Wx Proj Component: Precipitation

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

DATE	TIME	TEMPERATURE			HUMIDITY				PRECIPITATION			SKY Condition & CLOUD						WIND				PRESSURE			COMMENTS
					Note wick state & instrument type in RH column				Note when precip is from melted rain gauge																
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.

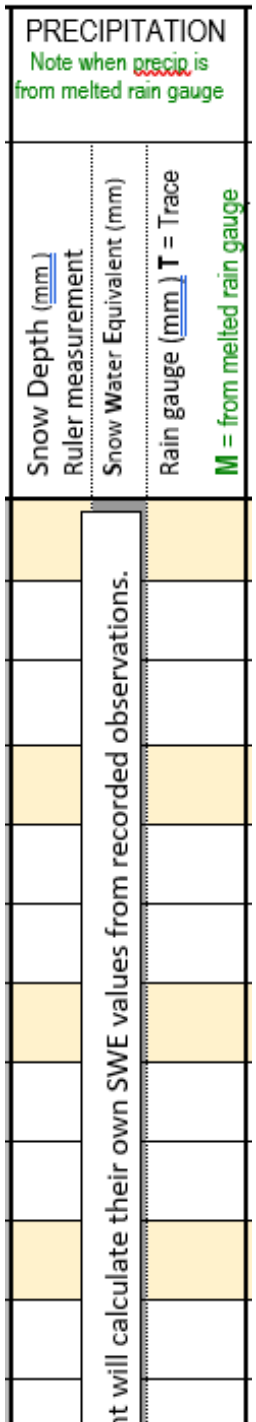
Each student will calculate their own pressures from recorded observations.

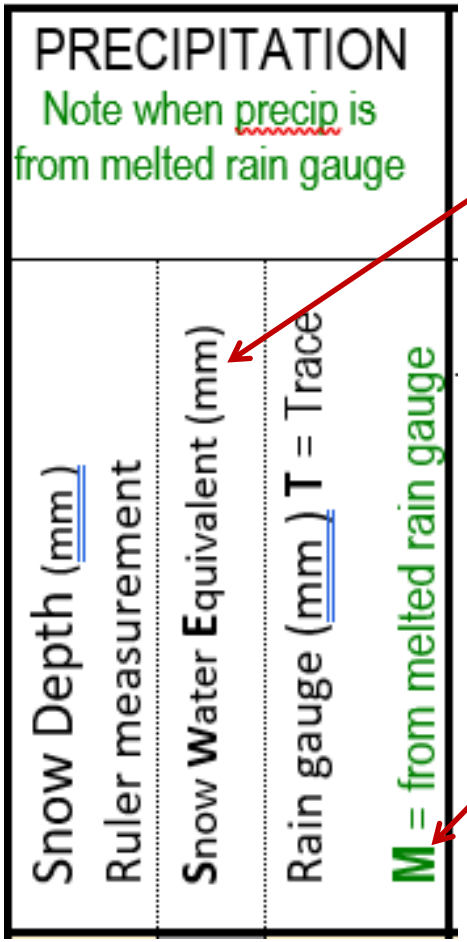
WxProj – 17

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

Precipitation: What are we recording?

How are the different measurements made?





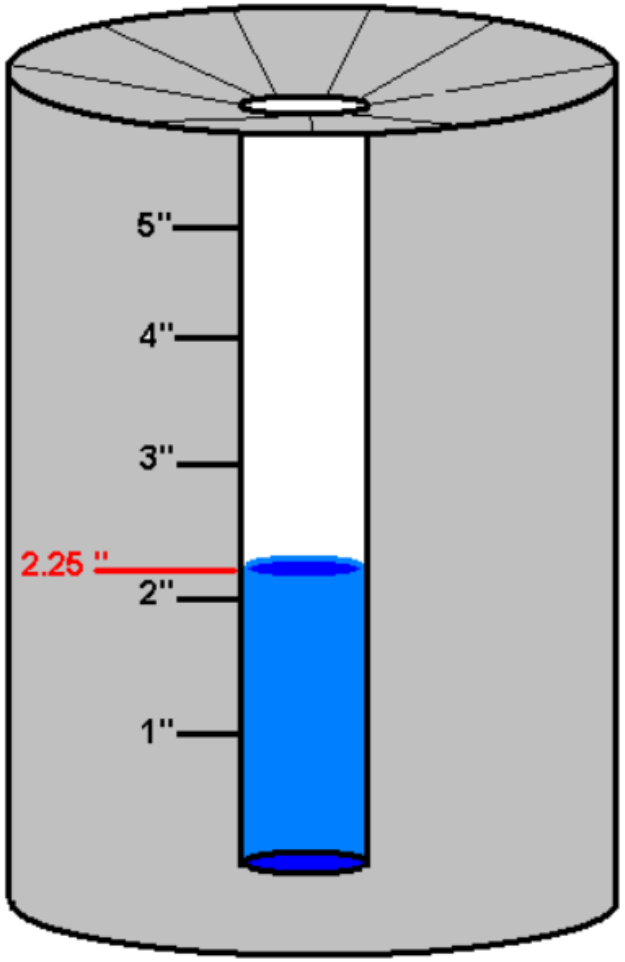
Why do we want "snow water equivalent" snow measurements?

Why do we note (with an M) when rain gauge data comes from melted snow?

A **standard rain gauge** measures rainfall as a depth of water over the catchment area of the gauge (the gauge's funnel area).

The example rain gauge below is used in the USA where rainfall is measured in inches (").

This gauge measures 2.25" of precipitation.

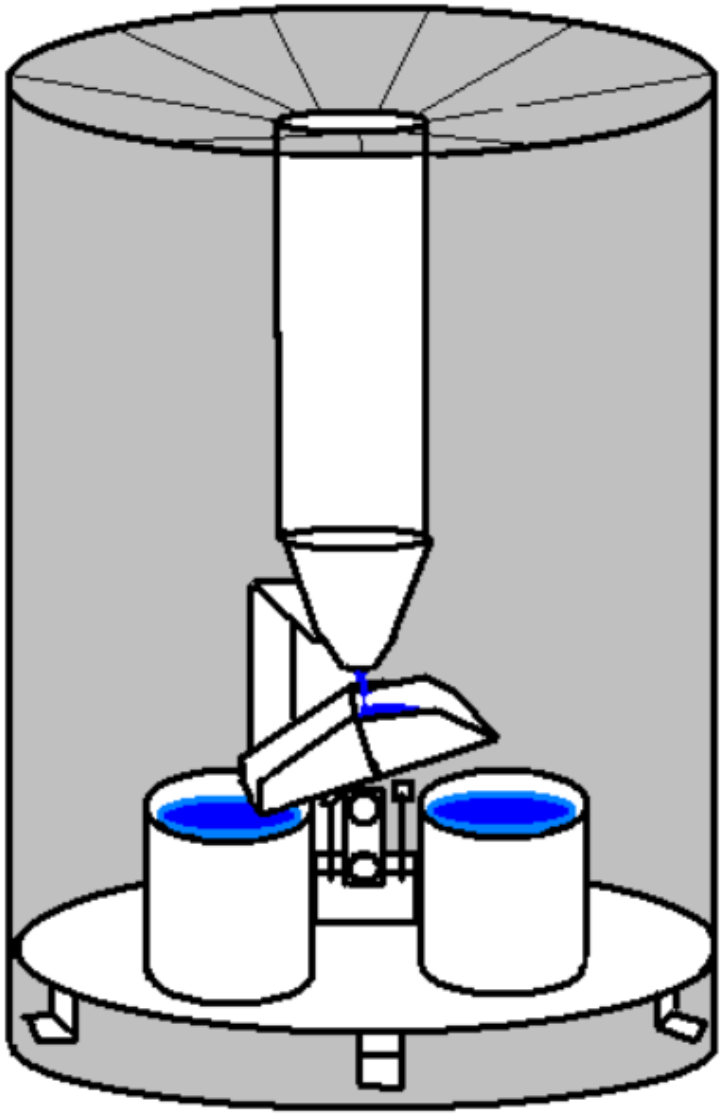


Equivalent metric- scale rain gauges are used in Canada /internationally where precipitation is measured in millimeters (mm).

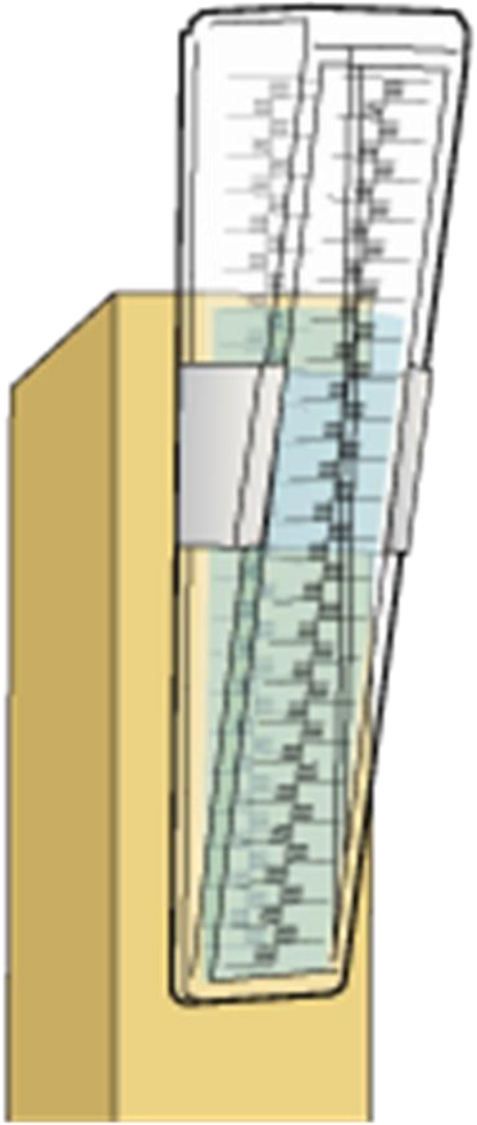
A **tipping bucket rain gauge** measures rainfall as a rate (volume of precipitation per time) over the gauge's catchment area (the gauge's funnel area).

It measures electronically by counting buckets of a known volume that are dumped after they fill, tip and dump their rainfall.

Many tipping bucket rain gauges don't collect the measured precipitation, instead it is dumped and drains through the bottom.



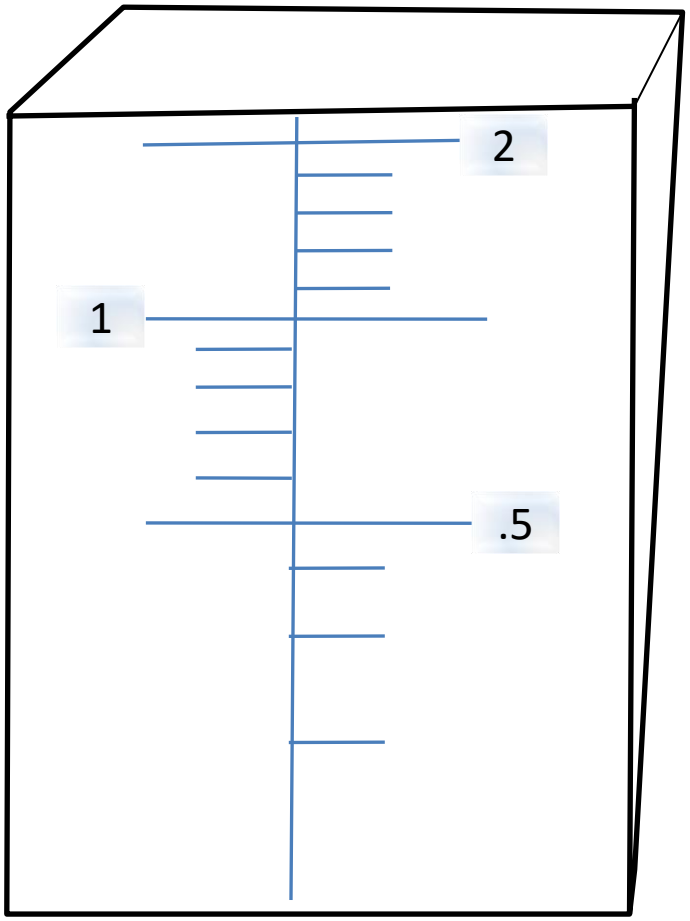
Our rain gauge: How do we read it?



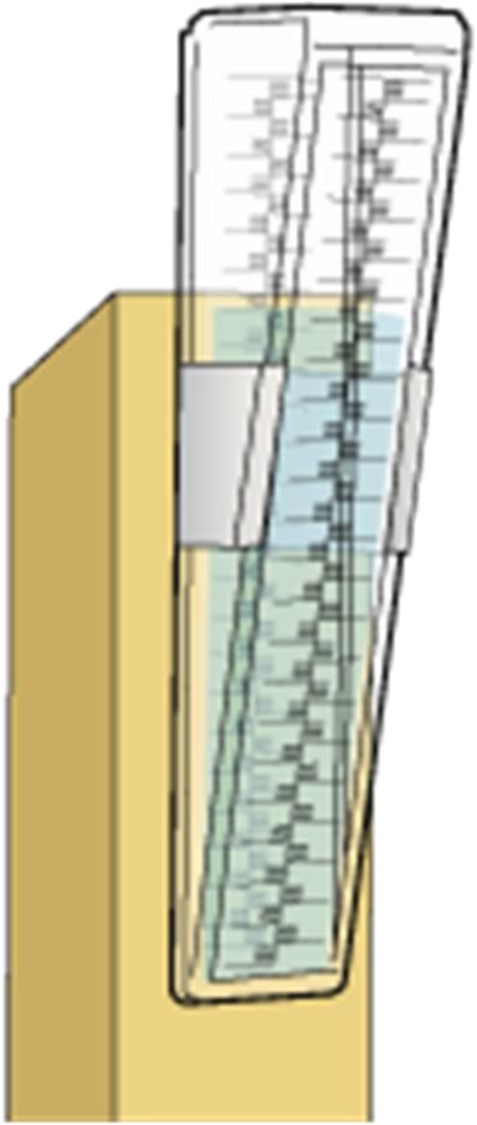
Look closely at the scales on the gauge in your hands.

How are they counted?

What's the smallest amount of water that can be measured?

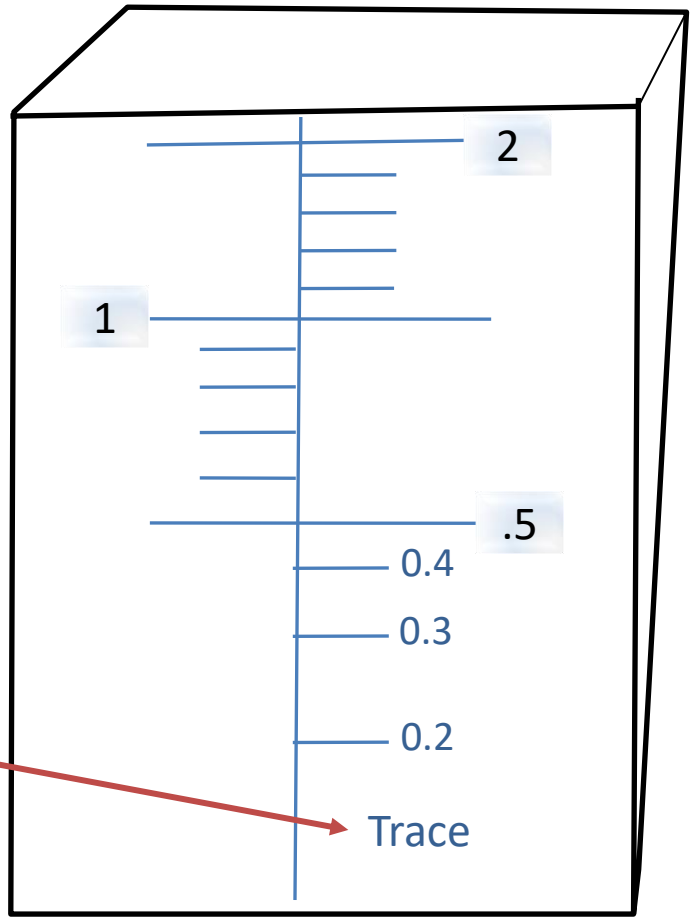


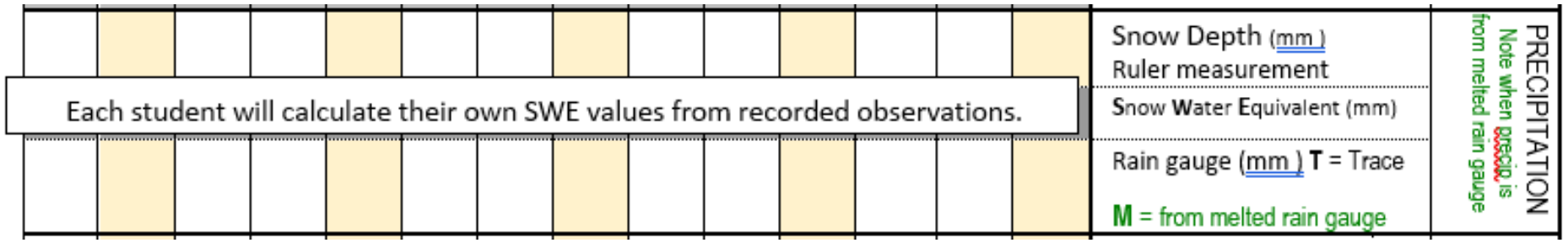
Our rain gauge: How do we read it?



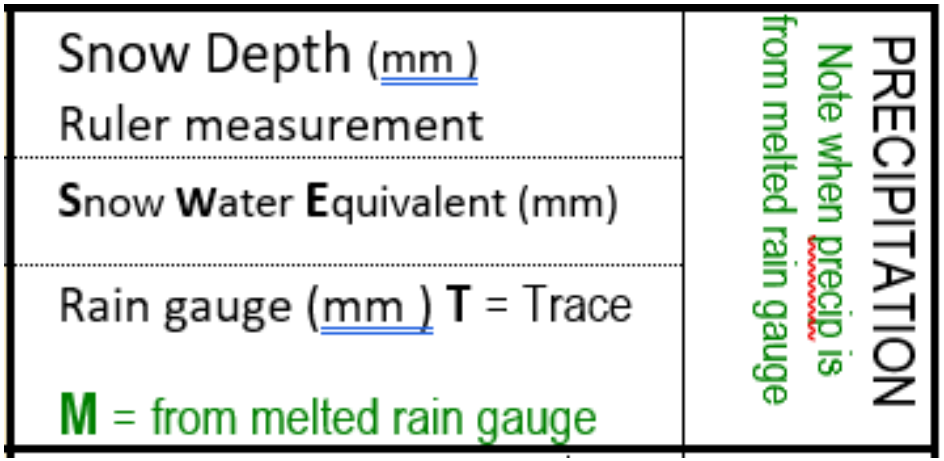
See how the divisions on these gauges change -- the 0.5 to 1 and 1 to 2 divisions differ because of the rain gauge's wedge shape.

When the divisions are counted, the smallest amount of water that can be measured is 0.2 mm and when precipitation is smaller it is reported as "Trace"





Which measurement is the most important?



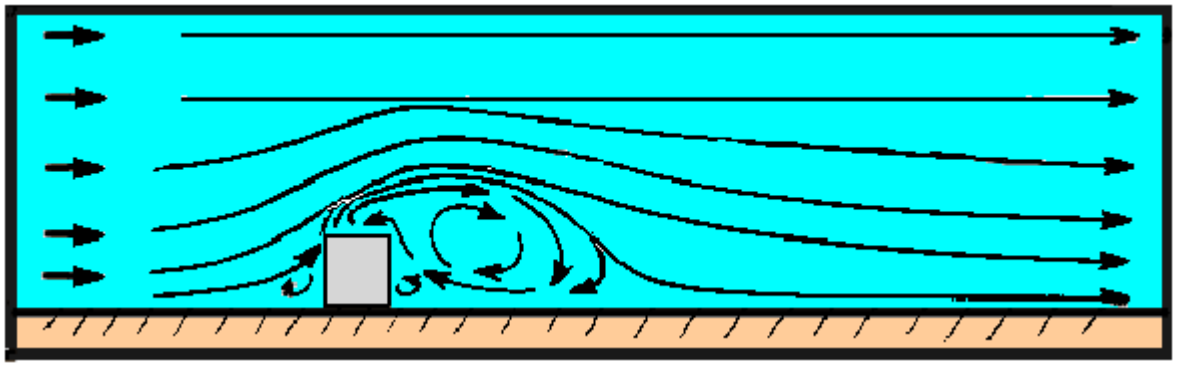
It depends……

What are some precipitation gauge problems?

- snow must be melted to read its water equivalent amount
- frozen temperatures can create ice from rain
- rain and especially snow not being captured in the rain gauge

What are some precipitation gauge problems? (from Cyclone Lab 3 links)

Wind flow (→) over a precipitation gauge (grey box).



Wind perturbations carry precipitation over and beyond the gauge. This leads to smaller rain /snow accumulations in the gauge than in the area just around it.

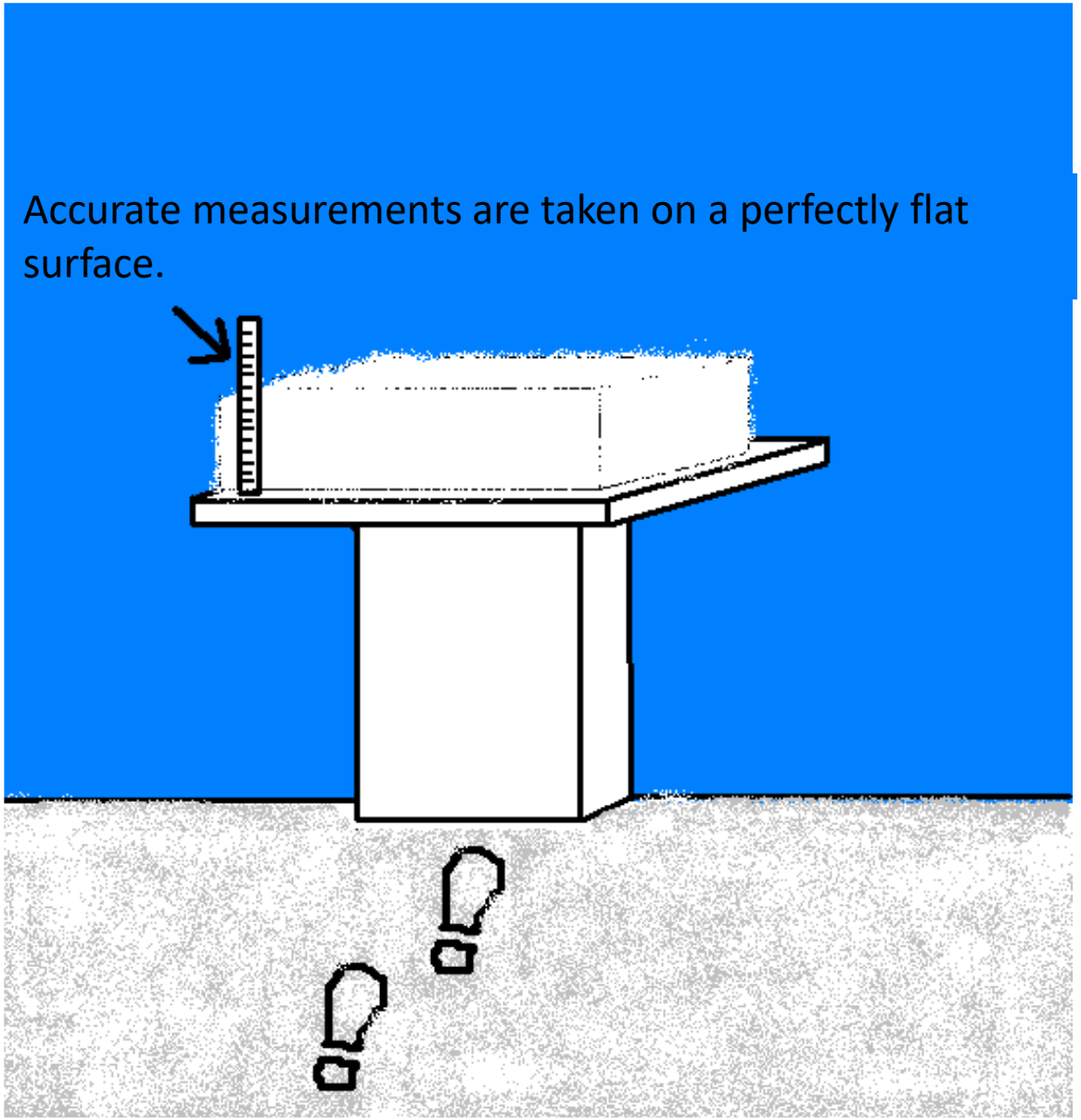
Wind screens slow the wind and reduce flow problems caused by an object disrupting the small to microscale wind field around an object.

UNBC Wx Stn precipitation gauge & screen:

From cirrus website: http://weather.unbc.ca/wx/roof-station-photos/P1130962-precip-3m-tripod-10m-mast.JPG
image: P1130962-precip-3m-tripod-10m-mast.jpg

Snow boards /Snow Benches

Snow bench materials & equipment sales: http://snowmetrics.com



Taking measurements on a snow bench.


our snow bench

Snow pillows and snow scales provide water equivalent snow measurements

https://niwa.co.nz/file/27843

https://products.kisters.net/products/hardware/meteorology/ssg-2

Remote snow measuring site

Snow Telemetry (SNOTEL) Network (USA)

https://www.nrcs.usda.gov/wps/portal/wcc/home/aboutUs/monitoringPrograms/automatedSnowMonitoring/