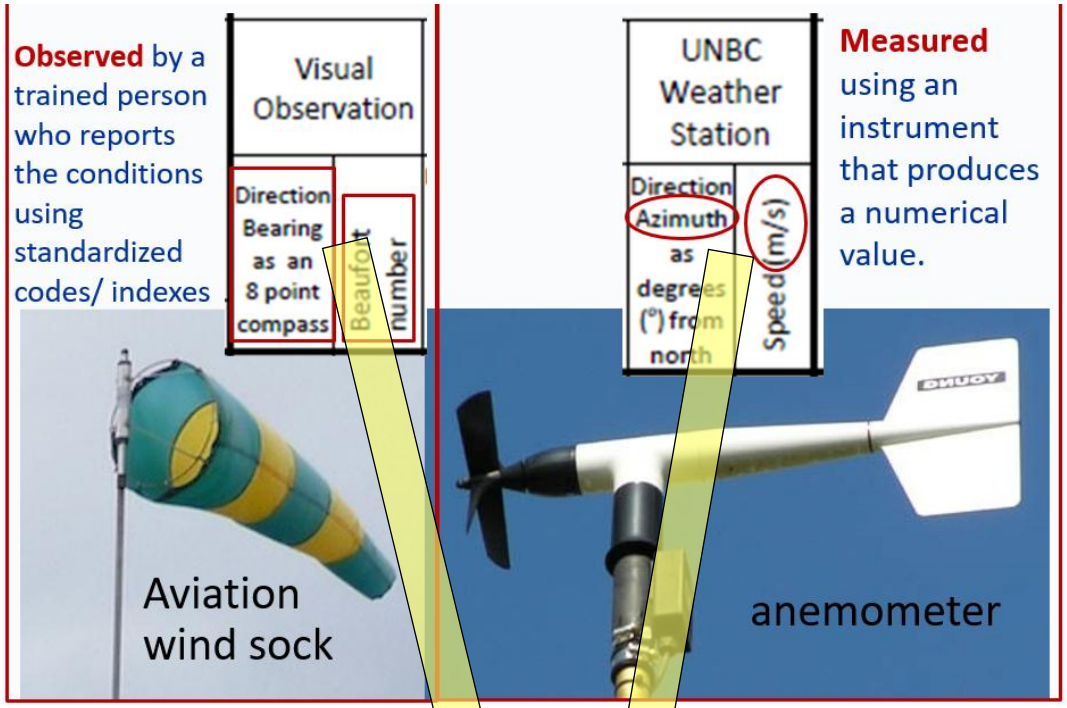
anemometer

Wx Proj Component:

Measuring Wind:

Speed & Direction

See handout
WxProj-21 to WxProj-22



DATE	TIME	TEMPERATURE			HUMIDITY Note instrument type in RH column				PRECIPITATION			SKY Condition & CLOUD								WIND				PRESSURE			COMMENTS
Entered from earliest to latest date & time		Max Temp. (°C)	Min Temp. (°C)	Present Air Temp. (°C)	Wet bulb Temp. (°C)	Dry bulb Temp. (°C)	e (hPa)	RH (%) W = Weksler A = Assmann B = Bacharach	Snow (mm) Ruler measurement	Water equivalent snow (mm)	Rain (mm) T = Trace From rain gauge	SKY	Amount (8ths)			Cloud type: Use 2-letter abbreviations & double dashes for layers you cannot see.			Visual Observation		UNBC Weather Station		Barometer (mm Hg)	Barometer Temp. (°C)	Corrected Pressure (hPa)	
												CLR FEW SCT BKN OVC OBSCD MISG	low	mid	high	low	mid	high	Direction Bearing (8-point compass)	Beaufort number	Direction Azimuth (degrees (°) from north)	Speed (m/s)			recorded observations.	
							recorded observations.			recorded observations.																recorded observations.	

Record automated wind speed & direction from the 2nd floor UNBC Weather Station (WxStn) display on your way to the Building 8, ENSC 201 roof-top weather stations.

Beaufort Wind Scale (Over Land)

Used to estimate wind speed from Surface Observations (From: Appendix C, *Meteorology Today*, 6th Ed. Ahrens. 2000.)

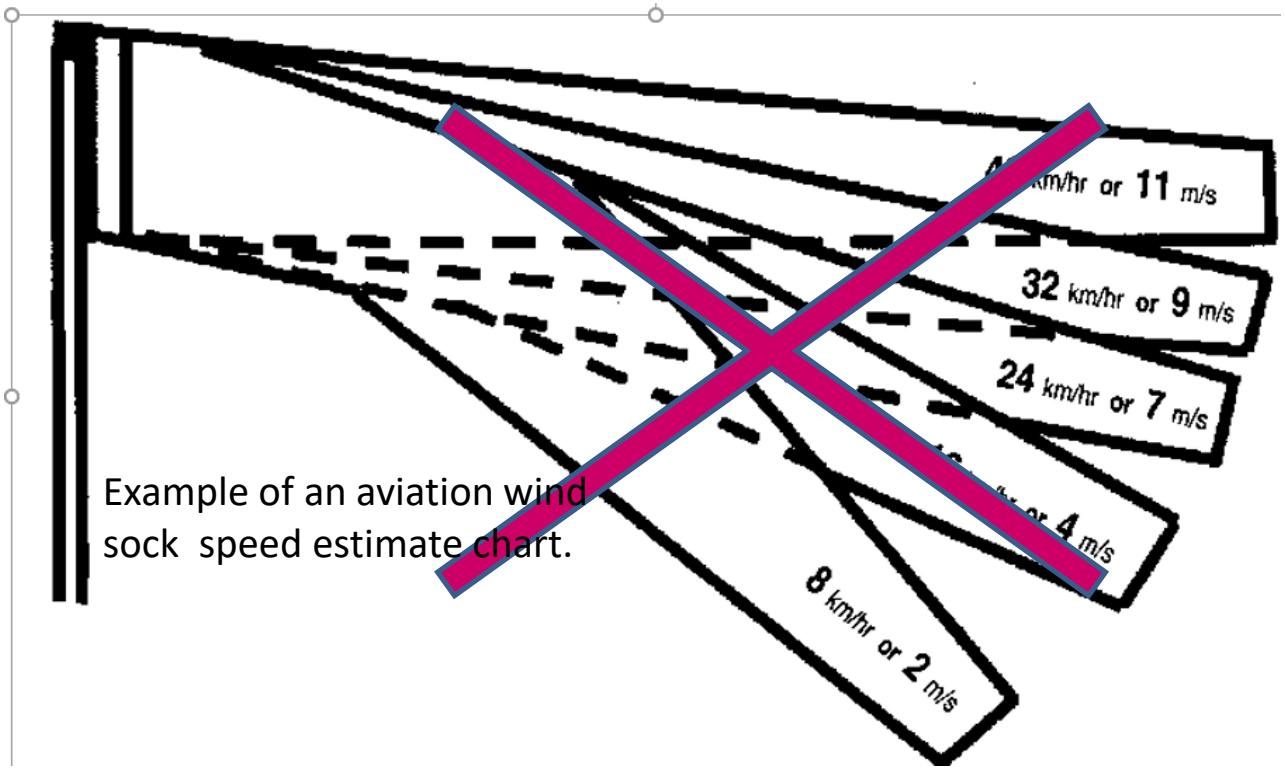
Beaufort Number	Description	Wind Speed Represented				Observations
		km/hr	m/s	Knots	mi/hr	
0	Calm	0 - 2	0 - 0.5	0 - 1	0 - 1	Smoke rises vertically
1	Light air	2 - 6	0.5 -1.5	1 - 3	1 - 3	Wind direction indicated by drifting smoke but not by wind vanes
2	Slight breeze	7 - 11	2 - 3	4 - 6	4 - 7	Wind felt on face; leaves rustle; wind vanes move; flags stir
3	Gentle breeze	12 - 19	3.5 - 5.5	7 - 10	8 - 12	Leaves and small twigs move; flags extend
4	Moderate breeze	20 - 29	6 - 8	11 - 16	13 - 18	Wind raises dust and loose paper; small branches move; flags flap
5	Fresh breeze	30 - 39	8.5 - 11	17 - 21	19 - 24	Small trees with leaves sway; flags ripple
6	Strong breeze	40 - 50	11 - 14	22 - 27	25 - 31	Large tree branches move; whistling heard in phone/power lines; umbrellas used with difficulty
7	High wind	51 - 61	14 - 17	28 - 33	32 - 38	Whole trees in motion; walking into the wind is bothersome; flags extend
8	Gale	62 - 74	17 - 21	34 - 40	39 - 46	Wind breaks twigs off of trees; walking is difficult
9	Strong Gale	75 - 87	21 - 24	41 - 47	47 - 54	Slight structural damage occurs (signs and antennas blow down)
10	Whole Gale	88 - 101	25 - 28	48 - 55	55 - 63	Considerable damage occurs; trees uprooted
11	Storm	102 - 119	29 - 33	56 - 64	64 - 74	Winds cause wide spread damage
12	Hurricane	120 +	33.5+	65+	75+	Winds cause extensive damage

Velocity values are for comparison only

Don't use them to determine Beaufort number!

Aviation Wind Socks can be made from specific fabrics that are calibrated to estimate the wind speed. They are used by pilots to infer wind conditions on the ground during take-off and landings. If using windsock speed diagrams ensure the windsock fabric matches the speed diagram .

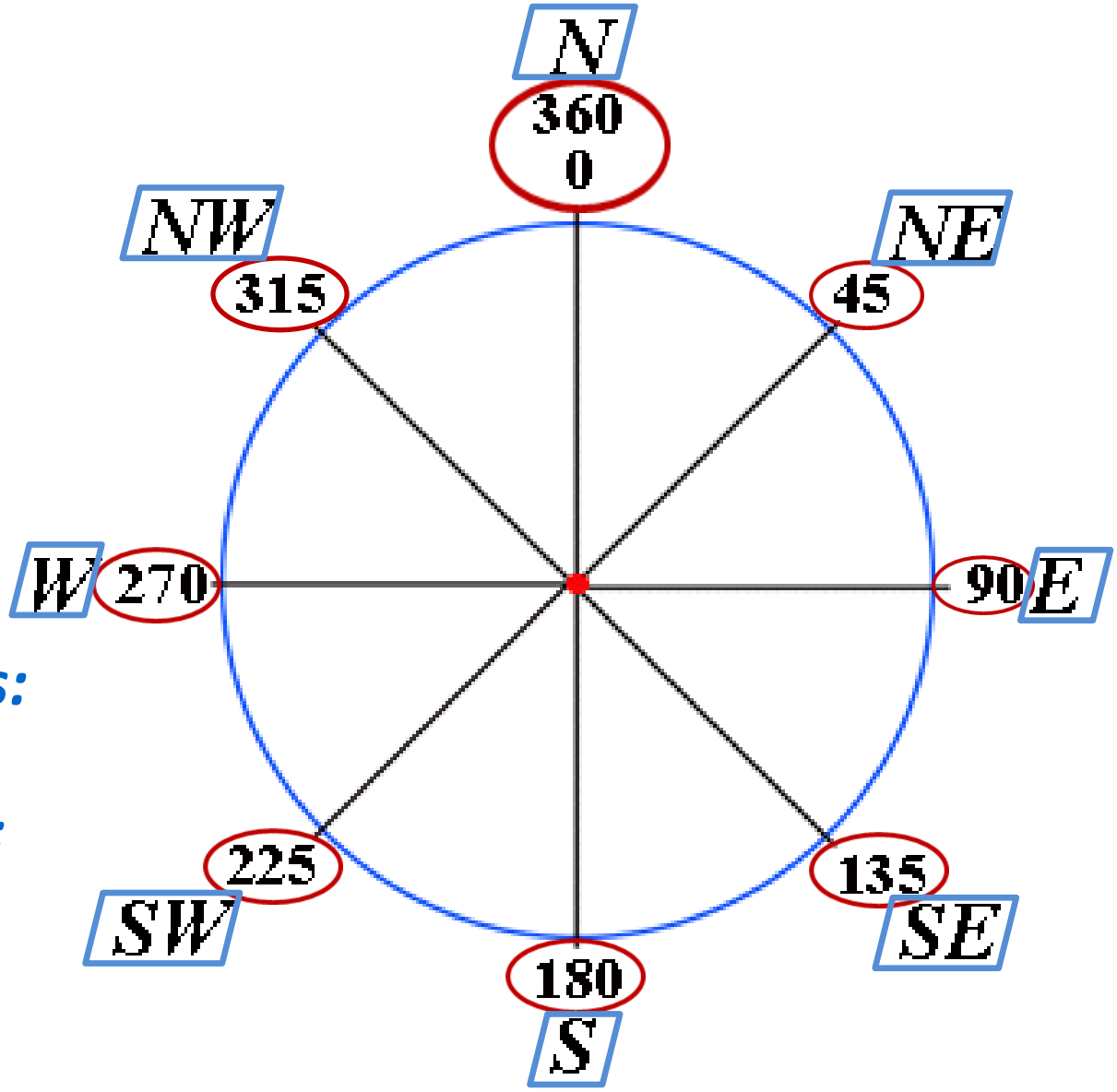
Our windsock isn't calibrated, so we can't use wind speed diagram estimates.



Example of an aviation wind sock speed estimate chart.

Directions:

Azimuths: Directions as degrees (^{0}) of a circle from 0^0 - 360^0; always increasing in a clockwise direction from zero.



Numberless Bearings:

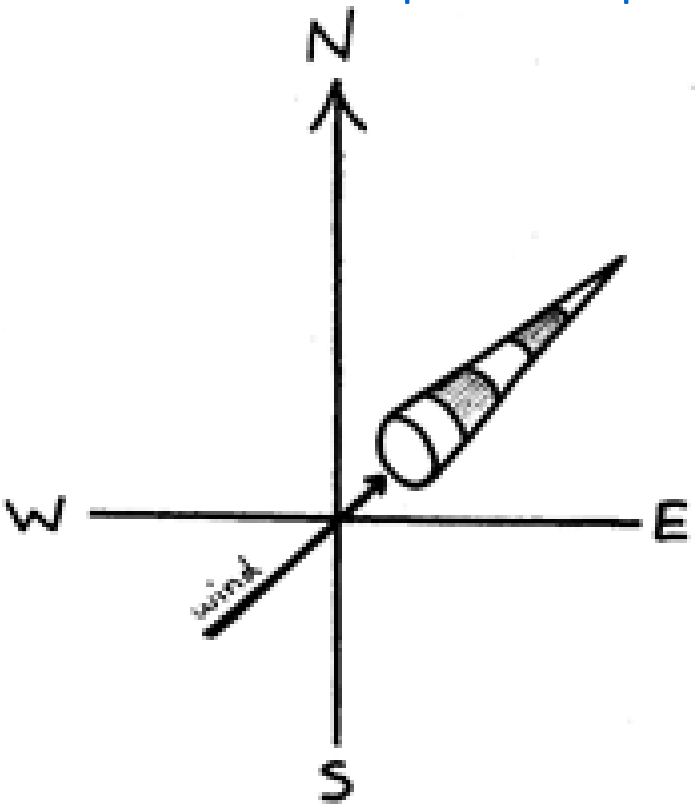
Report as the nearest 8-point compass direction:

N (north), NE (northeast),
E (east), SE (southeast),
S (south), SW (southwest),
W (west), NW (northwest)

Wind Observed Visually:

Observer Reported:

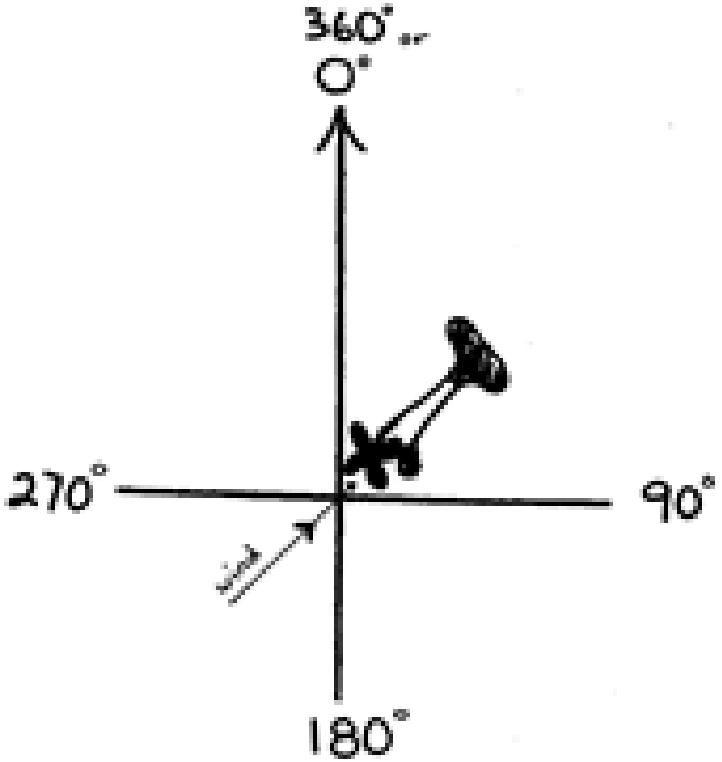
- Speed: Beaufort Number (an index based on observed conditions)
- Direction: a numberless bearing
- Based on an 8-point compass



Wind Measured by Instruments:

UNBC Wx Stn Measured:

- Speed: air flow (velocity) in meters /second (m/s)
- Direction: an Azimuth (degrees of a circle clockwise from north)



Always report wind as the direction the wind is coming from!

Wind Reporting: Always reports the direction wind comes from!

- Report both *Instrumented* (UNBC Wx Stn) & *Visual* (roof-top, observer reported) wind speed & direction
- *Instrumented*: Use 10-minute averaged UNBC Wx Stn values.
  Visual: Make multiple observations, generalize them at the end of all your roof-top observations.
- UNBC Wx Stn data precision? (see instrumented examples)
  - Speed = meters per second (m/s) recorded to 1-decimal
  - Direction = azimuth recorded to the whole degree (^{0})
- Properly use visual codes (see examples)
  - No wind = double dash (--) for wind direction

Example data recording *(observation descriptions below)*:

	WIND			
	Visual Observation		UNBC Weather Station	
	Direction Bearing as an 8 point compass	Beaufort number	Direction Azimuth as degrees (°) from north	Speed (m/s)
Strong breeze, coming from the south west →	SW	6	225	12.1
Calm* →	--	0	90*	0.2

**The UNBC WxStn shows a 90^0 wind direction as this is the wind direction before it stopped blowing.*

Lab 2
Additional Wx Proj Component

Started s**cheduling** WxProj d**ata** c**ollection** o**bservation** t**imeslots**, see Chris Jackson ASAP if you missed this during Lab 2.