Fronts:

- Basic facts:
  - Interval between frontal waves: 1 - 2 days
  - Summer: NE Canada Newfoundland to N Scotland
  - Winter: Florida to SW England
  - Upper winds blowing across fronts make it move faster
  - Direction of frontal depressions are in the direction of warm sector isobars
  - Surface winds veer & upper winds back
  - Transition zone between two air masses creates a frontal low pressure
  - **Generally** caused by temperature contrast between artic air & equatorial air
  - Wind directions: Behind cold: NW, In front of cold : W, in front of warm: South, North of centre of low: East
- Warm front:
  - Risk of fog greater ahead & behind compared to cold front
  - CI announce arrival, Halo effect
  - 1:100 – 150
  - TS forms when **warm air is unstable**
  - FZRA in just in front of surface position of warm front may cause clear ice accretion
  - Surface position may have windshear
  - Velocity: 2/3 speed of measured distance between isobars
  - Stratus/cumulus fractus clouds exists in warm or cold front
  - Reason for very low clouds ahead of warm front:
    1. Saturation of cold air by rain falling into it & evaporating
    2. Rain drags warm air into cold air and condenses it
  - Pressure
    1. Before: Decrease
    2. At passage: At lowest point
    3. After: Steady increase/slight rise then falls
- Cold front:
  - Mainly towering clouds
  - Wind **veers**(To the right with a headwind) & increases with height with in N hemisphere
  - 1:10 – 80
  - Surface position may have windshear
  - Behind cold front mostly scattered cloud cover & isolated showers
  - Strengthens when approaching upwind of a mountain
  - Pressure
    1. Before: Decrease (**Pressure decrease** indicates a **climb on altimeter**)
    2. At passage: Falls then **increase**
    3. After: Steady increase
- Occluded warm:
  - Warmer air behind front
  - On surface charts **extension of warm front**
  - Usually in **winter**
  - Ahead of warm occlusion: Low level ST clouds
- Occluded cold:
  - Colder air behind front
  - On surface charts **extension of cold front**
  - Usually in **summer**
- Stationary front:
  - **No** horizontal **motion perpendicular** to front
  - Surface wind **parallel** to front
- Warm sector:
  - Tropical air
  - Moderate to good visibility, haze & few or scattered cumulus, drizzle, **no high level clouds**
  - Poor visibility at lower levels possible advection fog, mist & drizzle
  - **Summer:** Fair weather CU
  - **Winter:** ST & SC broken to overcast, poor visibility in mist & drizzle
  - Generally stable VMC conditions above ST & SC clouds

- Locations:
  - East Darwin: 2
  - West Darwin: 5
  - Atlantic: 6
  - Philippines: 9
  - Bay of Bengal: 12
- Time of year
  - Hurricane: US=JUNO
  - Typhoon: SE-ASIA=JUNO
  - Cyclones:
    - ARABIAN SEA=MANOV
    - BAY OF BENGAL=JUNO
    - AFRICA(South of Indian ocean)=DECAP
    - PACIFIC=DECAP
    - DARWIN=DECAP

Climate zones:

- Zones Poles to equator:
  1) Polar high: Mean temperature of all months below +10°C, high pressure weather dominates with the sub-soil being frozen
  2) Disturbed temperate low (40° – 60°) for coastal areas: **Chilly summers** & **warm winters.** Weather systems mainly from travelling frontal depressions
  3) Sub-tropical high (20° - 40°)
  4) Tropical transitional (Trade winds)
  5) Equatorial convergence zone (ITCZ): Moves N in Summer (June/July/Aug), S in Winter (Dec/Jan/Feb)
- Seasons occur & exist due to the earth's spin axis inclined to the plane of its orbit around the sun
- Mid-latitude climate: Central Europe
- Mediterranean climate: Anti-cyclonic & hot in summer, frontal depressions in winter, annual rainfall <700mm
- Savannah climate: Variations in rainfall with a wet & dry period
- Tropical rain climate: 10°N - 10°S, humidity 80% throughout, 15000ft, average temp 28°C

Tropical climatology:

- Darwin: During July: Dry season, poor visibility in dust & haze
- Monsoons:
  - In summer of N hemisphere (July), S hemisphere experiences SE monsoon and after passing equator it becomes SW monsoon in N hemisphere
  - In winter of N hemisphere (January), N hemisphere experiences NE monsoon and after passing equator it becomes NW monsoon in S hemisphere
- Easterly wave:
  - Travelling east to west
  - It is a wave in the trade wind belt with severe convective weather rear of its trough
  - Originates from trade wind belt between sub-tropical high belt & ITCZ
  - Thunderstorms mostly develop on the east side of the wave
  - It is a **weak trough**
- Equatorial region: Rain, hail showers and thunderstorms occur all year, most frequent April – May & October – November (Spring/autumn)
- ITCZ:
  - Characterized by different wind directions on both sides of the zone
  - Moves more over land
  - In summer 10° - 25°N in west Africa & northern coasts of Arabian sea (Typical mean location: 20°N over west Africa), 40°N in China
  - In summer around 20°N over Asia & Northern Africa, light easterly upper winds occur
  - Does not move much over the oceans, thus, central Atlantic ocean only has NE trade winds
  - Freezing level isotherm: 15000ft(12000 -16000ft), **icing** occurs around 16000 – 28500ft
  - Areas on the geographical equator experience 2 wet seasons, Mar-May, Oct-Nov (Spring & autumn)
  - ITCZ position 0 - 7°N in January between Dakar & Rio, in vicinity of Dakar in July

  - Heavy dust storm
  - Convective SIGMET: Thunderstorms obscured by massive layers
  - Issued by **Meteorological watch office**
- GAMET & AIRMET:
  - Area forecast for low level flights
  - Meteorological visibility below 5000ft
- Windshear:
  - Reported every one min
  - MBST: Microburst, FNA: Final
  - Low level windshear occurs below 2000ft
- CAVOK:
  - No low drifting snow
  - 9999, no significant clouds (NSC) & no significant weather (NSW) below highest MSA
  - No clouds below 5000ft
  - No “CB”
- Aerodrome warning:
  - Message from MET concerning MET conditions that may adversely affect aircraft on ground including parked aircraft, aerodrome facilities & services
  - Should be **cancelled** when conditions are no longer occurring
- “Meteorological briefing”: Oral commentary on existing & expected meteorological conditions
- ”LLWAS”: North American system for detection & warning provision of low level wind shear
- ACARS: Transmission of operational messages including METAR/TAF from ground to air