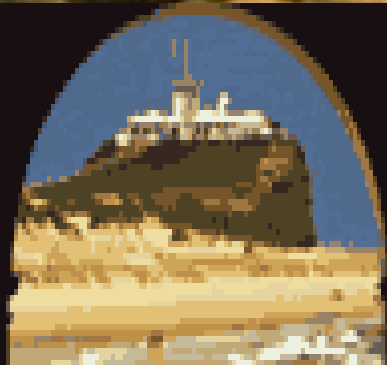


MAJOR AIR MASSES OVER AUSTRALIA



The UNIVERSITY
of NEWCASTLE
AUSTRALIA

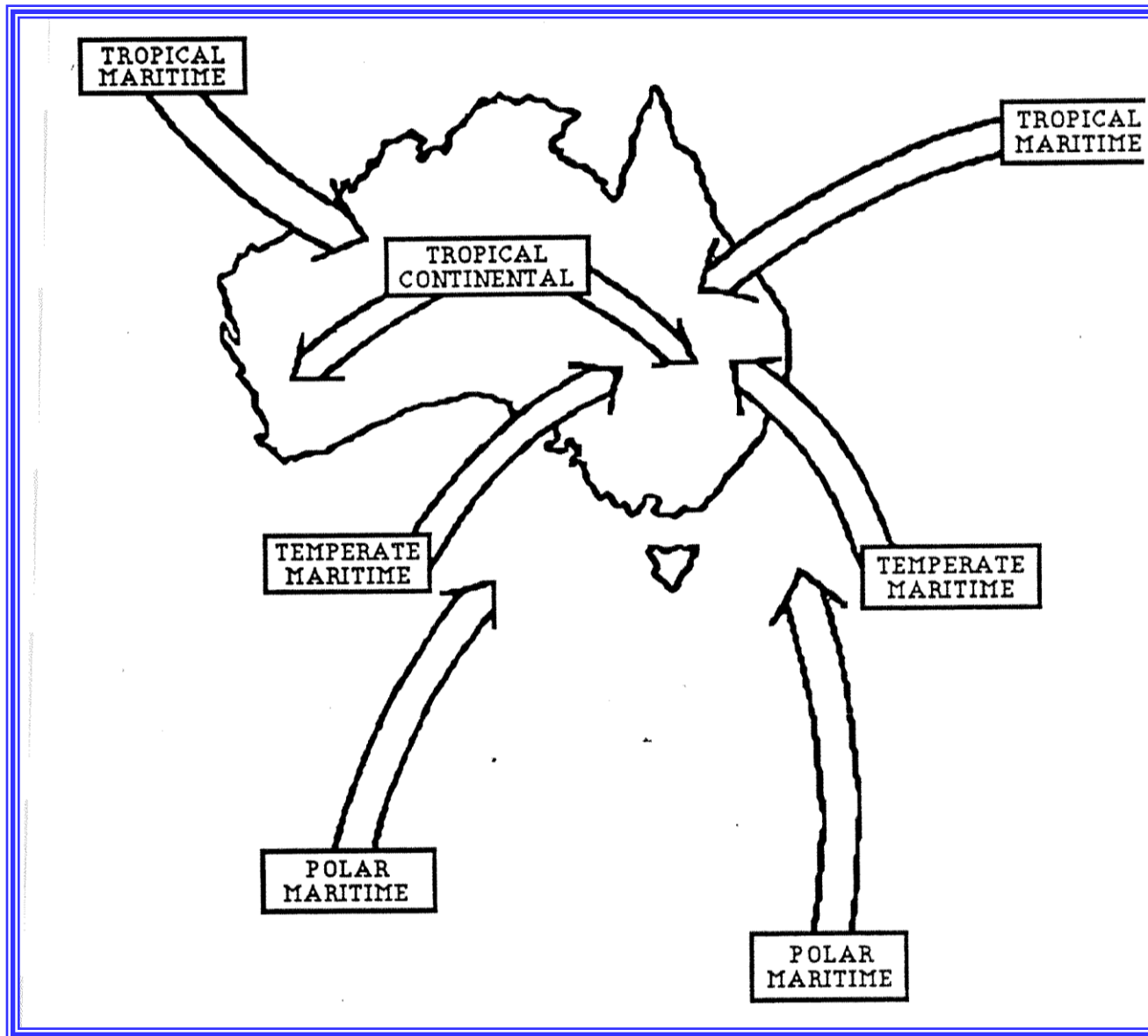
Martin Babakhan
Meteorologist



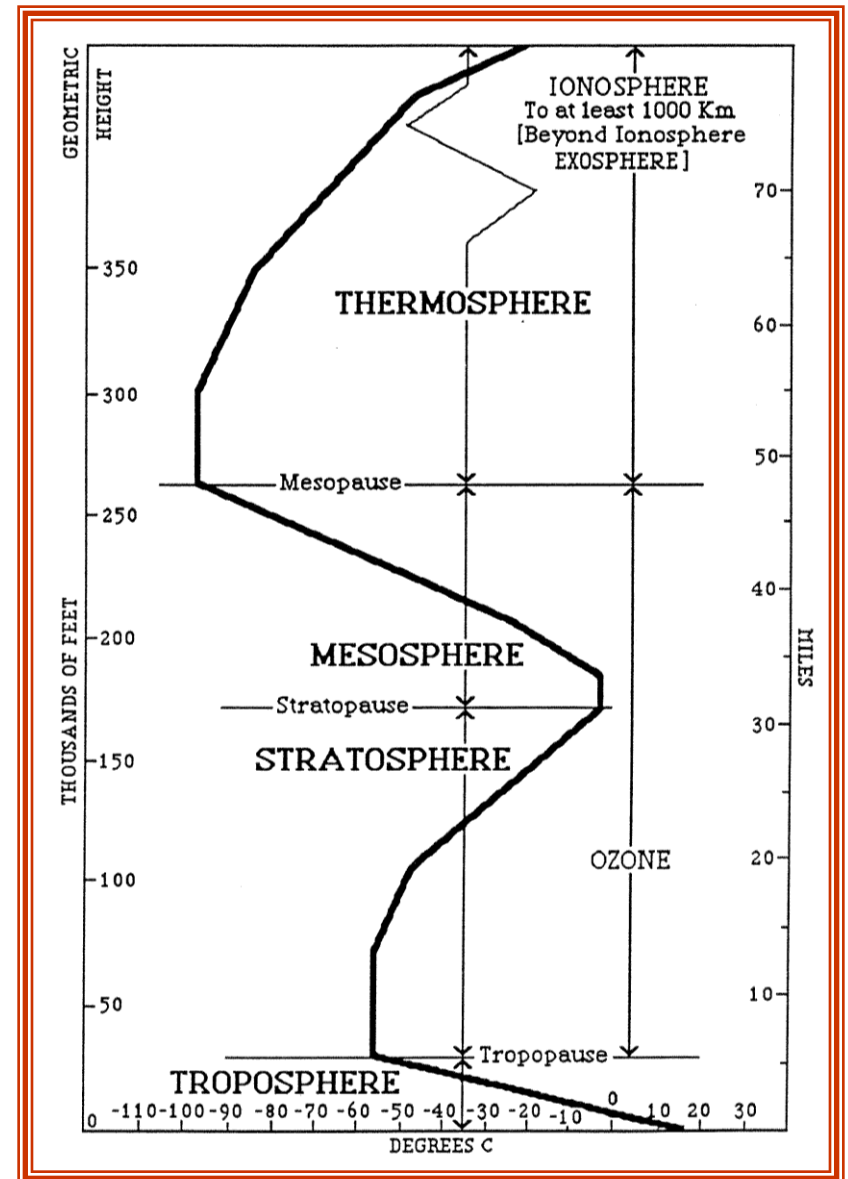
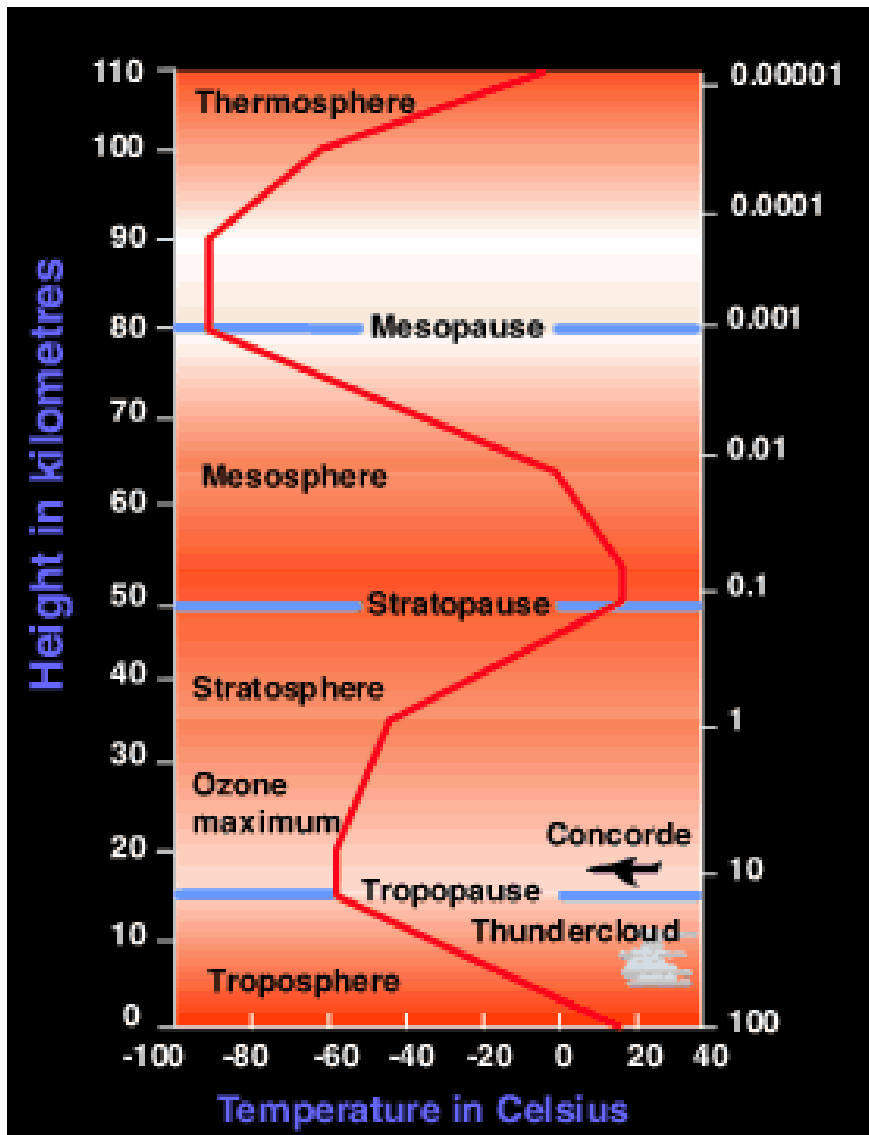
Air Mass

- **An air mass is an extremely large body of air whose properties of temperature and moisture are similar in any horizontal direction at any given altitude.**
- **Usually occupying the whole troposphere in a region.**
- **Within an air mass, the surface pressure may be low or high has little significance in this connection.**
- **The processes which create or modify air masses at the source and in their travels are fairly numerous, especially in middle latitudes far removed from the polar region and tropical sources.**
- **The modifications have a marked effect on the type of weather that will occur within the air mass.**

AIR MASSES WHICH AFFECT AUSTRALIA



Regions of the atmosphere



Air masses which affect Australia

- **Air Mass characteristics.**
- **The area of origin.**
- **The nature of the track from it's area.
origin to Australia.**

Air Stream

- The term “stream” is applied to a more or less steady flow of air from a constant direction over an area for a period (up to 4 to 5 days).
- We may also consider a stream as an air mass in motion from a constant direction e.g “southerly stream”.

Process affecting the weather in streams

- Different air masses are recognisable by having distinctly different values of temperature and humidity.”
- The area of origin.
- The nature of the track that the air mass follows from it's area of origin to Australia.

The factors which modify air mass properties

- **Latitudinal effects.**
- **Topography.**
- **Subsidence near the centre of an (anticyclone).**
- **Turbulence (Stratiform clouds 2000ft).**
- **Upper wind shifts(Mid-level clouds).**

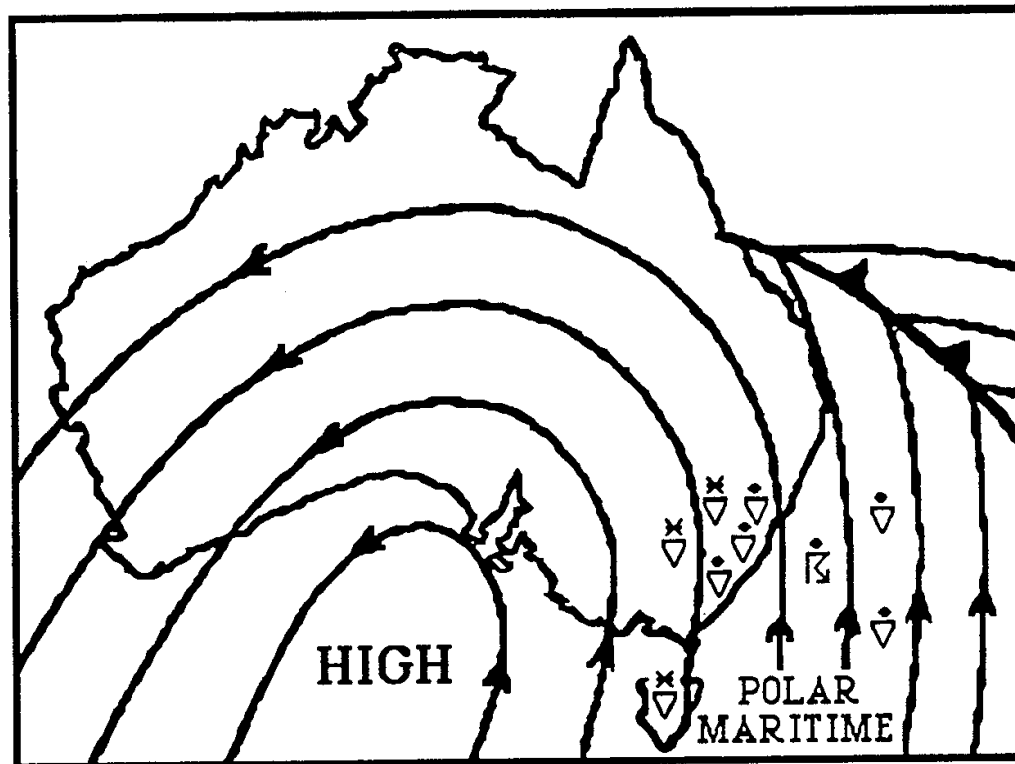
Polar maritime air mass

- Very cold, moist and unstable air mass.
- Source in the southern ocean on the margin of the Antarctic (55 - 68 S).
- Affect southern NSW in winter months during strong southerly flow after the passage of vigorous cold-front.
- Often accompanied by snow and sleet to low levels.

Polar Maritime air mass

AIR MASSES AS THEY AFFECT S. E. AUSTRALIA

1. POLAR MARITIME



Source
Track

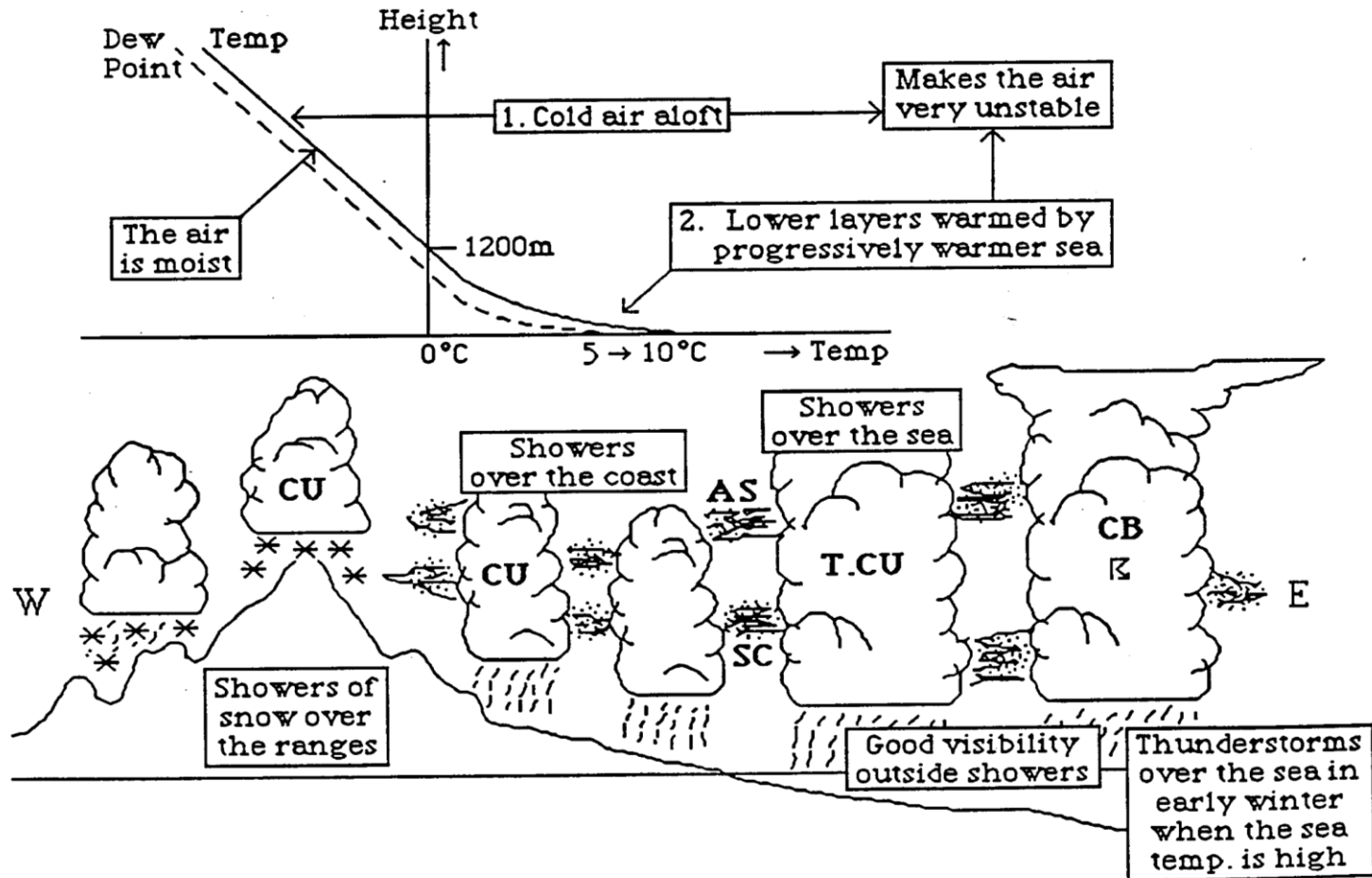
Characteristics

- Polar Anticyclone.
- Long sea track over progressively warmer sea.
- Cold and moist.

Polar Maritime Air mass

Weather Pattern

Typical temp/height graph for Polar Maritime air.



Southern Maritime air mass

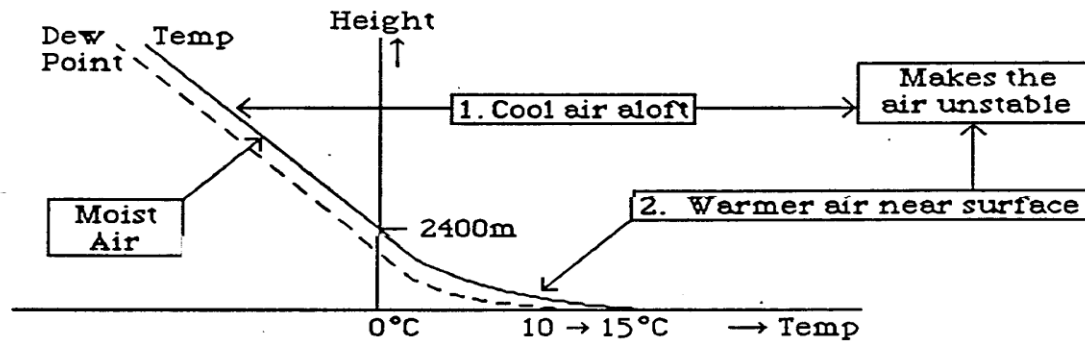
- Cool air mass , moist and unstable at low levels but stable above.
- Source in the southern ocean (35 - 55 S).
- It brings cool, moist, cloudy weather and drizzle to southern Australia at any time of the year.
- Little rain unless orographical uplifted.

Southern Maritime

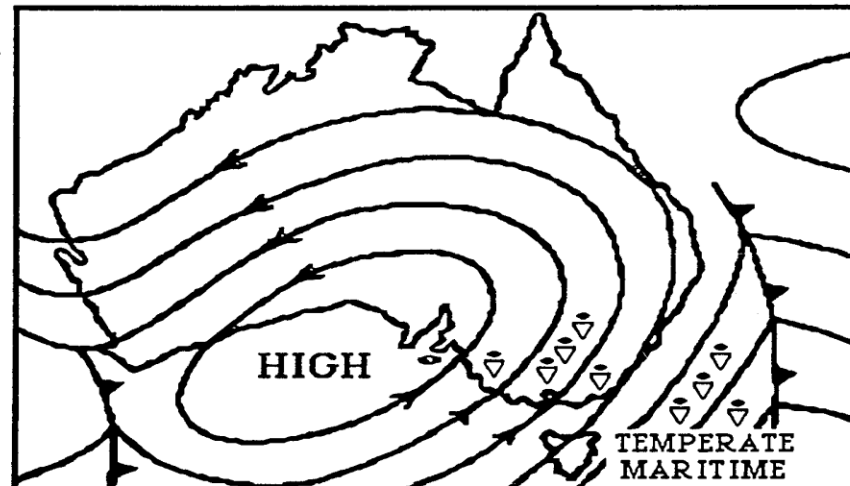
2. TEMPERATE MARITIME

- | | | |
|-----------------|---|--|
| Source | - | Anticyclone over Bight or Southern Tasman. |
| Track | - | Short sea track over progressively warmer sea. |
| Characteristics | - | Cool and moist. |

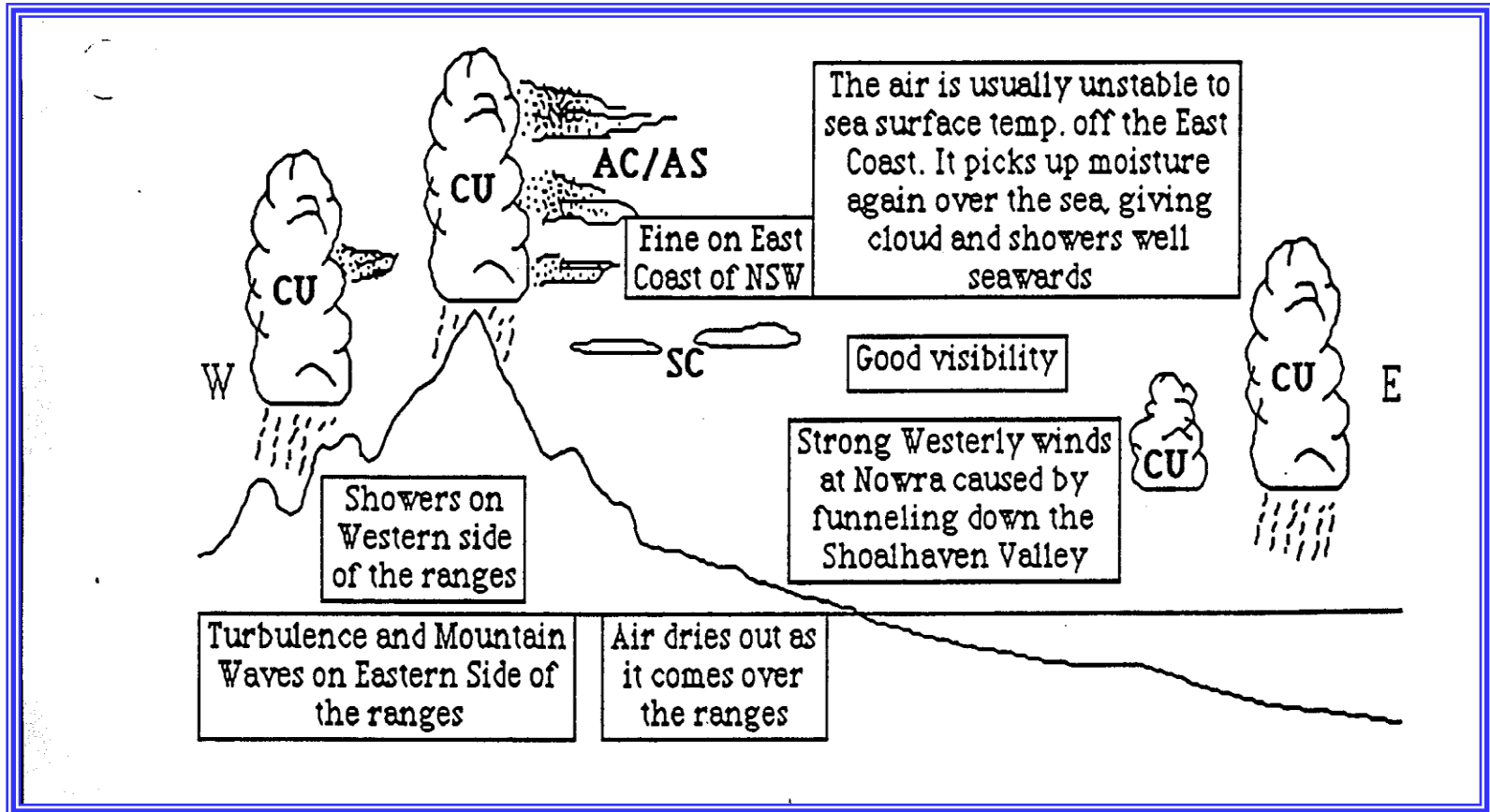
Typical temp/height graph for Temperate Maritime air.



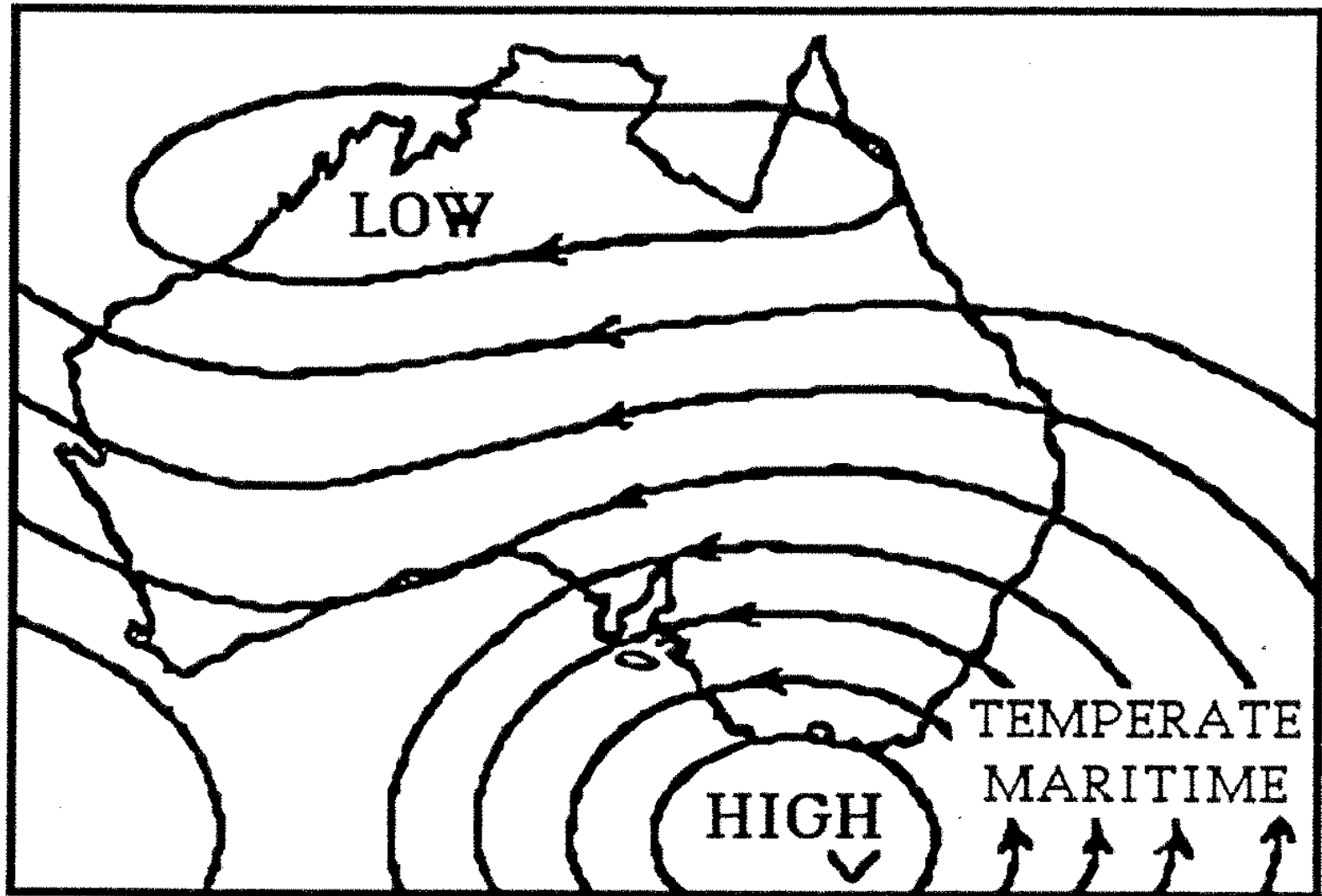
a. As a South
Westerly Air
Stream



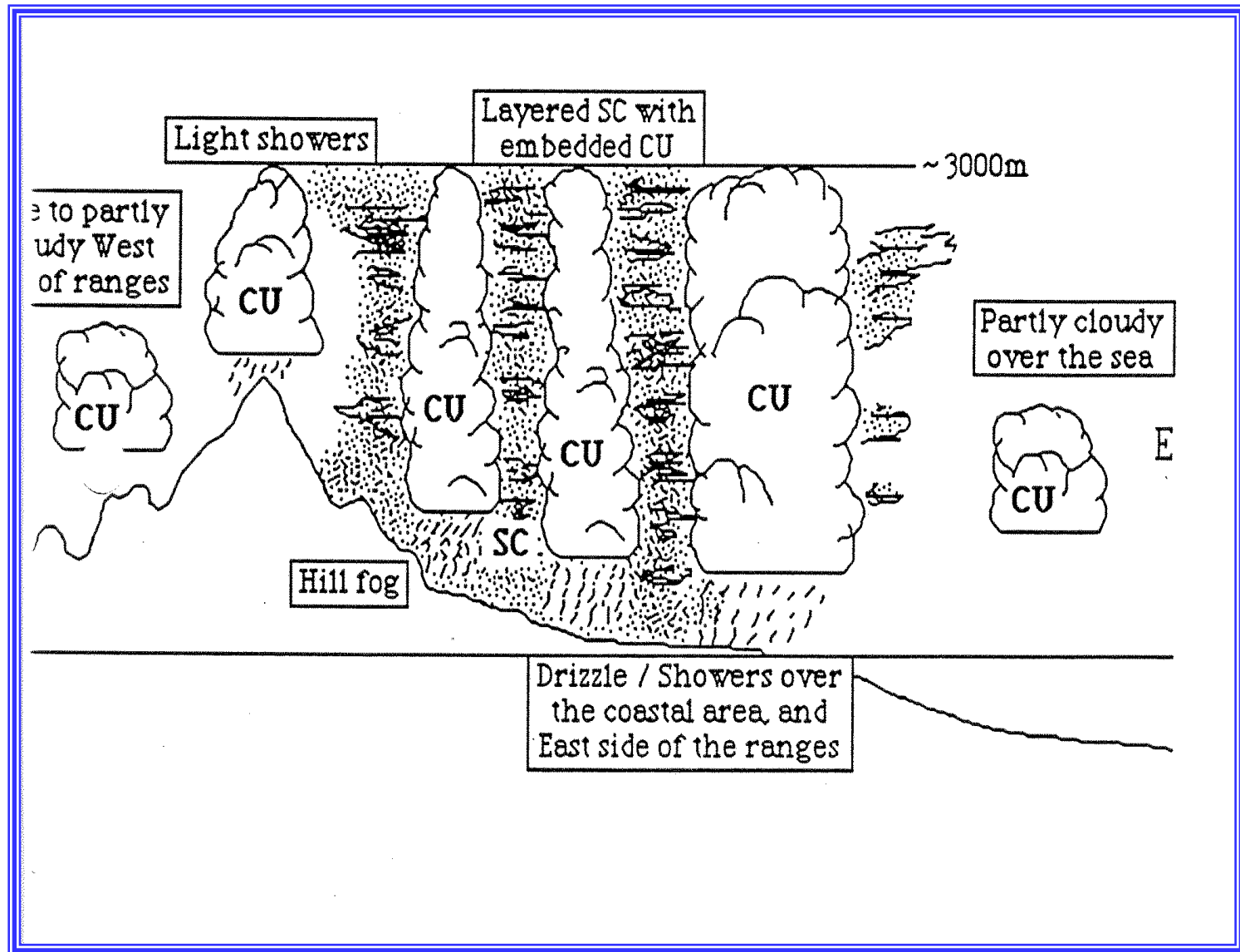
Temperate Maritime Weather Pattern



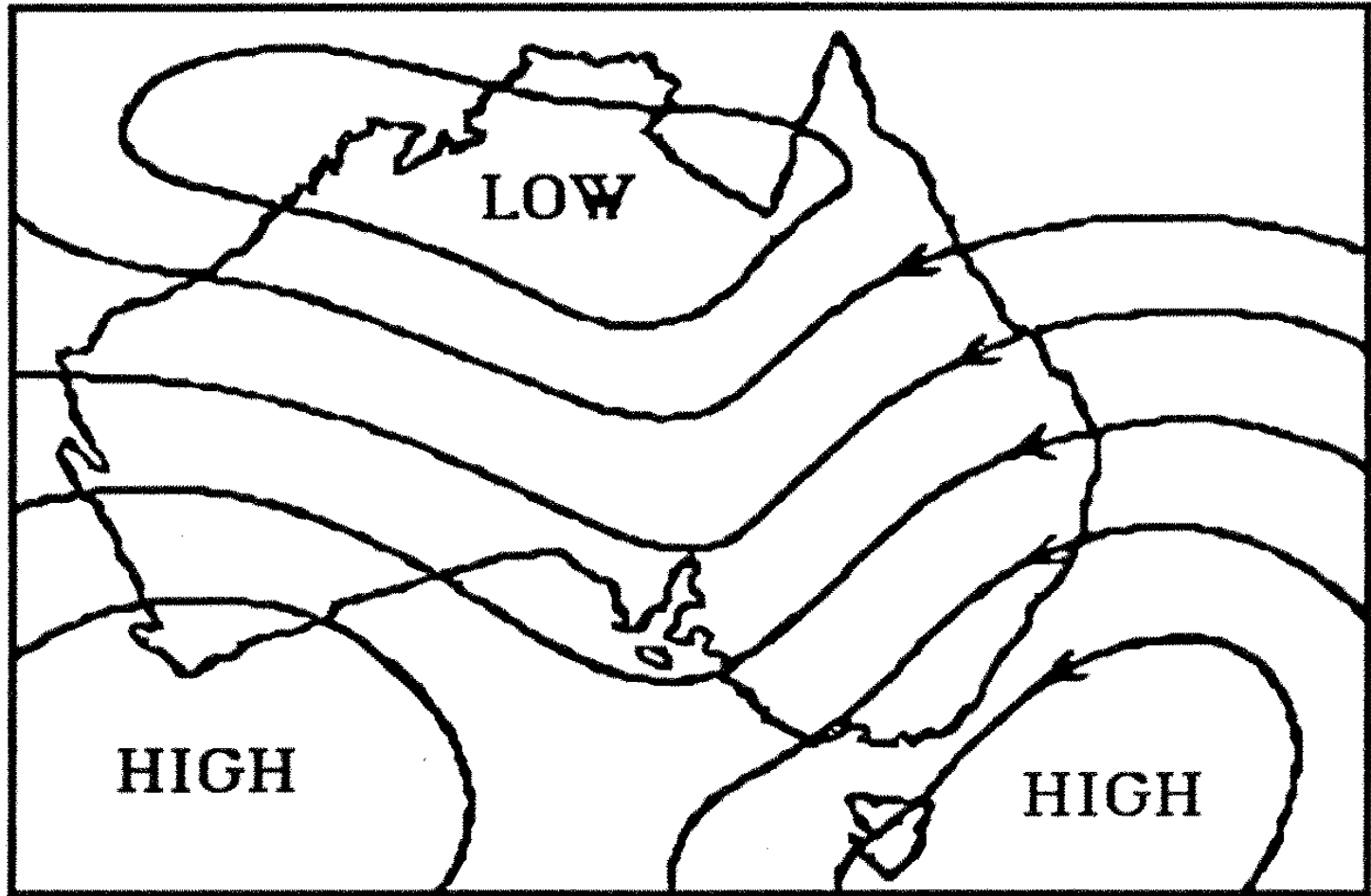
South Easterly Air Stream



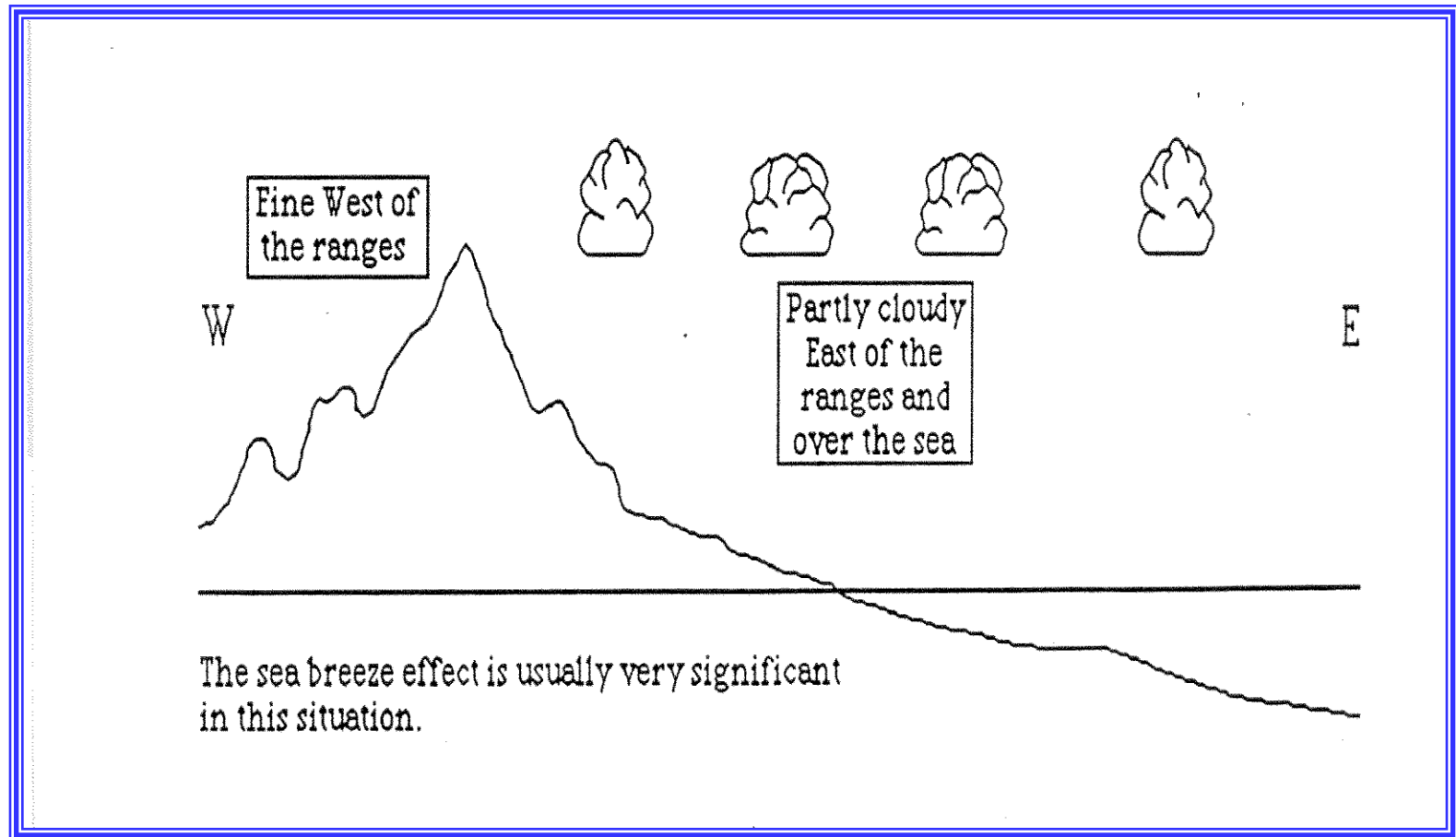
South Easterly Air Stream



North Easterly Air Stream



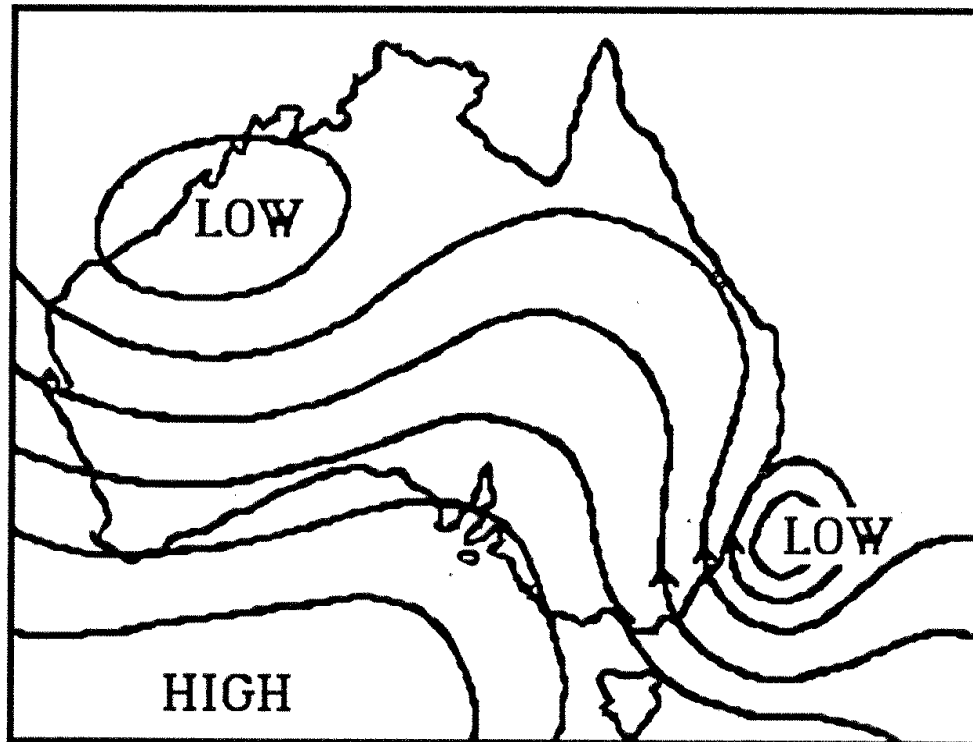
North Easterly Air Stream Weather Pattern



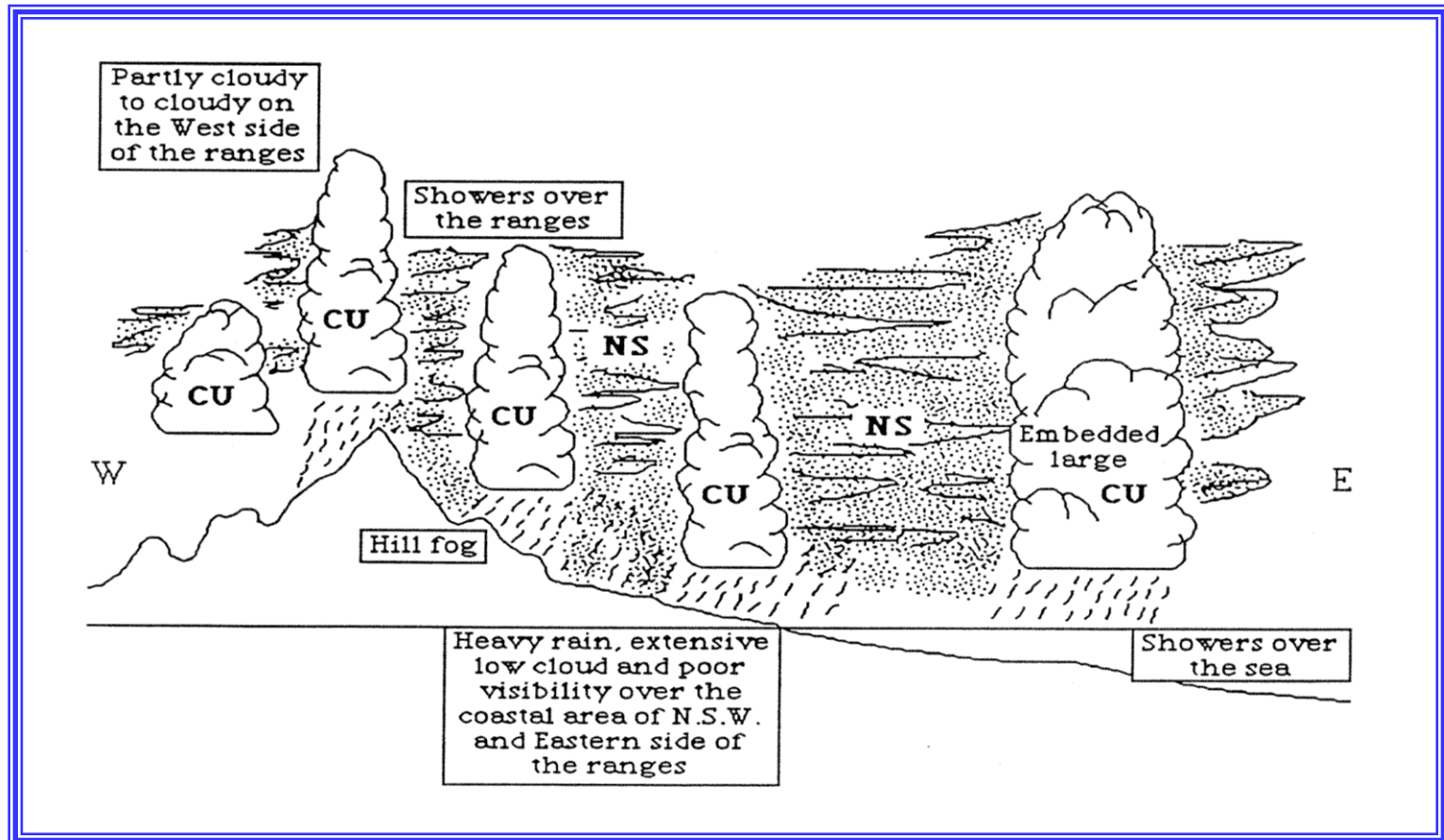
East Coast Low Pressure

As a South Easterly with a Depression off the Coast

(Usually associated with cold air aloft which increases the instability of the air mass)



East Coast Low Pressure Weather Pattern



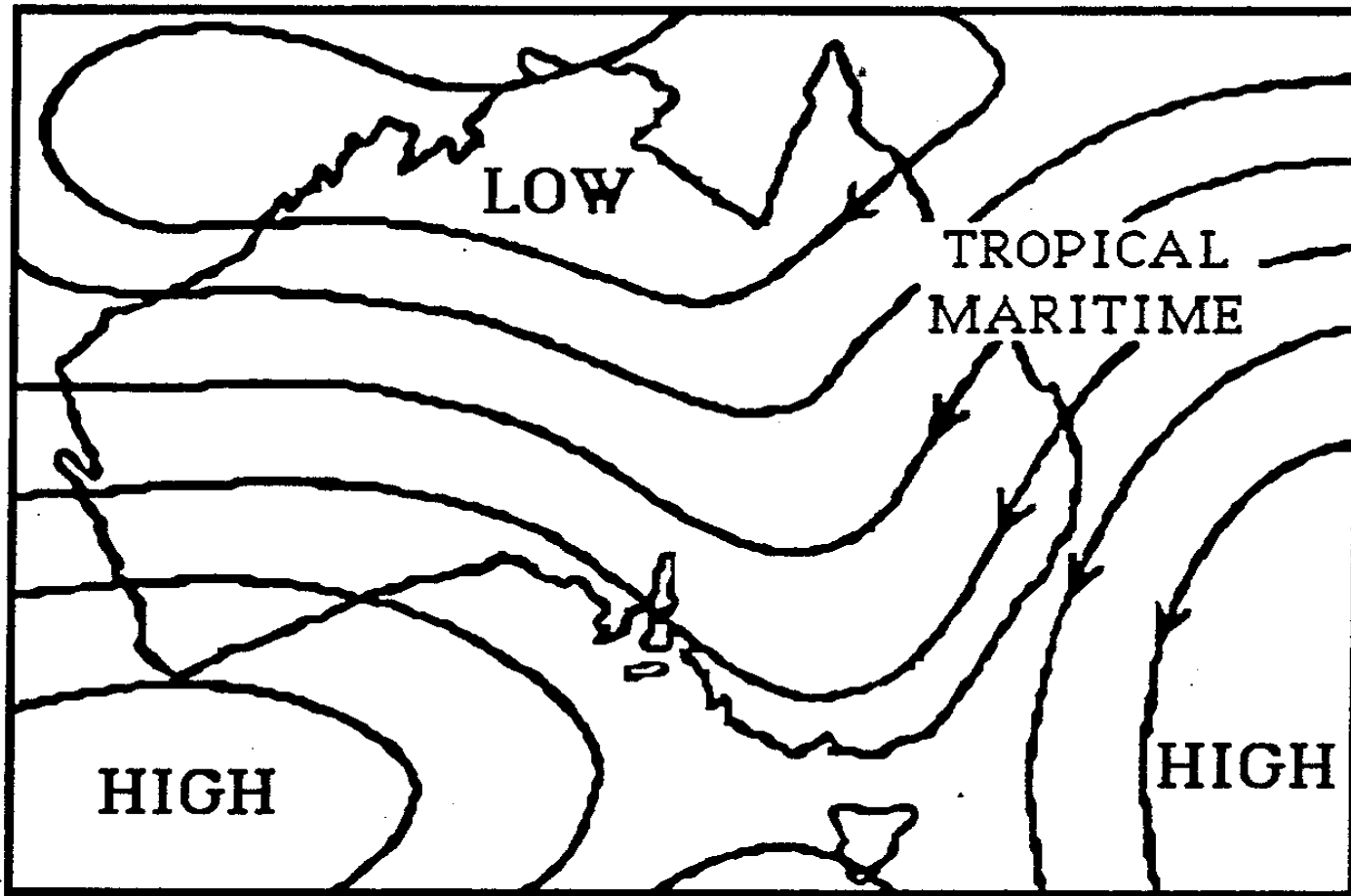
Tropical Maritime “Tasman”

- Warm air mass, unstable and moist to high levels.
- Brings warm, cloudy and drizzle weather to coastal regions of eastern Australia, with heavier rain if some means of lifting available.
- This air mass is influential along central coast region most of the year.

Tropical maritime “Pacific”

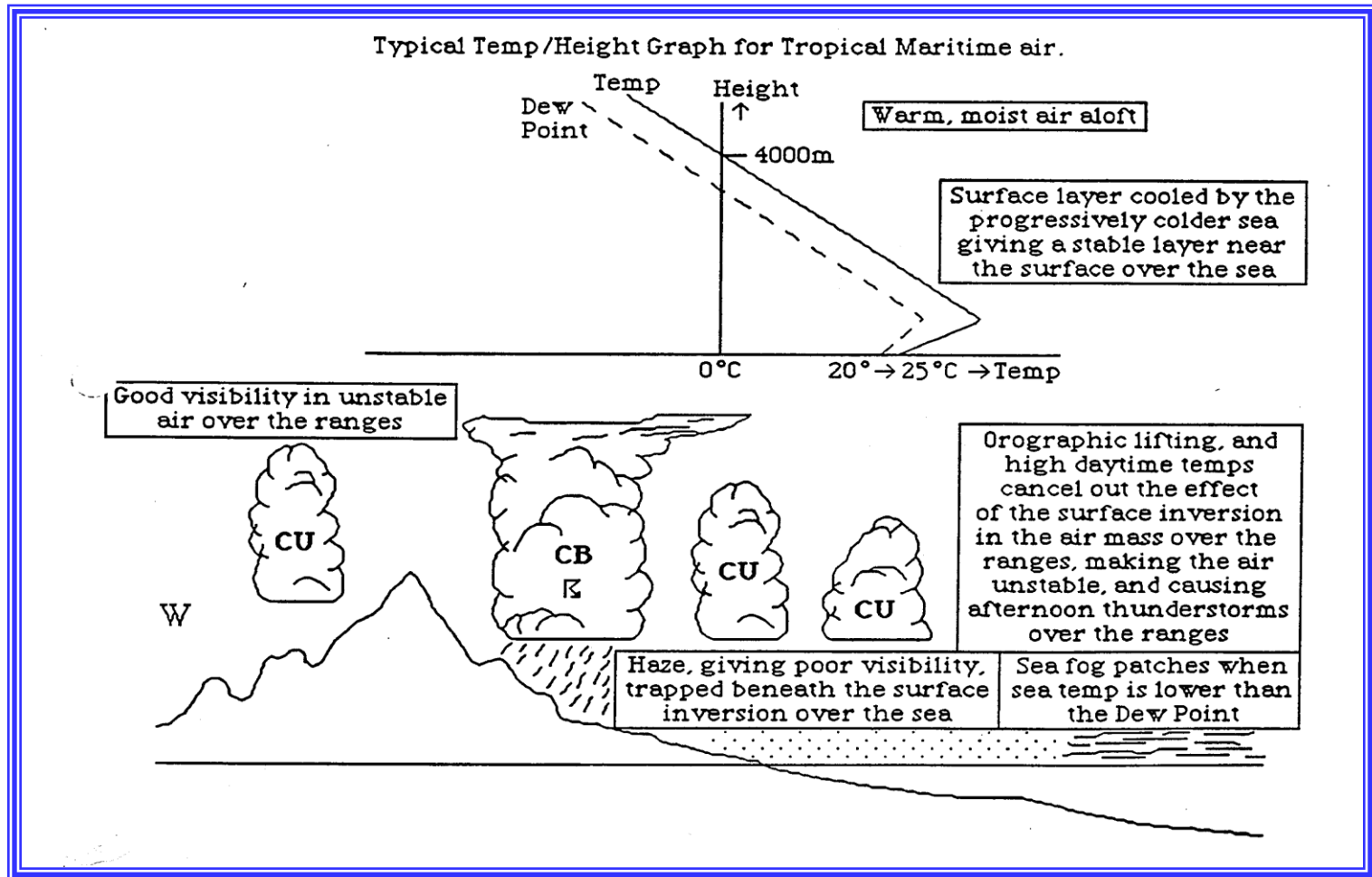
- This air mass is warm, humid.
- Source further north in coral sea and tropical pacific ocean.
- Effects the northern QLD coast most of the year and can bring heavy rainfall if associated with a tropical cyclone.

Tropical Maritime Air Mass



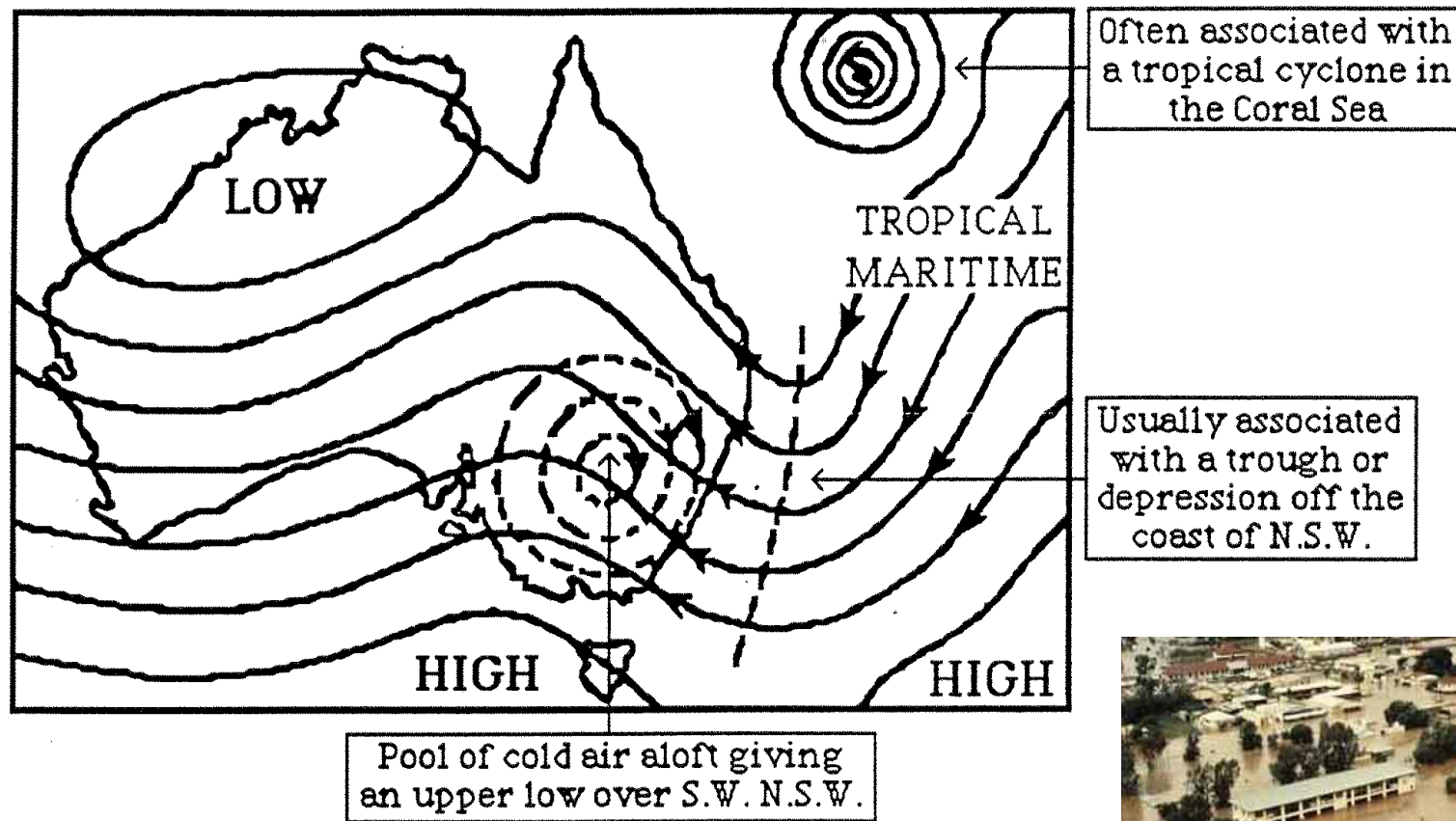
- | | |
|-----------------|--|
| Source | - Tropical area of Western Pacific. |
| Track | - Sea track over progressively colder sea. |
| Characteristics | - Warm and moist - humid. |

Tropical Maritime Weather Pattern



Tropical Maritime with Cold Pool Aloft

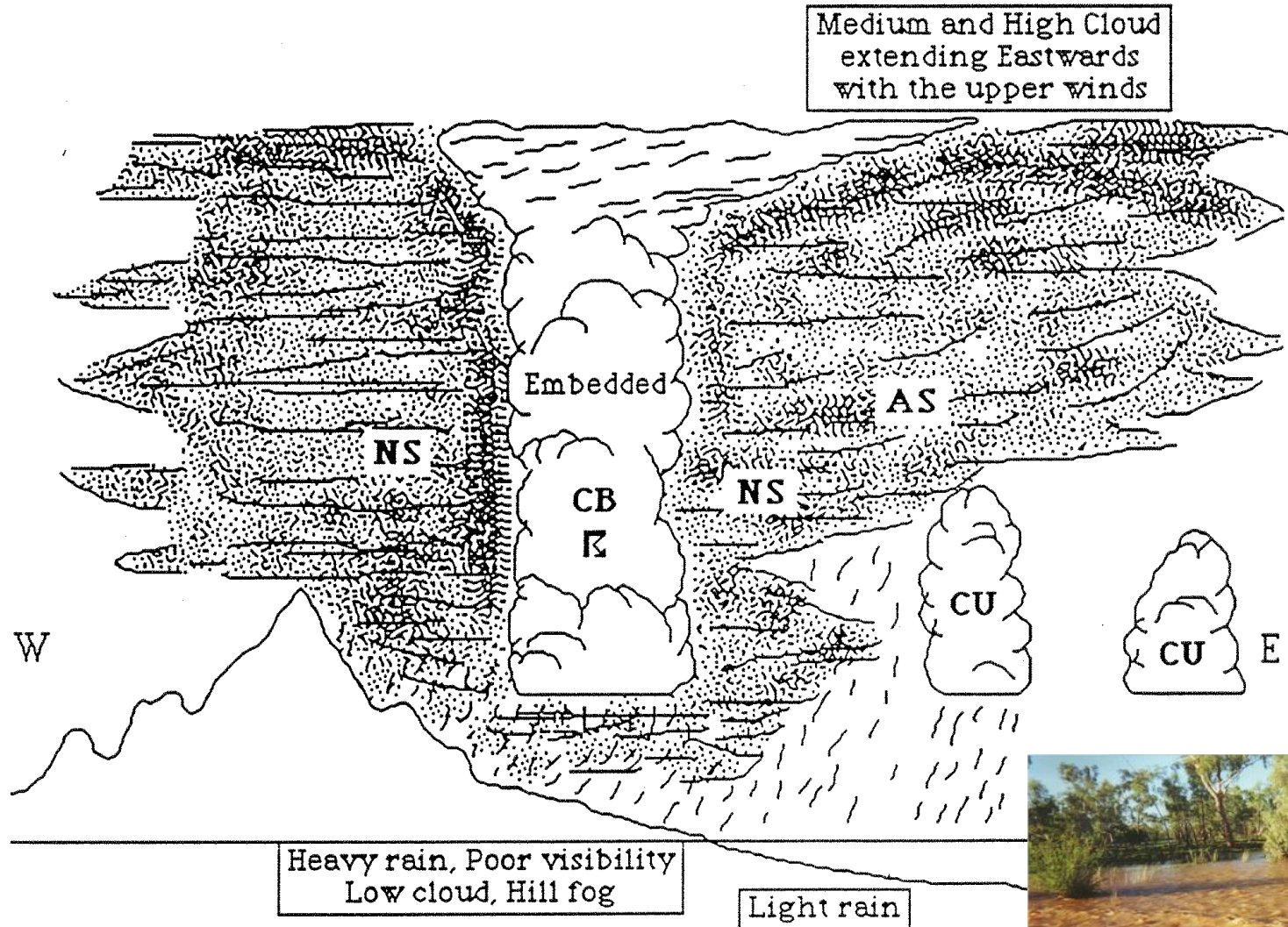
b. Tropical Maritime with Cold Air Aloft



The combination of warm moist air at low level and cold air aloft mass very unstable, giving prolonged heavy rain over N.S.W.



Tropical Maritime with Cold Air Aloft



Tropical continental air mass

- **Source over central Australia.**
- **Very hot, dry unstable in summer.**
- **Cooler in winter.**
- **Cloud and rainfall are severely inhibited by a lack of moisture.**
- **This air mass may bring heat-wave conditions to southern Australia in summer under strong northerly flow.**



Equatorial Maritime

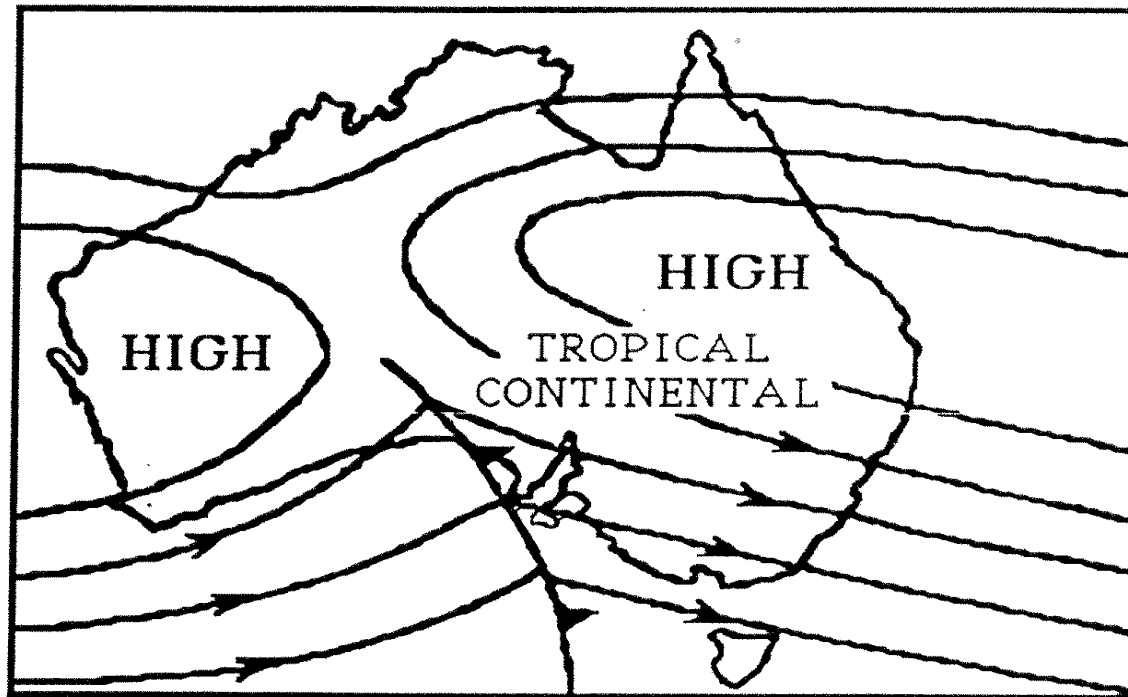
- Very warm moist and unstable air mass.
- Associated with the monsoon season.
- Affects north and north-western Australia in summer.
- This air mass can affect areas as far south as lat.. 30 S (during active monsoon.)



Tropical Continental Air Mass

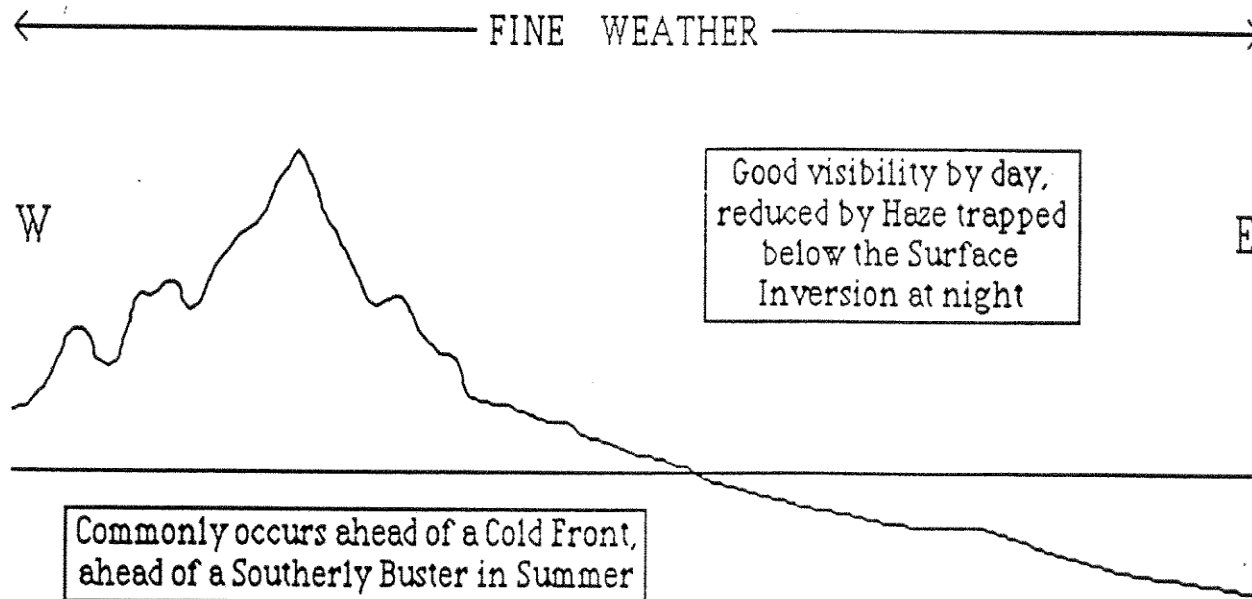


TROPICAL CONTINENTAL



- | | |
|-----------------|---------------------------------------|
| Source | - Centre of the Australian Continent. |
| Track | - Overland. |
| Characteristics | - Hot and dry. |

Tropical Continental



Tropical Maritime “Indian”

- Very similar characteristics to Pacific tropical maritime. Source in the eastern Indian ocean.
- Affects the north-western coastal areas of Australia.



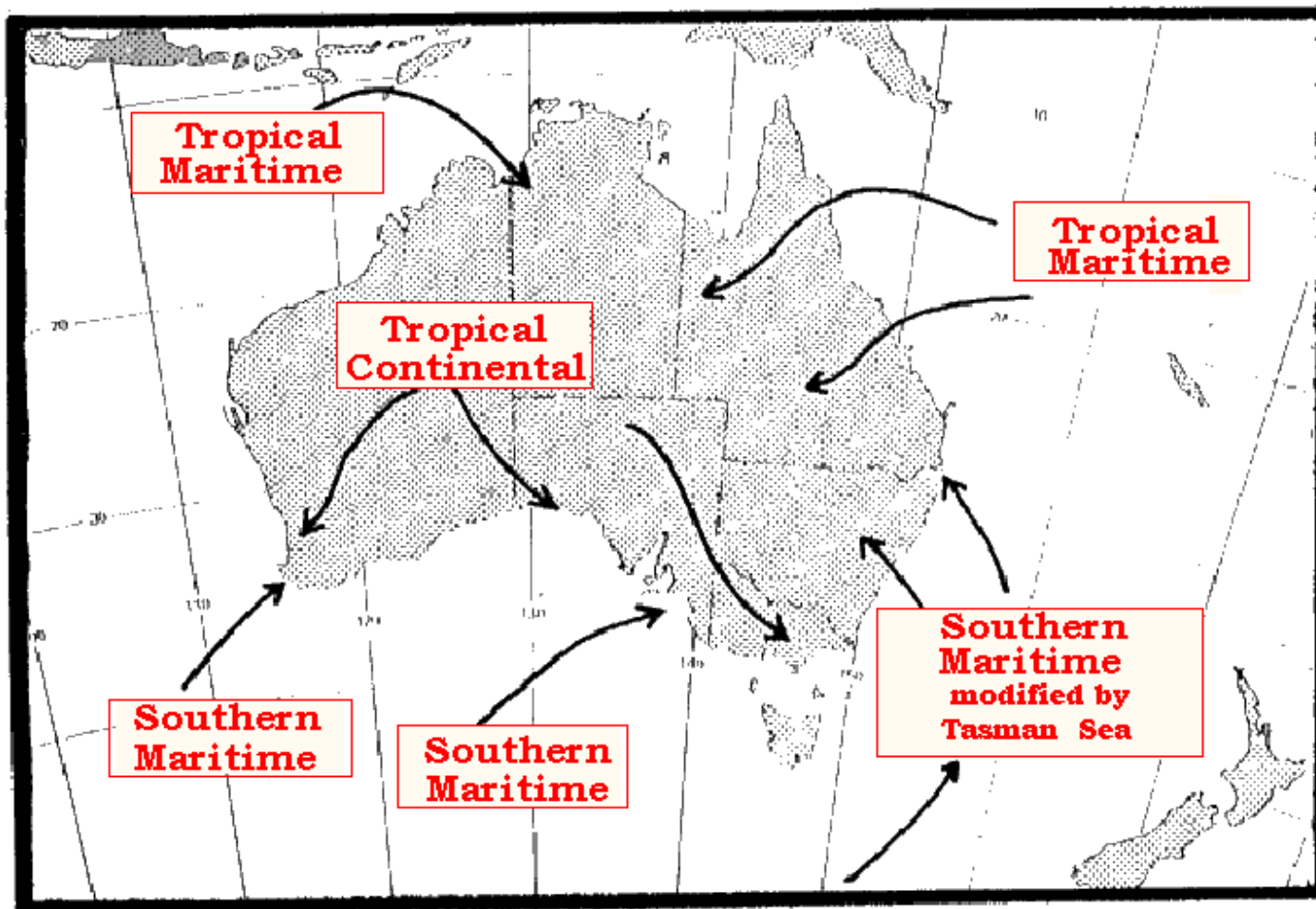
MAJOR AIR MASSES DURING THE SUMMER MONTHS



- TROPICAL MARITIME
- DRY TROPICAL CONTINENTAL
- SOUTHERN MARITIME

Mid Spring – Late Autumn

AIR MASSES



MID SPRING - LATE AUTUMN

SUMMER

MID SPRING - LATE AUTUMN

TROPICAL MARITIME:

- **Warm, very moist.**
- **Day temperatures greater than 25/30 deg and dew points greater than 20 deg.**

SUMMER

MID SPRING - LATE AUTUMN

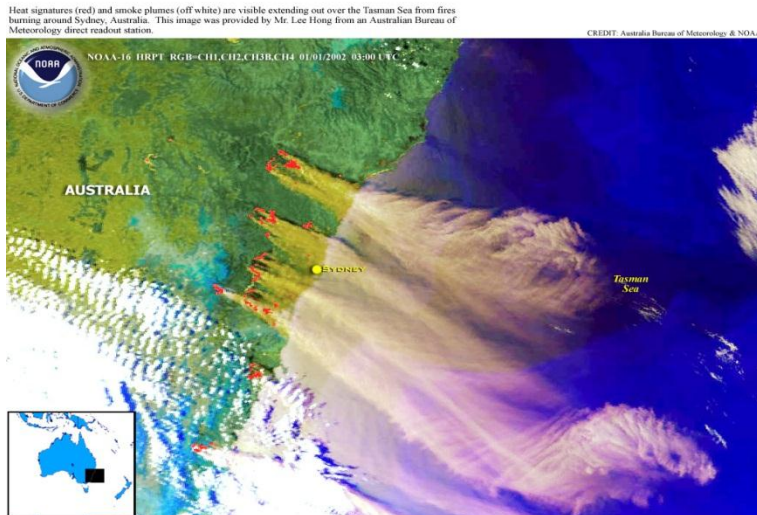
SOUTHERN MARITIME

- **Usually cool & fairly moist.**
- **Day temperatures 10/20 degrees.**
- **Dew Points 10/15 degrees.**
- **Slightly modified by warmer Tasman Sea.**

SUMMER MID SPRING - LATE AUTUMN

DRY CONTINENTAL AIR MASS

- Warm to Hot, low dew points
- Day time air temperatures >30 degrees
- Dew points < 5 degrees



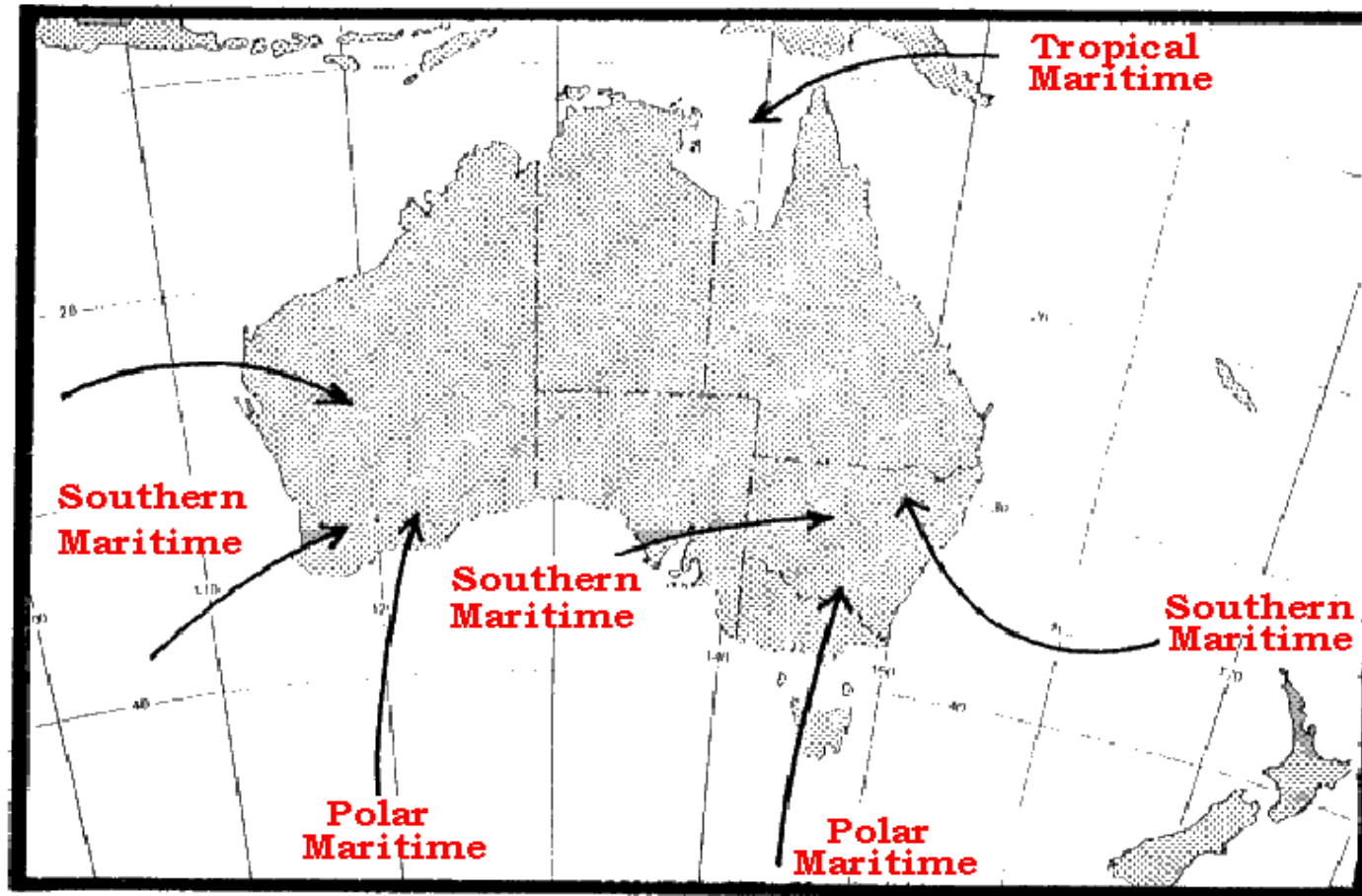
MAJOR AIR MASSES DURING THE WINTER MONTHS



- TROPICAL MARITIME.
- SOUTHERN MARITIME.
- POLAR MARITIME.

Late Autumn – Mid Spring

AIR MASSES



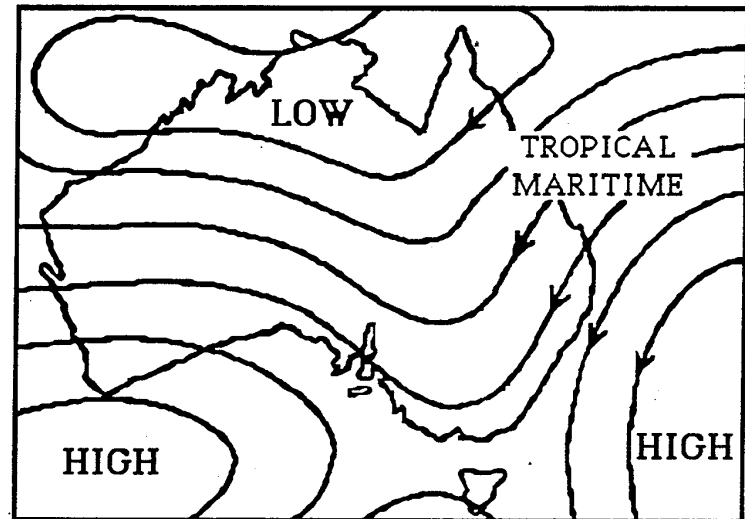
LATE AUTUMN - MID SPRING

WINTER

LATE AUTUMN - MID SPRING

TROPICAL MARITIME

- Only influences the far north of Australia.
- It is not a major Winter air mass.
- Warm & very moist.



Source	- Tropical area of Western Pacific.
Track	- Sea track over progressively colder sea.
Characteristics	- Warm and moist - humid.

WINTER

LATE AUTUMN - MID SPRING

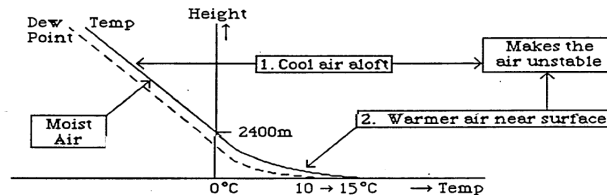
SOUTHERN MARITIME

- Most dominant for areas south of 20 degrees south.
- Usually cool & fairly moist.

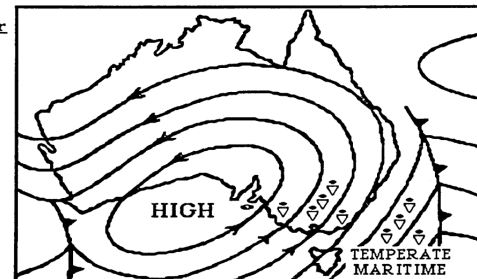
2. TEMPERATE MARITIME

- Source - Anticyclone over Bight or Southern Tasman.
- Track - Short sea track over progressively warmer sea.
- Characteristics - Cool and moist.

Typical temp/height graph for Temperate Maritime air.



a. As a South Westerly Air Stream

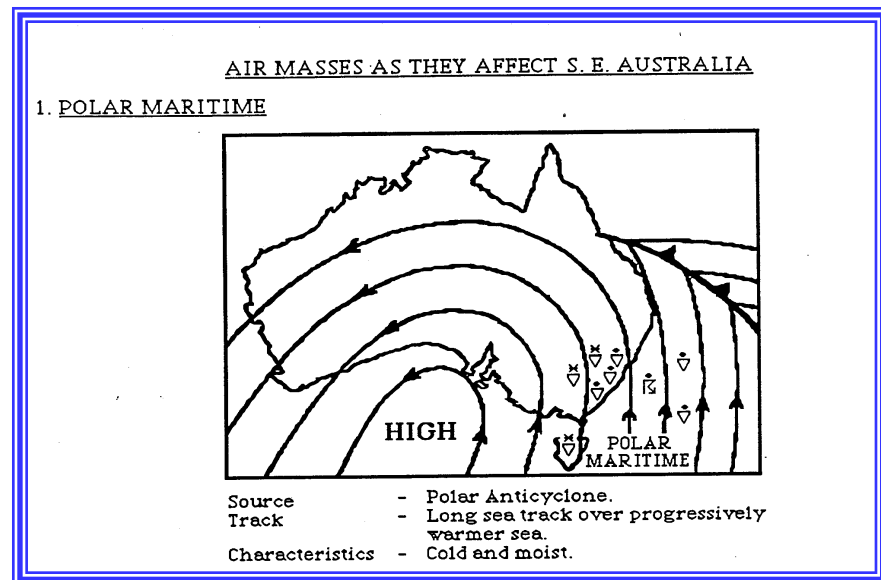


WINTER

LATE AUTUMN - MID SPRING

POLAR MARITIME

- Cold bursts of ex-Antarctic air
- Day temperatures 5/12 degrees & Dew Points 0/5 degrees.
- The true “outbreak” has an intense secondary low & high pressure with a strong ridge southwards.



THE *END*

