



# **UNDP CIRDA WORKSHOP KAMPALA – UGANDA 04<sup>th</sup> MARCH 2015**

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# **Business Perspective Aviation & Transport**

**The impact of weather on aircraft operations and the risks airlines are exposed to result of flight delays caused by disruptions to flight schedules as well the roll over affects by these disruptions.**



# This is not a free ride



**Weather in general is something we do not have control over however which can be planned around.**

**Most weather on our planet happens below 15,000 feet.**

**Commercial jetliners operate on altitudes above 30,000 feet in flight where there is barely any significant weather.**

**For the majority of us we live “under the weather” most of the time.**





**Whenever flying a small plane or a commercial aircraft; airlines and pilots have to monitor the weather at the departure airport, all along the route up to the destination station.**

**We will reflect on some of the major weather conditions which may affect flying under VFR (Visual flight rules) as well as IFR (Instrument flight rules).**



# **Aircraft and onboard weather and communication equipment.**

**Modern commercial aircraft may be regarded as an functional weather station due to improved onboard communication systems.**

**ACARS systems and electronic flight bags now form part of new generation aircraft and is widely used by airlines.**

**Flight deck crew can do minute by minute uplinks to weather services in flight for updated weather reports.**



# **Aircraft in flight weather download capabilities.**

**Agreements have already been reached between certain major airlines and specific weather service providers around the globe for aircraft to provide current in-flight weather condition downloads from the aircraft to weather service provider networks.**



# **There are 5 temperature variations that is important when operating an aircraft.**

**Diurnal variation**

**(Day / Night)**

**Seasonal variation**

**(Summer / Winter)**

**Latitudinal variation**

**(Solar radiation)**

**Topographical variation**

**(Terrain flight crosses)**

**Altitude variation**

**(Air density & temp)**





# Icing

**Ice is one of the major weather hazards in aviation.**

**It is the formation of ice on parts of a aircraft, i.e. Wings, Leading edges, Flaps and Engines.**

## Types of ice

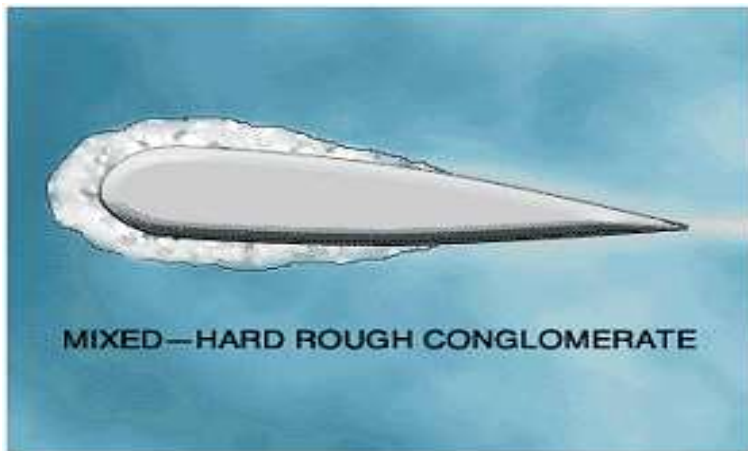
**Clear ice, Rime ice, Mixed ice.**





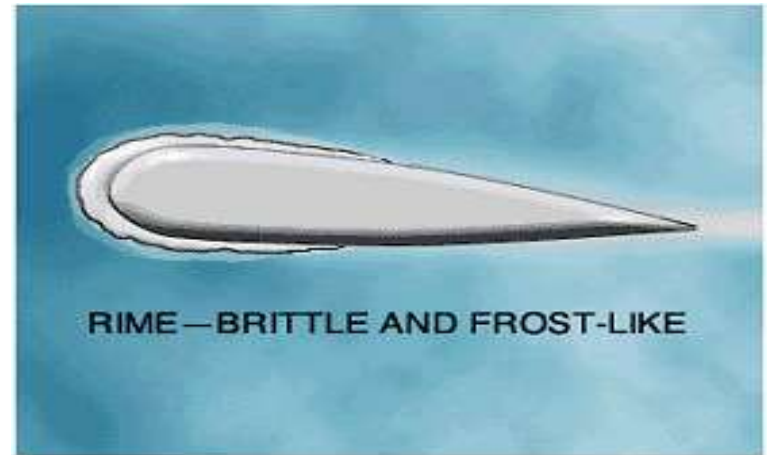
**CLEAR-HARD AND GLOSSY**

**Sideview of wing with clear ice**



**MIXED—HARD ROUGH CONGLOMERATE**

**Sideview of wing with mixed ice**

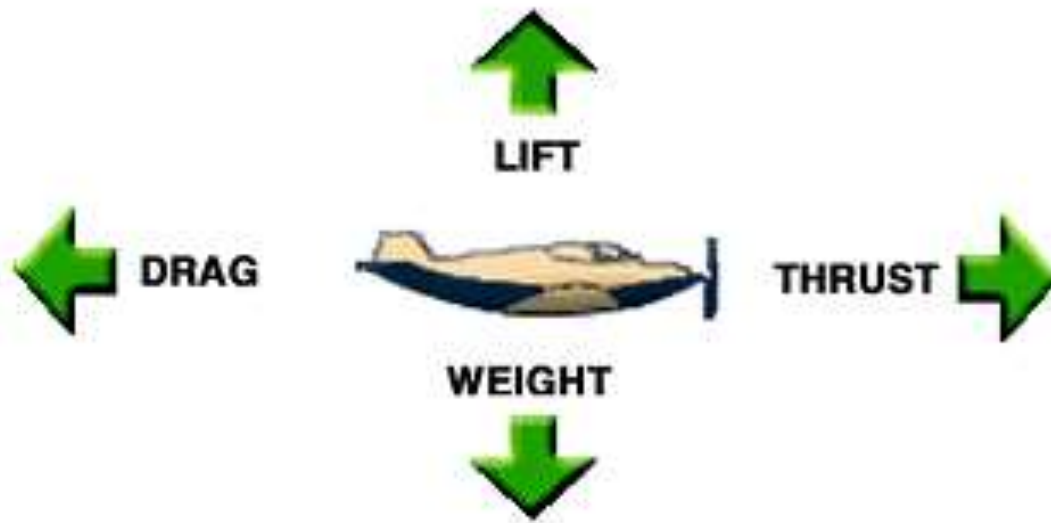


**RIME—BRITTLE AND FROST-LIKE**

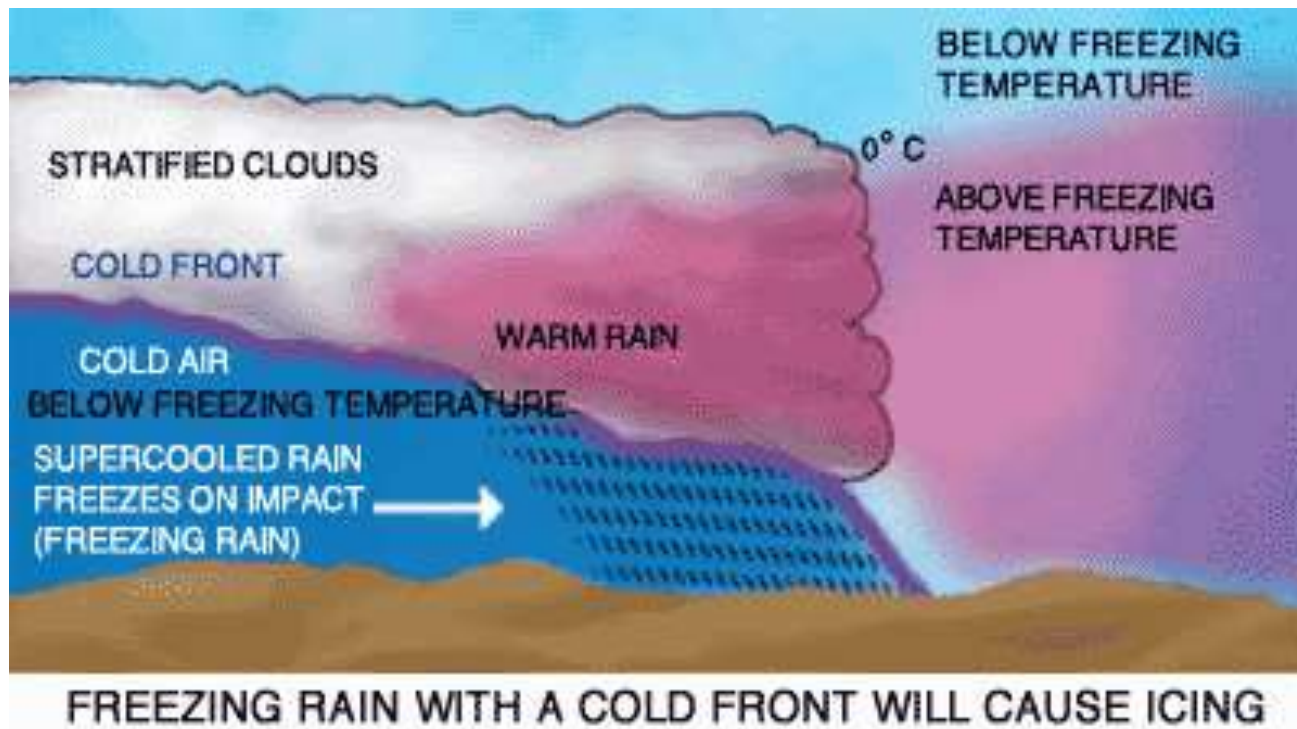
**Sideview of wing with rime.**



**Icing is considered a cumulative hazard as it takes time for the ice to build up on the aircraft and increasingly changes the flight characteristics of the aircraft.**



# Basically all clouds with sub freezing temperatures have the potential for icing conditions

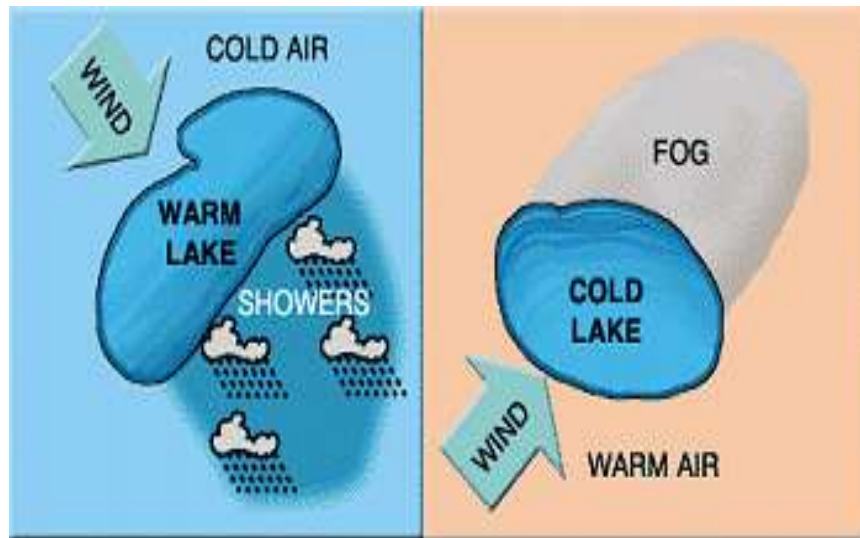


**Pilots can avoid conditions in which icing occurs or upon encountering icing either ascending or descending to different altitudes to search for warmer temperatures to melt the ice or with aircraft onboard anti ice procedures.**



# Fog

Fog usually forms when the dew point and the temperature are within a few degrees of each other.



Lake Effect

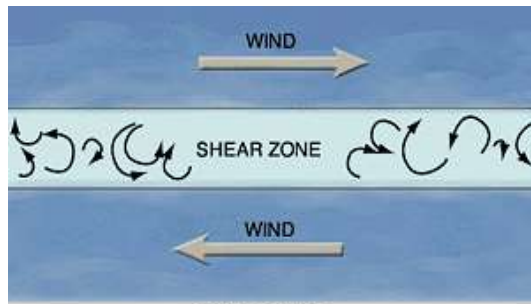


# Wind shear

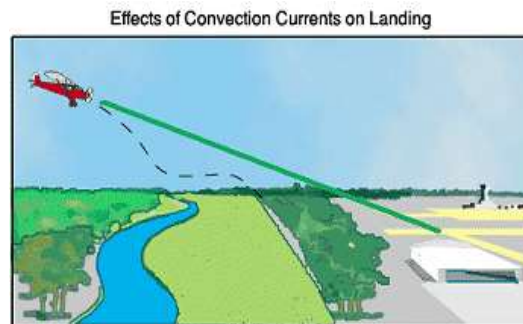
Wind shear is found where two winds move in opposite direction (Rub or mix together).

Creates small eddies and whirling masses of air moving in different directions causing turbulences.

Wind shear can be devastating to an aircraft especially if it is close to the ground (Approach for landing on short finals)



WIND SHEAR



Effects of Convection Currents on Landing



# Thunderstorms and lightning

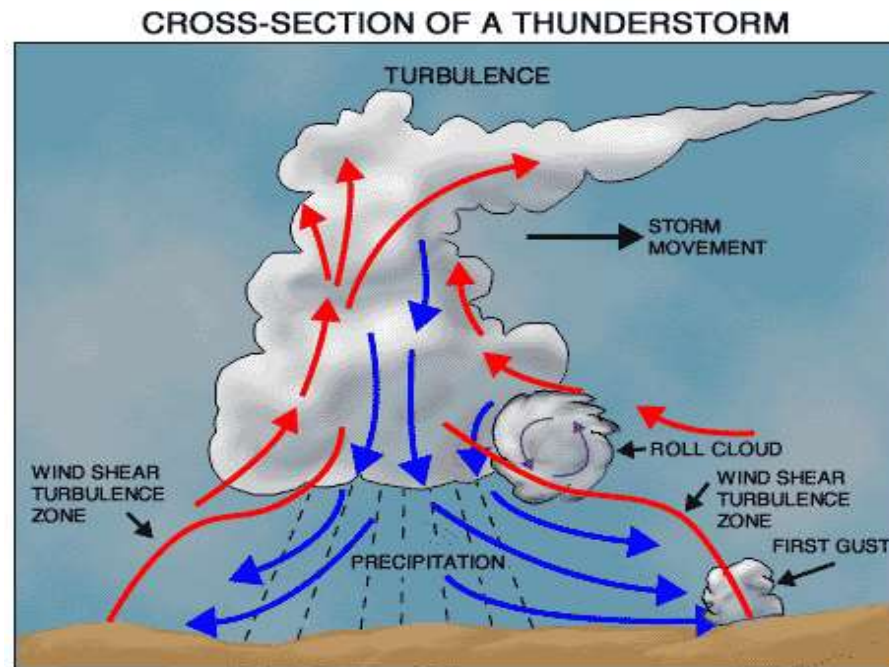
The intensity of a thunderstorm is a matter of great subjectivity. It is based upon the lightning / thunder frequency and the precipitation is assessed separately.

However, in some situations, the 'vividness' of the lightning display and 'loudness' of the accompanying thunder (notwithstanding the actual frequency of same), may be relevant to assessment.





**In particular, it is useful to note if the lightning is cloud-to-cloud (CC) or cloud-to-ground (CG) as well to determine the actual number of lightning discharges per minute.**



# **Diverse impacts to flight operations caused by Lightning activities.**

## **Lightning activities on the ground**

**Unable to fuel the aircraft. (Technicians).**

**Passenger boarding halted for safety.**

**Ground handling personnel stop their activities.**

**ATC - Ground control / Take off delays (Havoc).**

**Extended flight delays (Dept & Arr flight delays).**

**Unwanted disruptions to the airlines flight schedules.**

**Flight crews – FDP limitation.**



# Ground personal injured on the ramp following a lightning strikes.



## **Lightning activity in the air.**

**ATC and Flight crew possibly will request deviation from flight levels / air ways.**

**Probable lightning strikes to aircraft which could cause severe damage to sensitive onboard equipment ( Result in aircraft declared AOG).**

**Rerouted flights may cause unnecessary congested airspaces. (Aircraft in hold or diverted to alternate airports unable to land at destination result in critical flight delays).**



# An image of in-flight lightning strike to an aircraft.



SOUTH AFRICAN AIRWAYS

# **Regular operations turned into irregular operations (IROPS).**

**When regular operations turn into irregular operations (IROPS), airlines and airport ground personal have to communicate and share responsibility to work together to offer solutions to passengers, flight crews, technicians and ground personal.**

**Airlines and ATC systems need to share real time information regarding aircraft delayed in the bay as well with ramp closures and the availability of parking stands for arriving aircraft.**



When **lightning strikes** becomes active over the airfield a “RAMP CLOSED” warning message will be announced to ramp workers to move to shelter and safe areas.

“RAMP CLOSED” messages need to be clear to ramp personal and flight crews on board aircraft as soon as a “RAMP CLOSED” message is received.

Airline IROPS SOP’s must be adhered to and it must be ensured that gate areas where an aircraft is parked is cleared of ramp equipment and obstacles.




**Arrival aircraft will remain unattended and flight crews need to keep the aircraft park brake set to "ON" until such time the ramp personal attend to the aircraft and open the aircraft door.**

**Challenges by dealing with large numbers of people (passengers, employees, meeters and greeters) who are for various reasons stranded at different parts at the airport (congested holding areas) or on the aircraft.**

**Airlines and airport service providers have to introduce their IROPS situation plans.**







**Airline Contingency Plans for Irregular Operations (IROPS) takes a holistic approach in integrating existing plans with newly developed plans.**

**Airlines has developed measures to address unusual operational events driven by disruptions to air travel.**

**Airline Operations Control Centre's actively work tired less to bring the operation back to a normal state of affairs.**



# **Passenger inconvenience caused by airport disruptions.**

**Inbound passengers intended for onward flight connections may have to overnight as they might fail to connect their onward departing flights.**

**Potential onward connecting passenger and baggage separation due to congestion at the baggage sorting areas and passenger transfer facilities congested and inundated with irate passengers.**



# **RISKS TO THE AIRLINE DURING IROPS SITUATIONS.**

**Financial losses due to delayed and diverted flights.**

**Unnecessary landing and handling cost at diverted airfields.**

**Additional standby crew called in the assist to stabilise the flight schedule.**

**Potential loss of passenger ticket revenue.**



**Unnecessary insurance claims against the airline on behalf of passengers who failed to depart and arrive on their intended flights.**

**Passenger inconvenience and delays at international stations failing to be in time for their onward connecting flights.**

**Passenger financial compensation by the airline (Euro and American legislations).**

**Additional hotel accommodation arranged by the airline.**





**Airlines have to adhere to the “Passengers  
Bill of Rights.”**

**Airlines no longer manage the entire end-to-end customer air travel experience, especially during large scale disruptions and/or diversions.**



# **CONCLUSION**

**Many airports around the globe have yet to install adequate weather systems which not only will benefit weather forecasters but so to for airlines operating flights to and from these airports.**

**Advanced technology on aircraft have already outmoded the potentials of airports and their weather forecasting capabilities, governments and local authorities ought to make investments in equipment which could donate in generating additional income as well to stimulate and promote air traffic in their regions.**

