

Drone General Information and Safe Administration for Forest monitoring



Ministry of Forestry and Research

Created by: Forest Resource Management and Technical Services Division

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1. Introduction

Mainly two types

■ Rotary wing

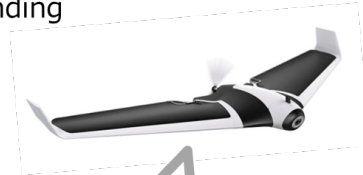
- Stable hover, enable adjusting camera angle
- No space required for landing
- Cannot fly long distance



Suitable for capturing imagery in small area
Multiple use

■ Fixed wing

- Fast speed and long distance flight
- Cannot hover
- Require space for takeoff and landing



Suitable for obtaining data for wide range of area

2. Definition of Drone

UAVs (Unmanned Aerial Vehicles), commonly called as “Drones” are aircrafts without a human pilot on board

- Originally developed for military operations
- Most civilian drones are smaller and have shorter range and maximum flight time than military drones
- Operation are usually done by radio-control
- Powered by engine or battery



3. Purpose of Drone

- Fly manually by remote control
- Fly programmed route automatically
- Take pictures with location
- Video Shootings
- Laser survey
- Pesticide Spraying

Being Used for...

- Aerial photography
- Land surveying
- Maintenance assessment
- Scientific research
- Product deliveries
- Agriculture

What can drones do?

Following product can be obtained from the Aerial image taken by the drone (requires 3D production software)

- 3D model
- Ortho-photo
- DSM
- Point cloud data



4. Advantages of Drones

- ✓ Remote sensing using drones has a range of benefits such as reduced costs, flexibility in time and space, high accuracy data and the advantage of no human risks
- Low operation costs
 - Aircraft is cheaper (2,000 ~ 30,000 USD)
 - A person can conduct for the operation
- Low operational risks to workers at the site
 - No need to enter inaccessible sites
 - Lower risk of accident (except Densely Inhabited District; DID)
- Quick implementation
 - It can fly as long as the permission of the flight is given and the weather is suitable

- Flexible operation
 - Variety of tools you can select from, depending on the purpose
- High quality data available for the target area
- Little influence of the cloud
 - Flight in lower altitude
- Can be used as a warning
- Effective visual promotion
 - Beautiful pictures/videos is worth thousand words



Parameters such as forest canopy cover and land use change, number of trees, volume estimation, vitality or composition of stands, are important parameters in forest planning and sustainable forest management. Quick and accurate determination of canopy cover can be reached using drone, leading to fast and better decisions that improve optimal quality and productivity of stands for sustainable forest management in the Solomon Islands.

5. Limitation of the Drone

- Law and regulation (different by countries)
 - Use of drone can be blocked/delayed by the military even if there are no regulation
- Cannot fly in rain and windy weather
 - Wind speed should be under 5 m/s
- Not suitable for obtaining data for large area
 - Flight time around 20 minutes and distance 500~700 m (rotary wing)
- Takes time for image analysis after shooting
 - Number of the image is a lot, as the imageries of small range is obtained in high resolution
- Only be able to obtain information from the above
 - Information of the small trees and underground vegetation cannot be obtained in the dense forest
 - Setting the camera to above angle enable shooting from below an object
- Requires open space for take off and landing
- Risk of crashing down and losing
- Requires repairs and maintenance

6. Establishment of Operational Capability

For safety drone operation in the Ministry, it is necessary to hold drone operational training and safety administration (especially the Solomon Islands drone regulations). The training practice and methods in this chapter is important as basic manipulation techniques. Drone operators should participate in training below depending on individual operational skill.

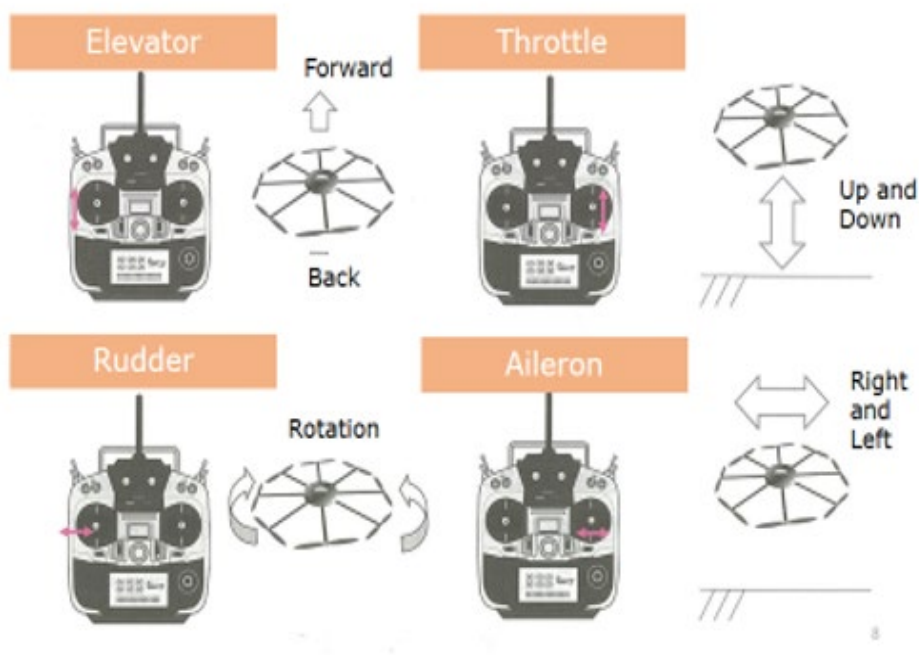
Beginner Training: Conduct drone training for beginners.

On-the-job Training: Conduct On-the-job drone training for operators who require the skills.

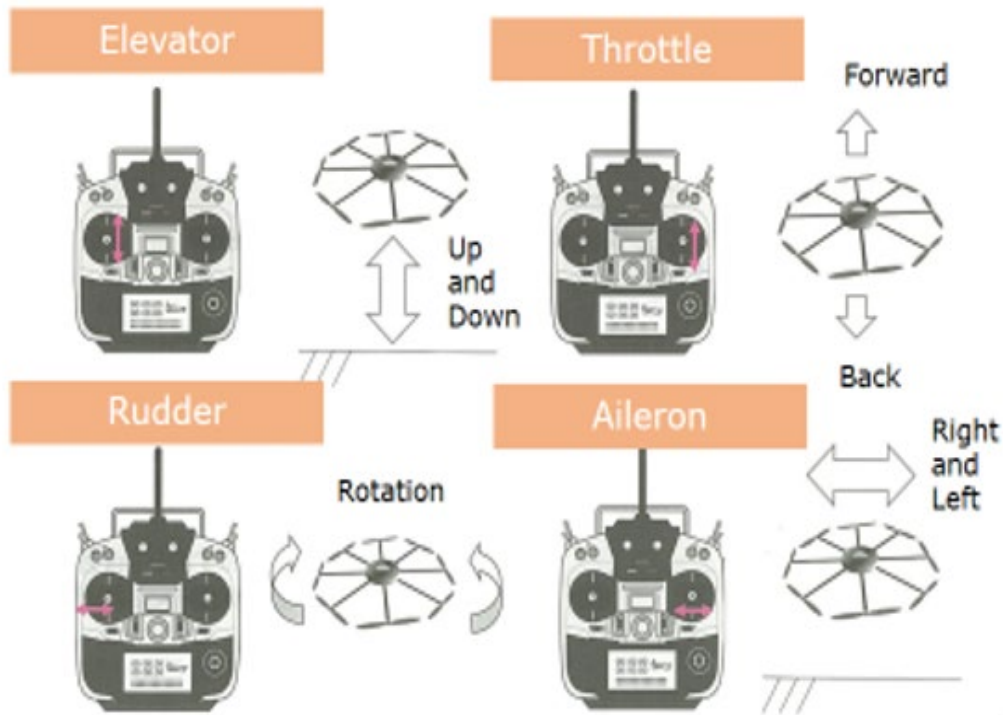
Follow-up Training: Conduct follow-up drone training for operators who require refresher training.

Drone manipulation mode

Mode 1



Mode 2



Practice 1: Takeoff and Landing

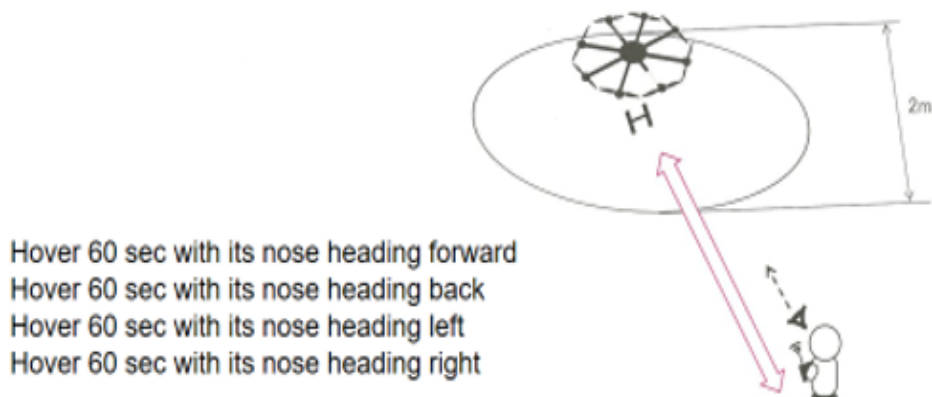
- ✓ Must take note that each practice needs to be done **carefully** and landing **smoothly**.



Practice 2: Rotation

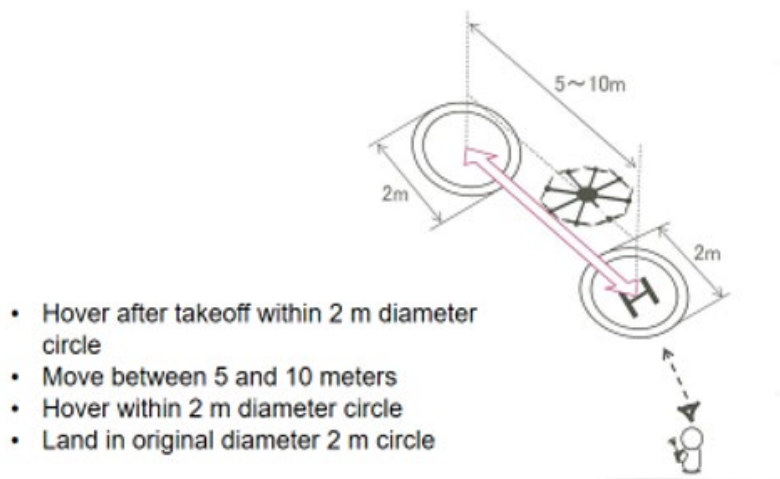
- ✓ This practice requires a drone pilot to stay **focus** and **concentrate**.





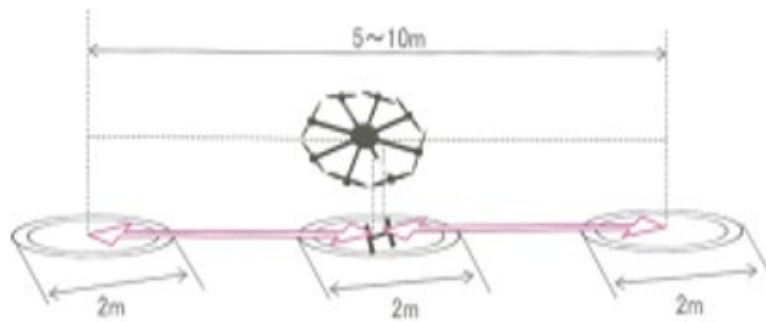
Practice 3: Forward and backward

- ✓ This practice requires visual sight to focus on the forward and backward movement of the drone with the surrounding environment/obstacle.



Practice 4: Left and Right

- ✓ This practice requires visual sight to focus on the left and right movement, to avoid hitting obstacles on both sides.



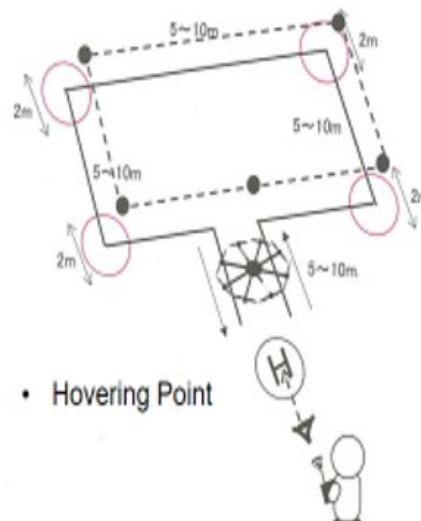
- Hover within 2 m diameter circle after takeoff
- Move 10 meters to left and right
- Hover within 2 m diameter circle
- Land in original diameter 2 m circle



Practice 5: Combination

- ✓ This combination involves all drone manipulation modes and practices from takeoff, hovering landing within an area of around 5m x 10m square meter in front.

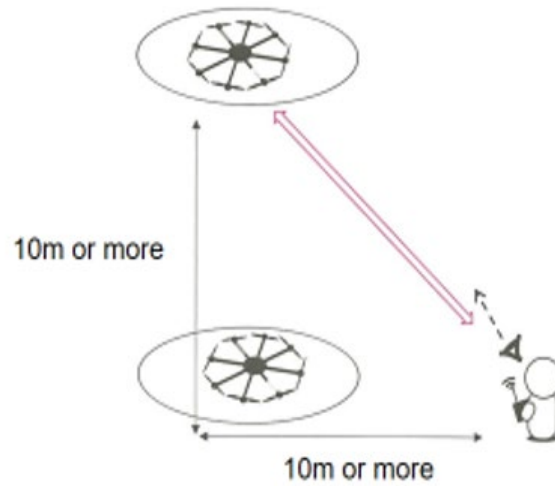
- Operate all the rudder and keep constant altitude.
- Always move toward the front around square of 5m x 10m
- Take off and land smoothly



Practice 6: Height.

- ✓ Hovering at different heights is important to produce smooth landing.

- Hover at height of the eyes
- Hover at height of 10m or more
- Land smoothly



7. Safe Administration



Regulation in Solomon Islands

SOLOMON ISLANDS DRONE REGULATIONS

According to the Solomon Islands's national aviation authority, the Solomon Islands Ministry of Transport and Civil Aviation (MTCA), flying a drone is legal in Solomon Islands, but we recommend being aware of and compliant with the drone regulations listed below before doing so.



If you'd like to contact the MTCA directly before you travel with any questions you might have, here is their contact information: MTCA Contact Form / +677 28 049



Why fly a drone in the Solomon Islands? To get great aerial shots like these!

Source: <https://uavcoach.com/drone-laws-in-solomon-islands/>

3rd Principal of aviation safety

To maintain a state where risk is kept at an acceptable risk level by society

- 1. Aircraft Safety**
Development, Design, Production, Maintenance, Certification
- 2. Manipulation Safety**
Skill, Training(to prevent from human error)
- 3. Operation System Safety**
Airport, Control tower

General Rules for Flying a Drone in the Solomon Islands

Based on our research and interpretation of the laws, here are the most important rules to know for flying a drone in the Solomon Islands.

- Permission from the MTCA is required to fly any drone weighing over 25 kilograms (55 lbs).
- Drones may not be operated within 4 kilometers (2.4 miles) of any airport or airfield.
- Drones may not be flown more than 122 meters (400 feet) above the ground.
- Drone pilots must maintain a direct line of visual sight with their drone while flying.
- Drones must be flown below the cloud base.
- Drones must give way to all manned aircraft.
- To fly a drone over private property you must first obtain permission from the property owner.

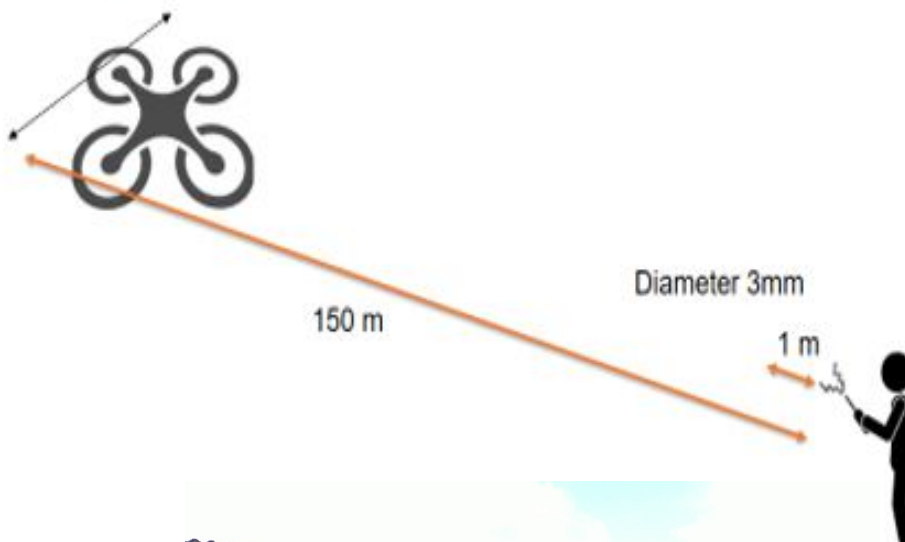
For more information on the Solomon Islands' drone laws, visit the MTCA website.

Source: <https://uavcoach.com/drone-laws-in-solomon-islands/>

Visually flying

- ✓ Always keep you drone in sight
- ✓ Keep the right distance from people and property.

Diameter 0.5 m



Below is the drone code for visually flying.

THE DRONE CODE
400ft (120m)

Don't fly near airports or airfields
Remember to stay below 400ft (120m)
Observe your drone at all times – stay 150ft (50m) away from people and property
Never fly near aircraft
Enjoy responsibly

Always keep your drone in sight
This means you can see and avoid other things while flying

Stay below 400ft (120m) to comply with the dronecode
This reduces the likelihood of a conflict with manned aircraft

BE DRONE AWARE

Every time you fly your drone you must follow the manufacturer's instructions
Keep your drone, and the people around you, safe

Keep the right distance from people and property
People and properties – 150ft (50m)
Crowds and built up areas – 500ft (150m) and don't overfly

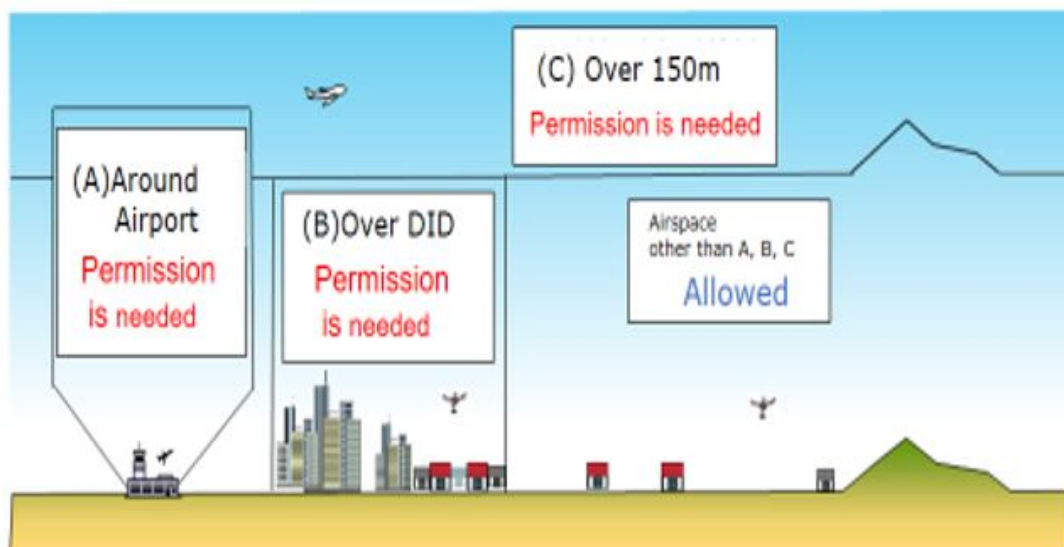
BE DRONE LEGAL

You are responsible for each flight
Legal responsibility lies with you
Failure to fly responsibly could result in criminal prosecution

Stay well away from aircraft, airports and airfields
If your drone endangers the safety of an aircraft it is a criminal offence and you could go to prison for five years

Flight Area (Summary)

- ✓ Stay below 120m to comply with the drone code
- ✓ Stay well away from aircraft, airports and airfields



Standard

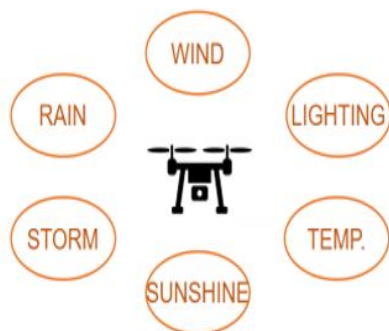
- ✓ You are responsible for each flight, so stay focus, be careful and concentrate.

Items	Contents
Daytime	From sunrise to sunset
Visual confirmation	Look with the naked eye (telescope, the monitor is not visible)
Secure Distance	Distance from third party, (human, building etc.)
Event Venue	Events, festivals, demonstrations, sports competitions, etc.
Hazardous Material	Transport-prohibited items, combustibles, poisons (Law regulation)
Dropping	To separate objects to be mounted, regardless of the distance from the ground

8. Risk/Hazard during drone flight

- ✓ **Some Parameters that would cause risk/hazard during drone flight.**

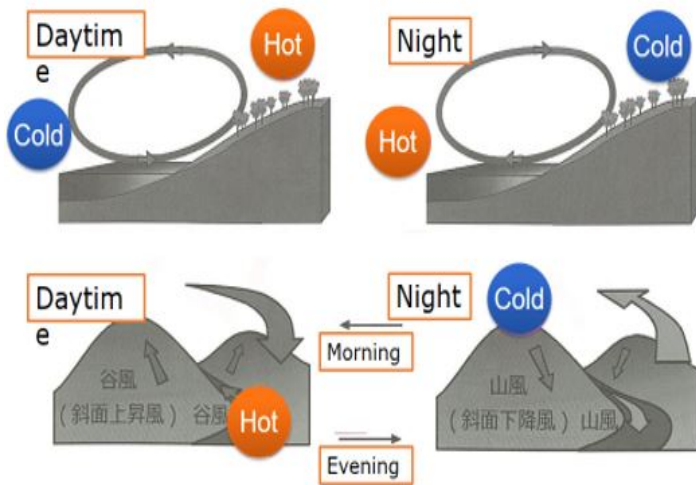
1. Weather



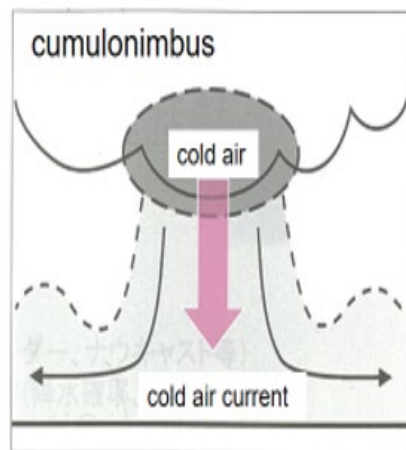
REMEMBER

Flying in wind can be difficult and will drain your drone battery faster than normal. Cold temperature cause batteries to lose charge faster. Rain is detrimental to anything electronic and high heat isn't because drones produce quite a bit of heat on their own. Extreme heat can put unnecessary wear and tear on batteries and computers.

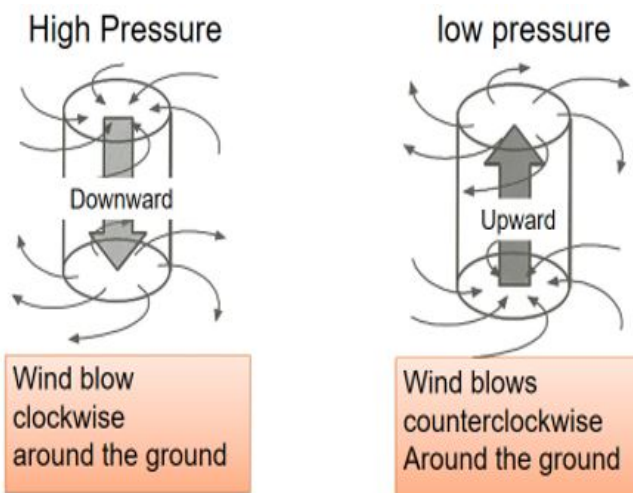
Summary



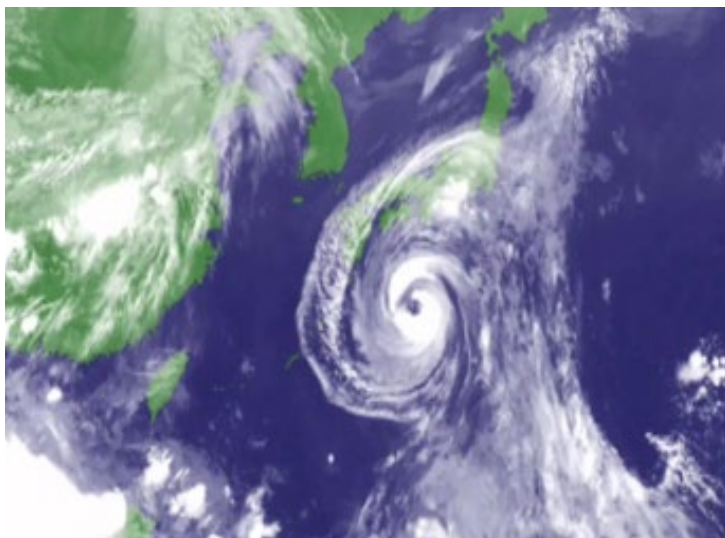
- Occur under decaying cumulonimbus
- Wind speed may exceed 50 m/s in some cases
- Accompanied by heavy rain
- It leads to the accident of takeoff and landing of the aircraft



Wind blowing mechanism



2. Hurricane



WARNING

Flying drone during hurricane or tropical disturbance is highly restricted.

Summary

• Safety: The risk is reduced to the level acceptable by the country(Low regulation)

• 3rd principal
1.Aircraft Safety, 2.Manipulation Safety, 3.Operation System Safety

• human error
• Report of accident · incident

Documentation of the checklist

List of drone (UAV) safety hazards:

(10 examples)

- High loss of altitude
- Loss of control
- Loss of transmission
- Collision with manned, unmanned aircraft or buildings, power lines
- Partial failure or loss of navigation systems-Severe weather or climatic events
- Existence of corrosion
- Pilot unfamiliar with area
- Rotor failures
- Take-off and landing incidents as under-shooting or overrunning

3. Drone Checklist

Checklist before operation

#	Check Item	Note
1	Radio wave	<0.05
2	Wind speed and direction	<5m/s
3	Is there any looseness of screw in each part	Crack and deteriorating
4	Are there mounting parts fixed	Protector and so on
5	Is there any damage to the propeller mounting parts and screw looseness?	Crack
6	Check battery level of the aircraft	LED4
7	Is the battery properly attached?	Lock especially back side
8	Check the controllers remaining battery charge	LED
9	Check the flight mode of the controller	P mode
10	Turn on the controller	LED4
11	Turn on the Aircraft	LED4
12	Check the link establishment between the controller and the aircraft	ipad
13	Check the GPS signal	Green flashing of the aircraft

Check before takeoff

#	Check Item	Note
1	Check the safety → start Motor → Take off	Right and left, back and forth, above
2	Check the motion at the hovering	
3	throttle, aileron, rudder, elevation	
4	Check the safety → Landing	
5	Stop Motors (propellers)	
6	Turn off the Aircraft	
7	Turn off the Controller	

Take-off

#	Check Item	Note
1	Turn on the controller	
2	Turn on the aircraft	
3	Check the link establishment of the controller and the aircraft	
4	Check the GPS signal	Green flashing of the aircraft
5	Start motors	
6	Right and left, back and forth, Above	Speak aloud
7	Take-off	Speak aloud

Landing

#	Check Item	Note
1	Landing	Check the safety
2	Stop the motors	
3	Turn off the aircraft	
4	Turn off the controller	
5	Check the aircraft body and propellers	

- Before every drone flight, make sure to check each phase from designing flight plan, before operating, during take-off and during Landing of every single flight.