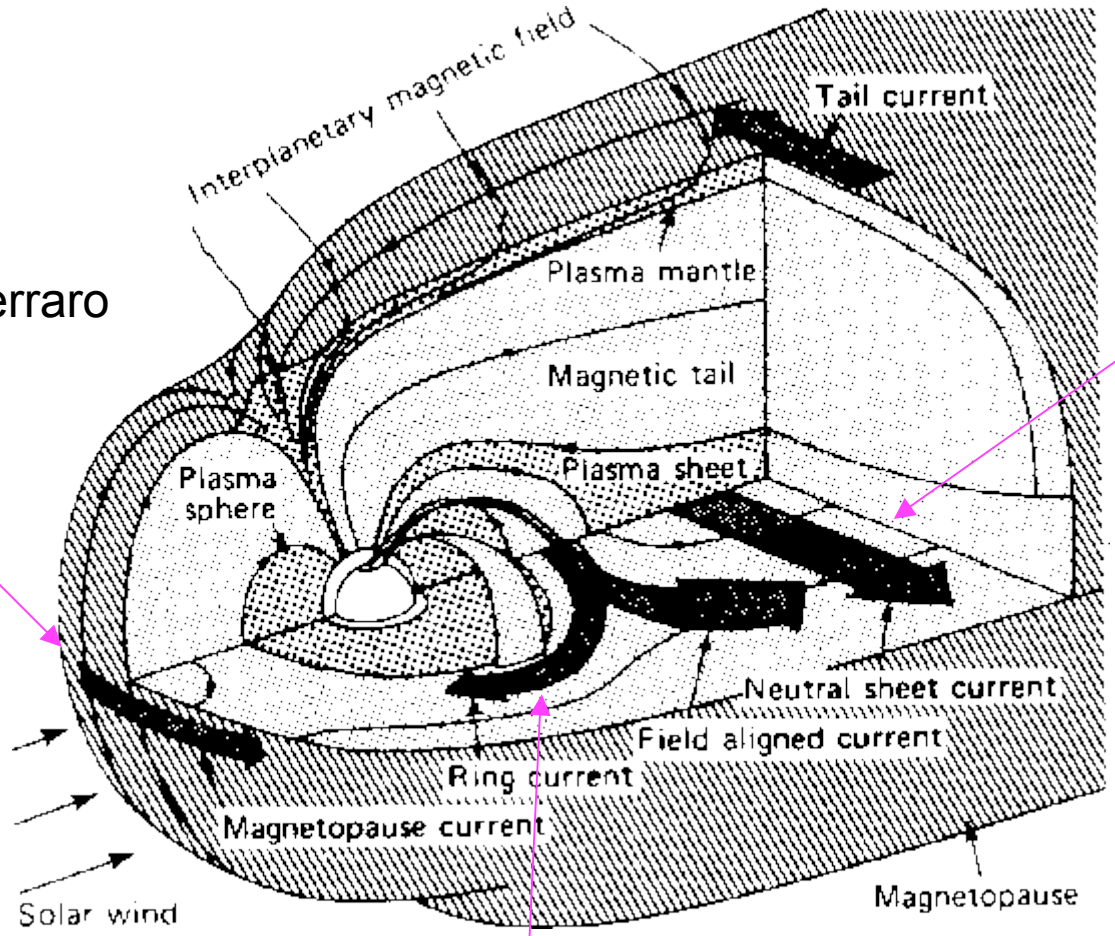
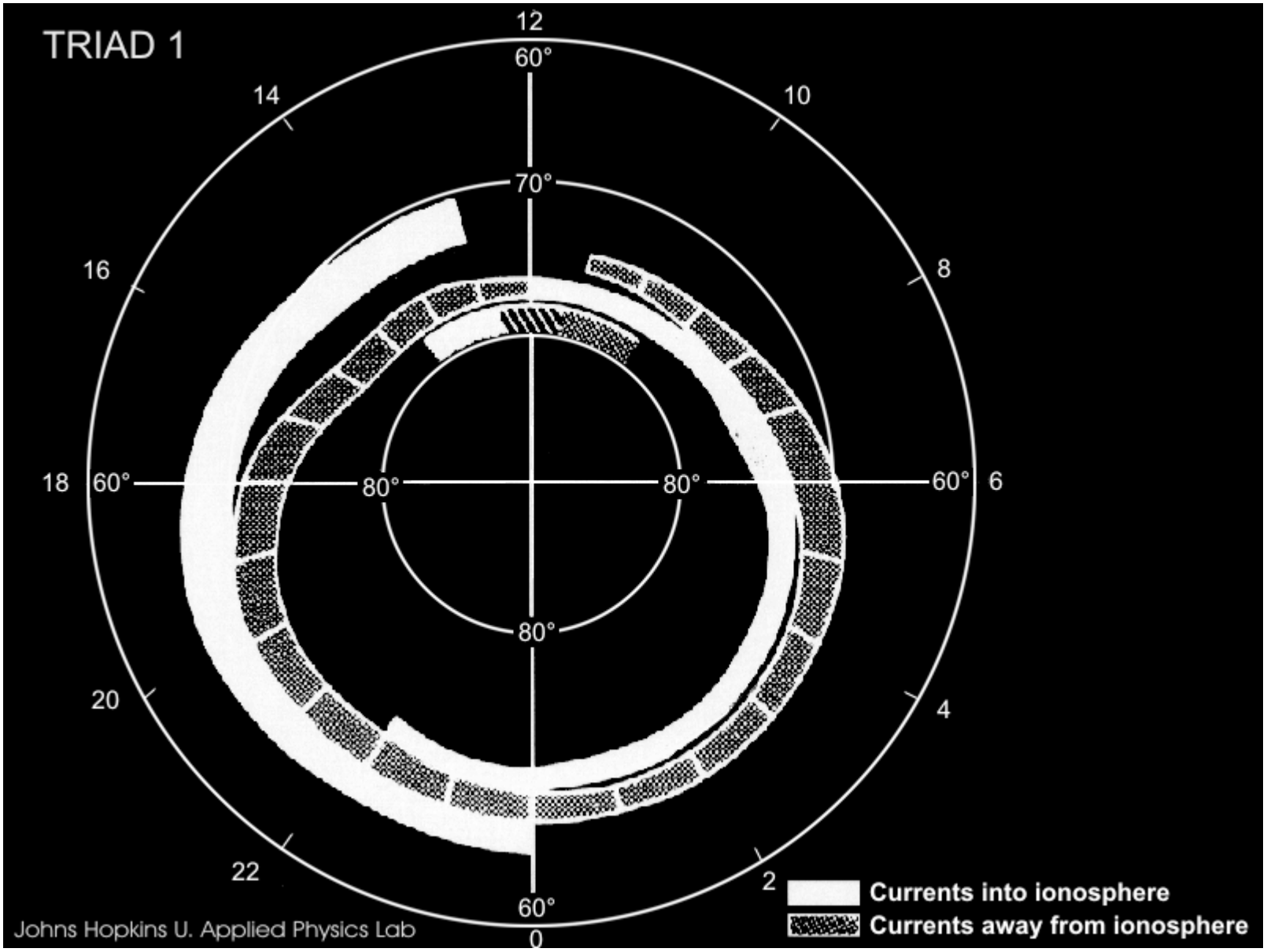
Chapman-Ferraro Current

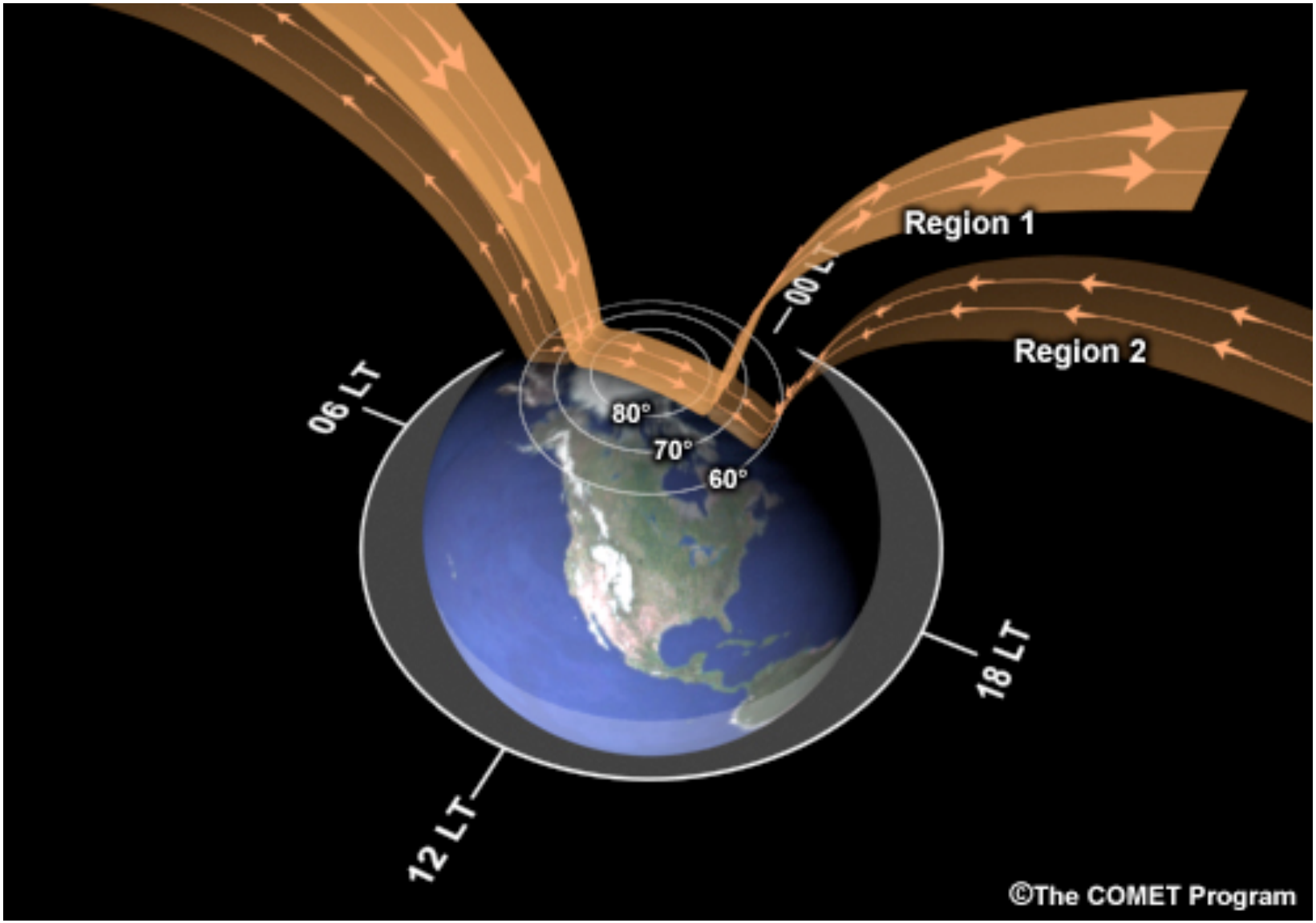


Solar wind Convection Electric Field

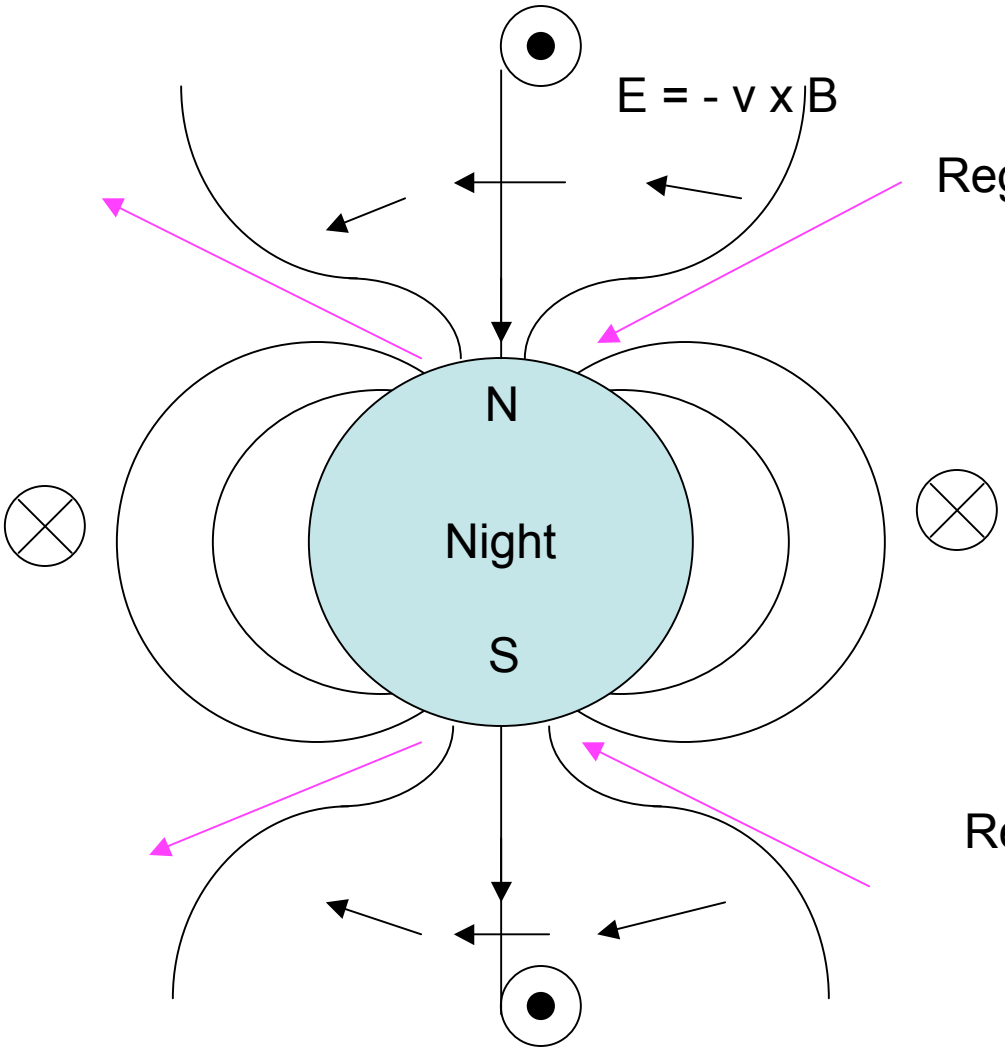
Gradient and Curvature Drifts

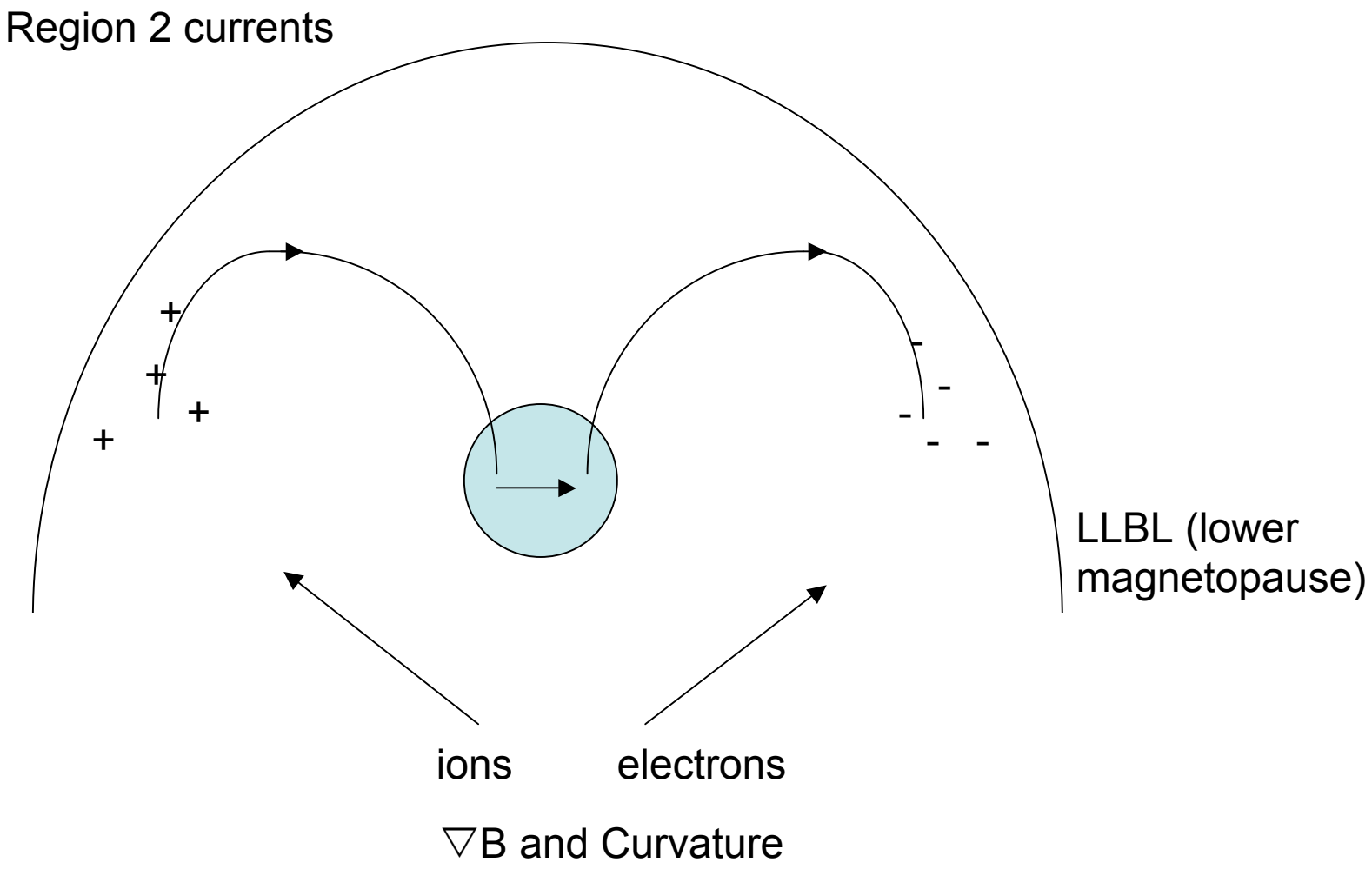


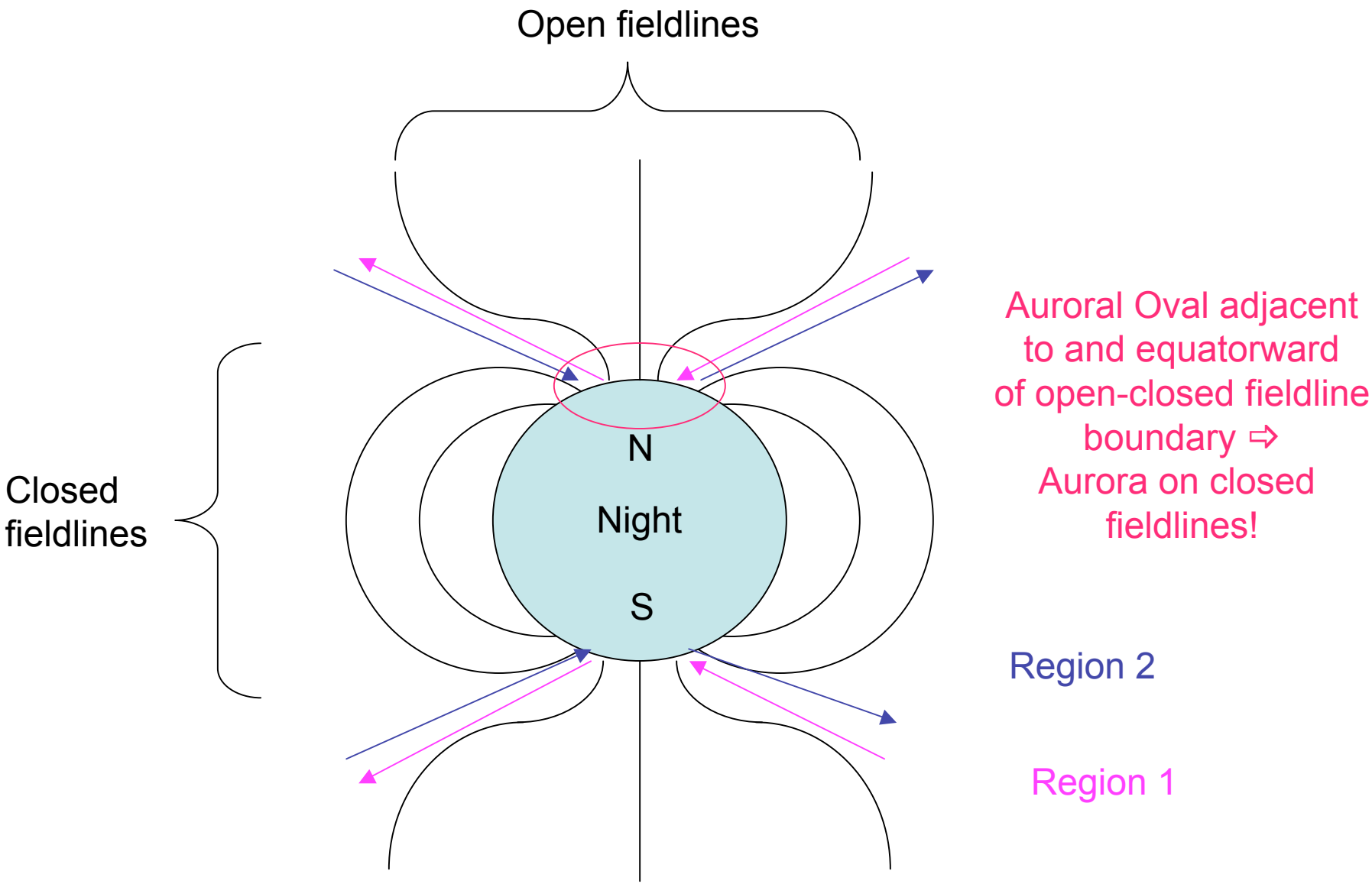
Birkland Currents

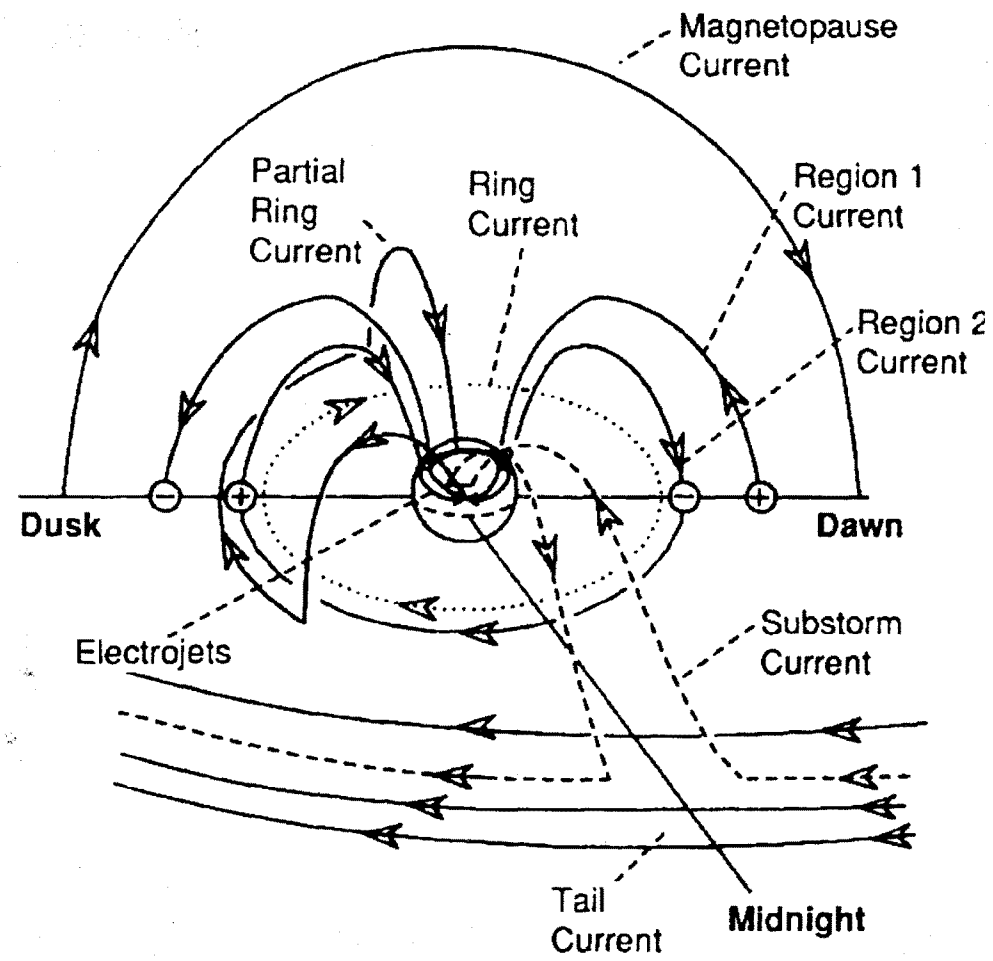

Region 1
Region 2
00 LT
06 LT
12 LT
18 LT
80°
70°
60°
©The COMET Program

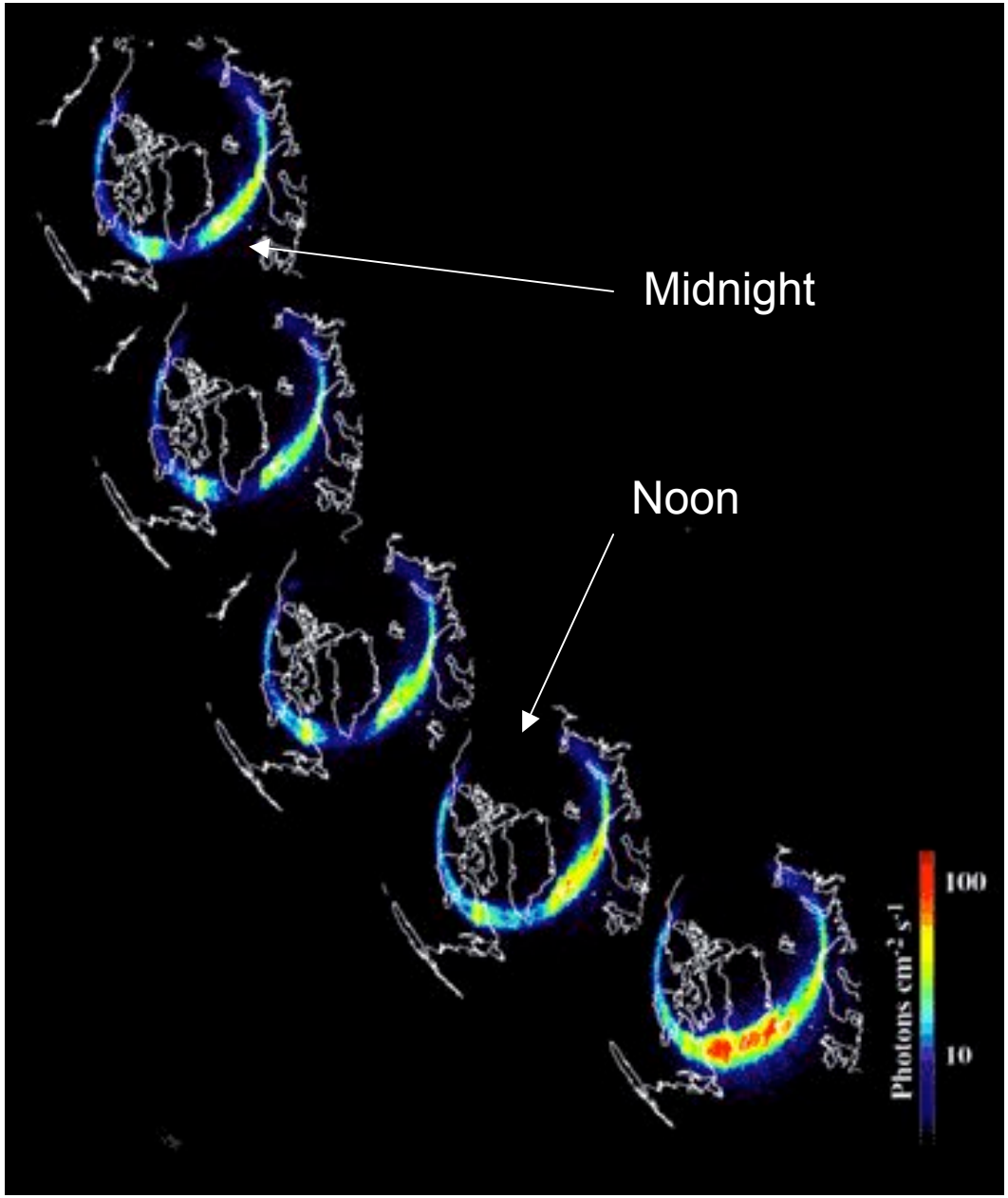
Region 1 Current – Convection of the fieldlines




Region 2 currents
+
+
+
+
-
-
-
-
LLBL (lower magnetopause)
ions
electrons
▽B and Curvature


Open fieldlines
Closed fieldlines
N
Night
S
Auroral Oval adjacent to and equatorward of open-closed fieldline boundary ⇨ Aurora on closed fieldlines!
Region 2
Region 1

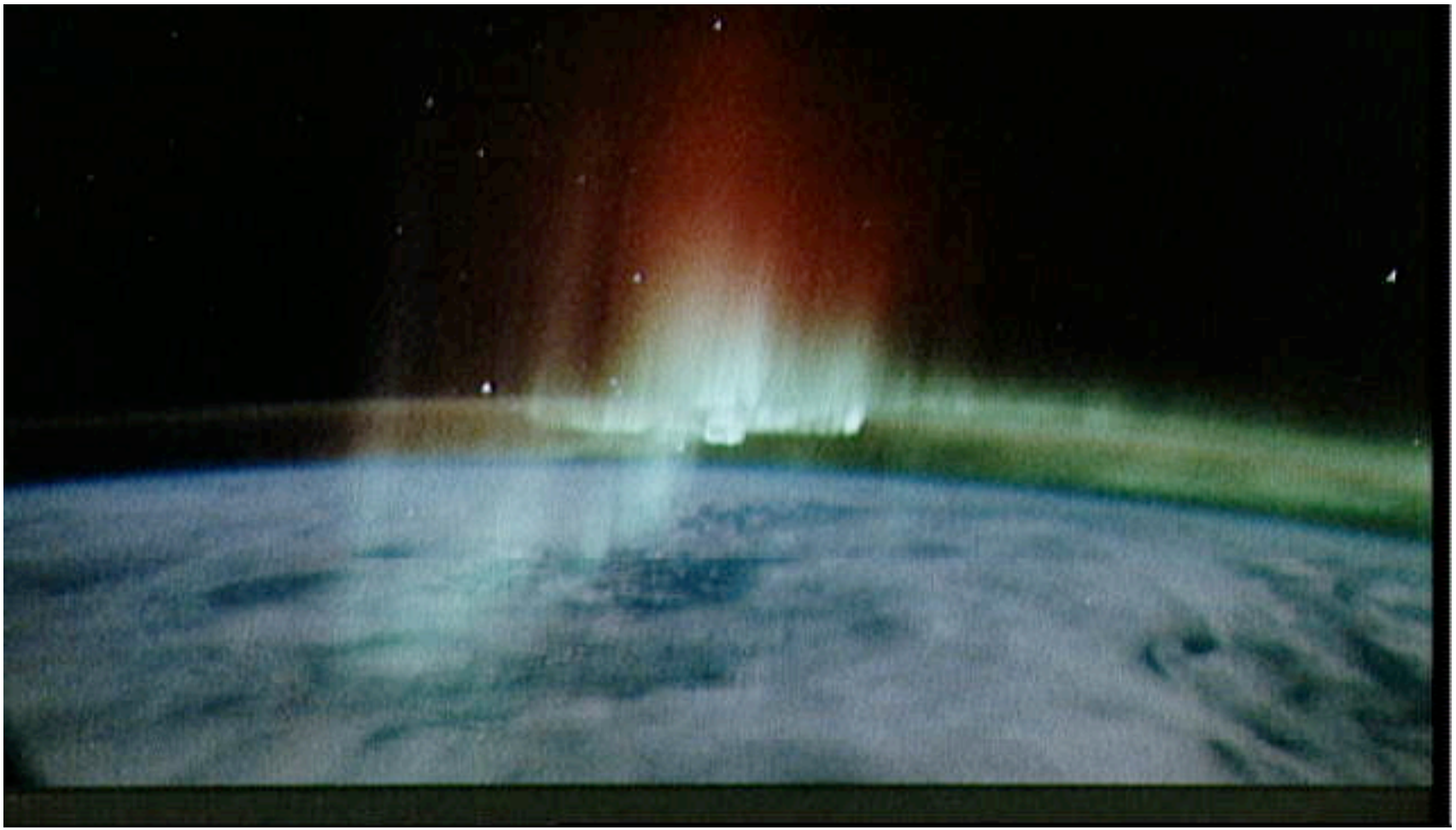

Magnetopause
Current
Partial
Ring
Current
Ring
Current
Region 1
Current
Region 2
Current
Dusk
Dawn
Electrojets
Substorm
Current
Tail
Current
Midnight

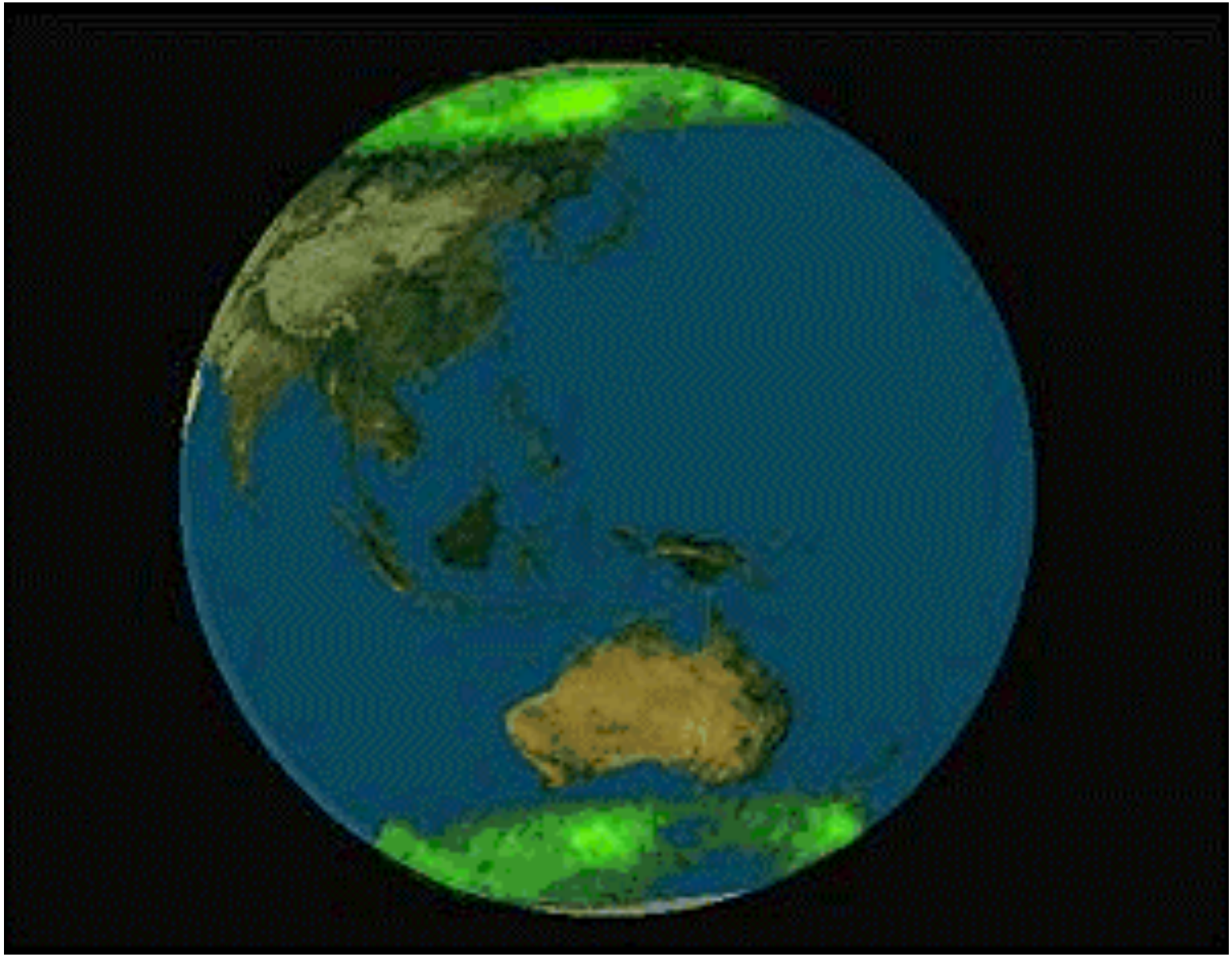

Midnight
Noon
100
10
Photons cm-2 s-1

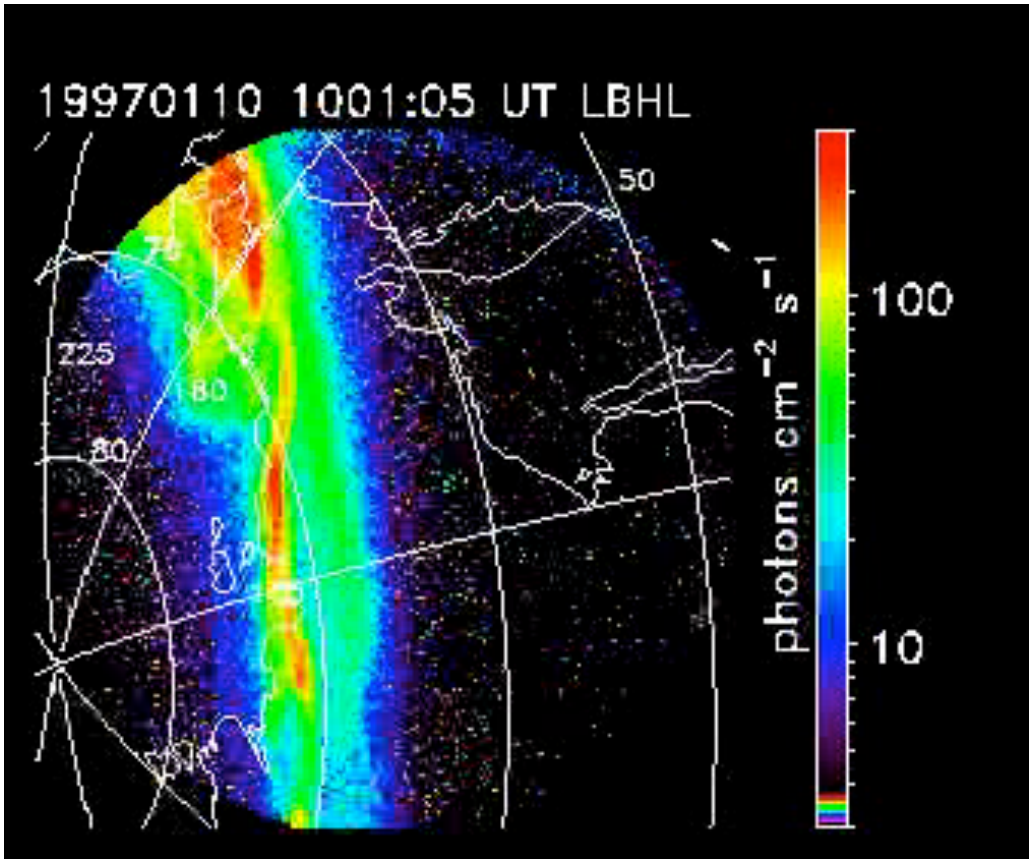
Green light (5557 A) and red light (6300 and 6364 A) from Oxygen atoms

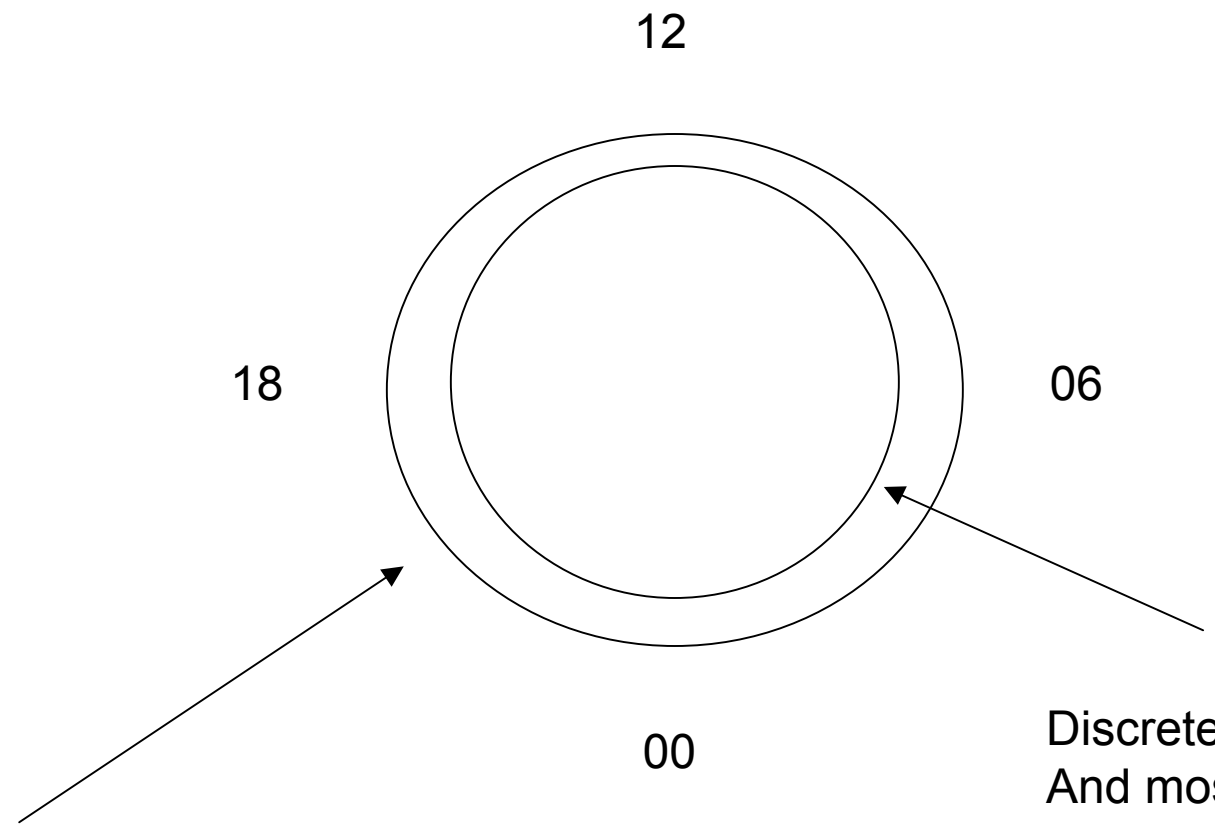
Pink light from Nitrogen, in regions were green light emissions also seen

Green emissions at 110 km and red emissions at 200 – 400 km





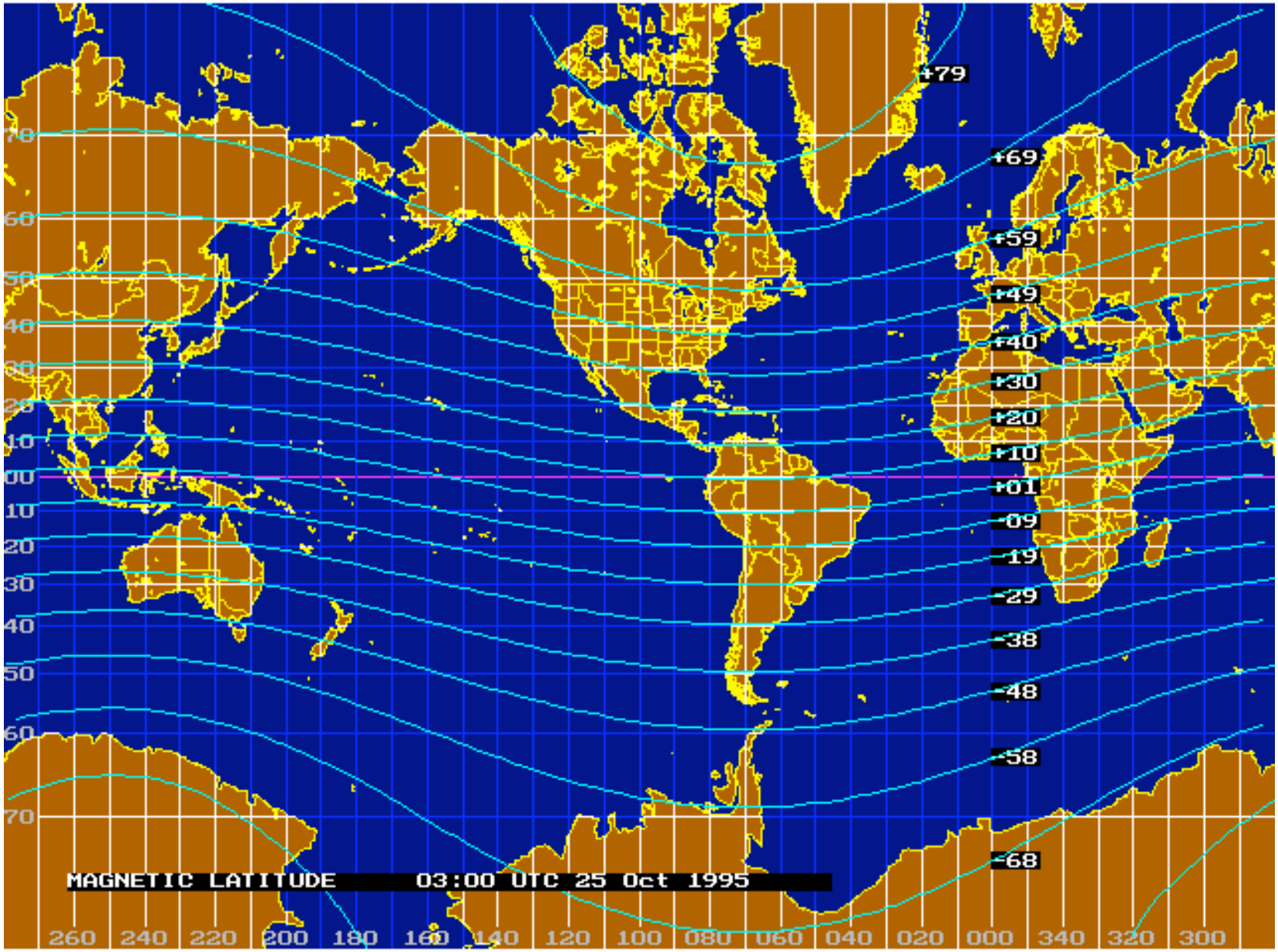

19970110 1001:05 UT LBHL
50
75
225
180
80
photons cm^{-2} s^{-1}
100
10



Diffuse aurora at equatorward edge

Discrete aurora in poleward
And mostly evening sector

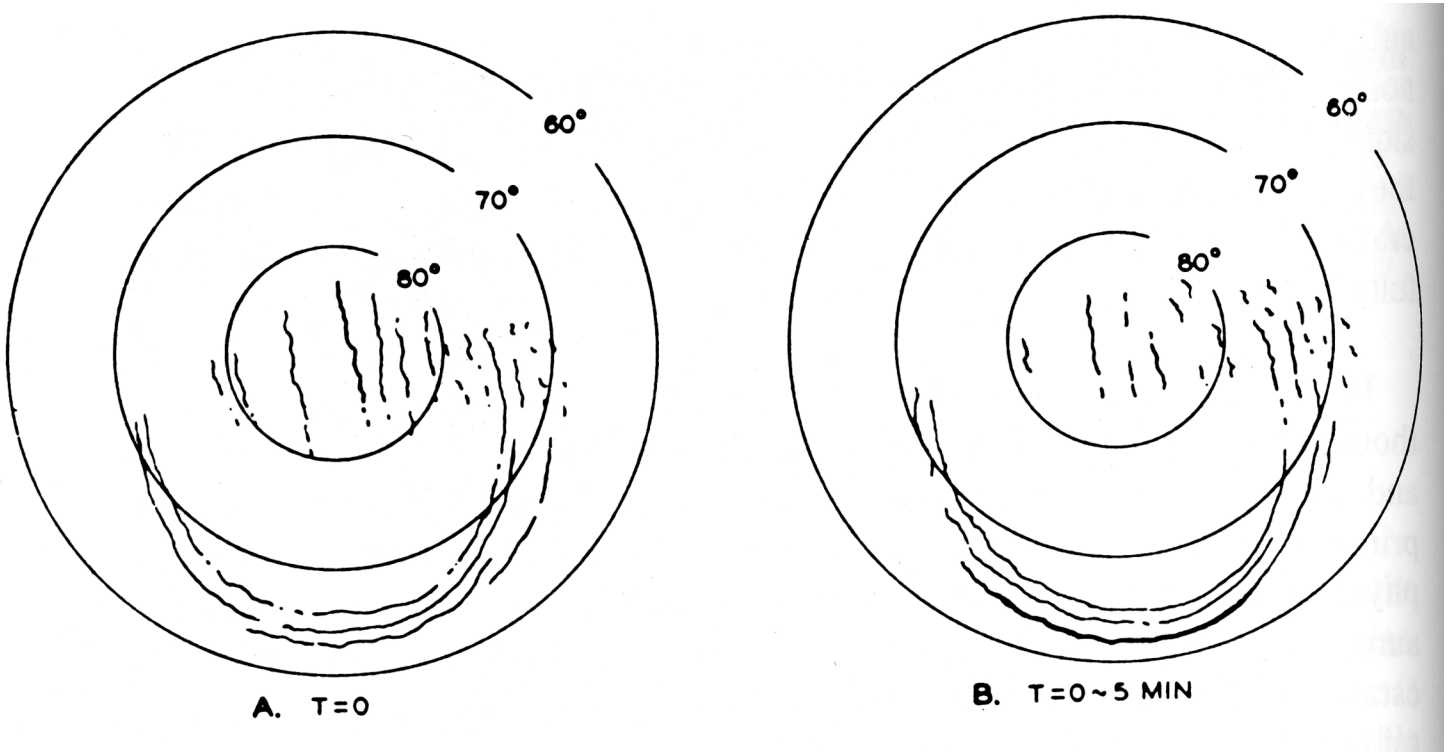
Long E-W bands
Very Small N-S extensions


+79
+69
+59
+49
+40
+30
+20
+10
+01
-09
-19
-29
-38
-48
-58
-68
70
60
50
40
30
20
10
00
10
20
30
40
50
60
70
MAGNETIC LATITUDE 03:00 UTC 25 Oct 1995
260 240 220 200 180 160 140 120 100 080 060 040 020 000 340 320 300

A) Quiet state with multiple arcs drifting equatorward

B) Onset : Sudden brightening of the most equatorward arc somewhere in the premidnight sector

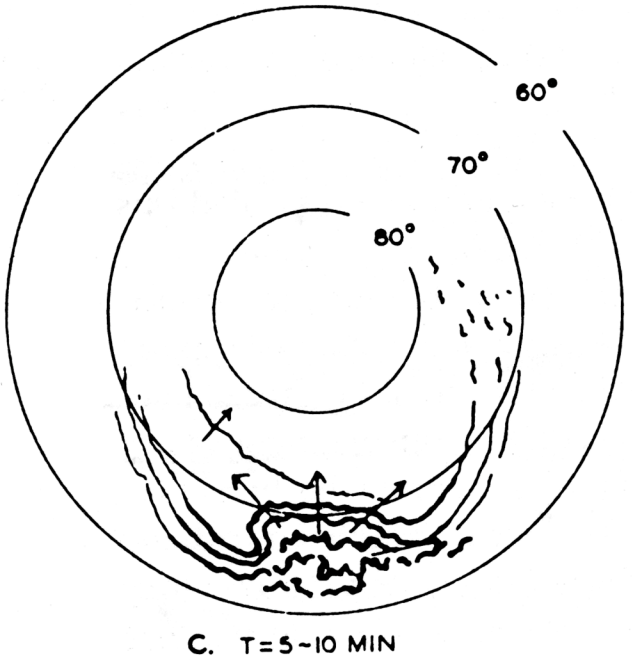
Growth Phase : Weak short duration intensifications and a lot of wave activity. Increase in the size of the polar cap



C) Expansion Phase : brightening extends westward and poleward

A bulge forms in a broad region of the midnight sector close to the original brightening

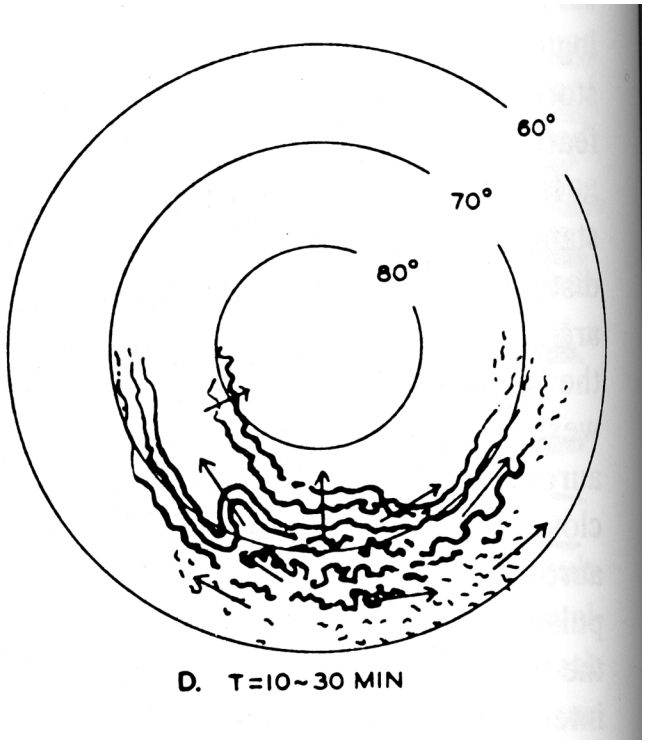
Bulge is very dynamic
- arcs appear and disappear
- patches pulsate
- draperly-like folds
- lower borders intensely colored



D) Westward-traveling surge : kink forms at the westward edge of the bulge, moves westward becoming more intense

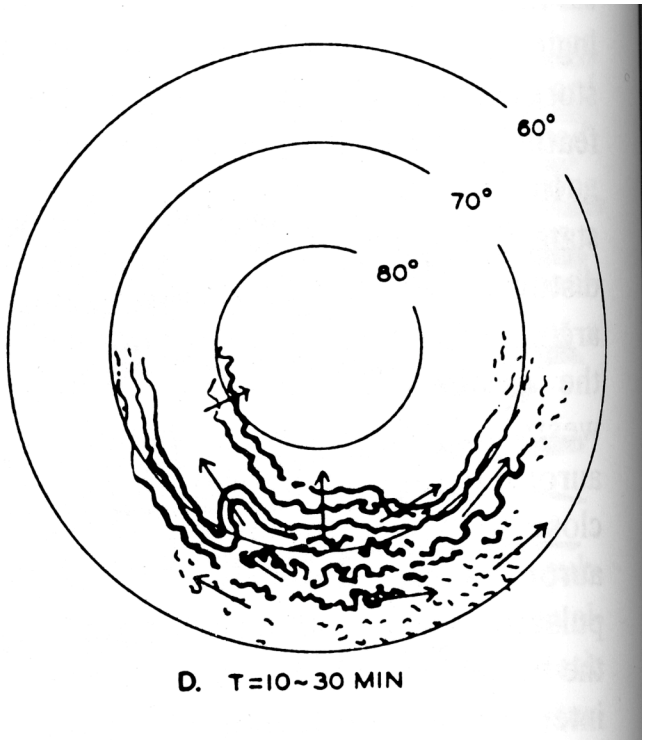
Multiple intensifications instead of one continous expansion

- each intensification westward surge produced
- each westward surge is formed progressively farther west and poleward giving appearance of continuous expansion
- intensification can continue at poleward edge of bulge after recovery has begun at low latitudes



Eastern edge of bulge, torchlike auroral forms appear, extending poleward from diffuse auroral band, drifting eastward →omega bands

Equatorward edge of eastern region, pulsations appear and drift eastward



30-50 minutes for expansion phase

E) Recovery Phase : Activity begins to dim at lower latitudes, westward surge dissipates into a westward loop

Morning sector pulsations proceed ~ 90 minutes