

## **THUNDERSTORMS**

A weather phenomena whose presence creates extremely serious hazards to flying. They may be accompanied by:

- thunder
- lightning
- strong vertical drafts
- severe gusts and turbulence
- heavy rain
- hail
- micro/macrobusts
- tornadoes
- severe wind shear

It is a weather condition of which a pilot should be enormously respectful.

### **Thunderstorms must have the following requirements:**

- a) Unstable air to high levels
- b) Lifting agent
- c) High moisture content

## **THE LIFE OF THUNDERSTORMS**

### **Initial or Cumulus Stage**

- Strong updrafts prevail (unstable air to high levels)
- Temperature is higher inside the cloud than the surrounding air
- Diameter ranges from 1 to 2 miles (but may become as large as 6 miles)
- Steep lapse rate

### **Mature Stage**

- Updrafts penetrate to great heights
- Downdrafts start in middle and lower level of cell
- Precipitation starts
- Stage usually lasts 15 to 30 minutes (may last as long as 60min).

### **Dissipating Stage**

- -Downdraft occupies all but top of cloud where updrafts persist
- Rain starts to slow and stop
- Top of cloud frays into anvil shape.

## **TYPES**

### **Air Mass**

- usually form on hot summer days
- relatively easy to avoid
- form as a result of either convection or orographic lift

### **Frontal**

- associated with cold fronts
- usually form in a line that may extend for hundreds of miles of cold front, known as LINE SQUALL
- can develop at warm front and may be embedded

## **THUNDERSTORMS HAZARDS**

### **TURBULENCE**

- could overstress aircraft or cause loss of control
- downdrafts as strong as 2000 feet per minute and updrafts as strong as 6000 feet per minute that can severely cripple aircraft
- strongest between 12,000 – 20,000 feet in mature stage
- can be experienced, in clear air up, to 20 miles away from severe cells
- can be severe in micro/macrobusts and at gust front.

### **WINDS**

- danger of gusts up to 80kts with rapid changes in direction
- gust front generates strong, gusty winds near the surface which can change direction by 180° and gust up to 50 kts in seconds.

### **HAIL**

- could cause serious structural damage
- can be encountered outside of cloud as it is thrown upward and outward by active cells.

### **ICING**

- abundance of supercooled water droplets, will cause severe icing
- most severe during the mature stage.

## **LIGHTNING**

- hampers vision for 30 – 50 seconds at a time
- greatest likelihood of strike at temperatures between
  - -5°C and + 5°C)
- solid state circuitry is particularly vulnerable to strikes
- electrical circuitry may be disrupted
- possibility of igniting fuel vapour in fuel cells.

## **PRESSURE**

- rapid changes in pressure cause unreliable altimeter readings.

## **THUNDERSTORM AVOIDANCE**

- If you must fly past one, stay at least 15 miles away and pass to the right.
- A thunderstorm is an area of low pressure (Anti-clockwise and inward).
- You will encounter more favorable winds (tailwind) if you pass to the right.
- Never fly under a thunderstorm due to up/down drafts.

## **BEST ADVISE – STAY ON THE GROUND**