

MID-LATITUDE CYCLONES

06 FEBRUARY 2014



Lesson Description

In this lesson we:

- Examine the origin of mid-latitude cyclones
- Discuss the conditions necessary for their formation
- Describe the stages in their development
- Discuss their effect on human activities



Summary

Origin and Development of Mid-latitude Cyclones

Origin of Mid-latitude Cyclones

- Form in mid-latitudes: 40° to 60° North and South
- Polar Front: warm, moist subtropical air meets cold polar air

Development of Mid-latitude Cyclones

Stage 1: Initial Stage

- A wave forms in the polar front (caused by jet stream, mt. range or coastline)
- Low pressure cell develops: winds deflect (Coriolis force) as air blows into low pressure cell along pressure gradient

Stage 2: Mature Stage

- Wave deepens and a stronger pressure gradient develops
- Polar front forms cold front (ahead of cold sector) and warm front (ahead of warm sector)
- Air blows in a clockwise direction into the low pressure
- Cold front – thunderstorms (cumulonimbus clouds); warm front – light, widespread rain (nimbostratus clouds)

Stage 3: Occluded Stage

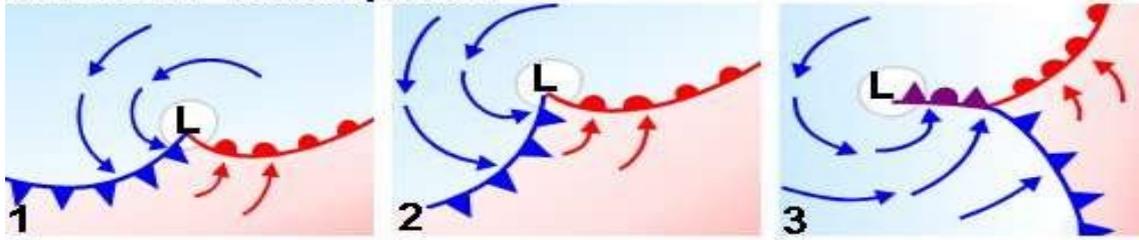
- Cold, dense air sinks and wedges underneath less dense, warmer air – warmer air is lifted off the ground
- Warm sector appears to narrow (on plan view) as cold front overtakes warm front
- Nimbostratus clouds with rain

Stage 4: Degeneration Stage

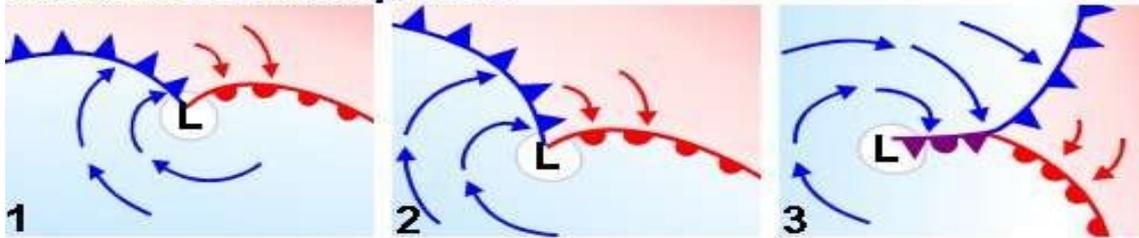
- Only cold air at ground level, rain and clouds clear up
- Isobars even out

notes for...

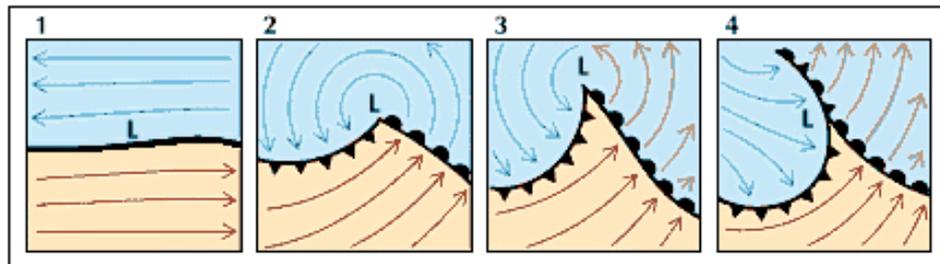
Northern Hemisphere



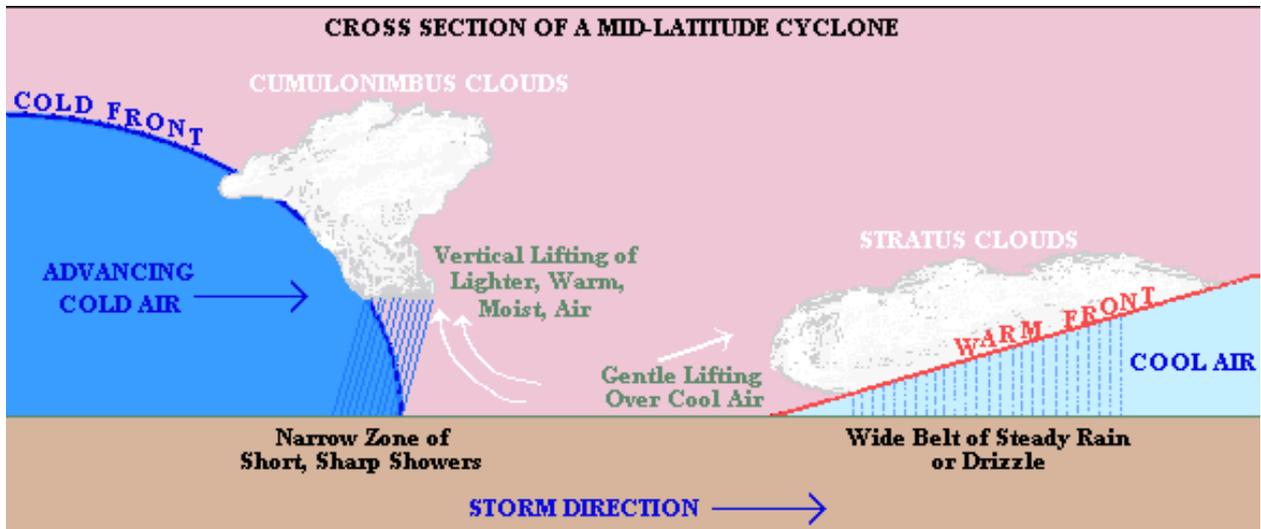
Southern Hemisphere



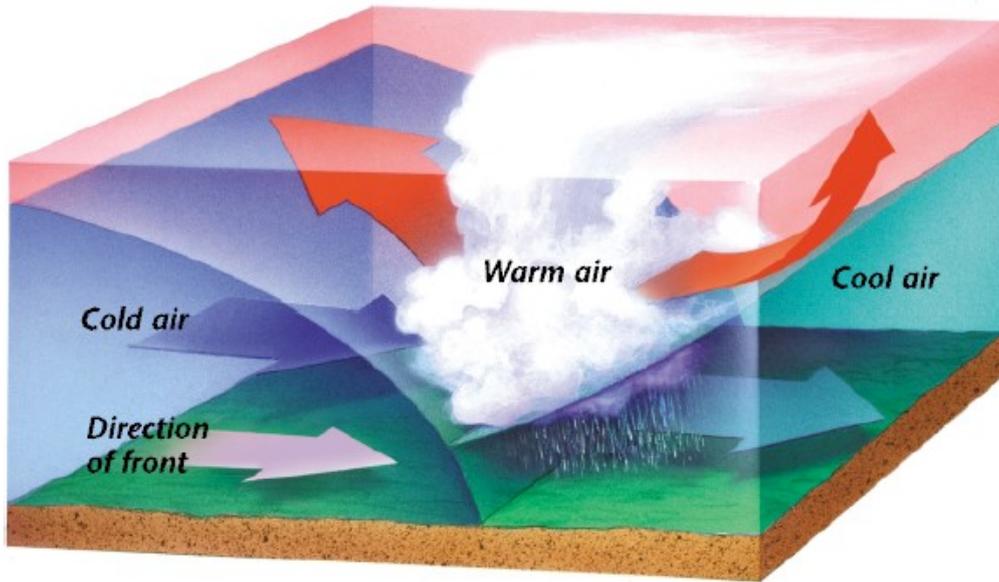
- polar front
- cold front
- warm front
- occluded front
- cold air
- cool air
- warm air



(Source: kids.britannica.com)



Occluded Front



(Source: <http://img543.imageshack.us/img543/2711/g4pn.gif>)

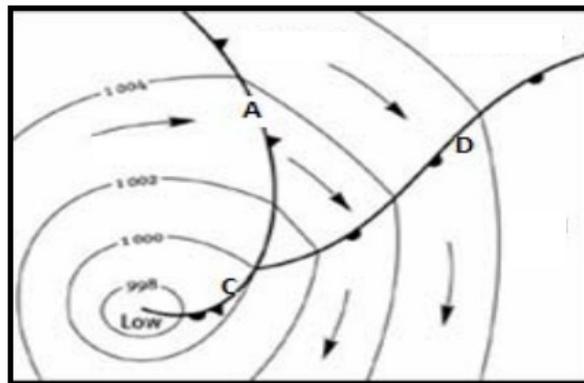


Test Yourself

Question 1

(Adapted from Feb/Mar 2012, NCS, Paper 1, Question 2.1)

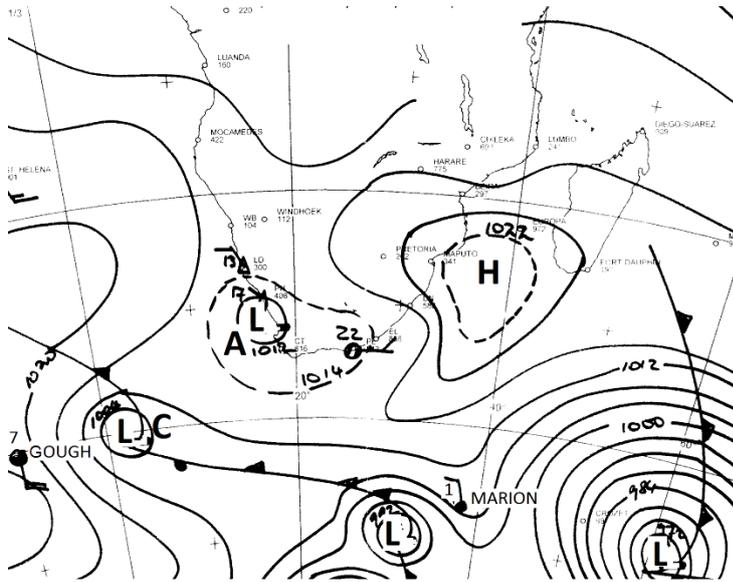
Refer to the figure below which shows a mid-latitude cyclone. Supply the appropriate term for each of the statements below.



- 1.1 Identify the front labelled **A**. (2)
- 1.2 State the type of cloud associated with the approach of a mid-latitude cyclone. (2)
- 1.3 Name the thunderstorm cloud associated with front **A**. (2)
- 1.4 The term used to describe the process when a cloud front catches up with the warm front at the apex (**C**). (2)
- 1.5 Identify the front **D** which rarely affects the weather of South Africa. (2)



Improve your Skills



(Source: SA Weather Service)

Question 1

What season is represented on the synoptic map? Give TWO reasons to support your answer.

Question 2

Estimate the air pressure at the centre of cell C.

Question 3

Describe the air movement associated with cell C.

Question 4

From which pressure belt does cell C originate?

Question 5

Explain why mid-latitude cyclones move from west to east.

Question 6

Mid-latitude cyclones tend to occur in “groups” called

Question 7

Discuss how weather conditions will change over the Eastern and Western Cape regions over the next two days. Refer only to precipitation, humidity and precipitation.

Question 8

In what stage is cell C? Explain your answer.

Question 9

Explain how the wind direction at Marion Island will change over the next two days.

Question 10

Describe TWO negative effects that mid-latitude cyclones could have on the economy of the Western Cape.



Links

- Cold Fronts and Warm Fronts: <http://www.youtube.com/watch?v=huKYKyjcm0>