Rural Training Center-Thailand Mobile Emergency Weather Station: Technical Paper



MEWS: Basic Level Introduction

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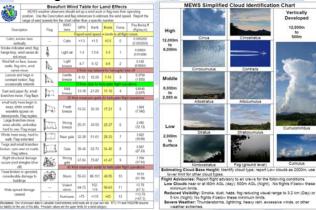
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MEWS (Mobile Emergency Weather Stat ion) is an emergency weather observing system operated under the RTC-TH EmComm (Rural Training Center-Thailand Emergency Communications) program. During times of local emergency, MEWS can provide on-scene weather observations and reports to emergency services and disaster relief agencies and responders.

Basic level observations use a minimum of equipment. This makes the system robust, reliable, and able to work in the basic chaotic environment of a disaster zone. The equipment can be carried in a backpack enabling transport to the site by foot, bicycle, motor bike or other means. No external or battery power is required. *Note*: As in many outdoor activities, a "buddy" system is highly recommended. It is often best to work in 2-person teams rather than to work alone. It is standard operating procedure to inform others of where you plan to go and when you plan to return, and possible alternative routes/places you would use for emergencies.





Basic equipment consists of a thermometer, magnetic compass, 3 basic reference charts.

Term	Amount of blue	Amount of cloud
Clear	Nearly all blue	Little or no clouds
Scattered clouds	Mostly blue	Some clouds
Broken clouds	Big blue patches	Mostly clouds
Cloudy	Some blue	Mostly clouds
Overcast	Little or no blue	Nearly all clouds

The Basic MEWS equipment is show above and to the left. Some optional equipment can be used to enhance the Basic level observations. These are shown below. However, these are NOT required to make Basic observations.

Basic MEWS observations are recorded and reported following the standard MEWS format. [*Note*: Gray areas block out the areas of the form NOT used by a Basic level observer.] One of the important functions is providing

on-scene flight weather conditions to emergency relief air crews.









Optional Equipment include an umbrella, a flag or wind streamer, local area topgraphic maps and binoculars

The Basic observations are:

- Measured temperature
- Estimated Wind speed
- Estimated Wind direction
- Estimated Cloud cover
- Estimated Cloud-base height
- Cloud type
- Estimated Visual Range
- Severe Storms

These observations do not require calculations. These observations do not replace standard aviation weather stations and observers. In many disasters, there may be no weather reports available inside the disaster zone. So although these observations are subjective, the weather data can be useful for air crews and for emergency relief planning and coordination.

The Observation form is designed as a teaching aid and guides the observer as to how to make the observations. With a minimum amount of training (~2-3 hours), Basic MEWS observers can be ready to work. The ideal situation is to

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have 2 Hams (licensed amateur radio operator) trained for Basic MEWS duties. Alternatively, a MEWS observer could team up with a Ham.

MEWS training is available to any interested community volunteer free of charge. There is no minimum age requirement. The training can be done in small groups or over the internet (e.g. via email, skype, or Echolink) or on the air with Hams. There is no minimum age requirement. The training can be done in small groups or over the internet(e.g. via email, skype, or Echolink) or on the air with Hams. Materials can be downloaded and printed. There are 8 Basic MEWS lessons in PDF slide shows so learners can work at their own pace. Observers would print their own supply of forms or keep notes on plain paper referencing the data block numbers on the standard MEWS form.



Temperature measurements are made with a thermometer in the shade. In an emergency, use an umbrella for shade.

valuable service in times of an emergency. For school children, the added benefit is the opportunity to apply their classroom lessons in math and science to the real world. This could be a first step to a future job.

community and contribute to providing

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Wind speed is estimated by observing the environment, then using a reference chart. Wind direction is estimated by local knowledge of the basic directions.



Term	Amount of blue	Amount of cloud	
Clear	Nearly all blue	Little or no clouds	
Scattered clouds	Mostly blue	Some clouds	
Broken clouds	Big blue patches	Mostly clouds	
Cloudy	Some blue	Mostly clouds	
Overcast	Little or no blue	Nearly all clouds	

Cloud cover is estimated by looking at the sky and using the standard terms in a reference chart



Identifying the cloud type gives a general estimate of cloud base height.

The use of simple reference charts helps make subjective observations more consistent. The charts use systematic categories/labels which are common in weather reporting.

Repeated practice in making observations improves observer performance. This makes MEWS training an on going effort.



Estimating visual range is based on local knowledge of land marks and features or from map measurements.



Severe weather observation reports use the "flashboom" method to estimate storm distance.

The simplicity of the Basic MEWS set up lends itself to rapid deployment by various no tech / low-tech methods and provides a highly robust system capable of functioning in areas of utter devastation. The weakest links in the Basic MEWS equipment are the thermometer and magnetic compass which could be lost or broken. Of the two, the thermometer is the hardest to replace, so a back-up/replacement is a good idea. Local knowledge of the main directions (e.g. North, South, East, and West) is sufficient to Basic MEWS observations and reporting.

To arrange for Basic MEWS training, contact Greg Lee rtc2k5@gmail.com



Sparky is slow, has limited range, and may encounter obstructed roads and limited fuel/energy supplies.



A motor-bike MEWS observer is faster, can get around some types of obstacles, but limited by fuel availability



A bicycle-MEWS observer is slower than a motor bike but A backpack pedestrian-MEWS observer is slower but may can get to inaccessible areas and has no fuel limits,.



be able to get to even more inaccessible locations.



School / shelter-based MEWS observers at a shelter (if students) are familiar with the area and close to family.



Home-based / home-bound MEWS observer at the window can actively contribute in an emergency.

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RTC-TH MEWS modified Beaufort Wind Table for Land Effects

MEWS weather observers should set up a wind sock or 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.

range of wind	a speeds from	n the chart ra	ainer ina	n a speciii	c numbe	er.	
Description	Flag	WMO term	MPH	Km/h	Knots	Force	Psu lbs/sq ft (Kg/sq m)
·		F	nt 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	1	Light air	1-3	1.5-6	1-3	1	0.02924 (0.01428)
Wind felt on face, leaves rustle, flag stirs, wind	B	Light breeze	4-7	6-12	4-6	2	0.142 (0.6934)
vanes move	" 34		5 Knts r	max tailwir	nd for he	licopter ta	ike off
Leaves and twigs in constant motion; flag		Gentle breeze	8-12	12-20	7-10	3	0.3759 (1.835)
occasionally extends	No.		10 Knts i	deal for he	elicopter	flight ope	rations
Dust and paper fly; small branches move; Flag flaps		Mild breeze	13-18	21-29	11-16	4	0.8145 (3.977)
branches move, i lag liaps	H -	20 Kn	ts maxin	num gusts	for helic	opter fligh	nt operations
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)
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		Strong gale	47-54	75-87	41-47	9	7.769 (37.93)
off)	75 55	45 Kn	ts maxin	num winds	for helic	opter fligl	nt operations
Trees broken or uprooted, considerable damage to buildings	W. San	Storm	55-63	88-101	48-55	10	10.53 (51.39)
Wide spread damage		Violent storm	64-72	102- 114	56-63	11	13.78 (67.3)
caused		Hurricane	>73	>115	>63	12	>13.78 (>67.3)
Disclaimer: Wind pressure values	are the unner	limits for a wind	Leatenory	Lise of the	wind nres	sure data to	n calculate

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

Table of Cloud Cover Terms Amount Amount Term of of blue cloud Little or Nearly all Clear blue clouds Scattered Mostly Some clouds blue clouds Broken Big blue Mostly clouds patches clouds Mostly Cloudy Some blue clouds Nearly Little or no Overcast all blue clouds

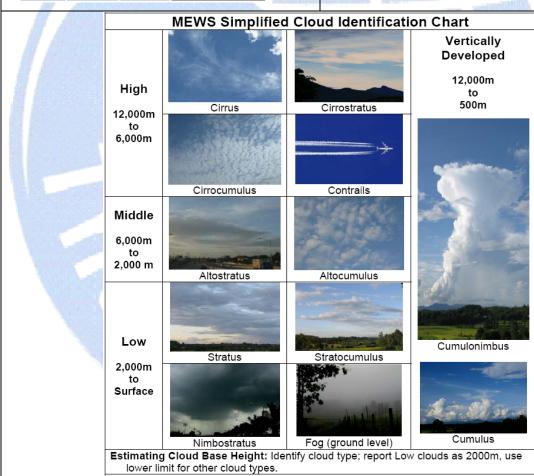
Flash / Boom Storm Distance Estimation

Use this method to estimate the distance to a thunderstorm.

- Immediately upon seeing a flash of lightning, count the number of seconds until you hear the boom of the thunder.
- Divide the number of seconds by 3 = km estimated distance to the storm

When the flash and boom are almost instantaneous, you may be in big trouble.

People have been struck by lightning 56+ km away from a thunderstorm.



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

Low Clouds near or at I60m 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.