

Rural Training Center – Thailand (RTC-TH)



**Community-based Environmental Education
for the Self-sufficiency and Sustainability of
Small Rural Family Farms**

Grassroots Emergency Communications Operations

Non-Radio Ground-to-Air Signals

#1 What a Spotter Looks For



Rural Training Center-Thailand Emergency Communications

This is an RTC-TH EmComm GECO presentation

GECO stands for Grassroots Emergency Communications Operations. It is an all volunteer people-to-people effort to provide information about emergency communications to those living in remote rural areas. In most cases the lessons can be self-taught or adapted to elementary school students. The idea is to use GECO to also help improve rural education.



The Non-Radio GTA Signals Series

A three part series about non-radio ground-to-air signals for emergency communications.



These methods can be used to communicate with aircraft when no GTA radio is available or when radio equipment fails.



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Learn more about the RTC-TH in Note#1 after this presentation.





Educational Note

This presentation is formatted for individual study or viewing on a single computer screen by a few people.



Photo courtesy of NZYLA

If showing this presentation to a larger group, a narrator must be available to read some of the slides with text which may not be legible to the majority of the audience.



About This Lesson

This lesson will teach you some basics of air search spotting. You can use this knowledge to better attract the attention of rescue aircraft searching for you.



Assumptions

- When disaster strikes in remote areas, helicopters may be the first outside help to arrive.
- This lesson assumes you have no radio, but rescuers know your general location (+/- 10 Km).
- Air search aircraft fly about 330-1000 m AGL in the search area.
- They may fly ~150-270 m AGL for a closer look; they have 15 minutes to see you.



If these don't apply to you, this lesson may not be very useful.



Assumptions



- Preparing for disasters can help speed your rescue.
- Night flight operations are unlikely in remote areas (especially mountainous regions).
- Do not assume rescue authorities know how to get to you just because your village exists. Aircrews unfamiliar with your area may be involved in the operations.
- Some data pertain to Northern Thailand to illustrate practical examples. An appropriate substitution of your local data could adapt the examples to your locality.

If these don't apply to you, this lesson may not be very useful.



Disasters and Helicopters

When disaster strikes in remote areas, helicopters may be the first outside help to arrive.



Terrain & Vegetation Affect Seeing You

The shape of the land and the amount of vegetation cover affects what spotters can see

Selected General Probability of Detection (POD) for Small Targets from the Air

Aircraft search line spacing, atmospheric, visibility, and air speed affect these generalized values. Target contrast also plays a key role.

AGL (m)	Open, Flat	Mod. Trees/Hilly	Forested/Mountains
333	85%	60%	35%
233	80%	55%	35%
166	75%	50%	30%



Images from the Internet; educational fair use clause

Atmospheric visibility, search line spacing, search pattern, etc. affect POD.



Atmospheric Visibility

Factors affecting visibility are atmospheric particles and sun angle.



Helicopter pilots must see the ground to navigate and fly safely. Weather conditions in mountains changes rapidly. This increases the danger for flight crews.

Image from the Internet; educational fair use clause



Atmospheric Visibility

Northern Thailand Annual Patterns

From North Thailand Climate Data During 54 years (1951 - 2004)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Trop. Storms	-	-	-	-	5	2	9	17	23	15	1	-	72
Seasons	Winter		Summer			Rainy (SW Monsoon)					Winter (NE Monsoon)		
Ave Temp	23.1°C		28.0°C			27.3°C					23.1°C		
Temp Range	17.1-30.8°C		21.4-35.8°C			23.7-32.2°C					17.1-30.8°C		
Ext Temp	0.8°C		44.5°C			23.3-34.6°C					0.8°C		
Rainfall (mm)	105.5		182.5			952.1					105.5		
Thawangpha Rainfall (mm)	11.0	12.6	29.2	108.0	206.2	202.4	244.1	302.3	175.6	80.4	22.7	5.9	1400.04

Cloudy and rainy days can limit air operations.

In mountains, weather changes quickly over short distances. Remote areas may not have weather stations. Lack of local weather data in remote or disaster areas makes search and rescue work more risky. FFI: See Note #5 to learn about MEWS.

Atmospheric Visibility



Smoke and haze cover much of Thailand from Mar to Apr when farmers are burning to clear land for planting.



Atmospheric Visibility

Haze Relative to the Sun / Viewing Angle



Sun in front of spotter



Sun behind spotter

Air Spotters can see you easier if the sun is behind them but shining in your eyes. But that's good for your signal mirror.





Where the Spotters Sit



It depends on the aircraft type and size.
Helicopters vs. Fixed Wing



Images from the Internet; educational fair use clause



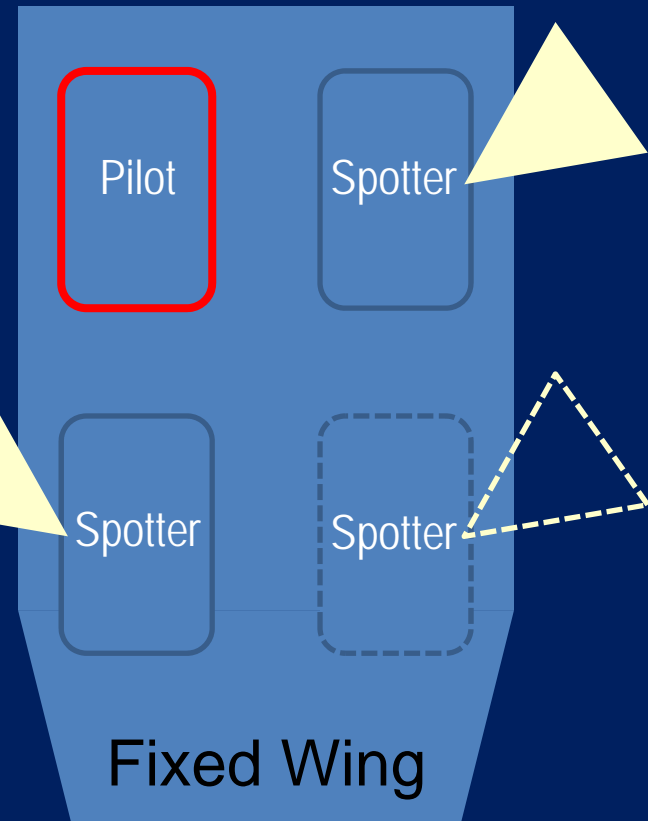
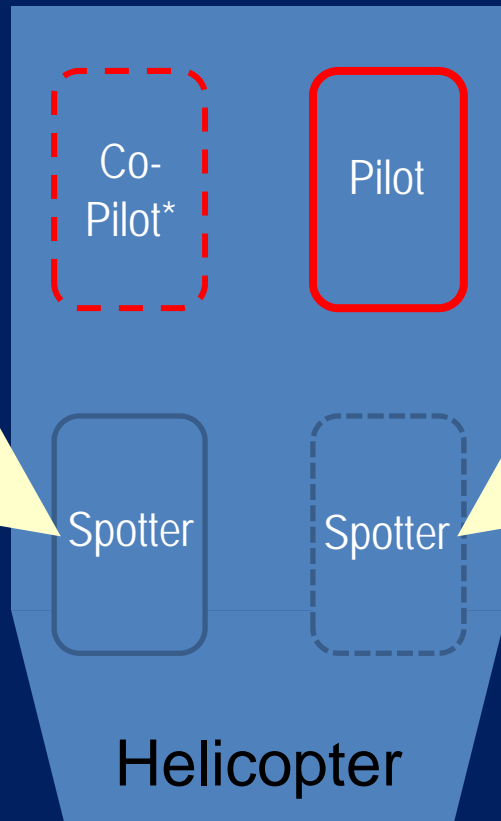
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Where the Spotters Sit

In most cases, the pilot does not do spotting work.
The general seating goes something like this.

*Some
allow pilot
to sit in left
or right
seat



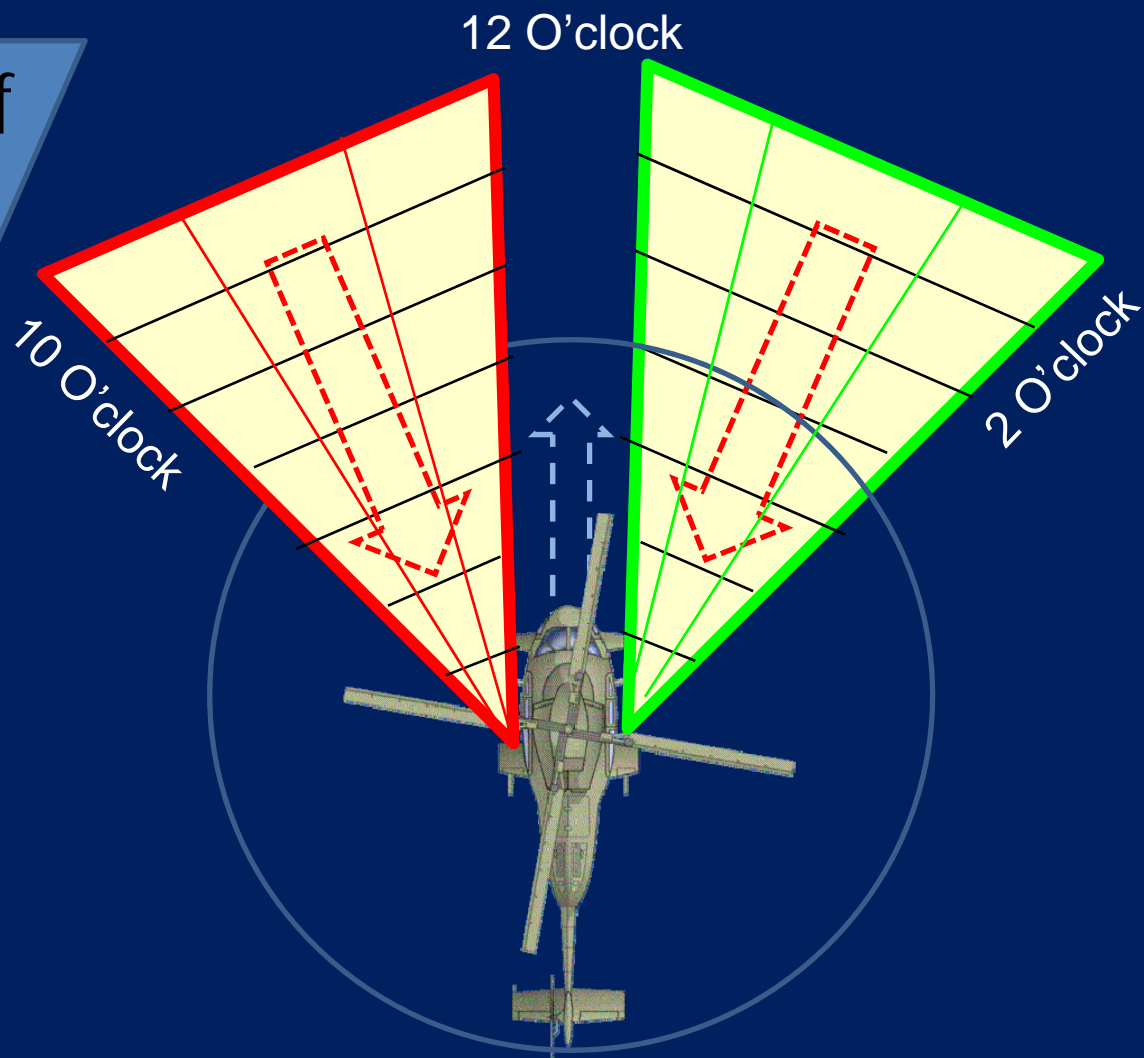


Where Spotters Look



Generally, spotters look forward along the flight path.

They divide the field of view into sections and scan the from the horizon to the aircraft



Where the Spotters Look

Generally, spotters scan from a high oblique angle to a low oblique angle.



High Oblique
(Horizon)

High Oblique
(Horizon)

Low Oblique
(No horizon)

Low Oblique
(No horizon)

**On smaller
helicopters,
crew cannot
see directly
below**



Where the Spotters Look

Generally, spotters scan from a high oblique angle to a low oblique angle.



High Oblique
(Horizon)

High Oblique
(Horizon)

Low Oblique
(No horizon)

Low Oblique
(No horizon)

Spotters on
the tail ramp
can see
directly below

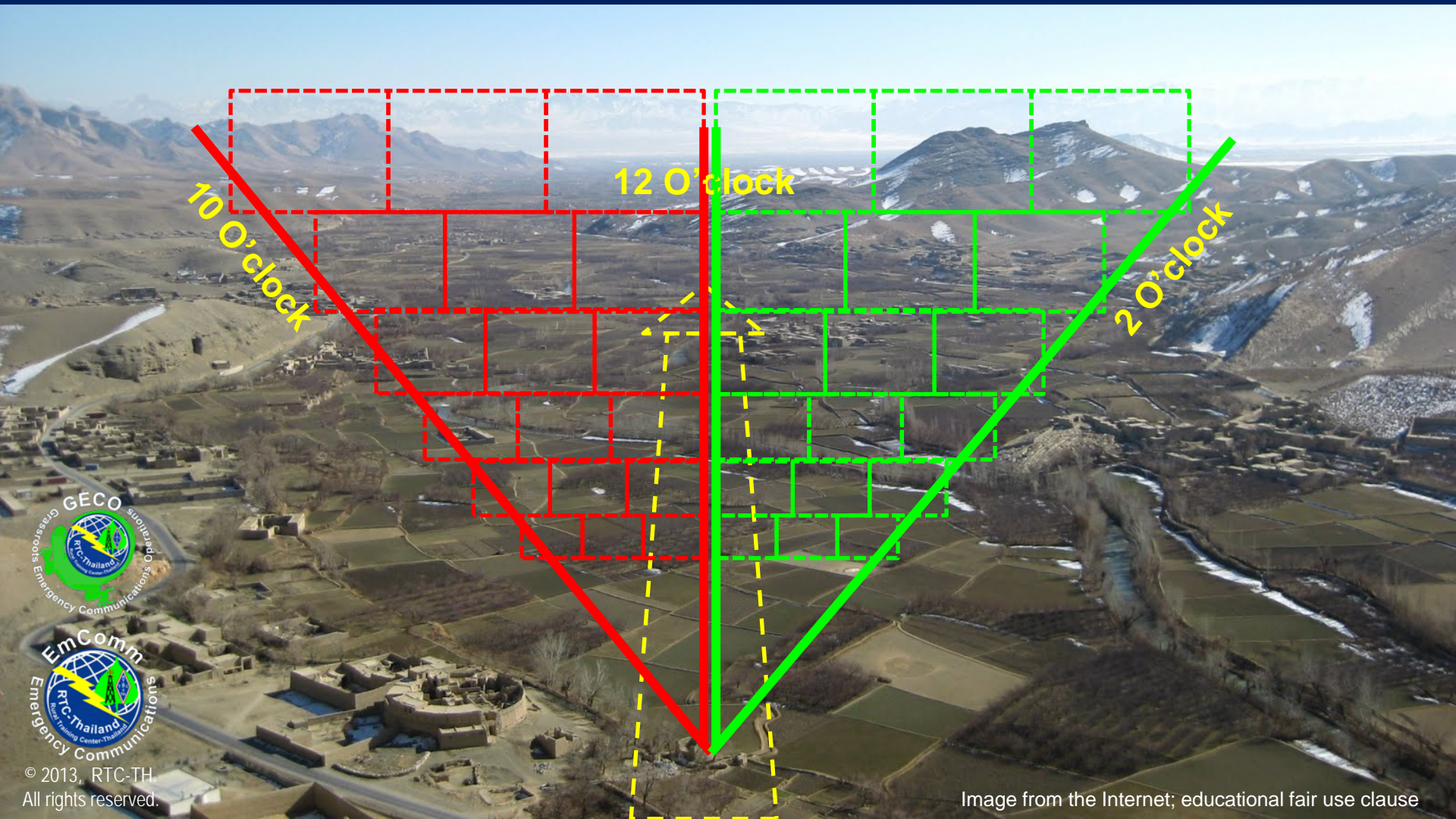




How Spotters Look



Each spotter breaks up the view into segments; pausing in each segment helps detect motion. The view covers smaller patches of ground closer to the aircraft.





What Spotters Hear / Can't Hear



Helicopters are very noisy. That's why the aircrew use headset / microphones to talk with one another.



Images from the Internet; educational fair use clause



The crew can't hear you shouting and screaming at them from the ground.

Air Search Flight Altitudes

Search aircraft usually fly 330-1000 m AGL in the search area.



Images from the Internet; educational fair use clause

They may fly about 150-270 m AGL for a closer look. This may give you a 15 minute window to be spotted.



What Spotters Look For



They generally know where your village is located, but the disaster could make it unrecognizable.

En route, spotters will look for:

- Long linear features (e.g. rivers, roads, trails) leading to your village
- The landmarks along the way.
- Smoke signals you make.
- Bright flashes from your mirror



Long Linear Features & Landmarks leading to your village



Image from the Internet; educational fair use clause

The human eye is drawn to long linear objects. Use this fact to your advantage. Describe your village location relative to a linear landscape feature.



To Increase Your Chance of Being Seen

Find a clearing along a linear feature



Smoke

(especially thick smoke in stark contrast to surroundings)



Images from the Internet; educational fair use clause

There are many reasons for smoke. Spotters use context clues to guess if it might be related to finding you.



To Increase Your Chance of Being Seen

Make a smoke signal when you hear aircraft in the area.



Green vegetation, oily rags, animal dung, used motor oil or a combination of these can make dense smoke to catch attention.

Be careful not to start a fire that become a threat to yourself and other survivors.

FFI: See Note #2 after the end of the presentation.

Bright Flashes

A flash from a small mirror can be seen 30+ km.



Images from the Internet; educational fair use clause

There are many causes for "flashes". But regularly repeated flashes do not normally occur in nature.



To Increase Your Chance of Being Seen

Learn to use a signal mirror



images from the Internet; educational fair use clause

When you hear an aircraft in the area, aim the mirror in its general direction

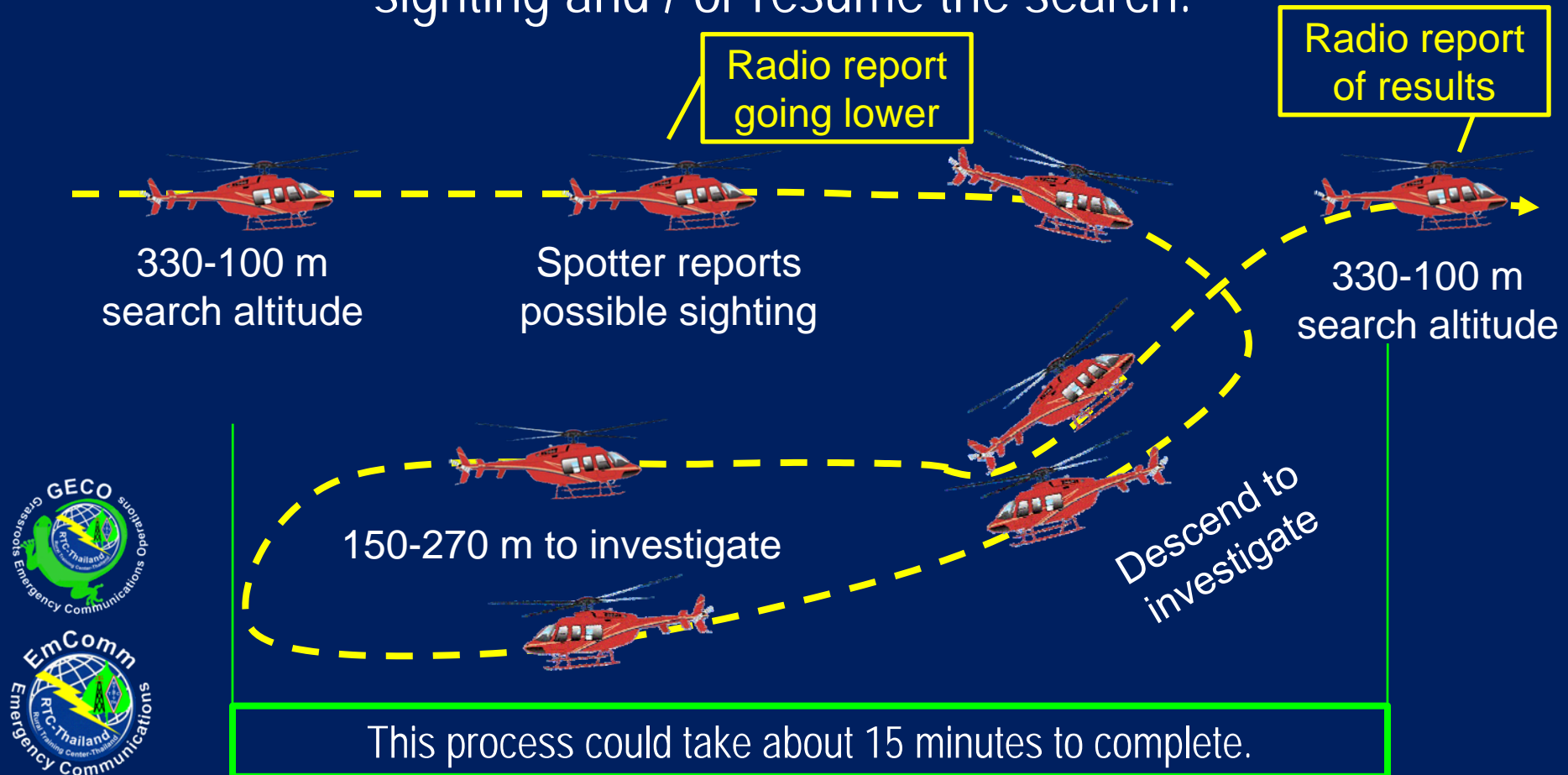
If on a high spot, sweep the horizon with mirror flashes even if you don't hear an aircraft.

FFI: See Note #3 after the end of the presentation.



Once They Spot Something of Interest

The spotter tells the pilot. They can make a lower pass to investigate. They then return to the normal search altitude to report a sighting and / or resume the search.



Closer Look at Objects Out Of Place to their surroundings

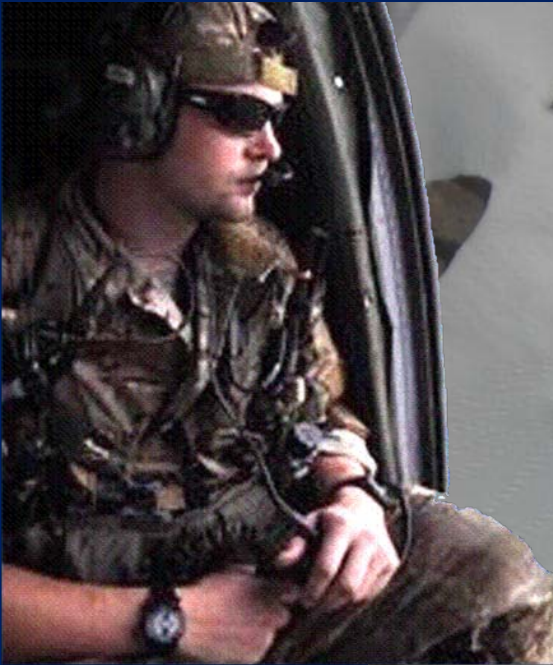


**Yes, that is an
airplane inside the
yellow circle.**



Distress Symbols

Make them high contrast to the background.



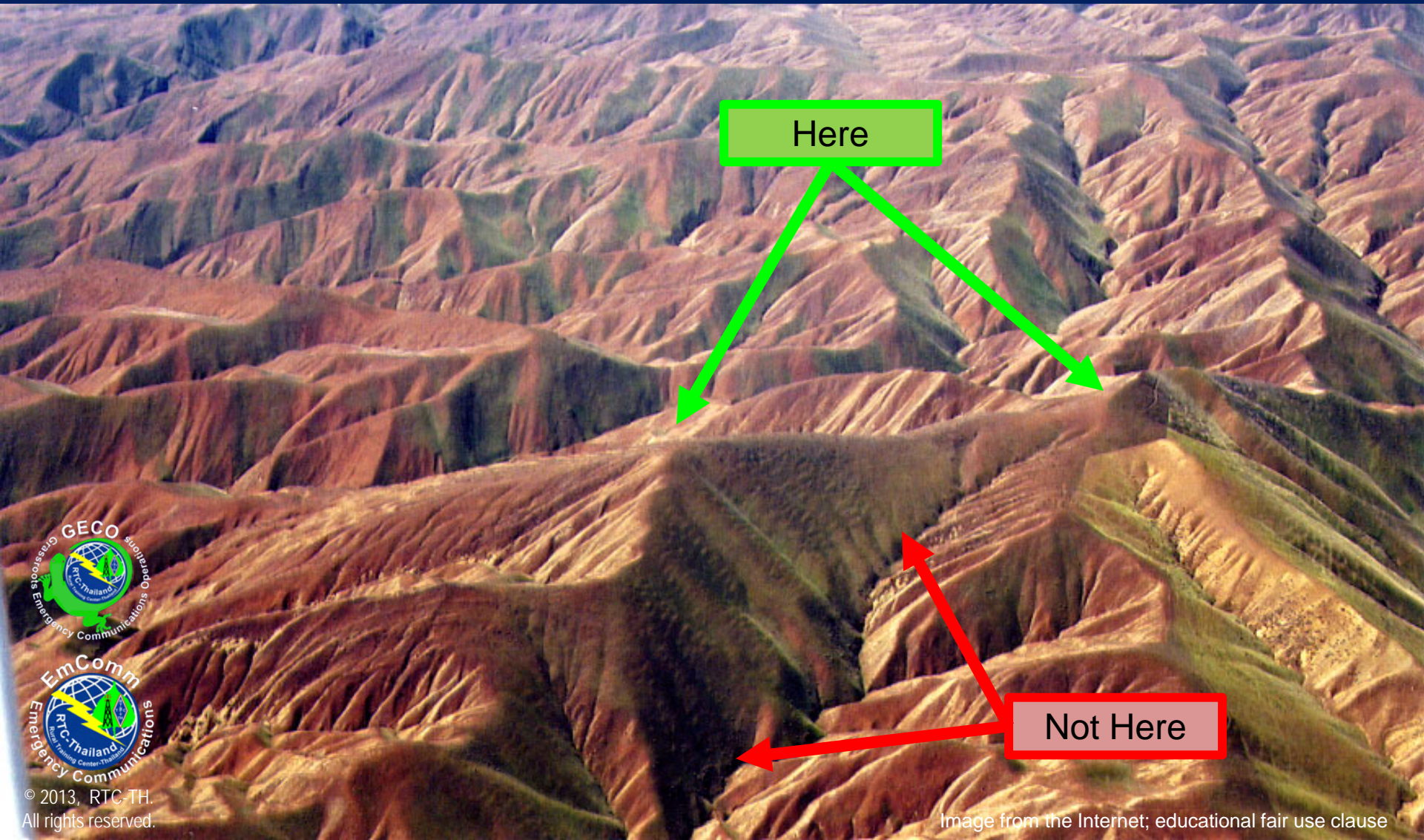
Images from the Internet; educational fair use clause

These need to be large to be seen. It is best to use smoke or mirror flashes to attract attention. Then the aircraft can descend for a closer at your symbol.



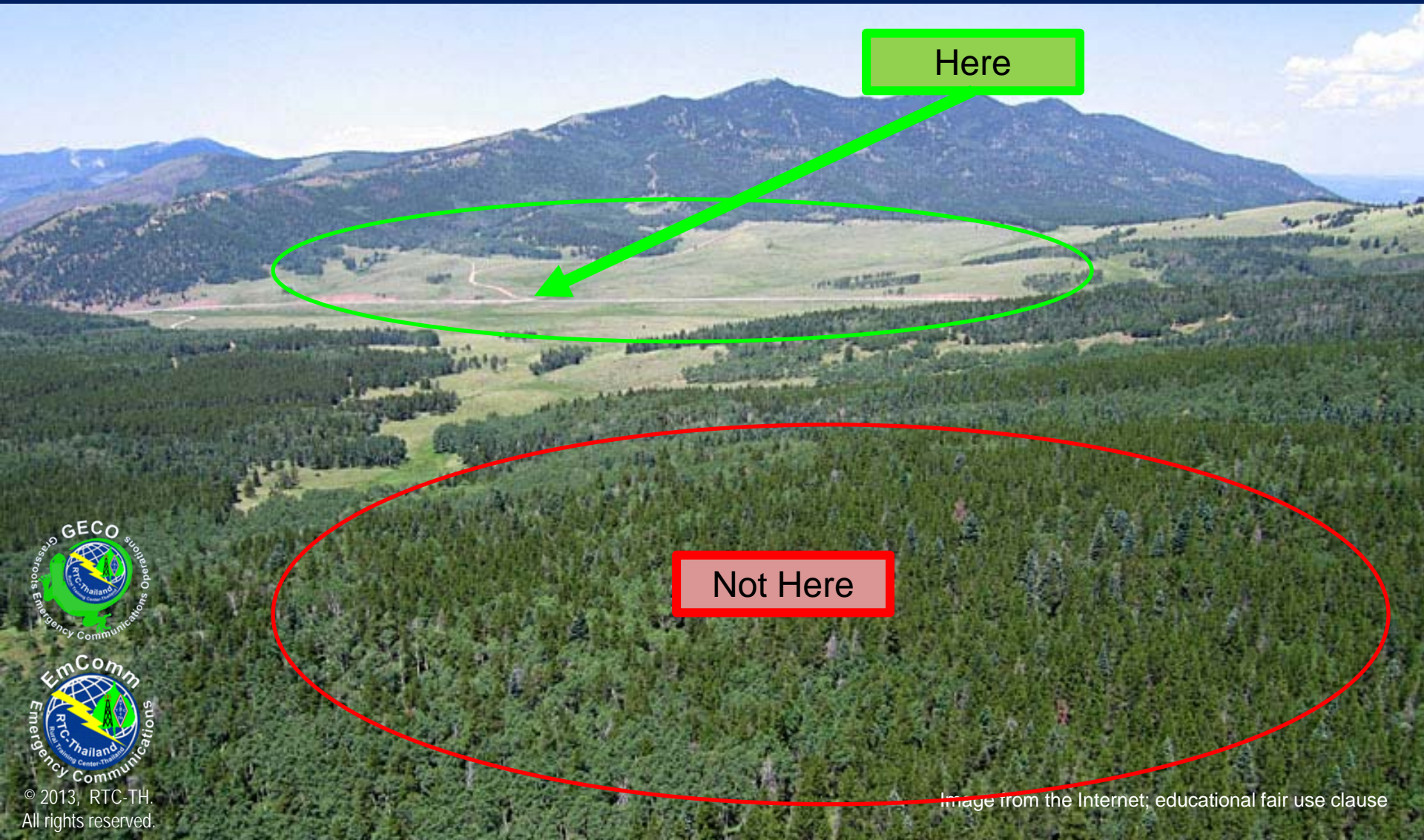
To Increase Your Chance of Being Seen

Get to high ground rather than low



To Increase Your Chance of Being Seen

Get in a clear open area

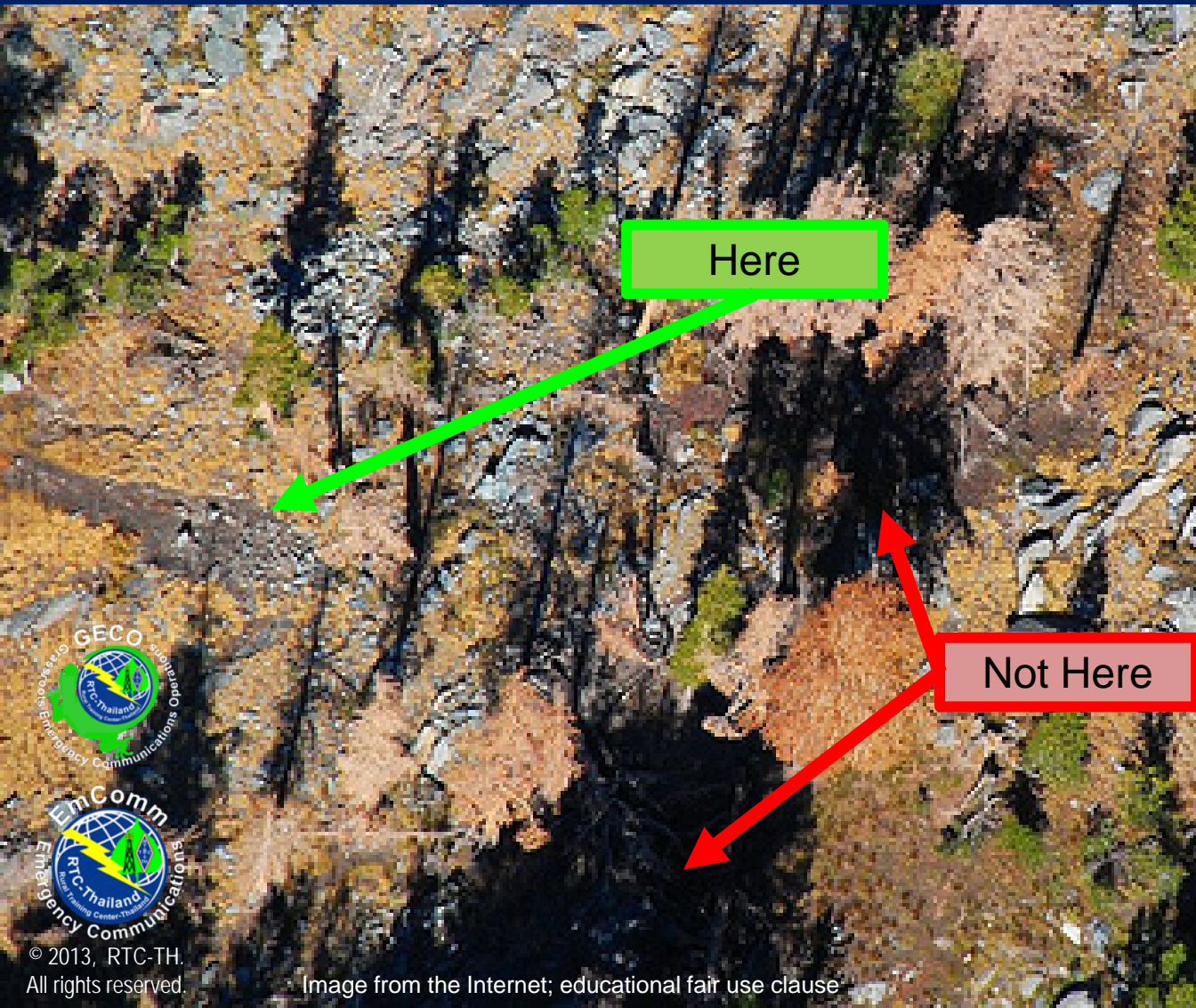


To Increase Your Chance of Being Seen

Avoid shadows

Shadow location and length / size change through the day.

Consider this carefully when deciding on your location for signaling or setting out ground symbols.



Avoid Areas of Orographic Turbulence

This is the general pattern

If windward surface is
Rough = stronger updraft
Smooth = weaker updraft

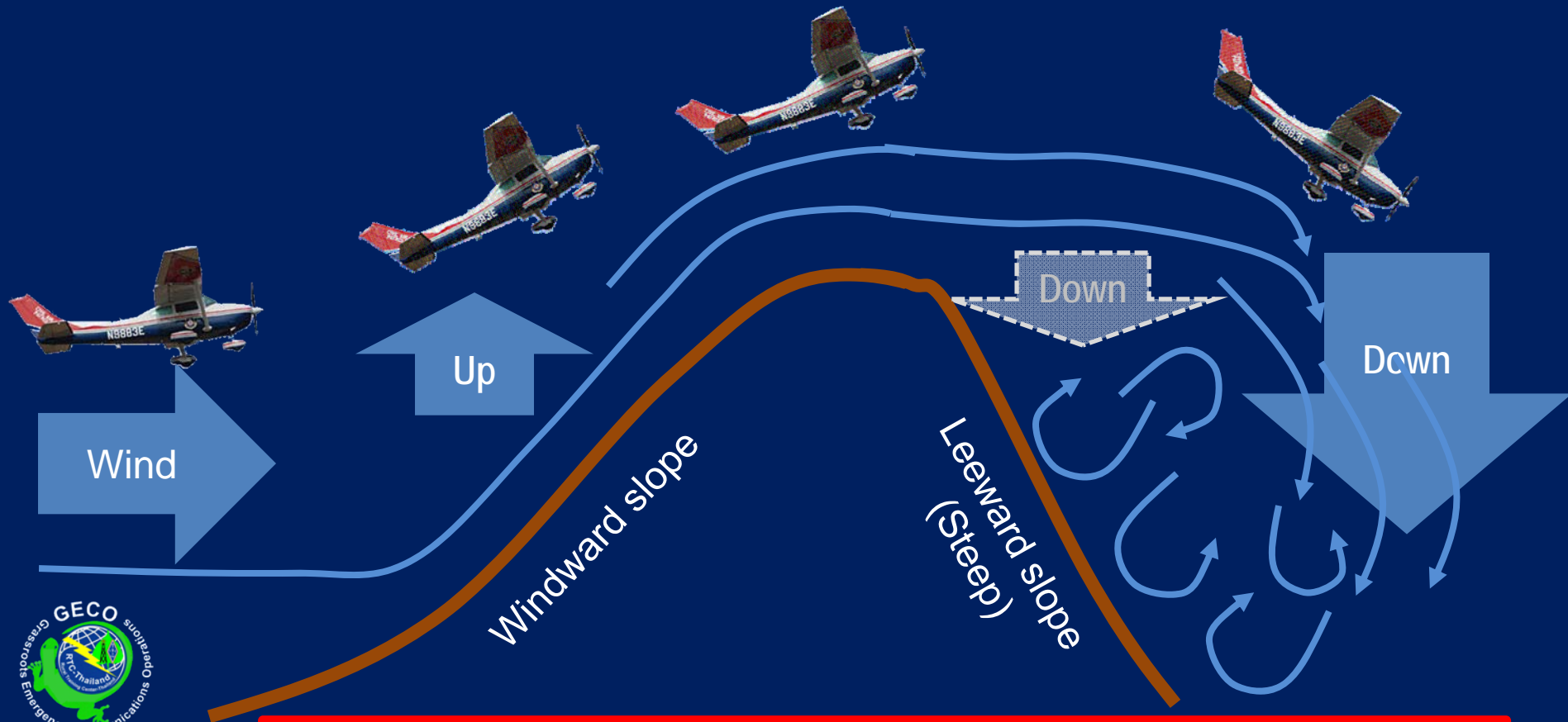


If they are looking for you, avoid leeward slopes if you can. Try to make it safer for aircrews searching for you.



Avoid Areas of Orographic Turbulence

Steep Windward Slope



If wind speed is 15-20 knots and the leeward slope is steep, the down draft zone could be 100 m past mountain crest



You Know How They Look, so You Know How to Be Seen

- From a distance, smoke or mirror flashes are more noticeable.
- When they come down for a closer look, use ground-to-air (GTA) symbols and signals to communicate



The Next Lesson in This Series

Grassroots Emergency Communications Operations Non-Radio Ground-to-Air Signals #2 Selected GTA Signals



Learn some selected basic non-radio
GTA signaling methods.



Questions or Comments

We are always trying to improve our lessons. Your constructive comments and suggestions are welcomed.

You may contact us by e-mail:
hs0zhm@gmail.com

Please tell us how you heard about us and the lessons of interest to you.



For More Information about RTC-TH EmComm Lessons



Contact
Greg Lee

RTC-TH Co-founder

Author / Mentor

Geography Professor Emeritus



Via E-mail
hs0zhm@gmail.com



Via Skype video
conference call: rtc_th

Lesson Archives: www.neighborhoodlink.com/RTC-TH_Tech/pages

FFI: Other *free* RTC-TH lessons see Note #19 after the end of this presentation.



Community-based Environmental Education for



The End

Continue past this slide to get to the Notes mentioned in the presentation.



Note #1: About the Rural Training Center-Thailand (RTC-TH)

We are an all volunteer organization providing community-based environmental education for self-sufficiency and sustainability of small rural family farms. We receive no government or outside funding.

We believe in what we do.

We spend our own money to do it.



www.neighborhoodlink.com/org/rtcth

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The Rural Training Center-Thailand was created to honor the life and memory of Mr. Tang Suttisan (a father of one of our co-founders), farmer and former custodian of Ban Na Fa Elementary School who appreciated and valued education.



The RTC-TH EmComm Program

is a volunteer effort to
provide emergency
amateur radio
communications for local
community self-sufficiency
and sustainability in times
of need.



E-mail: hs0zhm@gmail.com

The RTC-TH EmComm GECHO Program

is a volunteer effort to provide remote rural area hams without formal EmComm training a bare bones guide for single-handed emergency communications operations.



When disaster strikes, a lone rural hobbyist ham may suddenly become an “accidental” EmComm ham. GECHO strives to give the “accidental” ham some minimal systematic EmComm operating guide lines.

E-mail: hs0zhm@gmail.com



The Gecko in GECO



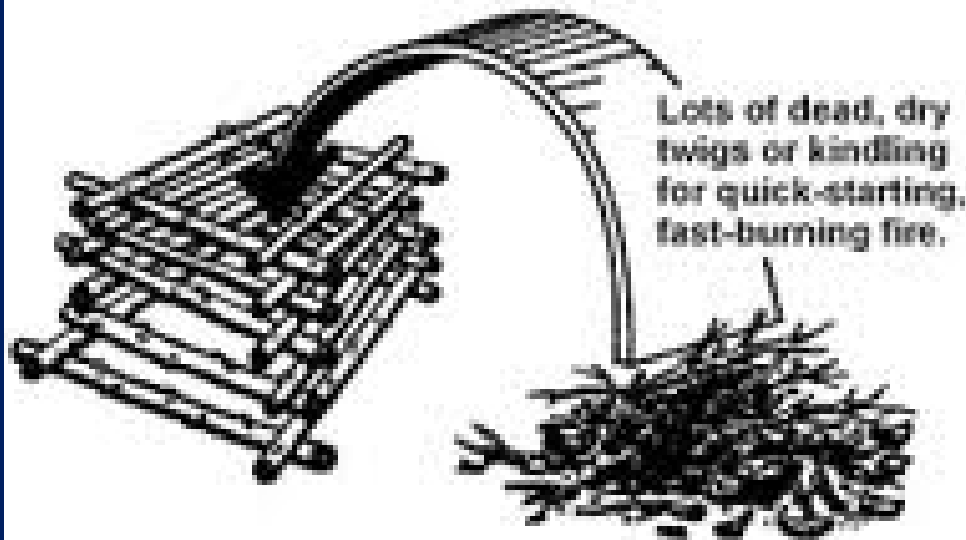
We admire the ability
of this lizard to cling
tenaciously to walls
and ceilings.

We hope grassroots
emergency
communication
operators will be
equally tenacious in
serving their
communities.





Note #2: Making Smoke



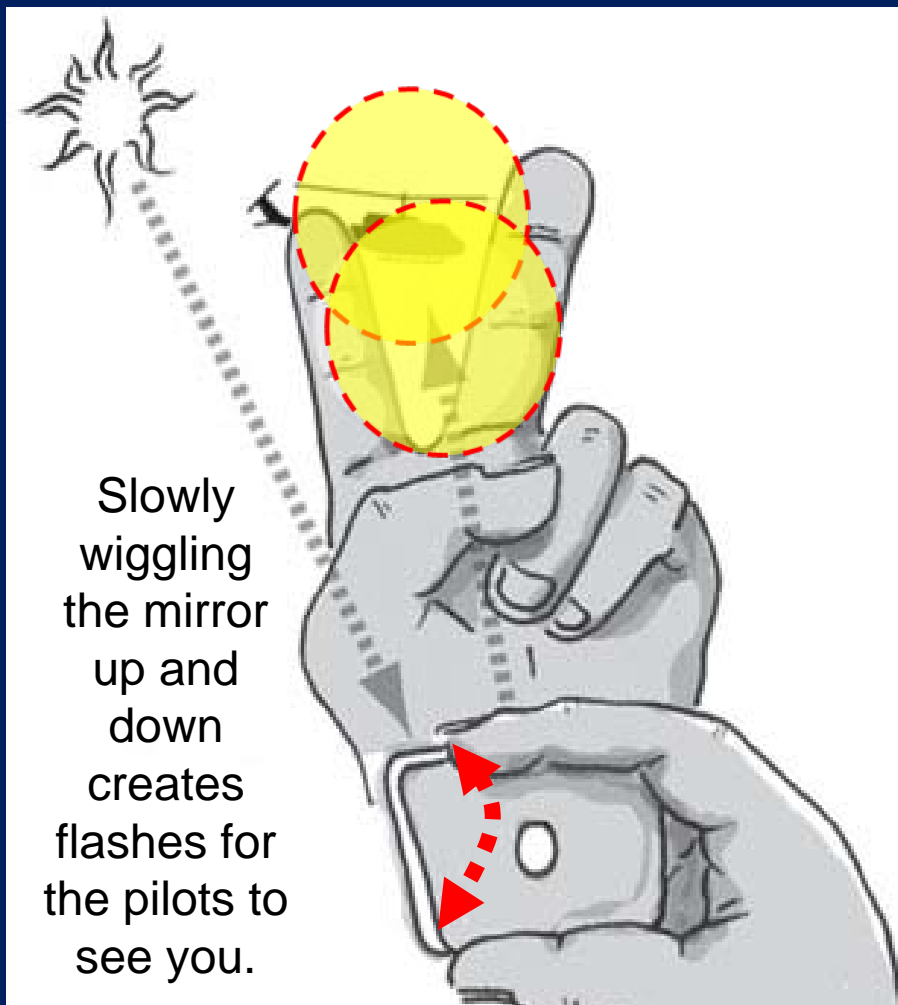
- Big amount of dry tinder
- Green vegetation, oily rags.
- Prepare ahead of time; stay close by; light tinder at first sound of an aircraft

Do not build signal fires within 90-120 m of a helicopter landing zone. Rotor downwash can blow embers and start accidental fires.





Note #3: Signal Mirror



Slowly wiggling the mirror up and down creates flashes for the pilots to see you.

Be careful not to blind the pilot when the aircraft is closer.

- Hold up one hand; make a "V" with two fingers.
- Sight the aircraft between your fingers.
- Reflect sunlight onto your hand; between the two fingers
- Shift the bright spot of light up and down your fingers aimed at the aircraft.





Note #4: Make Symbols



A bigger symbol is easier to see from the air.

- Make a large SOS using material in strong contrast to the background.
- The larger the symbol, the more material needed, and the longer to set it up.



Other Symbols You Can Make

- SOS is an internationally recognized distress symbol.
- Aircrews are trained to recognize other ground symbol codes.
(Learn more about GTA signal codes in the next lesson.)

Get copies of your GTA signals to local and regional emergency authorities so they know what your signals mean.



Note #5: Other Free RTC-TH Lessons

The Rural Training Center-Thailand has a diverse catalog of lessons for rural families at http://www.neighborhoodlink.com/RTC-TH_Tech/pages



Community-based Education:
Alternative learning methods for teachers, parents, students;



Applied Geography: Field survey methods for local villagers and students



Other Free RTC-TH Lessons

Save Our Individual Livelihood:
Lessons for the self-sufficiency and
sustainability of small rural family farms



Mobile Emergency Weather Station:
Systematic weather observations *from*
remote disaster sites to support relief
helicopter flight operations



GECO stations should seriously consider using MEWS.
It can also be useful for sustainable agriculture.



MEWS Lesson Series

Orientation



Basic



Advanced



The Emergency Preparedness Lesson Series

Completed and available



In Development

All lessons can be adapted to any location on Earth using the Geographic Systems Model.



Community-based Environmental Education for



The End

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