

Brief Instructions of APanel

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Forewords

APanel (Astroweather Panel) is a numerical weather forecast which especially designed for astronomical purpose. It can be a good reference if you would like to know the weather condition in the next 72-hour.

To get the forecast, read the image from left to right. Each column represents different period, and each line represents different elements. Read the corresponding color in the legend below and then you will have it.

APanel updates four times a day (around 05Z, 11Z, 17Z and 23Z), you can see the data initializing time on the upper-right corner. The graph is generated in real-time, so you may have to wait for a few seconds before the graph appeared if it's not yet cached by former users.

APanel is a product of 7Timer!.

Explanation and legend

Cloud work function (CWF)

The cloud work function (CWF) is an integrated measure of the difference between the moist static energy in the cloud and that in the environment. Generally speaking, it can be viewed as an indicator that if the cloud is likely to grow.



(Unit: J/kg)

Cloud Cover

Cloud Cover forecasts average total cloud cover over the entire atmosphere. This forecast may miss very low cloud and afternoon thunderstorms. You can refer to “cloud work function (CWF)” or “lifted index” if you would like to assess the stability of the atmosphere.



Seeing

The astronomical seeing conditions on a given night at a given location describe how much the Earth's atmosphere perturbs the images of stars as seen through a telescope. The seeing here is a reference to the best possible angular resolution which can be achieved by an optical telescope.



Generally the actual seeing is slightly worse than the prediction, as of the contribution of the turbulence near the ground.

Transparency

The transparency here is an integrated measure of the extinction of sky objects. The extinction is generally caused by the moisture of atmosphere. In this forecast, both moisture and ozone are taken into account, but no industrial pollutants or aerosols (although they are big contributors for starlight extinction as well), because they are hard to be measured and predicted across the global by far.



(Unit: magnitude/air mass)

Lifted Index

The lifted index (LI) is the temperature difference between an air parcel lifted adiabatically $T_p(p)$ and the temperature of the environment $T_e(p)$ at a given pressure height in the troposphere (lowest layer where most weather occurs) of the atmosphere, usually 500 hPa (mb). When the value is positive, the atmosphere (at the respective height) is stable and when the value is negative, the atmosphere is unstable.



LI can be scaled as followed:

Range (K)	Amount of Instability	Thunderstorm Probability
more than 11	Extremely stable conditions	Thunderstorms unlikely
8 to 11	Very stable conditions	Thunderstorms unlikely
4 to 7	Stable conditions	Thunderstorms unlikely
0 to 3	Mostly stable conditions	Thunderstorm unlikely
-3 to -1	Slightly unstable	Thunderstorms possible
-5 to -4	Unstable	Thunderstorms probable
-7 to -6	Highly unstable	Severe thunderstorms possible
less than -7	Extremely unstable	Violent thunderstorms, tornadoes possible

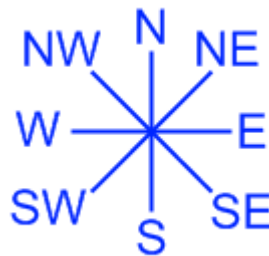
Darkness

The darkness here shows the visual limiting magnitude in zenith. It takes into account sun's and moon's position, moon phase, atmospheric moisture condition (transparency/starlight extinction), ozone thickness, and environmental conditions near the surface (temperature, humidity, etc.), but light pollution is not yet included.



Wind

The wind forecast here shows the average wind direction and speed at a height of 10 meters above the ground. The line points to the direction where the wind is coming from.



The conversion table of Beaufort Class and different wind speed units is shown below.

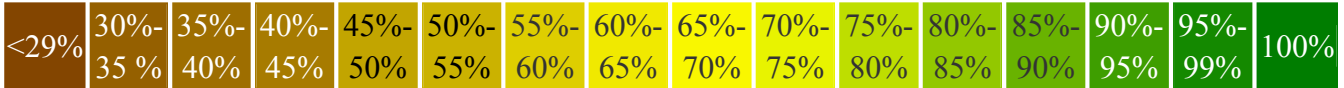
Beaufort Number	Description	General Description	Wind Speed			
			knots	km/h	mph	m/s
0	Calm	Calm	0	0-1	0-1	0-0.2
1	Light	Light air	1-3	2-6	1-3	0.3-1.5
2		Light breeze	4-6	7-11	4-7	1.6-3.3
3	Moderate	Gentle breeze	7-10	12-19	8-12	3.4-5.4
4		Moderate breeze	11-15	20-29	13-18	5.5-7.9
5	Fresh	Fresh breeze	16-21	30-39	19-24	8.0-10.7
6	Strong	Strong breeze	22-27	40-50	25-31	10.8-13.8
7		Near gale	28-33	51-62	32-38	13.9-17.1
8	Gale	Gale	34-40	63-75	39-46	17.2-20.7
9		Severe gale	41-47	76-87	47-54	20.8-24.4
10	Storm	Storm	48-55	88-103	55-63	24.5-28.4
11		Violent storm	56-63	104-117	64-72	28.5-32.5
12	Hurricane	Hurricane	64+	118+	73+	32.6+

Temperature

The temperature here gives that on 2 meters above ground in both Centigrade and Fahrenheit (indicates by “C” and “F”)

Relative Humidity

Relative humidity (RH) is a term used to describe the amount of water vapor that exists in a gaseous mixture of air and water. The relative humidity here forecasts that on a height of 2 meters.



References

- Astronomical seeing, *Wikipedia* <http://en.wikipedia.org/wiki/Astronomical_seeing>
- Beaufort Wind Scale <<http://www.stormfax.com/beaufort.htm>>
- Explanation of the Clear Sky Chart <<http://cleardarksky.com/c/ChrSprPkPAkey.html>>
- Lifted index, *Wikipedia* <http://en.wikipedia.org/wiki/Lifted_index>
- Moist Process, GrADS Development Team <http://grads.iges.org/agcm/agcm_moist.html>