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Practice Q&A (20 Questions)

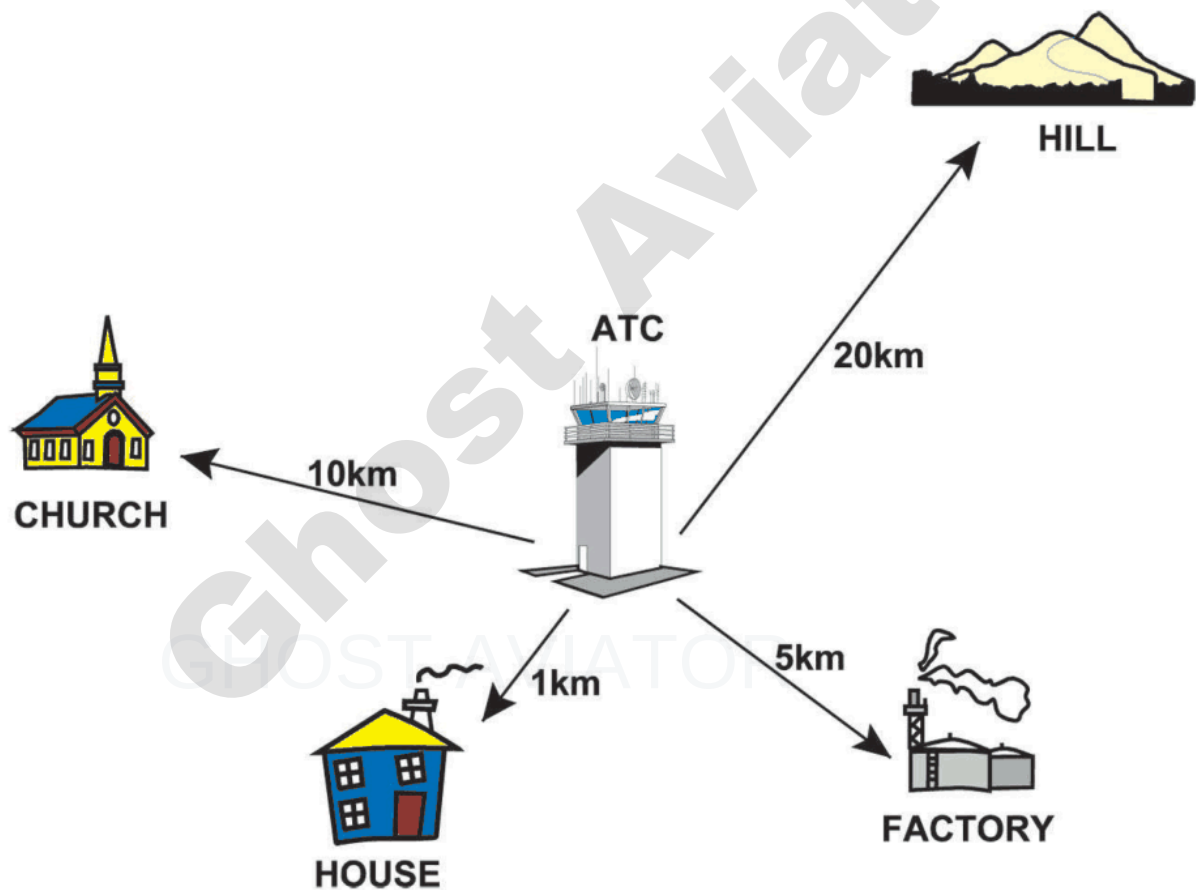
Master Reference Tables

1. Definition of Visibility

Visibility (Aeronautical Definition): The greatest distance at which a **black object of suitable dimensions**, situated near the ground, can be seen and recognised when observed against the bright background.

Night Definition: The greatest distance at which lights in the vicinity of **1,000 candela** can be seen and identified against an unlit background.

In simple terms: **The distance up to which prominent objects can be seen by naked eye and recognized as such under natural light.**



Visibility from marker objects

Visibility on the ground and from the air are of great importance to a pilot for landing and take-off. The pilot needs to see various land marks, targets, obstructions, beacon lights, other aircraft, runways etc., while in flight

and during approach and landing. Poor visibility is a serious aviation hazard. Even at airfields where ILS is installed, a pilot would prefer better visibility conditions for safe landing and take-offs.

2. Visibility Reports & RVR

Visibility Reports

- The visibility reported by a Met Office is the **lowest horizontal visibility** at an airfield
- It may be different in different directions due to varying amounts of atmospheric obscurities
- This visibility may also differ from **vertical and slant visibilities** as estimated by an aircraft while in-flight

Method	Daytime	Night-time
Estimation Method	Seeing runway markings and objects at pre-measured distances along the runway, within and around the airfield	From existing lights at known distances in and around the airport — called Visibility Land Marks

Runway Visual Range (RVR)

Definition: The range over which the pilot of an aircraft on the centre line of the runway can see the runway markings or the lights delineating the runway or identifying its centre line.

- RVR equipment installed along various runways, close to the take-off and landing areas
- RVR is reported when the visibility is **less than 1500 m**
- RVR **2000** and **1500** are included in METAR as supplementary information
- RVR 2000 and 1500 are **NOT** disseminated internationally

💡 **Exam Tip:** RVR reported when visibility < 1500m. METAR includes RVR 2000 and 1500 as supplementary — but these are NOT disseminated internationally. The instrument is called **Scopograph or Transmissometer**.

3. Causes of Poor Visibility

The surface visibility is reduced by atmospheric obscurities, such as smoke particles, sea spray, dust, industrial particles, vehicular emission, volcanic ash, etc.

Obscurity	Definition	Visibility	Special Notes
Haze	Suspension of very small particles of smoke, dust, water, etc. Gives a milky appearance	≤5000 m	—
Dust Haze	Dust kicked up by strong winds, especially in desert/semi-arid areas; suspended in air; causes Dust Haze. Summer hazard. Thicker during day.	Widely reduced; diversionary hazard	Extends from Rajasthan to Punjab, Haryana, UP, Bihar; vertically may extend 6–8 km
Smoke Haze	From industrial/domestic sources; spreads as haze layer, especially when wind is calm or very light and strong ground inversion	Widely reduced	—
Mist	Suspension of water droplets in atmosphere	≥1000 m but ≤5000 m	RH is almost 100%
Fog	Suspension of water droplets or ice crystals; RH ~100%	<1000 m	Classified as: Thick, Moderate, Light. Fog is the cloud sitting on ground.
Smog	When fog and smoke co-exist	Very poor	Severely limits visibility; health hazard
Dust Storm	—	≤5000 m	If followed by rain visibility improves fast
Sea Spray	Under favourable wind conditions, salt particles sprayed from wave crests; water drops form; thin layer at low level and on wind screen	Considerable reduction	In rare cases reduces forward visibility to almost zero on wind screen; also during monsoons and cyclones
Volcanic Ash (VA)	Solid matter from volcanoes; carried by winds; suspended for long time	Surface and in-flight: almost nil	Severely damages engine and other aircraft parts. Indian Volcano: Barren Island (12.16N 93.51E) — first erupted 1787, most recent 2020. Baratang Island lies 150 km N of Port Blair.

Precipitation	Rain, showers, drizzle, snowfall	Variable (see table below)	—
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Visibility in Precipitation

Precipitation Type	Intensity	Visibility
Rain	Moderate	1–3 km
Rain/Showers	Heavy	<1000 m
Drizzle	Any	<1000 m
Snow	Any	may fall <1000 m

⚠ **Volcanic Ash — Aviation Warning:** VA reduces surface and in-flight visibility to almost nil. It severely damages engines and other aircraft parts. Volcanoes are active in Japan, Philippines, Indonesia, America, Mexico, Iceland, Russia, etc. If VA is encountered, pilots must exit the area immediately.

Indian context: Barren Island (12.16N 93.51E) — first erupted 1787, most recent 2020. Baratang Island (mud volcano) is 150 km N of Port Blair.

flowchart TD

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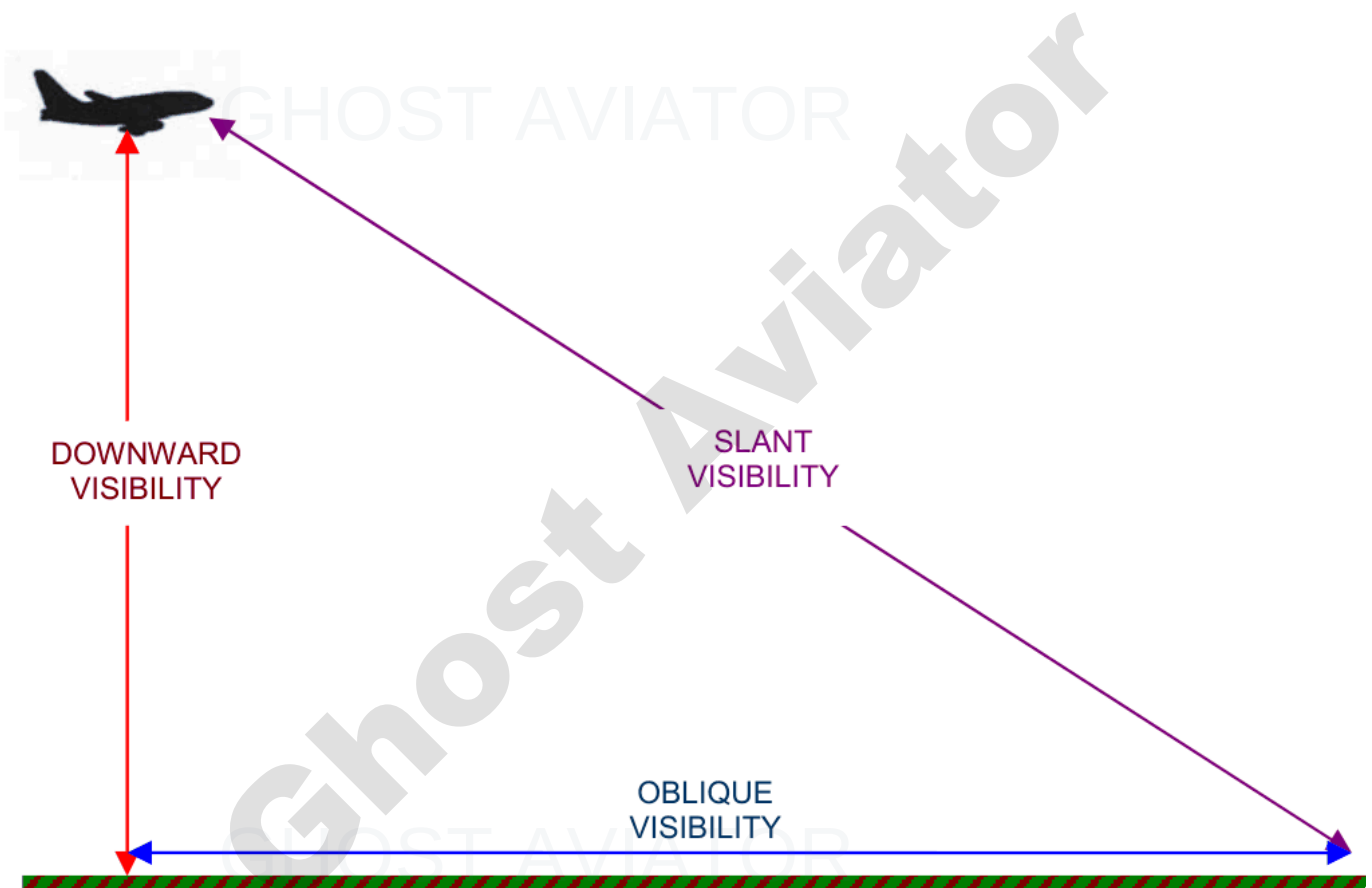
PV["CAUSES OF POOR VISIBILITY"] --> H["Haze ≤5000m\n(smoke/dust/water)"]
PV --> DH["Dust Haze\n(desert storms, summer)"]
PV --> SH["Smoke Haze\n(industrial, inversion)"]
PV --> M["Mist 1000-5000m\nRH~100%"]
PV --> F["FOG <1000m\nRH~100%"]
PV --> DS["Dust Storm ≤5000m"]
PV --> SS["Sea Spray\n(coastal, thin layer)"]
PV --> VA["Volcanic Ash\n(almost nil, engine damage)"]
PV --> P["Precipitation\n(1-3km mod rain,\n<1km heavy/drizzle/snow)"]
F --> RF["Radiation Fog"]
F --> AF["Advection Fog"]
F --> STF["Steaming Fog"]
F --> FF["Frontal Fog"]
F --> UF["Upslope Fog"]
F --> IF["Inversion Fog"]

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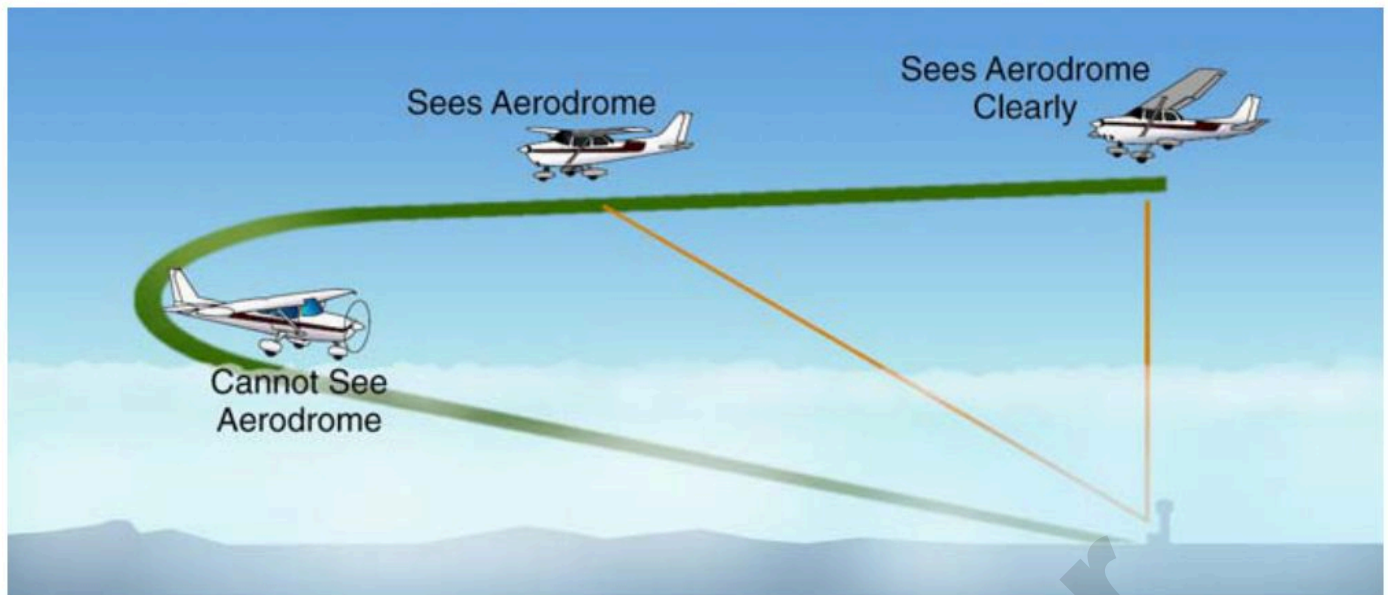
4. Vertical and Slant Visibility

Haze and fog layers are generally confined to a few thousand feet above ground level. In a shallow layer of haze or fog, the **horizontal visibility is poor**. A pilot flying above such a layer may see the airfield clearly through a vertically thinner layer of fog, but on approach for landing, as he has to see through an elongated layer of fog, he may lose sight of the runway. In such a case:

- **Vertical Visibility** may be good
- **Slant Visibility** is poor

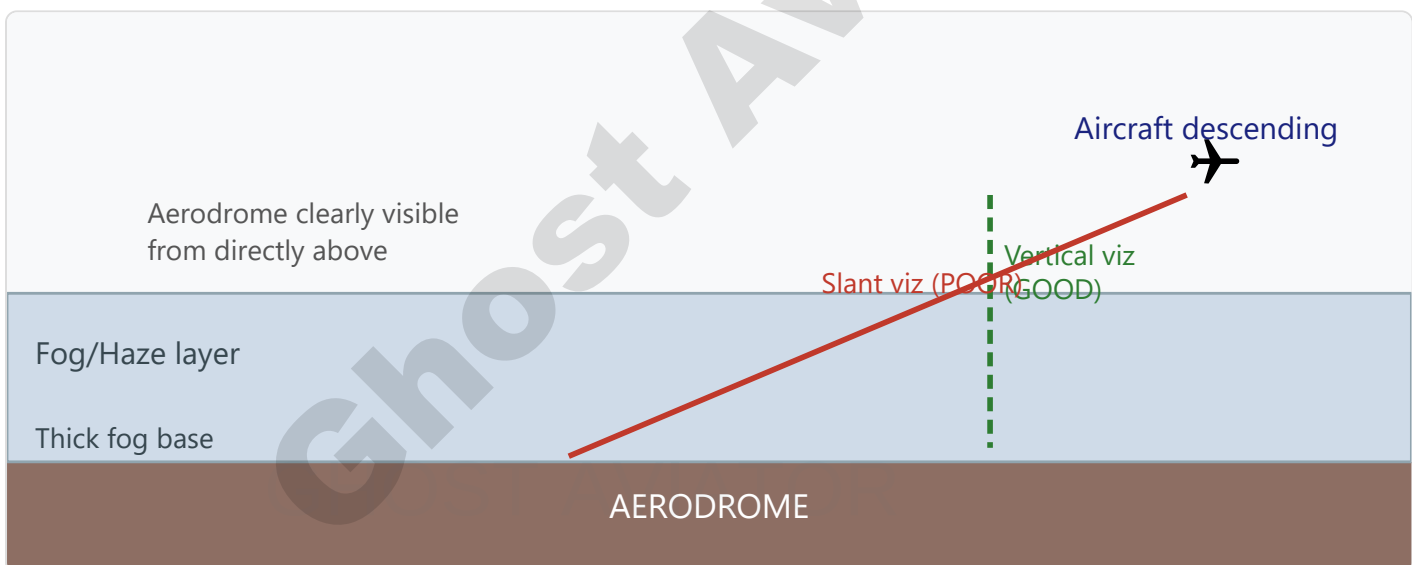


Types of visibility



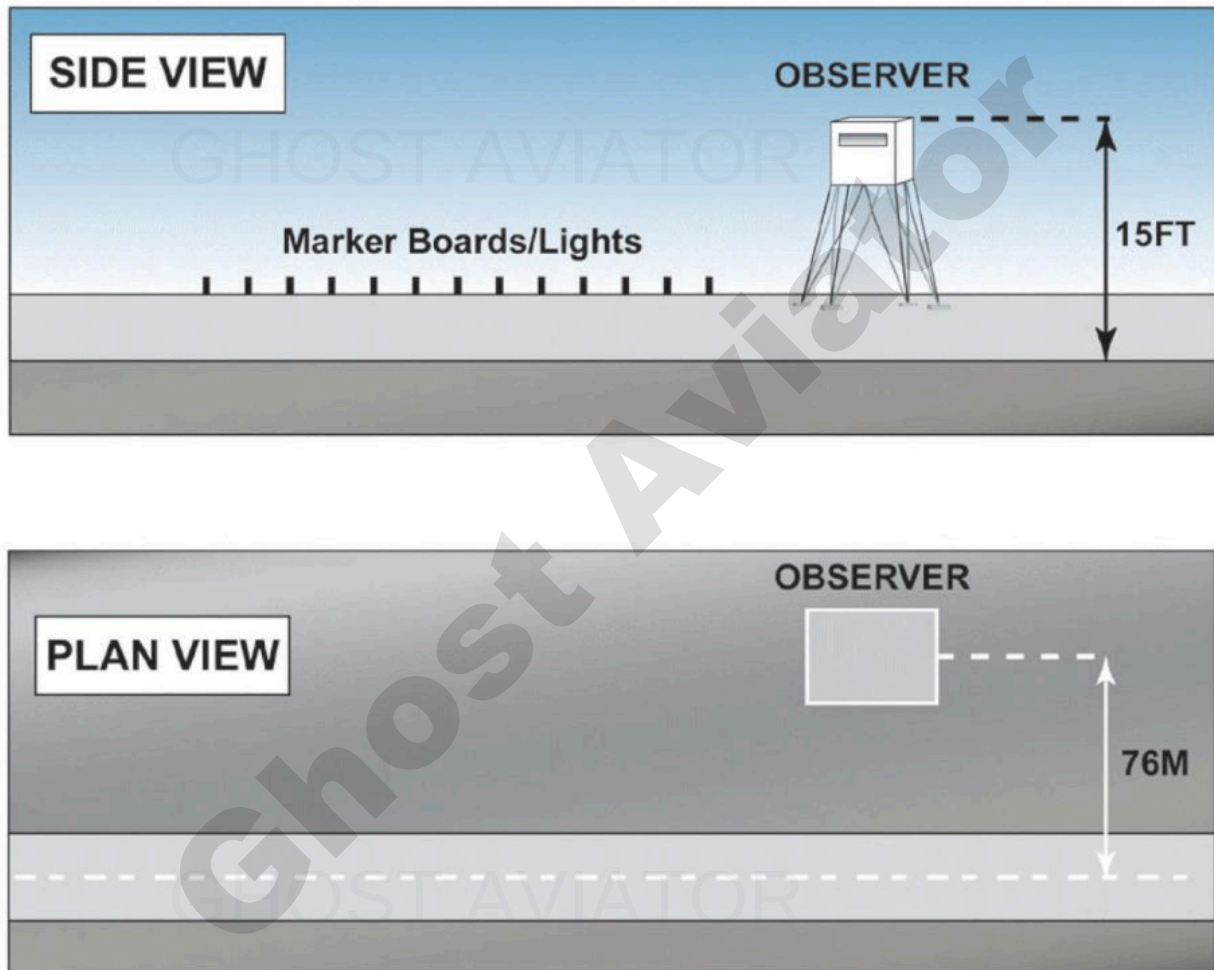
Visibility above a shallow fog layer

As one goes higher and higher, the transparency of the atmosphere increases considerably, except in cloud and precipitation. **Visibility is lower looking towards the sun** due to reflection of the moon light (also applies to looking towards the sun during daytime).

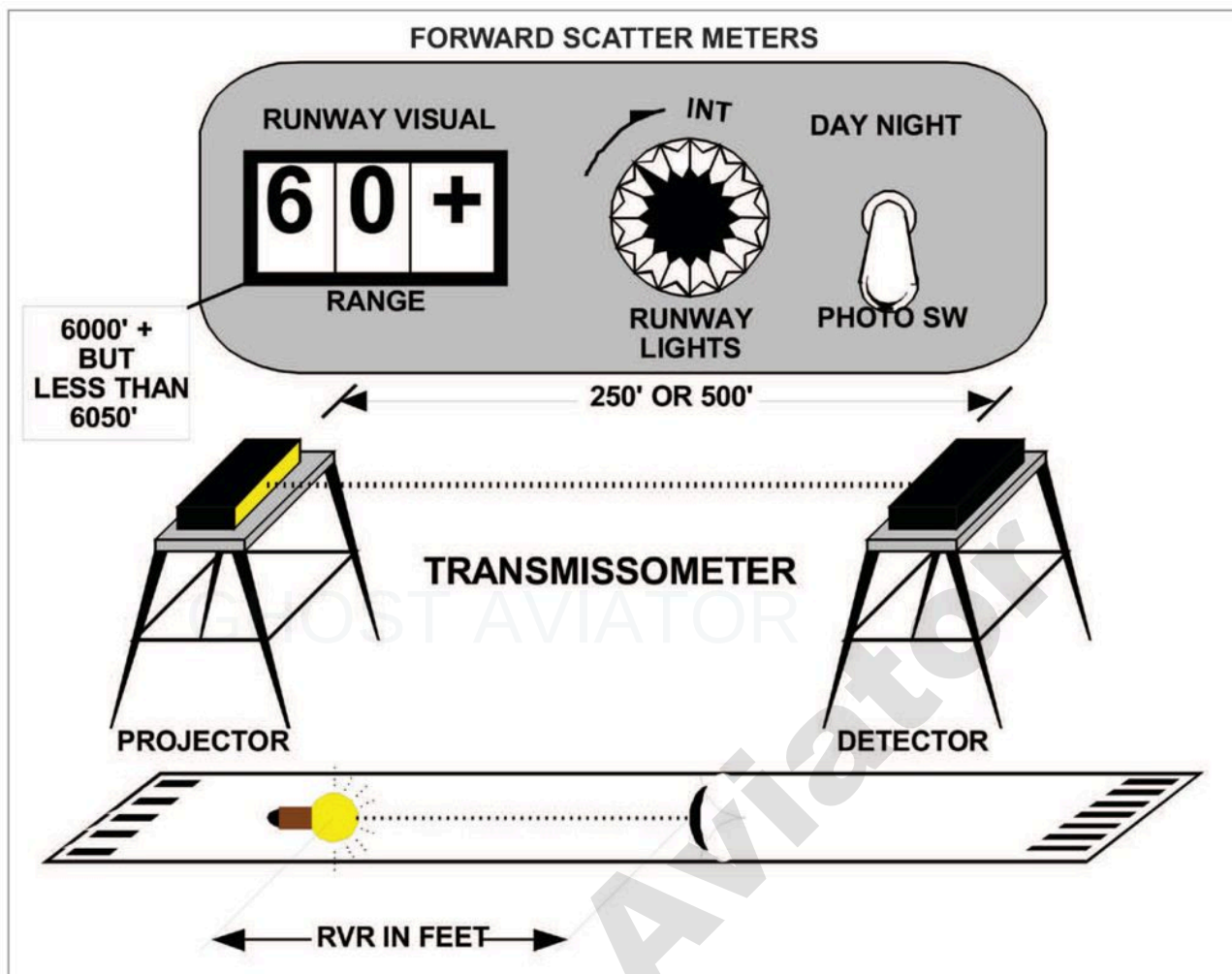


5. Instruments for Measuring Visibility

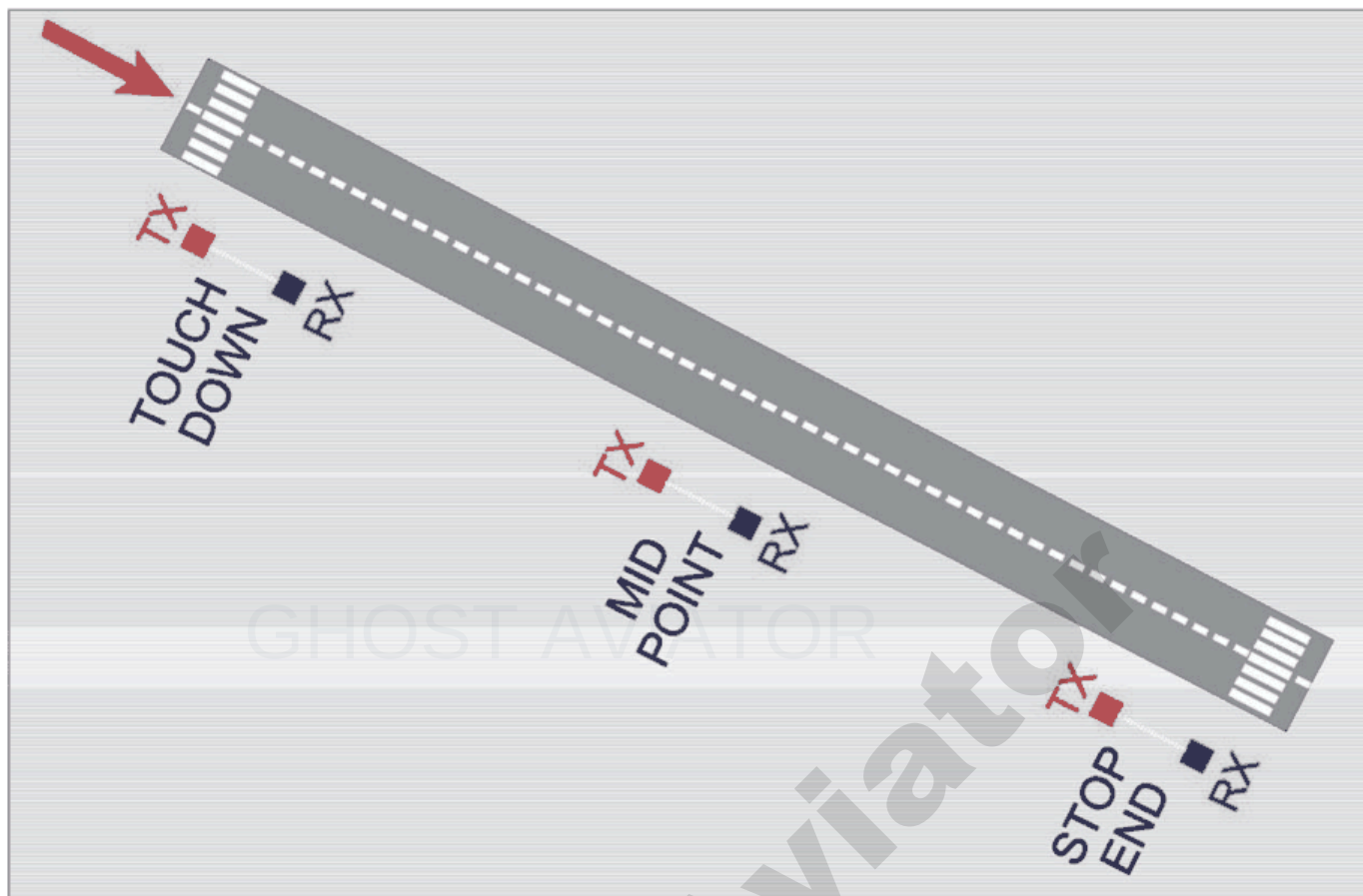
Scopograph or Transmissometer: Used for measuring visibility along the different runways on an aerodrome. RVR equipment installed along various runways close to take-off and landing areas. Consists of a light source and a photoelectric receiver; equipment generates electric current according to the obscurities present between the receiver and the source. Current generated gives a measure of RVR. Display units located in the Met Office and ATC Tower.



Runway visual range



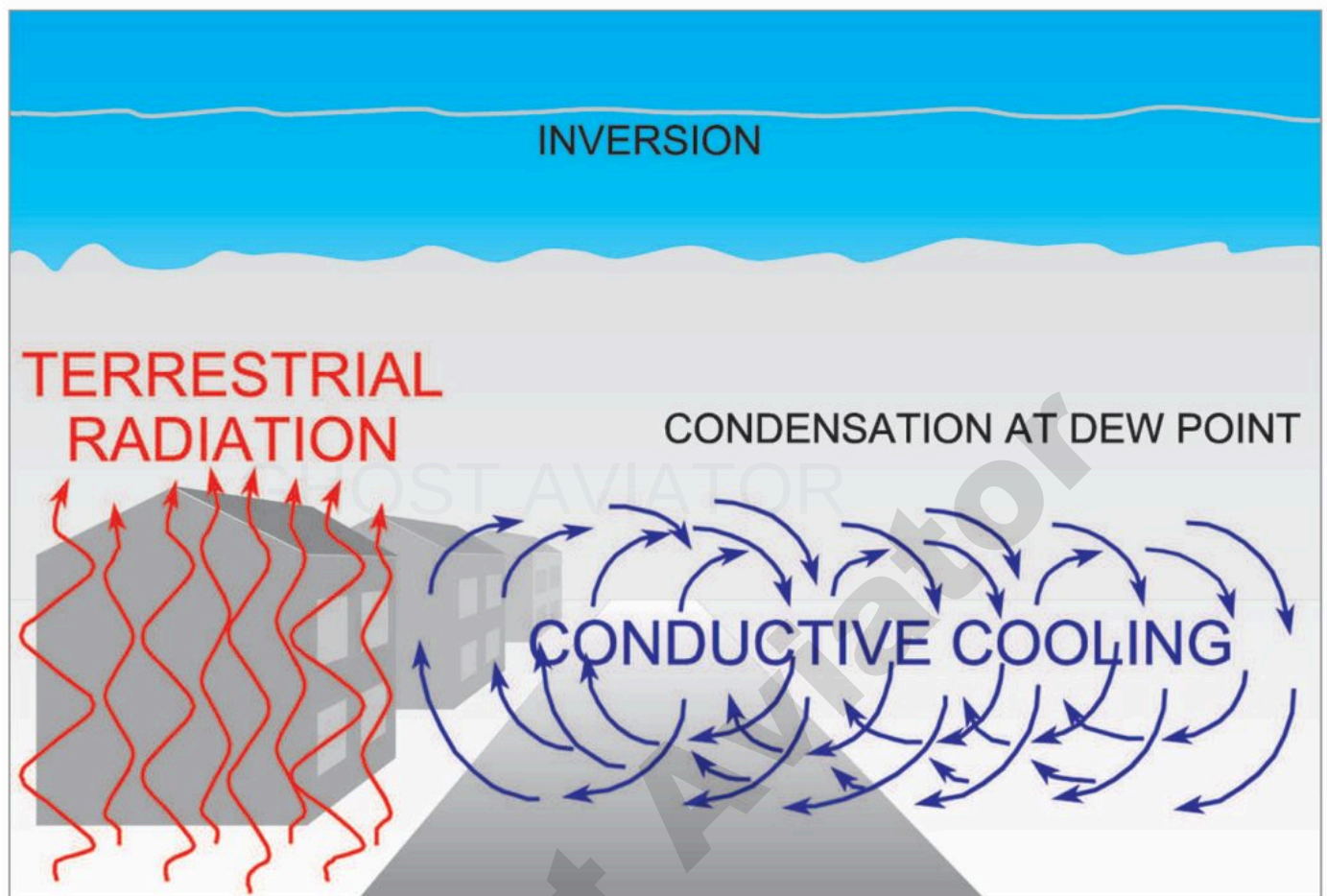
Transmissometer



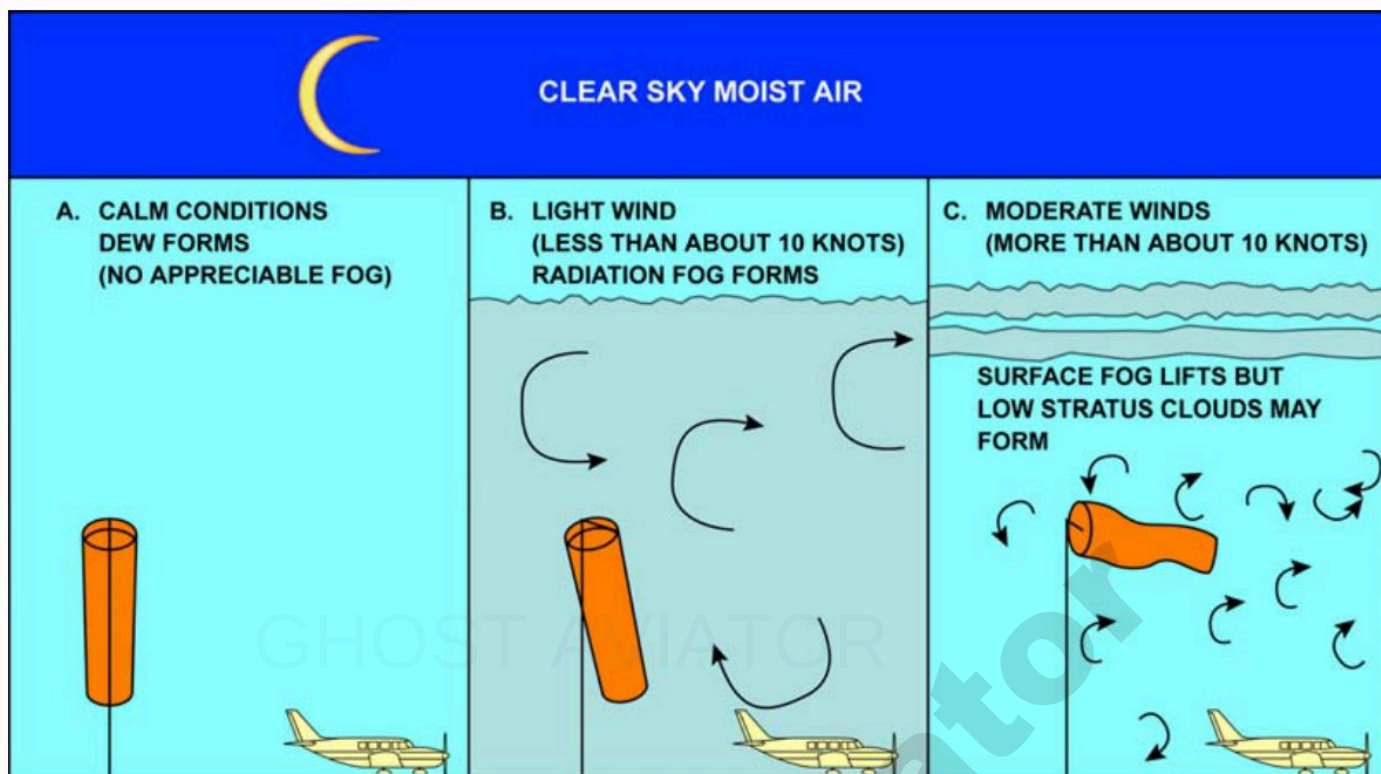
Instrumented RVR

- At some Indian Met Offices: **Automatic Visual Range Assessor (AVRA)** is used for measuring RVR

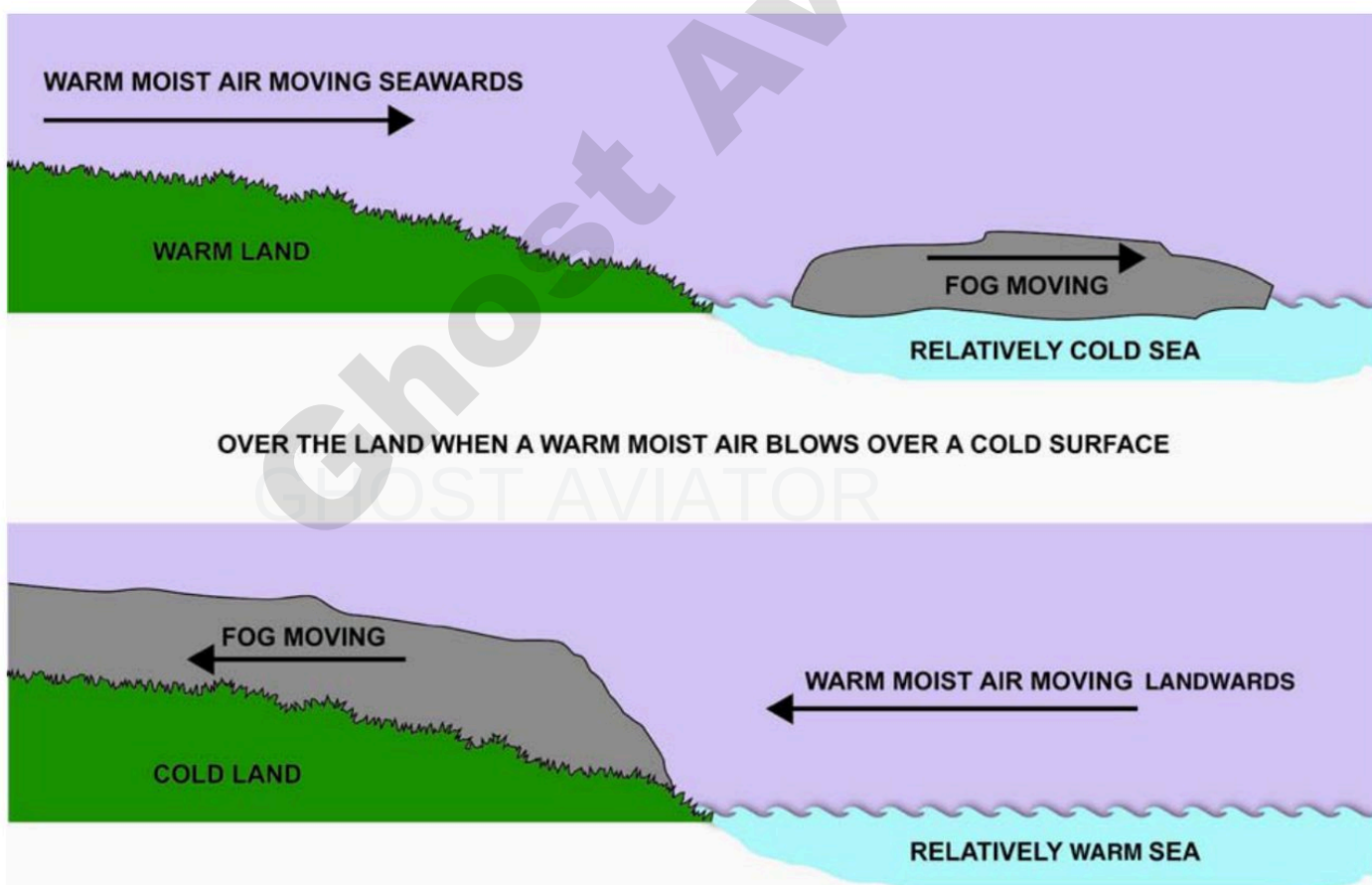
6. Types of Fog



Radiation fog



Radiation fog and wind speed

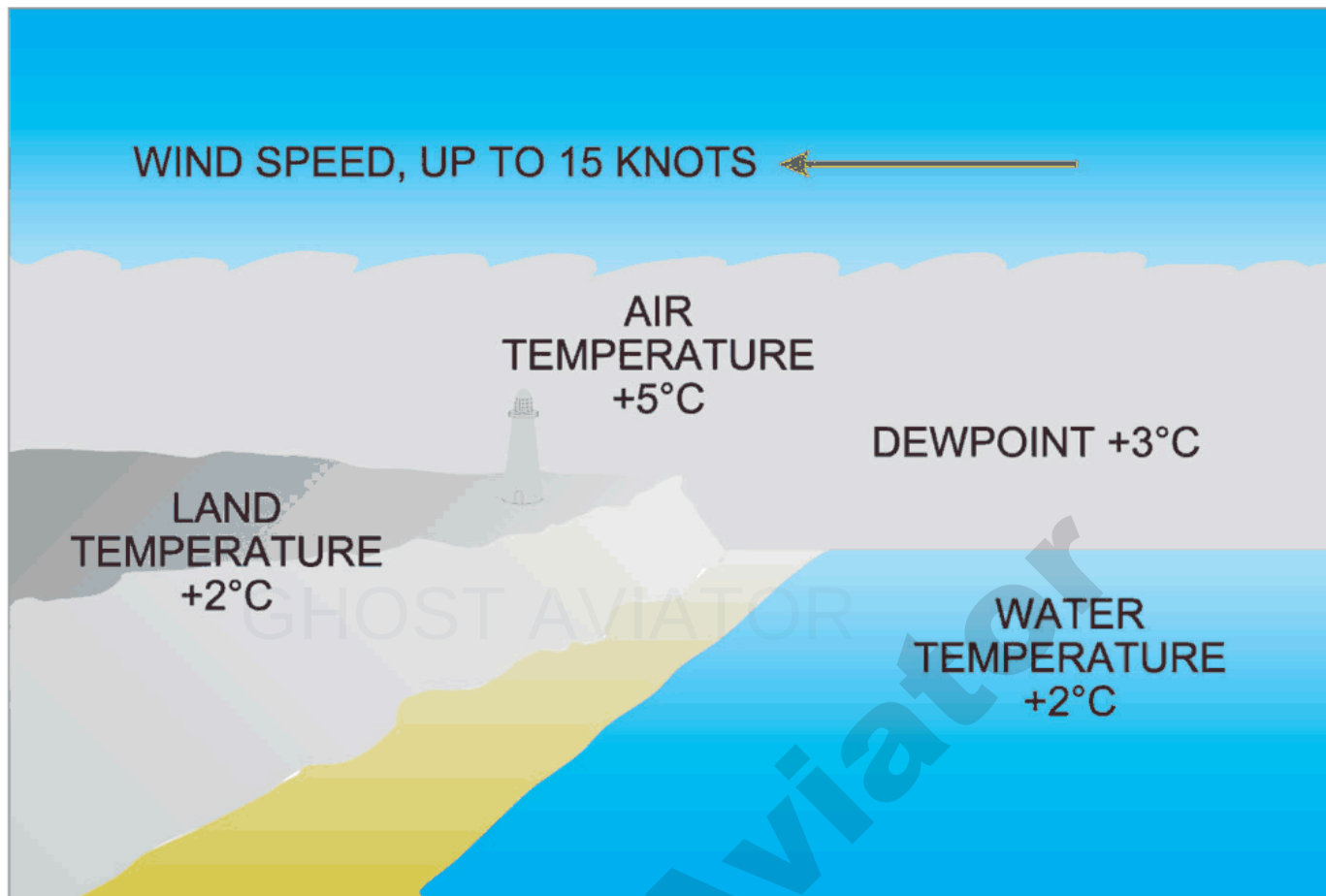


Advection fog

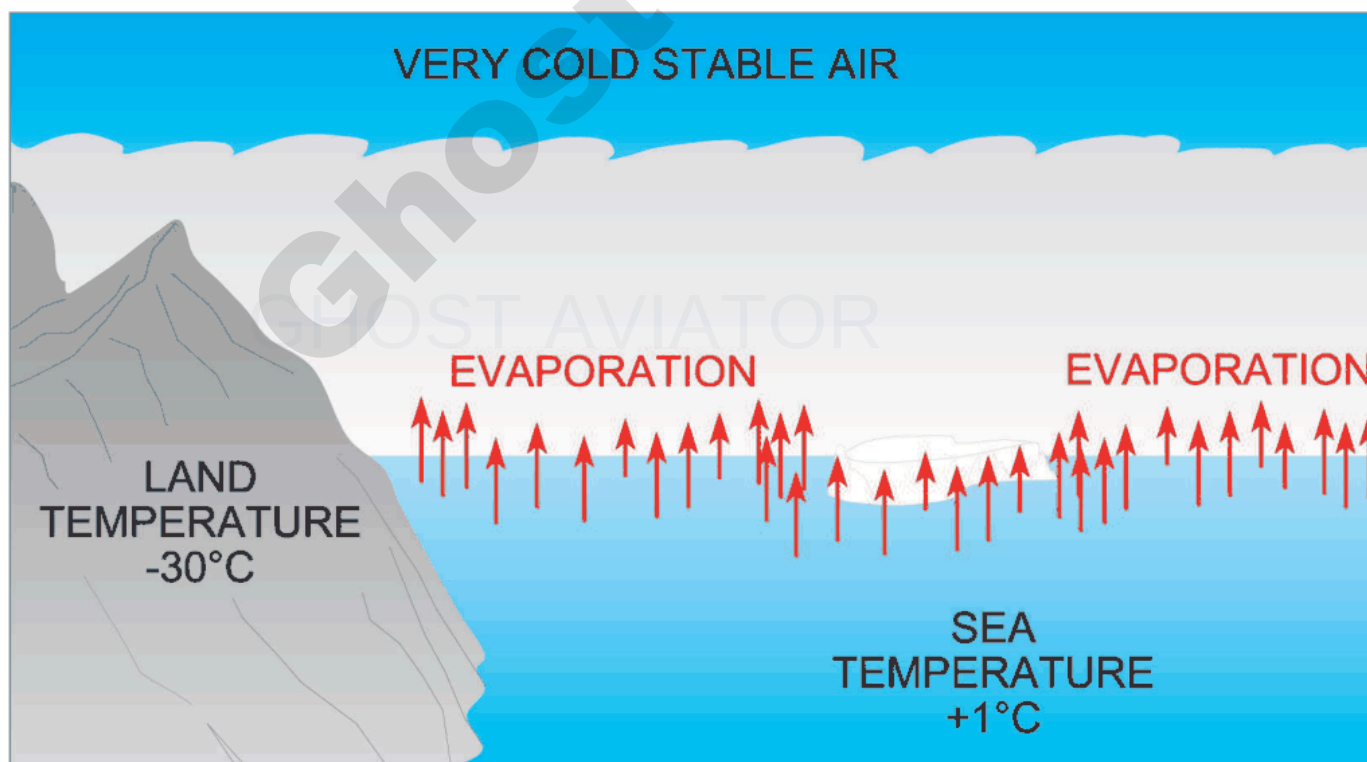


Hill fog

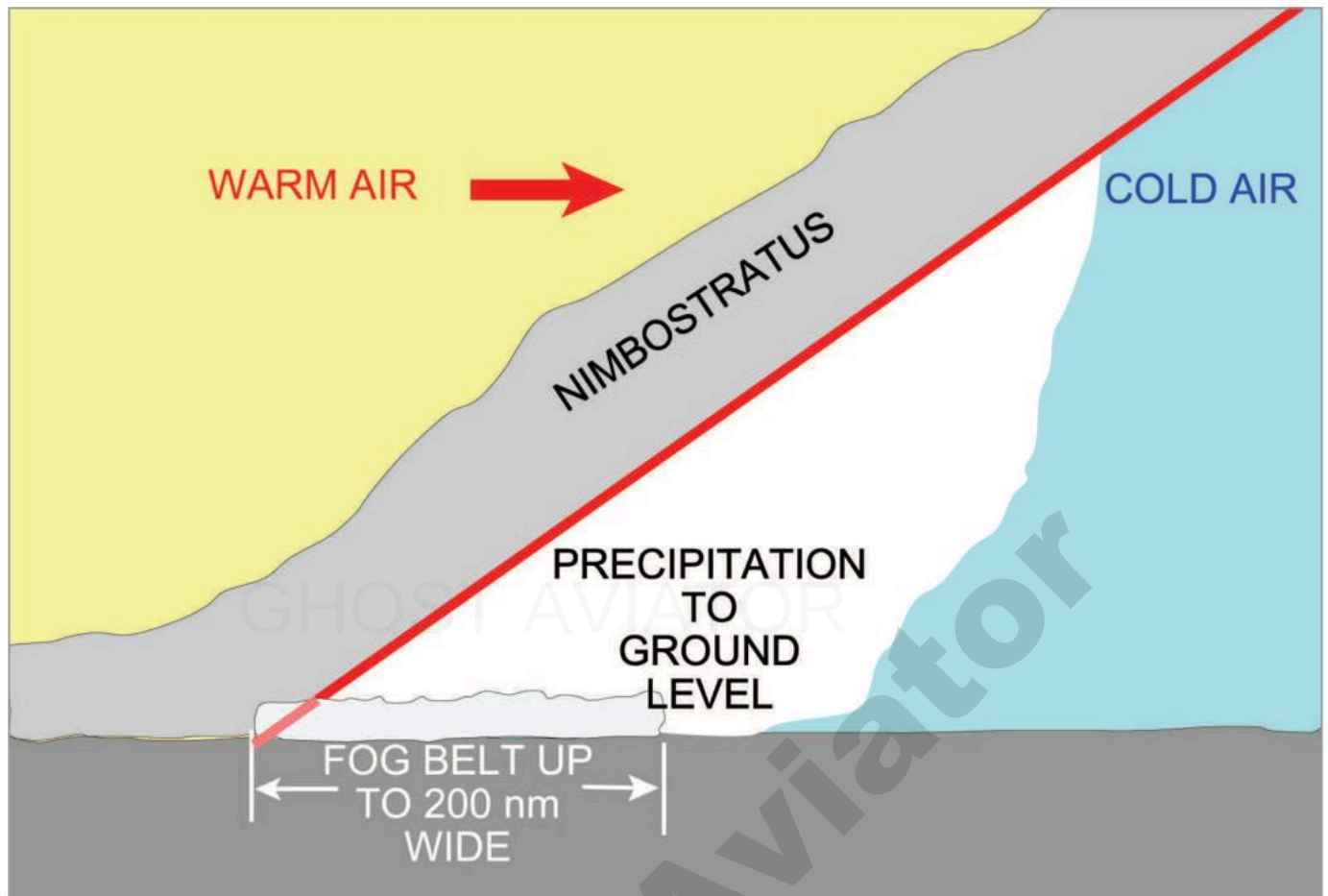
Ghost Aviator
GHOST AVIATOR



Advection fog



Steaming fog



Frontal fog

6.1 Radiation Fog

Formation: Radiation fog forms due to **nocturnal cooling** of the ground and the adjacent air layers. It is essential that the cooling should lower the temperature below the dew-point. If the wind is light, there is no turbulent mixing. The cooling of the ground is unable to extend upwards at sufficient rate — moisture close to the ground settles down as dew. If wind is strong, it may prevent cooling or cool too thick a layer — fog forms. The temperature may not fall sufficiently for fog formation. In such cases **stratus cloud** may form at the top of the layer of turbulence.

Favourable Conditions for Radiation Fog Formation

Condition	Reason
(a) High Relative Humidity	Little cooling needed to reach dew-point; condensation of water vapour can occur
(b) Clear Sky	Clear skies permit maximum nocturnal cooling of ground and adjacent air layers
(c) Light Wind: 3–7 kt	Enables turbulent mixing and cooling of layers close to ground; brings their temperature to dew-point
(d) Stability	Generally stable atmosphere, so mixing and cooling are confined to a shallow layer

⚠ **Why Calm Wind Can Prevent Radiation Fog:** If the wind is too light (calm), there is no turbulent mixing. The cooling of the ground is unable to extend upwards fast enough — moisture close to ground merely settles down as **dew**, NOT fog.

Why Strong Wind Can Prevent Radiation Fog: Turbulence prevents cooling any one layer enough; cooling spreads over too thick a layer and temperature doesn't fall to dew point.

Characteristics of Radiation Fog

- Forms in **anticyclones, ridges, and ground inversions** — wind is light, skies are clear, atmosphere stable
- Fog would form even when RH is less than 100% due to hygroscopic condensation nuclei
- Minimum temperature usually occurs just after sunrise
- **Most frequent at about sunrise or it thickens at that time**
- Radiation fog dissipates about **2–3 hours** after sunrise due to heating
- If deep, sun's heat takes longer to penetrate ground; fog may persist to **midday**
- Usually lifts into low stratus clouds before finally dissipating

Radiation Fog in India

⚠️ Radiation Fog — Indian Aviation Hazard (Winter):

- A **winter hazard** in India
- Usually forms after the passage of a **Western Disturbance (WD)** which caused rain and then sky cleared
- Almost a daily feature in winters in the valley of the **Brahmaputra river** where adequate moisture is present
- Katabatic flow provides the required turbulence and additional cooling
- Most susceptible areas: **NW India, UP, Bihar, Jharkhand, Chhattisgarh, Bengal and Assam** (particularly Southern banks of Brahmaputra river)
- **Vertical extent:** Few hundred feet to **1500 ft**, maximum **1 km**
- Upper surface of vertical radiation fog is sharp with clear air above
- **Pressure system:** A High or Col with weak pressure gradient is favourable; fog does NOT form when pressure gradient is steep and low level winds are strong

6.2 Advection Fog

Formation: Forms when **warm moist air from elsewhere is transported over a cold surface** (ground or water) where the surface temperature is less than the dew point of the advected air. Advection fog forms both over land and sea.

- Coastal fogs of Bengal and Orissa in winters are due to a combined effect of advection and radiation
- Advection fog forms any time of day and night
- More persistent than radiation fog and more extensive
- Common over sea in spring when warm air moves over cooler sea water

💡 **Key Distinction:** Radiation Fog = nocturnal cooling of ground (stationary process). Advection Fog = horizontal transport of warm moist air over cold surface (dynamic process). Advection fog can form DAY or NIGHT; Radiation fog mainly at night.

6.3 Steaming Fog (Sea Smoke)

Formation: Occurs at high latitudes when cold air mass flows over a warm sea surface. The water vapour from the warm sea condenses as it lifts into the cold air. Looks like steam coming out of the sea surface. Hence called **Sea Smoke**.

- Common in Icelandic and Norwegian regions

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- Over sea, often referred to as sea smoke

6.4 Frontal Fog

Formation: Occurs on the sloping boundary between two contrasting air masses due to the saturation of the air near the surface in the area of continuous rain ahead of a front. Also forms due to the lowering of cloud to the surface with the passage of a front.

6.5 Upslope Fog

Formation: Forms due to lifting of moist air along a sloping hill or plains — due to adiabatic cooling.

6.6 Inversion Fog

Formation: Occurs in an anticyclonic area when cold air, due to subsidence, comes in contact with a warm water body.

Fog Types — Comparison Table

Fog Type	Cause	Time	Location	Key Characteristic
Radiation	Nocturnal cooling; radiation loss	Night → morning	Land; valleys, depressions	Clear sky + light 3-7kt wind required; dissipates 2-3hr after sunrise
Advection	Warm moist air over cold surface	Day or Night	Land and sea coasts	More persistent; can be thick; Bengal/Orissa coastal fogs in winter
Steaming (Sea Smoke)	Cold air over warm sea	Any time	High latitude seas	Looks like steam; Iceland/Norway
Frontal	Rain ahead of front saturates air; cloud lowers to surface	With frontal passage	Frontal zones	Associated with Western Disturbances; common with Cold Fronts
Upslope	Moist air lifts along slope; adiabatic cooling	Any	Hill slopes, plains	—
Inversion	Subsiding cold air meets warm water body	Any	Anticyclonic areas; coasts	In anticyclone with temperature inversion

flowchart LR

subgraph Formation

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A["Clear night\n+ High RH\n+ 3-7kt wind\n+ Stable air"] --> RF["RADIATION FOG\n(most common in India)"]
B["Warm moist air\ntransported over\ncold surface"] --> AF["ADVECTION FOG\n(land + sea, day/night)"]
C["Cold air over\nwarm sea"] --> STF["STEAMING FOG\n(Sea Smoke)"]
D["Rain ahead of front\nor cloud lowering"] --> FF["FRONTAL FOG"]
E["Moist air lifted\nalong slope"] --> UF["UPSLOPE FOG\n(Adiabatic cooling)"]
F["Subsiding cold air\n+ warm water body"] --> IF["INVERSION FOG\n(Anticyclone)"]
end

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7. Fog Dispersal

Thermal Method

When air is heated to temperature above the dew point, fog or clouds will dissipate. During the Second World War, heaters, burners, fires were used to disperse fog but the method involved large expenditures and was discontinued.

Use of Hygroscopic Nuclei

When hygroscopic particles are injected into fog water drops form. This lowers the RH of the air, leading to dissipation of fog. **Seeding** with dry ice or silver iodide or propane gas produces freezing and precipitation.

💡 Fog Dispersal Methods:

1. **Thermal Method** — heat air above dew point (expensive, discontinued after WWII)
2. **Hygroscopic Nuclei / Cloud Seeding** — dry ice, silver iodide, propane gas → freezing and precipitation
→ lowers RH → fog dissipates

Practice Q&A — Chapter 7: Visibility and Fog

Q1. Fog is reported when visibility is reduced to

(a) Less than 1000m (b) 1000m (c) 1000 to 2000

✅ Answer: (a) Less than 1000m — Fog is defined as visibility reduced to LESS than 1000m, with RH nearly 100%.

❌ (b) 1000m exactly: At exactly 1000m it is still Mist ($\geq 1000\text{m} \leq 5000\text{m}$).

❌ (c) 1000-2000m: This is the Mist range.

💡 Mnemonic: "Fog < 1000m. Mist = 1000–5000m." RH ~ 100% in both cases.

Q2. RVR is reported in visibility falls below

(a) 500m (b) 1000m (c) 1500m (d) 2000m

✅ Answer: (c) 1500m — RVR is reported when visibility is less than 1500m.

❌ Others: Only c is correct per the text — "RVR is reported when visibility is less than 1500m."

💡 "RVR = 1500m trigger point." RVR 2000 and 1500 included in METAR as supplementary but NOT disseminated internationally.

Q3. Radiation fog occurs:

(a) Over land (b) Over sea (c) During day

✅ Answer: (a) Over land — Radiation fog requires nocturnal cooling of the GROUND surface. It forms over land, particularly in valleys and depressions.

❌ (b) Over sea: Radiation fog does not typically form over sea as sea temperature varies very little diurnally.

❌ (c) During day: Radiation fog forms at night and persists until morning; daytime heating dissipates it.

💡 "Radiation Fog = Land + Night + Clear sky + 3-7kt wind."

Q4. If visibility reduces between 5000m and 1000m and RH is almost 100%, it is

(a) Mist (b) Haze (c) Fog

✅ Answer: (a) Mist — Mist: visibility $\geq 1000\text{m}$ but $\leq 5000\text{m}$, RH almost 100%. Composed of water droplets.

❌ (b) Haze: Haze visibility $\leq 5000\text{m}$ but it's composed of dry particles (smoke, dust, water), RH not necessarily $\sim 100\%$.

❌ (c) Fog: Fog is visibility $< 1000\text{m}$.

💡 "Mist = 1000-5000m, wet (water droplets), RH $\sim 100\%$. Haze = $\leq 5000\text{m}$, dry particles, milky appearance."

Q5. Radiation Fog forms over N India during:

(a) May to June (b) Dec to Feb (c) Oct to Nov

✅ Answer: (b) Dec to Feb — Radiation fog in India is a winter hazard, typically December to February, especially after passage of Western Disturbances.

❌ (a) May to June: This is pre-monsoon / summer season — too warm for radiation fog.

❌ (c) Oct to Nov: Transition season; not the primary radiation fog season.

💡 "India Radiation Fog = Winter (Dec-Feb) after WD." The Brahmaputra valley is particularly affected — almost daily in winters.

Q6. Warm and moist air moving over a cold surface causes:

(a) Thunder clouds (b) Fog and stratus (c) Frontal clouds

✅ Answer: (b) Fog and stratus — Warm moist air moving over cold surface = Advection Fog. The surface chills the air from below, leading to fog or stratus.

❌ (a) Thunder clouds: Thunderclouds require strong instability and rising motion — not created by cold surface.

❌ (c) Frontal clouds: These require frontal lifting.

💡 "Advection Fog = Warm air + Cold surface = Fog + Stratus." Classic coastal fog mechanism.

Q7. The radiation fog activity increases after the passage of a

(a) WD (b) Depression (c) Col

✓ Answer: (a) WD (Western Disturbance) — Radiation fog in India usually forms after the passage of a WD which caused rain and then sky cleared, leaving adequate moisture in the air.

✗ (b) Depression: Generally brings cloud cover and rain — not favourable after depression.

✗ (c) Col: Col can be favourable but WD is specifically mentioned in the text as the trigger.

💡 WD sequence: WD arrives → rain → sky clears → moisture left → radiation fog forms. Classic NW India winter pattern.

Q8. The radiation fog forms due to

(a) Heating of the earth during day

(b) Radiational cooling of earth at night

(c) Advection of cold air

✓ Answer: (b) Radiational cooling of earth at night — The ground radiates heat at night, cooling the adjacent air layers below the dew point, forming radiation fog.

✗ (a) Daytime heating: Daytime heating promotes convection and dissipates fog.

✗ (c) Advection of cold air: That is Advection Fog mechanism (warm moist air over cold surface).

Q9. Radiation fog is essentially a phenomena

(a) Nocturnal (b) Dusk (c) Day

✓ Answer: (a) Nocturnal — Radiation fog forms at night (nocturnal) due to radiative cooling of the earth's surface.

Q10. Radiation fog forms over

(a) Water (b) Land (c) Both

✓ Answer: (b) Land — Radiation fog requires significant diurnal temperature variation, which occurs over land. Sea temperature is nearly constant.

Q11. The fog forms due to horizontal movement of warm moist air over cold surface

(a) Radiation (b) Advection (c) Frontal

✓ Answer: (b) Advection — Advection Fog = horizontal transport (advection) of warm moist air over a cold

surface.

- ✗ (a) Radiation: Radiation fog = vertical (radiative) cooling of stationary air.
- ✗ (c) Frontal: Frontal fog = saturation from rain ahead of front or cloud lowering.

Q12. The fog forms due to horizontal movement of warm moist air over cold surface

(a) Radiation (b) Advection (c) Frontal

✓ Answer: (b) Advection — Same as Q11.

Q13. Advection fog forms during:

(a) Night only (b) Day time only (c) Any time of day and night

✓ Answer: (c) Any time of day and night — Advection fog can form at any time because it depends on the horizontal transport of warm moist air, not on day/night cycle.

- ✗ (a) Night only: That's a characteristic of radiation fog.
- ✗ (b) Daytime only: No fog type is daytime-only.

💡 "Radiation fog = NIGHT process. Advection fog = ANY TIME." Key exam distinction.

Q14. For the formation of Radiation fog

(a) There should be sufficient moisture in atmosphere, cloudy sky, nil wind
(b) There should be sufficient moisture in atmosphere, clear sky, light wind
(c) There should be sufficient moisture in atmosphere, cloudy sky, strong wind

✓ Answer: (b) Sufficient moisture, clear sky, light wind (3-7kt) — The three essential conditions: high RH, clear sky for nocturnal cooling, and light winds for turbulent mixing down to the surface.

- ✗ (a) Cloudy sky, nil wind: Cloudy sky prevents radiation cooling. Nil/calm wind → dew forms, not fog.
- ✗ (c) Cloudy sky, strong wind: Cloudy sky prevents cooling; strong wind mixes fog away or too thick a layer cooled.

💡 "Radiation Fog conditions: HIGH RH + CLEAR SKY + LIGHT 3-7kt WIND + STABLE AIR." All four must be present.

Q15. Instrument used for measuring visibility is called

(a) Viscometer (b) Transmissometer (c) Ceilometer

✅ Answer: (b) Transmissometer — Also called Scopograph. Measures visibility along runways. Uses light source and photoelectric receiver.

❌ (a) Viscometer: Measures viscosity of fluids — unrelated.

❌ (c) Ceilometer: Measures cloud base height, not visibility.

💡 "Transmissometer = visibility. Ceilometer = cloud base. Barometer = pressure."

Q16. Advection fog forms:

(a) Over sea (b) Over land (c) Both over land and sea

✅ Answer: (c) Both over land and sea — Advection fog forms wherever warm moist air is transported over a colder surface, which can be land or sea.

💡 Classic example: Coastal fogs of Bengal/Orissa in winters (advection + radiation combination). San Francisco Bay Area fog is classic sea advection fog.

Q17. Fog is cloud on ground

(a) Stratus (b) Strato cumulus (c) Nimbostratus

✅ Answer: (a) Stratus — Fog is essentially stratus cloud sitting on the ground. The textbook states: "Fog is the cloud sitting on ground."

❌ (b) Stratocumulus: Has patchy, lumpy structure — not the flat fog layer.

❌ (c) Nimbostratus: Rain-bearing grey layer cloud at significant height.

💡 "Fog = Stratus at ground level." As radiation fog lifts with morning heating, it becomes stratus clouds.

Q18. Frontal fog is more common with a: (a) Western Disturbance (b) Cyclone (c) Warm Front (d) Cold Front

✅ Answer: (c) Warm Front — Frontal fog forms at a warm front (or an occlusion): the rain falling from the warm air saturates the cold air near the ground and the cloud base lowers to the surface. The fog is mainly ahead of the front.

✗ (a) A Western Disturbance brings fog mostly after its passage, as radiation fog. (b) A cyclone is a wider system. (d) The cold front is a narrow, fast-moving feature and rarely holds fog.

💡 Frontal fog = ahead of a warm front, in the drizzle belt.

Q19. The favourable pressure system for formation of fog is: (a) Lows and Cols (b) High and Trough (c) Lows and Ridges (d) Highs and Cols

✓ Answer: (d) Highs and Cols — In highs and cols the pressure gradient is slack, the wind is light, the air sinks and is stable, and skies are often clear: ideal for radiation fog.

✗ (a), (b) and (c) include lows or troughs, where winds are stronger and the air is unstable or cloudy.

💡 Fog loves light winds: Highs and Cols.

Q20. Thermal processes / temperature distribution which favours formation of fog is: (a) Isothermal (b) Adiabatic (c) Inversion (d) SALR

✓ Answer: (c) Inversion — A temperature inversion traps moisture and prevents mixing. Fog commonly forms at the top of an inversion layer, or underneath an inversion where cool moist air is trapped. Radiative cooling creates a surface inversion which is the typical radiation fog environment.

✗ (a) Isothermal: Temperature constant with height — less conducive to fog than inversion.

✗ (b) Adiabatic: Adiabatic process relates to rising/sinking air — upslope fog only.

✗ (d) SALR: Saturated adiabatic lapse rate is about in-cloud processes.

💡 "Fog loves inversions" — temperature inversion = stable = no mixing = fog can persist. Radiation fog itself CREATES a surface inversion.

Master Reference Tables — Chapter 7: Visibility and Fog

Key Numerical Values

Parameter	Value
Fog: visibility threshold	< 1000 m
Mist: visibility range	≥ 1000 m but ≤ 5000 m
Haze: visibility	≤ 5000 m
Dust Storm visibility	≤ 5000 m
RVR reporting trigger	< 1500 m
RVR in METAR (supplementary)	2000 and 1500 m (not disseminated internationally)
Mist: RH	~ 100%
Fog: RH	~ 100%
Favourable wind for radiation fog	3–7 kt
Radiation fog dissipation after sunrise	~ 2–3 hours
Radiation fog vertical extent	few hundred feet to 1500 ft (max 1 km)
Dust Haze vertical extent	6–8 km
Visibility in moderate rain	1–3 km
Visibility in heavy rain/drizzle/snow	< 1000 m
Barren Island (Indian volcano) position	12.16N 93.51E
Barren Island first eruption	1787
Barren Island most recent eruption	2020
Baratang Island distance from Port Blair	150 km N

Join live classes for guided practice and doubt clearing.

Fog Formation Conditions Summary

Fog Type	Key Conditions	Time	Indian Context
Radiation	High RH + Clear sky + 3-7kt wind + Stability + Anticyclone/Ridge	Night → AM	NW India, UP, Bihar, Jharkhand, Chhattisgarh, Bengal, Assam; after WD; Dec-Feb
Advection	Warm moist air + Cold surface (land or sea)	Any	Bengal/Orissa coastal (advection + radiation)
Steaming	Cold air over warm sea	Any	Not common; high latitude seas
Frontal	Continuous rain ahead of front; cloud lowers to surface	With front	With Cold Fronts and WD
Upslope	Moist air + slope + lifting + adiabatic cooling	Any	Hill stations, plains adjacent to hills
Inversion	Anticyclonic subsidence + warm water body + cold air	Any	Coastal anticyclonic areas

Visibility Obscurity Classification

Obscurity	Visibility	Composition	RH
Haze	$\leq 5000\text{m}$	Smoke, dust, water particles	Variable; milky appearance
Dust Haze	Widely reduced; diversionary	Dust from desert/semi-arid	Variable; summer
Smoke Haze	Widely reduced	Industrial/domestic smoke	Variable; stable/inversion
Mist	$\geq 1000\text{m}$, $\leq 5000\text{m}$	Water droplets	$\sim 100\%$
Fog	$< 1000\text{m}$	Water droplets or ice crystals	$\sim 100\%$
Smog	Very poor	Fog + smoke	$\sim 100\%$ + pollutants
Dust Storm	$\leq 5000\text{m}$	Dust particles	Low
Sea Spray	Variable; almost nil at windscreen	Salt particles, water drops	High
Volcanic Ash	Almost nil	Solid volcanic particles	Variable

Quick Revision Summary — Chapter 7

Chapter 7 — Visibility & Fog: 60-Second Revision

Definitions: Fog <1000m; Mist 1000–5000m; Haze $\leq$ 5000m (all RH); Smog = fog+smoke

RVR: Reported when viz <1500m. Instrument = Transmissometer/Scopograph. AVRA at some Indian Met Offices.

Radiation Fog: Night cooling + Clear sky + 3-7kt wind + High RH + Stability → land only; After WD in India; NW India/UP/Bihar/Jharkhand/Chattisgarh/Bengal/Assam; Lifts 2-3hr after sunrise; Top sharp; Ext: few 100ft to 1500ft max 1km

Advection Fog: Warm moist air over cold surface; land + sea; day or night; Bengal/Orissa coastal (advection+radiation)

Steaming Fog: Cold air over warm sea; Iceland/Norway

Frontal Fog: Cold Front rain saturation / cloud lowers to surface

Upslope: Adiabatic cooling on slope

Inversion: Anticyclone + cold air + warm water

Dispersal: Thermal (discontinued, expensive) or Seeding (dry ice, AgI, propane)

VA: Barren Island (12.16N 93.51E); first erupted 1787; last 2020; Baratang = 150km N Port Blair