Optional Fast Pack for
Quick Start Basic MEWS Observer Training

The Fast Pack contains the critical forms and reference tables / charts needed to participate in a Quick Start Basic MEWS Observer Training session. Quick Start Basic MEWS training is not a substitute for the comprehensive self-guided or mentored Basic MEWS training lessons series.

The goals of Quick Start Basic MEWS Observer Training are:

- Rapid training of EmComm hams to make and report weather observations in a disaster area immediately after a disaster;
- Increasing the value of EmComm hams by providing critical weather information to aid in relief response and management;
- Increasing the flight safety of emergency relief flight crews by providing weather reports relevant to VFR (visual flight rules) common to helicopter flight operations;
- Empowering EmComm hams to train other disaster survivors to assist in making weather observations. This enables survivors overcome the feeling of being "helpless victims" by making them active participants in meaningful relief work.

Instructions: Before coming to the training session:

1. Print out the contents of this packet and the MEWS Weather Observer Handbook. Bring them to the training session.
2. Download and view the MEWS Overview (Introductory) PDF slide presentation.
3. Bring a writing pad or notebook and pen / pencil with you.
4. Bring a recent photo of yourself (not larger than 4 x 6 or 3 ½ x 5 inches). You will be asked to put this in the MEWS Instructor's Training Log Book. You will also be asked to writing your name, callsign (if you have one) and make any comments in the remaining space. Please also take the instructor's name card and send an email to the instructor. This will assure the accurate recording of your email address.

RTC-TH M.E.W.S. Weather Observation Log

Ready to serve and sustain our community.

1. Header

Location			
Lat ° ' " N	Long ° ' " E		
Lat N	Long E	Elev m AMSL	

Date	Weather Observations Time		
	Sunrise	Mid-Afternoon	Sunset
Local time 24-hr format — Hour→			
Observer (initial; see back)			

2. Temperature / Relative Humidity

			Sunrise	Mid-Afternoon	Sunset
2.1	Air (Dry bulb)	Thermometer in shade: 1.5 m above ground	°C	°C	°C
2.2	Wet Bulb		°C	°C	°C
2.3	Difference	Subtract 2.2 from 2.1;	°C	°C	°C
2.4	Rel. Humidity	Use 2.1, 2.3; R H Table	%RH	%RH	%RH
2.5	Dew Point	Use 2.1, 2.3; Dew Pt Table	°C	°C	°C
2.6	Heat Stress	Use 2.1, 2.4 ; HSI Table	Heat Stress °C	Heat Stress °C	Heat Stress °C
		Danger Level (if any from Heat Stress Index table)	□Cautn □Danger □ Ex Cautn □Ex Dangr	□Cautn □Danger □ Ex Cautn □Ex Dangr	□Cautn □Danger □ Ex Cautn □Ex Dangr
2.7	Wind Chill	Use 2.1, 3.1; Wind Chl Tbl	Wind Chill. °C	Wind Chill. °C	Wind Chill. °C
		Danger Level (if any from Wind Chill chart)	□Trvl Dngr □Frstbte10 □TShltr Dgr □Frstite30 □Frostbite □Frstbte5	□Trvl Dngr □Frstbte10 □TShltr Dgr □Frstite30 □Frostbite □Frstbte5	□Trvl Dngr □Frstbte10 □TShltr Dgr □Frstite30 □Frostbite □Frstbte5

3. Wind Speed / Direction

Report wind speed in ***knots to air crews;*** km/h to all others.

			Sunrise	Mid-Afternoon	Sunset
3.1	Average	Get 3 readings & average	km/h knts	km/h knts	km/h knts
	Gusts	Record highest gust	km/h knts	km/h knts	km/h knts

Wind Speed Guidelines for Helicopter Flight Operations

10 knots / 18.5 km/h ideal; OK to fly

Above 45 knots / 83 km/h; No flights.

Gusts above 20 knots/ 37 km/h: No flights

Max tailwind 5 knots/ 6 km/hr: No take off

			Sunrise	Mid-Afternoon	Sunset
3.2	Steady Wind Direction	Circle direction steady **wind comes FROM**	N NE S SW E SE W NW	N NE S SW E SE W NW	N NE S SW E SE W NW
	Variable Wind Direction	Circle 1 or more directions **wind comes FROM**	N NE S SW E SE W NW	N NE S SW E SE W NW	N NE S SW E SE W NW

4. Sky Conditions

			Sunrise	Mid-Afternoon	Sunset
4.1	Cloud Cover	Use Definitions in Cloud Cover Table	□ Clear □ Cloudy □ Scattered □ Overcast □ Broken	□ Clear □ Cloudy □ Scattered □ Overcast □ Broken	□ Clear □ Cloudy □ Scattered □ Overcast □ Broken
4.2	Cloud Base Ht (Loc Rel) m	Relative to local Mtn m AMSL	□ Clouds above mtn □ Clouds at mtn top □ Clouds below mtn	□ Clouds above mtn □ Clouds at mtn top □ Clouds below mtn	□ Clouds above mtn □ Clouds at mtn top □ Clouds below mtn
		DewCal (2.1-2.5)/9.8x1000m	m AGL	m AGL	m AGL

Use local mountain of known elevation (above mean sea level) and report clouds above, at, or below mountain top.

Min. flight altitudes: ***Day*** *= 160m AGL ;* ***Night*** *– 500 m AGL ;* ***Low cloud ceiling*** *= No flights*

				Sunrise	Mid-Afternoon	Sunset
4.3	Cloud Type	High	Vertically Developed	□ Cirrus □CuNim	□ Cirrus □CuNim	□ Cirrus □CuNim
		Middle		□ Altostrat □ Altocum	□ Altostrat □ Altocum	□ Altostrat □ Altocum
		Low		□ Stratus □ Cumul	□ Stratus □ Cumul	□ Stratus □ Cumul
				□ Nimstrat	□ Nimstrat	□ Nimstrat
4.4	Rainfall	Measure at 0900 hrs each morning. Report amount for last 24 hrs				mm
4.5	Visual Range (Visibility)	Name of 3.2 km mark		□ more □ less than □ Rain □ Fog □ Haze □ Smoke	□ more □ less than □ Rain □ Fog □ Haze □ Smoke	□ more □ less than □ Rain □ Fog □ Haze □ Smoke
		Name of 5 km mark		□ more □ less than □ Rain □ Fog □ Haze □ Smoke	□ more □ less than □ Rain □ Fog □ Haze □ Smoke	□ more □ less than □ Rain □ Fog □ Haze □ Smoke

Helicopter minimum visibility: ***Day*** *= 3.2 km / 2 miles;* ***Night*** *= 5 km / 3 miles;* ***Low visibility*** *= No flights*

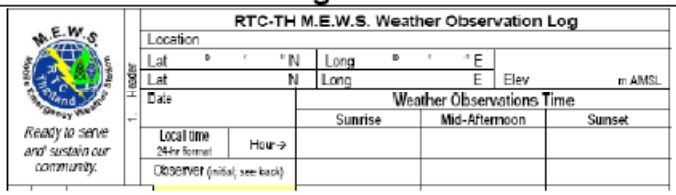
				Sunrise	Mid-Afternoon	Sunset
4.6	Severe Weather	Thunderstorms		□ Yes □ No	□ Yes □ No	□ Yes □ No
		Lightning	Flash, count secs to boom / 3	N NE E SE S SW W NW □ Yes km	N NE E SE S SW W NW □ Yes km	N NE E SE S SW W NW □ Yes km

Warn air crews of any severe weather in your area.

All weather observers write their initials and clearly print their name using block letters			

M.E.W.S. Summary Weather Observation Log Instructions

Header



Location: Local Place Name

Latitude, Longitude from GPS, survey records or map measurement.

Elevation: Survey records or map measurement (GPS elevations are not reliable).

Date/Hour: Use local Thai standard time in 24-hour format.

Observer: initials in box. Full name (print clearly) on top/back of form

Temperature / Relative Humidity

2.1 Air (Dry Bulb) Temp: Read thermometer kept in the shade, 1.5 m above the ground.

2.2 Wet Bulb Temp from hyrgrometer kept in the shade, 1.5 m above the ground.

2.3 Difference between Dry and Wet Bulb temperatures.

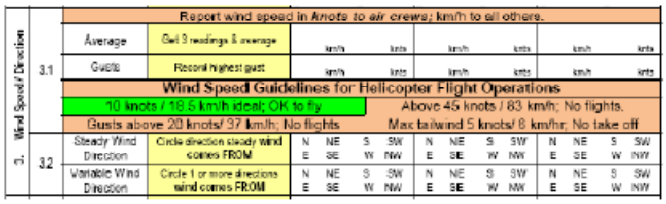
2.4 Relative Humidity: Use Dry Bulb Temp (2.1), Difference (2.3) and Relative Humidity table to find % Relative Humidity.

2.5 Dew Point Temperature: Use Dry Bulb Temp (2.1), Difference (2.3) and Dew Point Temp table to find Dew Point Temp.

2.6 Heat Stress Temperature: Use Dry Bulb Temp (2.1), % Relative Humidity (2.4) and Heat Stress Index Table to find Heat Stress Temperature and relevant advisory warning.

2.7 Wind Chill: Use the Dry Bulb Temp (2.1) and Wind Speed (3.1) and Wind Chill Table to find the Wind Chill Temperature and relevant advisory warning.

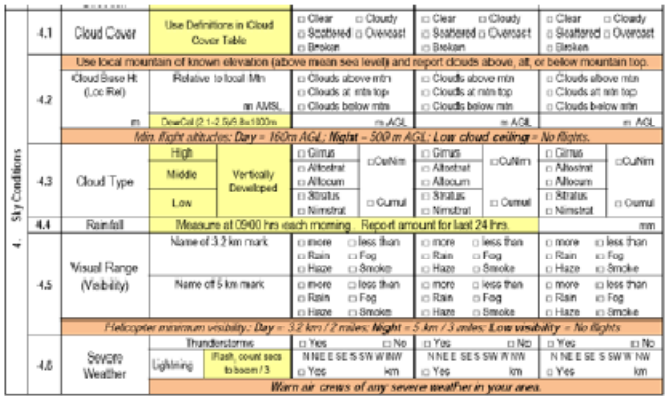
Wind Speed / Direction



3.1 Average and Gust Wind speeds: Use Beaufort Table or direct measurements 3 times and average results. Gusts are short, strong blasts of wind. *Report wind speeds in knots to air crews. Advise air crews when wind speeds are close to affecting helicopter flight operations.*

3.2 Steady or Variably blowing winds. If steady, circle letter for direction. If variable, circle all appropriate letters for directions.

Sky Conditions



Sky Conditions

4.1 Cloud cover: Look at the sky and follow the definitions for each cloud cover classification.

4.2 Cloud Base Height: If relative to a local mountain, give its name and elevation above mean sea level. Note Local Relief in meters. If using the Dew Point method, subtract Dew point temp (2.5) from Dry temp (2.1) and divide result by 9.8; multiply quotient by 1000m. *Advise air crews when cloud base height (ceiling) are close to affecting helicopter flight operations.*

4.3 Cloud Type: Check the appropriate box based on cloud description in the guide book

4.4 Rainfall: Measure water in rain gauge each day at 0900 hrs. Rain gauge should be in open area, away from tall objects, with top of gauge 50 cm above ground to avoid splash water from entering gauge.

4.5 Visual Range: Pick landmarks 3.2 km and 5 km from your observation site. Report when visual range is more or less than the known distances to these landmarks. *Advise air crews when visual range is close to affecting helicopter flight operations.* Check appropriate boxes for reasons of reduced visibility.

4.6 Severe Weather: Primary concerns and thunderstorms and lightning. Check the appropriate boxes. If lighting, watch for flash, count seconds until you hear the thunder, divide by 3 = approximate distance in km. Circle direction to storm.

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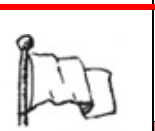
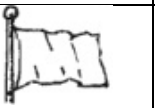
Beaufort Wind Table for Land Effects

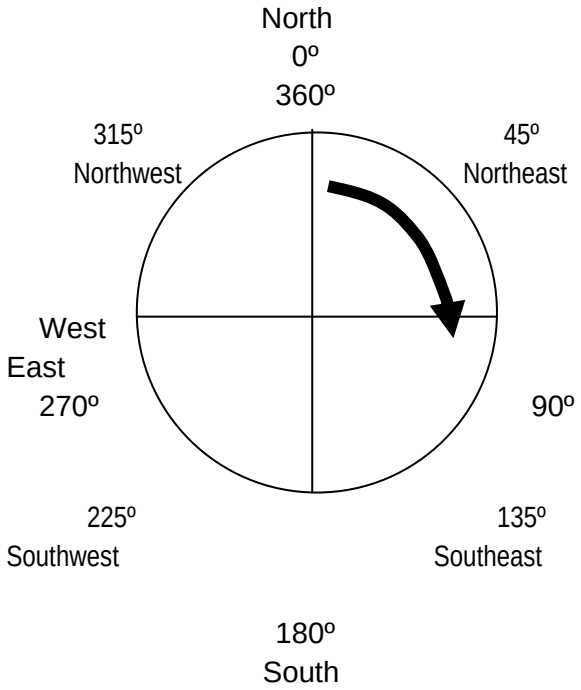
MEWS weather observers should set up a flag near their operating position. Use the Description and flag references to estimate the wind speed. Report the range of wind speeds from the chart rather than a specific number.

Description	Flag	WMO term	Mph	Km/ hr	Knots	Force	Psu lbs/sq ft (Kg/sq m)
			Report wind speed in knots to flight crews				
Calm; smoke rises vertically	---	Calm	<1.0	<1.5	<0.9	0	0.006266 (0.003059)
Smoke indicates wind; flag hangs limp, wind vanes do not move		Light Air	1-3	1.5-6	1-3	1	0.02924 (.01428)
Wind felt on face, leaves rustle, flag stirs, wind vanes move		Light breeze	4-7	6-12	4-6	2	0.142 (0.6934)
		5 Knots maximum tailwind for helicopter take-off					
Leaves and twigs in constant motion; flag occasionally extends		Gentle Breeze	8-12	12-20	7-10	3	0.3759 (1.835)
		10 Knots ideal for helicopter flight operations					
Dust and paper fly; small branches move; Flag flaps		Mild Breeze	13-18	21-29	11-16	4	0.8145 (3.977)
Small leafy trees begin to sway; white crested wavelets appear on lakes/ponds; Flag ripples		Fresh Breeze	19-24	30-39	17-21	5	1.504 (7.342)
		20 Knots maximum gusts for helicopter flight operations					
Large branches move; wires whistle; umbrellas hard to use; Flag snaps		Strong Breeze	25-31	40-50	22-27	6	2.485 (12.13)
Whole trees sway; hard to walk; Flag extended		Near Gale	32-38	51-61	28-33	7	3.822 (18.66)
Twigs and small branches broken; cars veer on roads; Flag tatters		Gale	39-46	62-74	34-40	8	5.597 (27.33)
Slight structural damage occurs (roof shingles blow off)		Strong Gale	47-54	75-87	41-47	9	7.769 (37.93)
		45 Knots maximum winds for helicopter flight operations					
Trees broken or uprooted, considerable damage to buildings		Storm	55-63	88-101	48-55	10	10.53 (51.39)
Wide spread damage caused	---	Violent Storm	64-72	.02-114	56-63	11	13.78 (67.3)
	---	Hurricane	>73	>115	>63	12	>13.78 (>67.3)

Disclaimer: Use of the pressure data to calculate tower/antenna wind loads is at your own risk. The RTC-TH and HSØZHM assume no liability for the use of this data. Pressure values are the upper limits for a wind category.

Wind Speed Conversion Table									
mph	km/h	knots		mph	km/h	knots		mph	km/h	knots
1	1.61	0.869		9	14.48	7.821		45	71.42	39.10
2	3.22	1.738		10	16.09	8.69		50	80.47	43.45
3	4.83	2.607		15	24.14	13.03		55	88.51	47.79
4	6.44	3.476		20	32.19	17.38		60	96.56	52.14
5	8.05	4.345		25	40.23	21.72		65	104.60	56.48
6	9.66	5.214		30	48.28	26.07		70	112.70	60.83
7	11.27	6.083		35	56.33	30.41		75	120.70	65.17
8	12.87	6.592		40	64.37	34.76		80	128.70	69.52
Report wind speeds in knots to air crews.										
Wind Speed Guidelines for Helicopter Flight Operations										
10 knots / 18.5 km/h ideal; OK to fly								Above 45 knots / 83 km/h; No Flights		
Gusts above 20 knots / 37 km/h; No Flights								Max tailwind 5 knots / 6 km/h; No take off.		
Advise air crews when wind velocities approach guideline limits.										

MEASURING WIND DIRECTION



Imagine you are standing in the middle of the circle in the picture on the left.

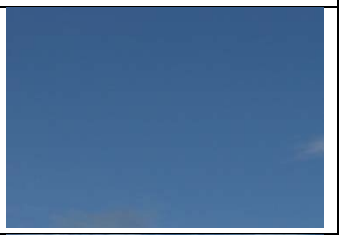
Step 1. Stand facing the wind (looking into the direction from which the wind is blowing).

Step 2. Aim the magnetic compass directly into the wind, but keep the compass level so the needle swings freely.

Step 3. Read off the azimuth angle in degrees ranging from 0º (starting at North) going clockwise around the circle or report the general name (e.g. North, Northeast, etc.)

Step 4. Change the azimuth number into the name of the direction using the table below. Ultra precision is not needed. The general direction is good enough.

Sky Condition: Cloud Cover Terms

	Clear Sky is blue with no clouds or very few small clouds.	
	Scattered Sky is blue, but small patches of clouds are present.	
	Broken Large patches of clouds, but patches of blue sky can be seen between the clouds.	
	Cloudy The sky is covered mostly with clouds and a few blue patches.	
	Overcast Clouds cover the sky; no patches of blue can be seen.	

MEWS Simplified Cloud Identification Chart

High **12,000 m to 6,000m**	 Cirrus	 Cirrostratus	**Vertically Developed** **12,000m to 500m**
	 Cirrocumulus	 Contrails	 Cumulonimbus
Middle **6,000m to 2,000 m**	 Altostratus	 Altocumulus	
Low **2,000m to Surface**	 Stratus	 Stratocumulus	
	 Nimbostratus	 Fog (ground level)	 Cumulus

Estimating Cloud Base Height: Identify cloud type; report Low clouds as 2000m, use lower limit for other cloud types.

Flight Advisories: Report flight advisory to air crews for the following conditions.

Low Clouds near or at l60m AGL (day); 500m AGL (Night). No flights if below these minimum limits.

Reduced Visibility: Smoke, dust, haze, fog reducing visual range to 3.2 km (Day) or 5 km (Night); No flights if below these minimum limits.

Severe Weather: Thunderstorms, lightning, heavy rain, excessive winds, or other weather extremes.

Code	**Name**	**Cloud Description**	**Altitude**		
			m	ft	
Ci	Cirrus	Delicate, wispy, feathery; streaky, stringy; slow moving; doesn't block the sun; mares tails—large ice crystals extending down	6,000 to 12,000	20,000 to 40,000	**High (Ice)**
Cc	Cirrocumulus	Thin sheets or closely packed small puffs without shadows; "mackerel" sky			
Cs	Cirrostratus	Whitish veil, usually fibrous; makes halo around the sun or moon.			
Ac	Altocumulus	Layer of separate cloud masses; fit closely in geometric pattern; blue sky visible between masses; white or gray on shaded side; associated with bad weather.	2,000 to 6,000	6,500 to 20,000	Middle
As	Altostratus	Extensive, eve, gray layer over entire sky; gray, smooth bottom; sun is a bright spot; associated with bad weather.			
St	Stratus	Dense, dark gray layer; uniform base	Ground to 2,000	Ground to 6,500	Low
Ns	Nimbostratus	Dense, dark gray layer with precipitation (rain or snow); thick enough to block the sun			
Sc	Stratocumulus	Distinct gray masses (long rolls, right angles to the wind and cloud motion) with patches of open sky, flat tops; often associated with fair or clearing weather; but snow flurries or rain are possible from individual cloud masses.			
Cu	Cumulus	White, wooly mass, flat base, lumpy top; gray or dark on shaded side or bottom; small clouds associated with fair weather.	300 to 1,525	1,000 to 5,000	Vertical Dev.
Cb	Cumulonimbus	White, anvil shaped top; very dark base; vertical dimension greater than horizontal; heavy rainfall, thunder, lightning, gusty winds, hail possible; strong updrafts	12, 000 to 300	40,000 to 1,000	

Thunder / Lightning

Step 1. Watch for lightning flash; count seconds (Time) until hearing the thunderclap.

Step 2. Use the reference table below or divide the Time (in seconds) from Step 1 by:

- 3 to get the distance in kilometers (km)
- 5 to get the distance in miles (mi)

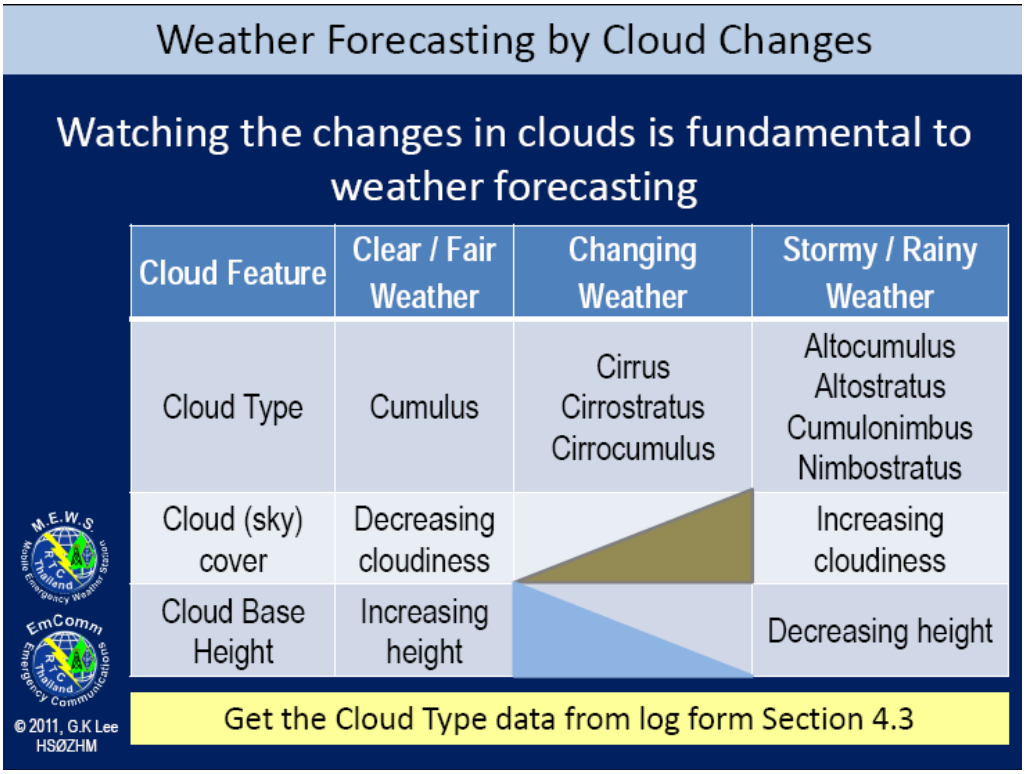
Lightning Hazard: When the flash and thunderclap are almost instantaneous, you may be in trouble. People have been struck by lightning 30 miles away from a thunderstorm.

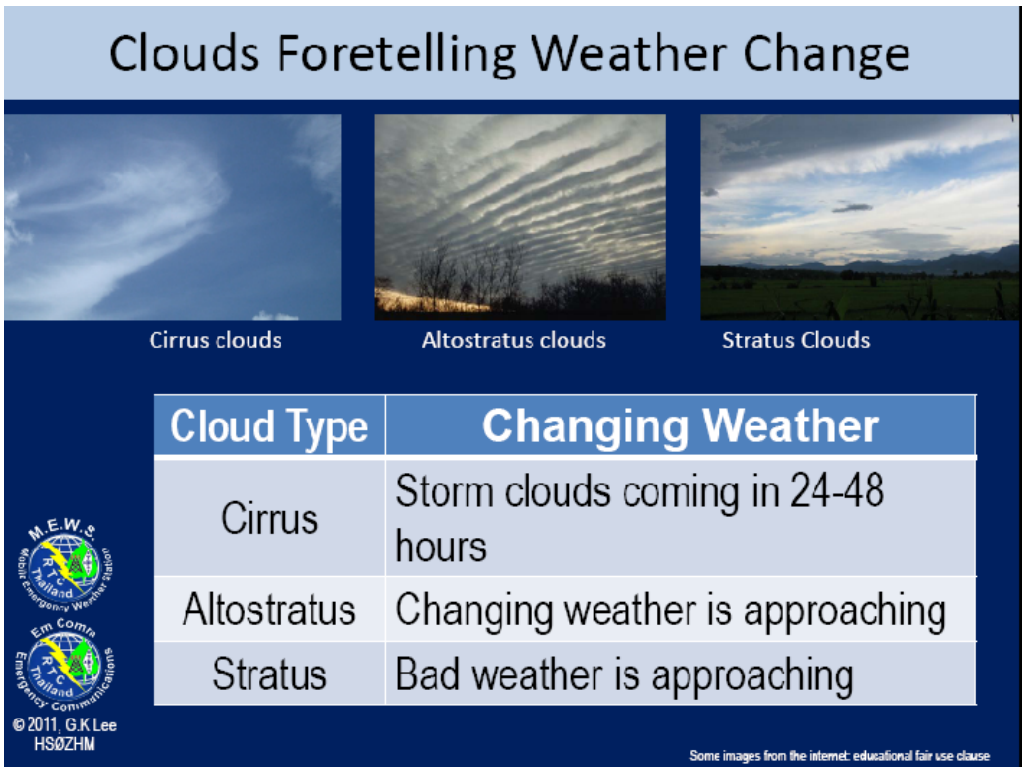
Report severe weather (e.g. thunderstorms and lightning) to all air crews.

# Seconds	km	mi	# Seconds	km	mi
1	0.33	0.20	11	3.67	2.20
2	0.67	0.40	12	4.00	2.40
3	1.00	0.60	13	4.33	2.60
4	1.33	0.80	14	4.67	2.80
5	1.67	1.00	15	5.00	3.00
6	2.00	1.20	16	5.33	3.20
7	2.33	1.40	17	5.67	3.40
8	2.67	1.60	18	6.00	3.60
9	3.00	1.80	19	6.33	3.80
10	3.33	2.00	20	6.67	4.00

Optional Basic Weather Forecasting with Clouds

Materials needed: • MEWS Simplified Cloud Identification Chart	• Completed MEWS Weather Observation forms for the previous 3 days (These must have Section 4.3 Cloud Typoe data.)
What to do: • Look for patterns of sequential change in cloud types	





Weather Forecasting by Cloud Observation

If the change is from Cumulus to Cirrus type clouds, there may be a change in 24-48 hours to possible stormy or rainy weather.

Cumulus Cirrus clouds Cirrostratus Cirrocumulus

Cloud Feature	Clear / Fair Weather	Changing Weather
4.1 Cloud cover	Decreasing cloudiness	Increasing cloudiness
4.2 Cloud Base Ht	Increasing height	Decreasing height
4.3 Cloud Type	Cumulus →	Cirrus Cirrostratus Cirrocumulus

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Weather Forecasting by Cloud Changes

If rain clouds are followed by Cirrus type clouds, fair / clear weather is 24-48 hours away.

Cirrus Cirrostratus Cirrcumulus

Altocumulus Altostratus Cumulonimbus Nimbostratus

Cloud Feature	Changing Weather	Stormy / Rainy Weather
4.1 Cloud cover	Decreasing cloudiness	Increasing cloudiness
4.2 Cloud Base Ht	Increasing height	Decreasing height
4.3 Cloud Type	Cirrus Cirrostratus Cirrocumulus ←	Altocumulus Altostratus Cumulonimbus Nimbostratus

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Clouds of Fair Weather

Cumulus clouds

Altocumulus clouds

Cloud Type	Fair Weather
Cumulus	When small and widely scattered
Altocumulus	Settled weather conditions

Rainy Weather Clouds

Cumulonimbus

Cumulus

Nimbostratus

Stratocumulus

Stratus

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Cloud Type	Rainy Weather
Cumulonimbus	Rain, lightning, thunder, heavy rain, hail possible.
Cumulus	Rain possible especially on hot summer days and when clouds get thick and dark
Nimbostratus	Rainstorm likely when dark gray clouds are low and widely cover the sky; drizzly rain.
Stratocumulus	When wide spread possible drizzly rain.
Stratus	Drizzly rain when clouds stretched out widely in calm flat layers.

Darker clouds are thicker and block more sunlight. Thicker clouds mean more vertical development which could mean more turbulence, rain, lightning, thunder.