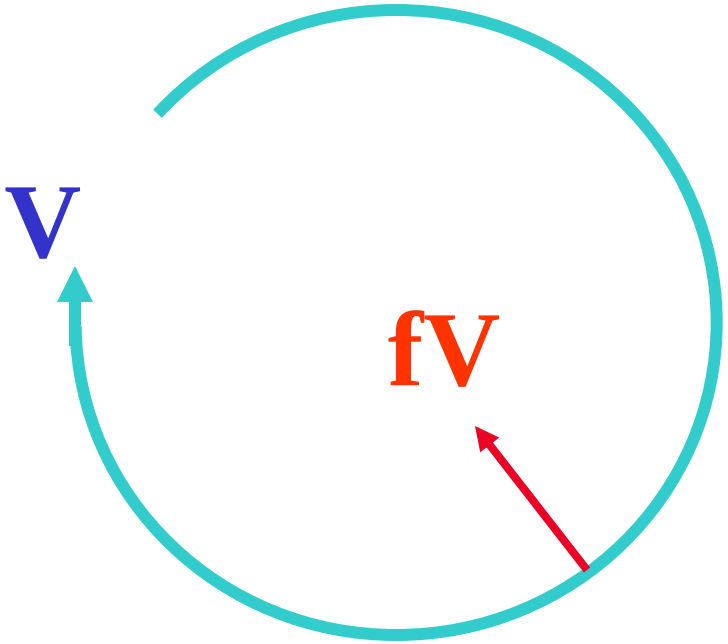
Coriolis III

-What's the meaning of it all?

The Coriolis effect

1. The inertia circle motion

The “inertia circle” motion



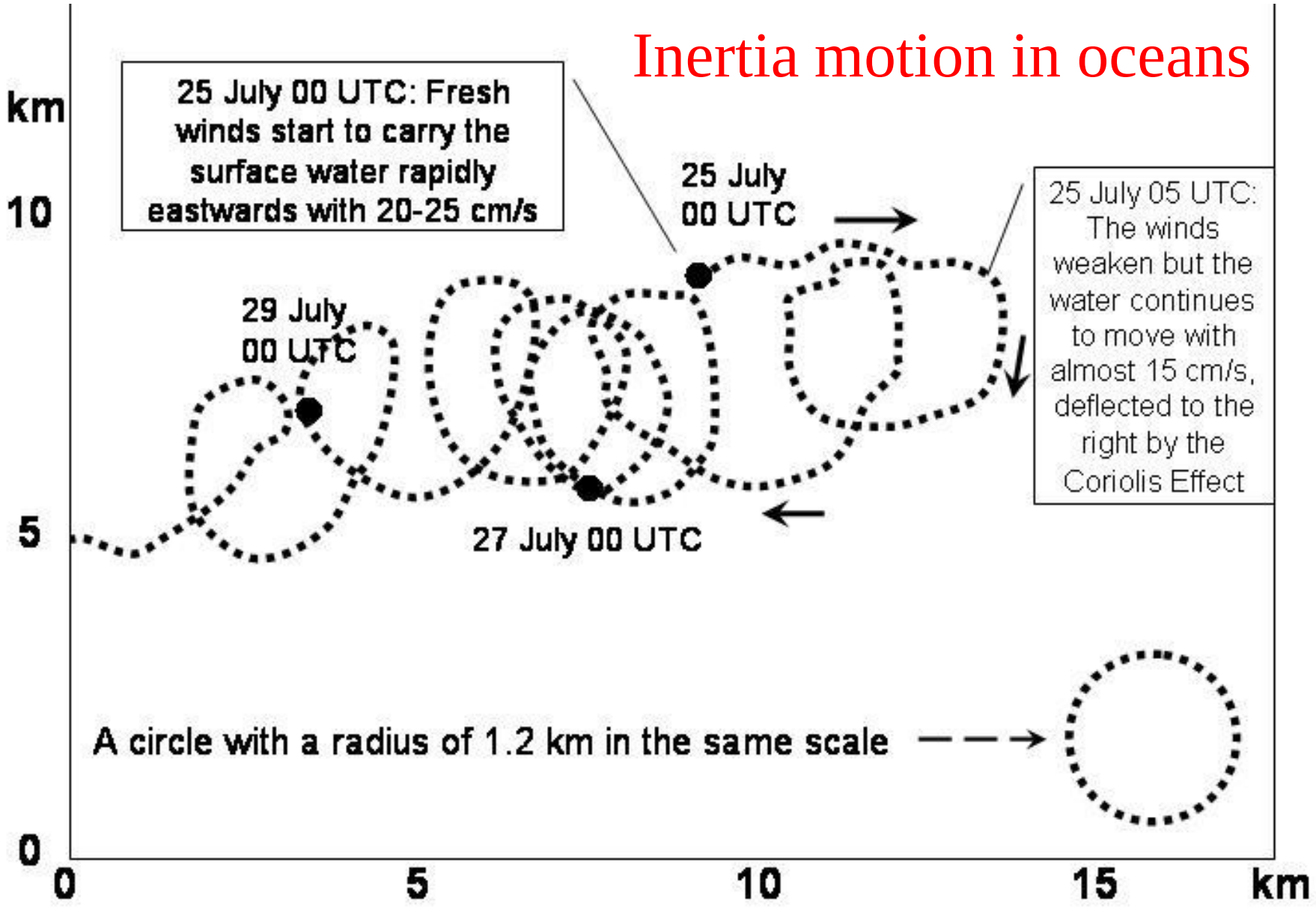
The Coriolis parameter

$$f = 2\Omega\sin\varphi$$

The radius of the inertia circle

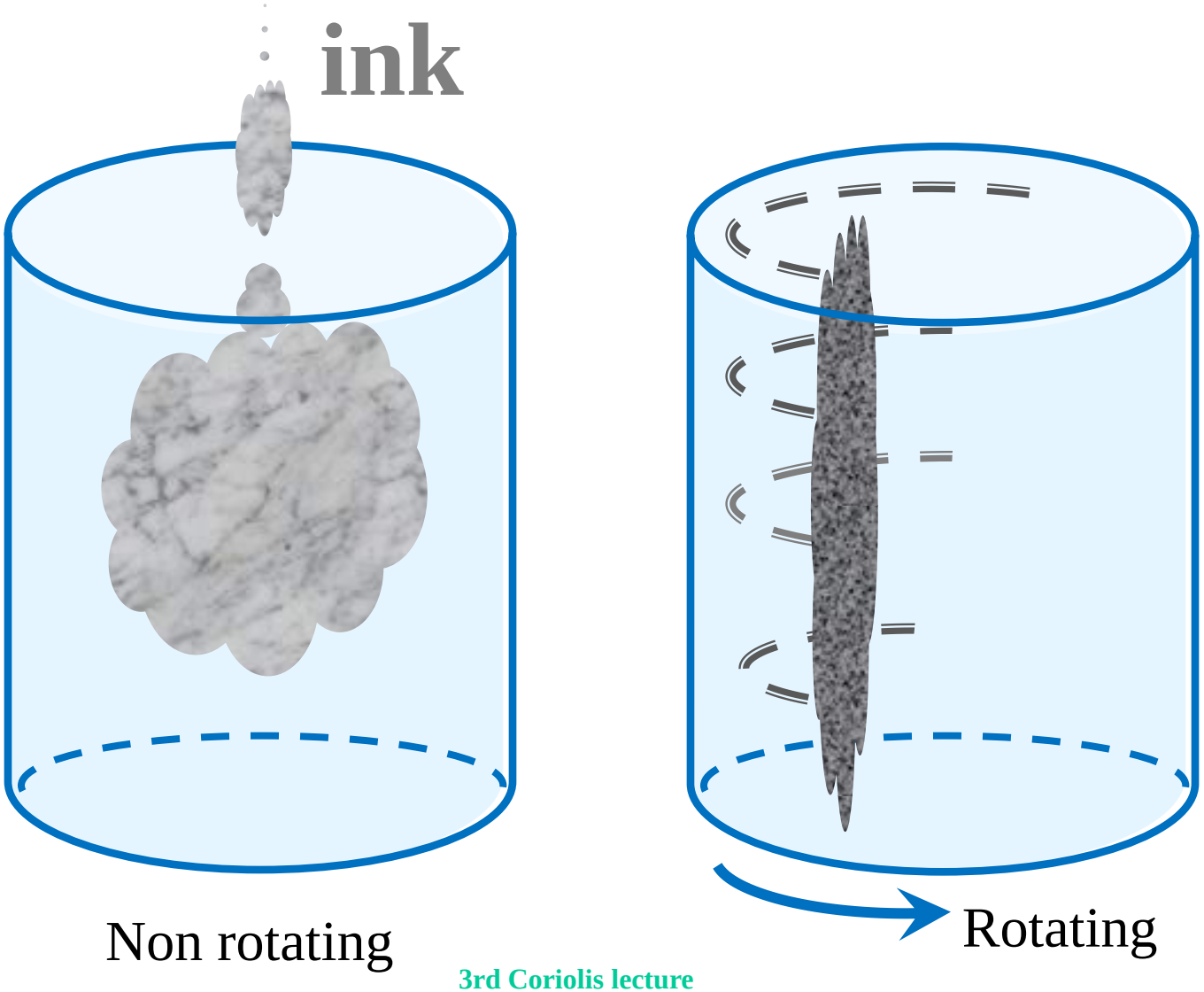
$$R = V/f$$

Inertia motion in oceans

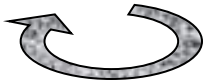


2.Taylor columns

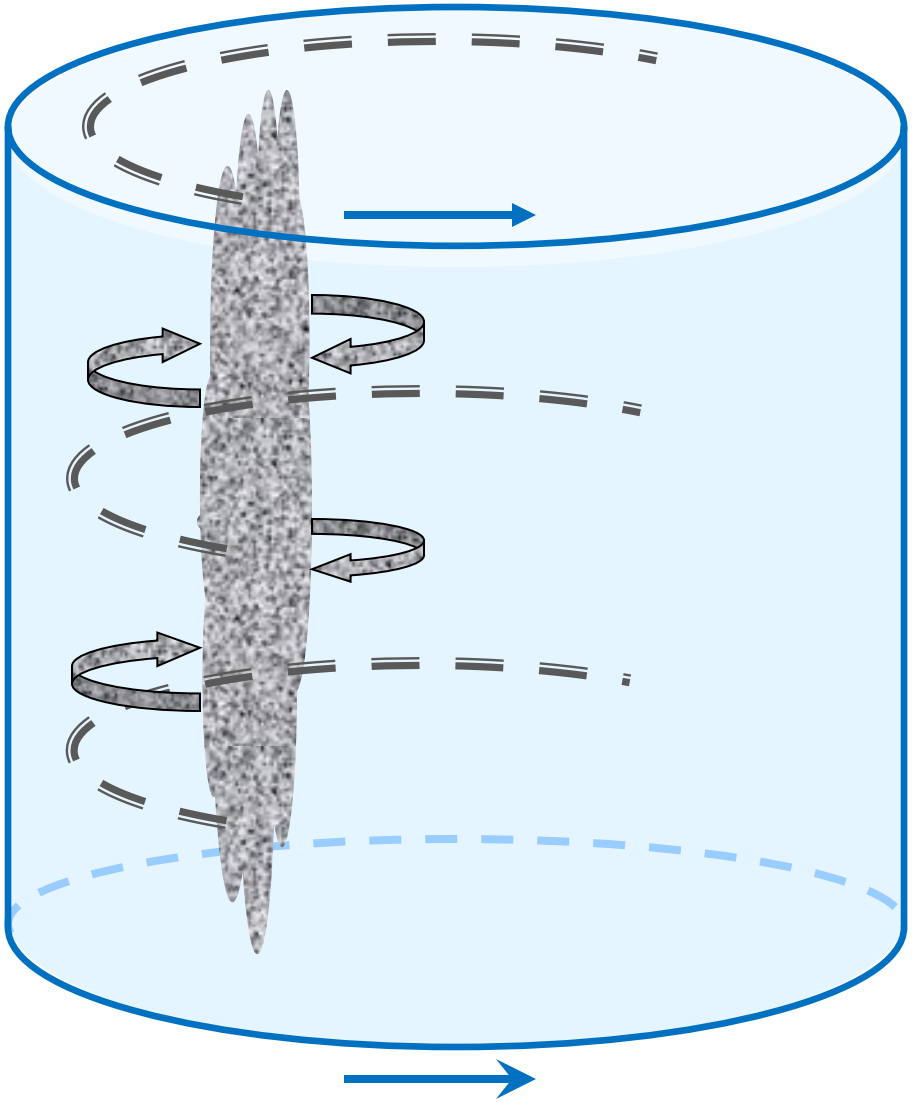
The Coriolis effect on Taylor columns



Whenever a water parcel tries to move away it is brought back by the Coriolis force in an "inertia circle"

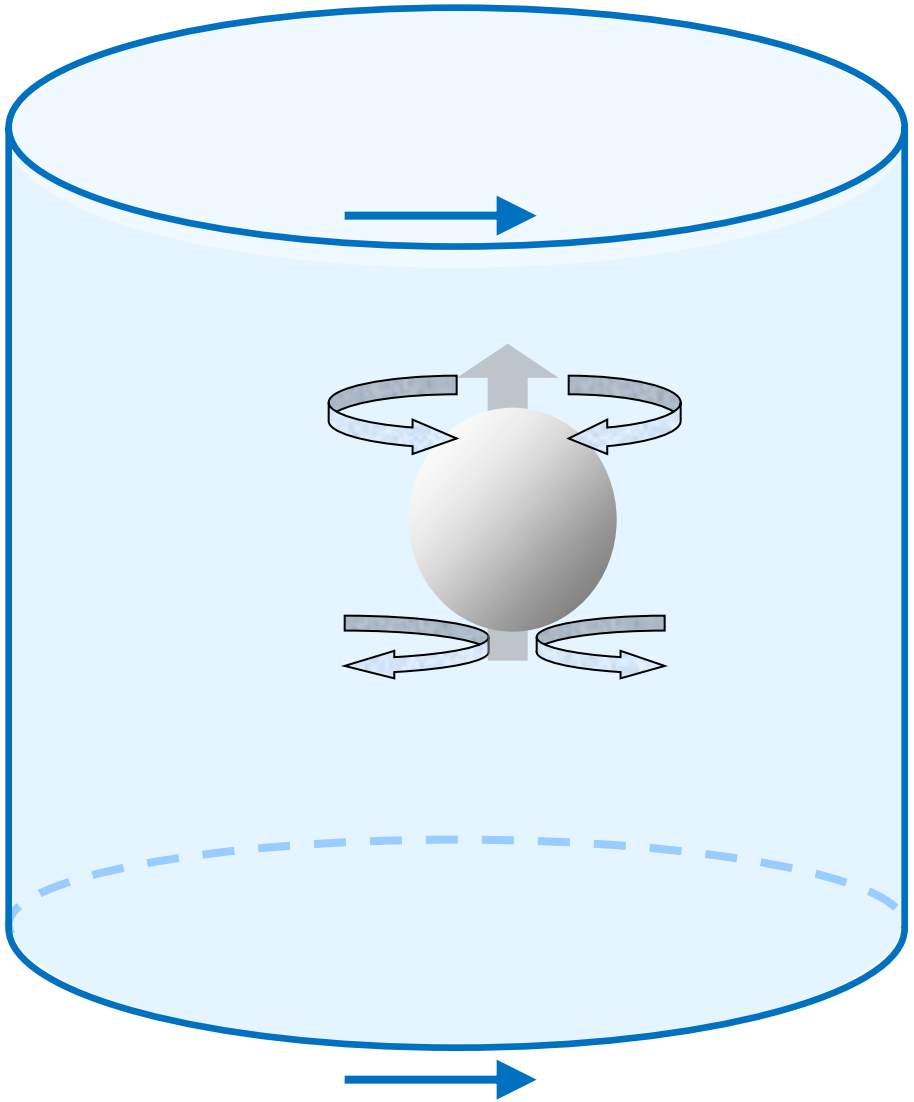


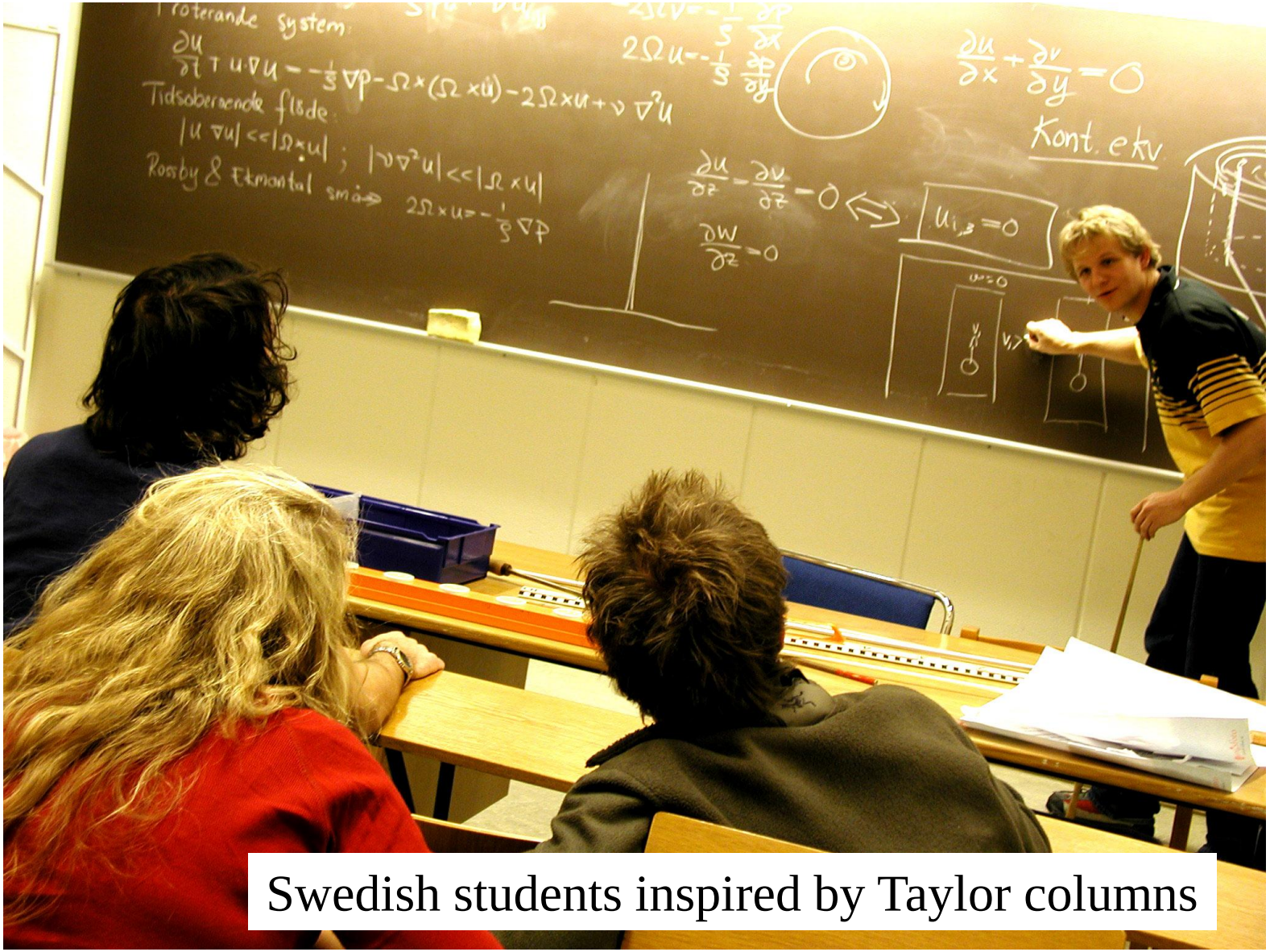
Any motion "away" has a component perpendicular to the axis of rotation and is therefore subjected to the Coriolis effect



When the water above the ball tries to move away it is brought back by the Coriolis force in an "inertia circle"

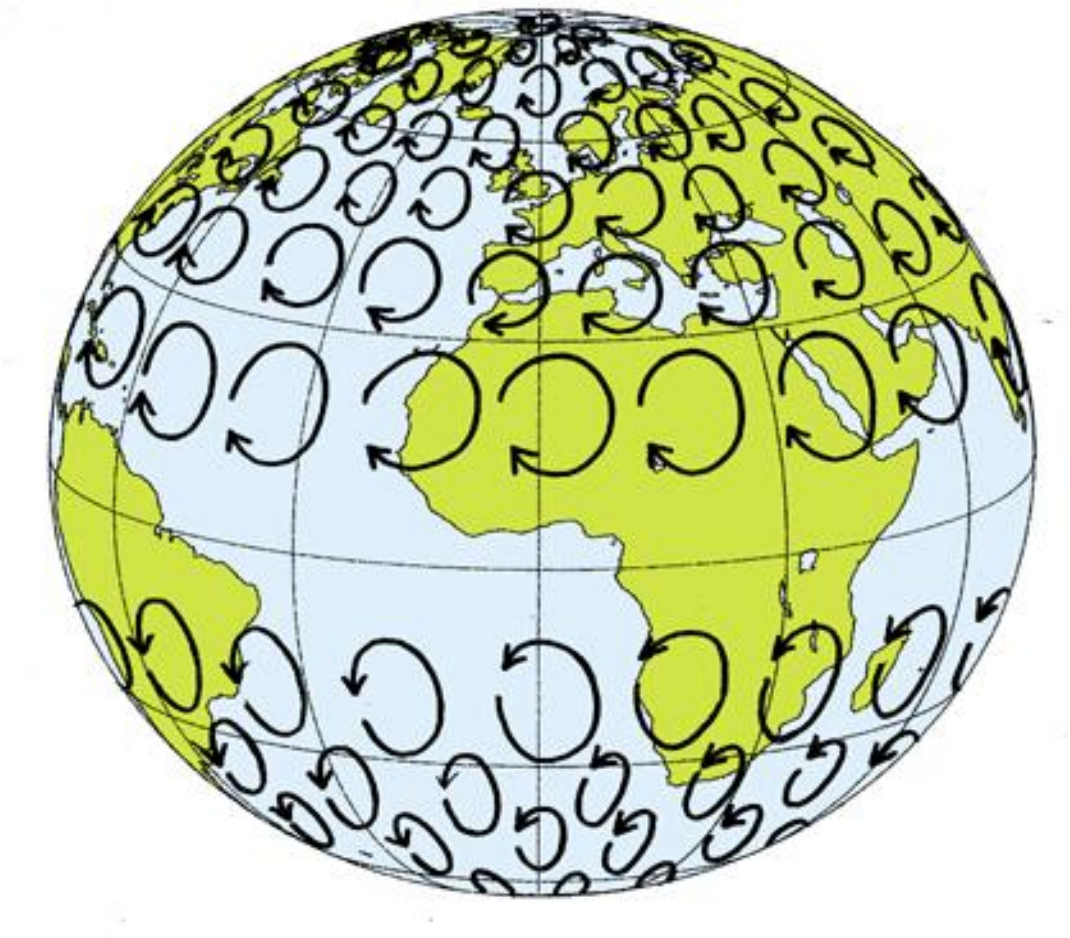
When the water below the ball tries to move in behind it is brought back by the Coriolis force in an "inertia circle"





Swedish students inspired by Taylor columns

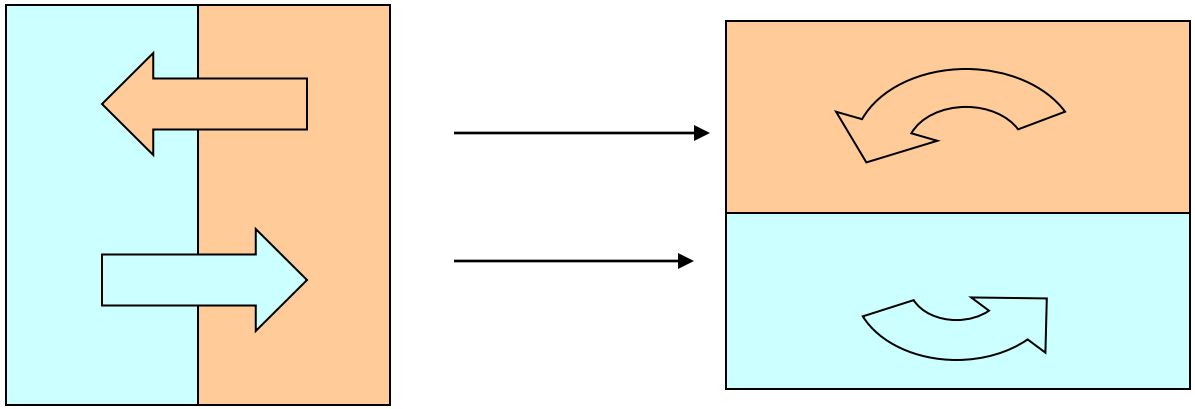
The “woollen cap” effect

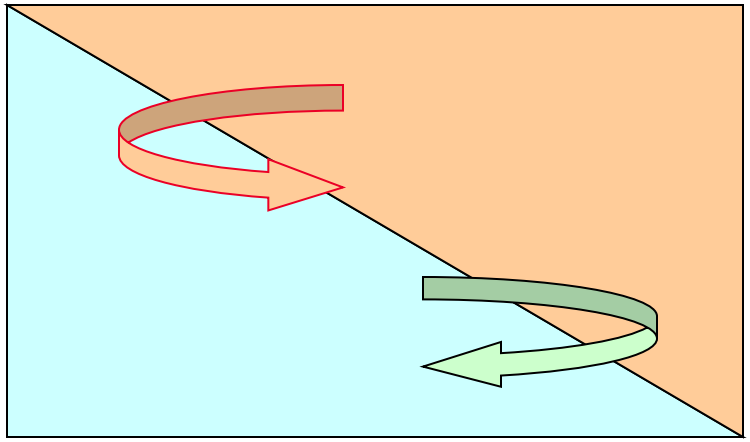


. . .makes it diffucult for the air (and water) to move around

3.Sloping fronts

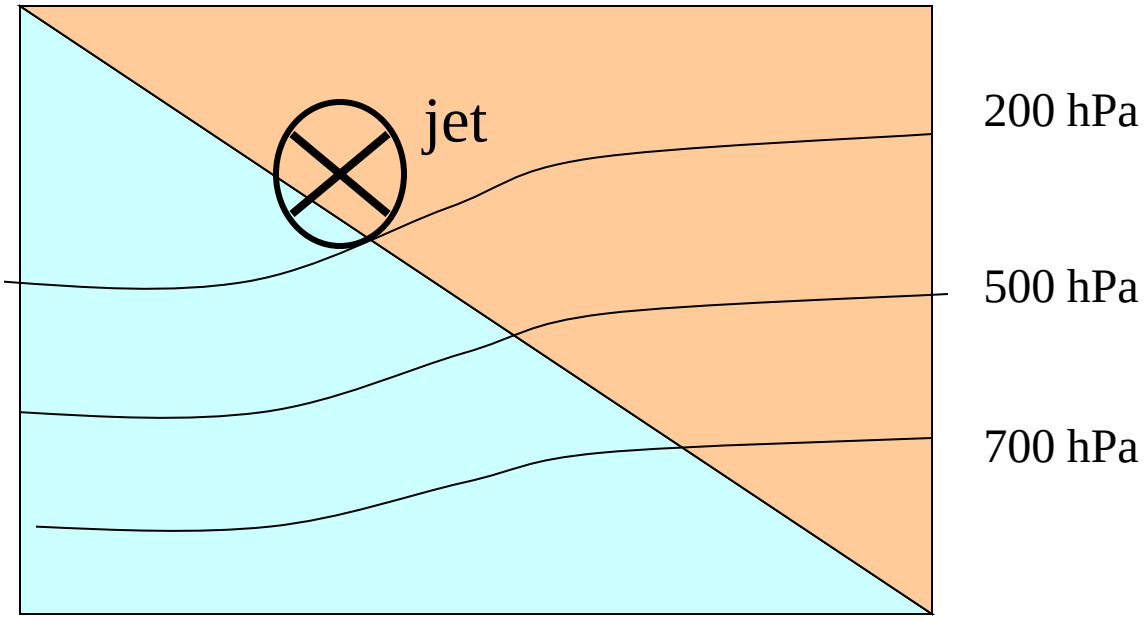
The slope of frontal surfaces (Margules equation)

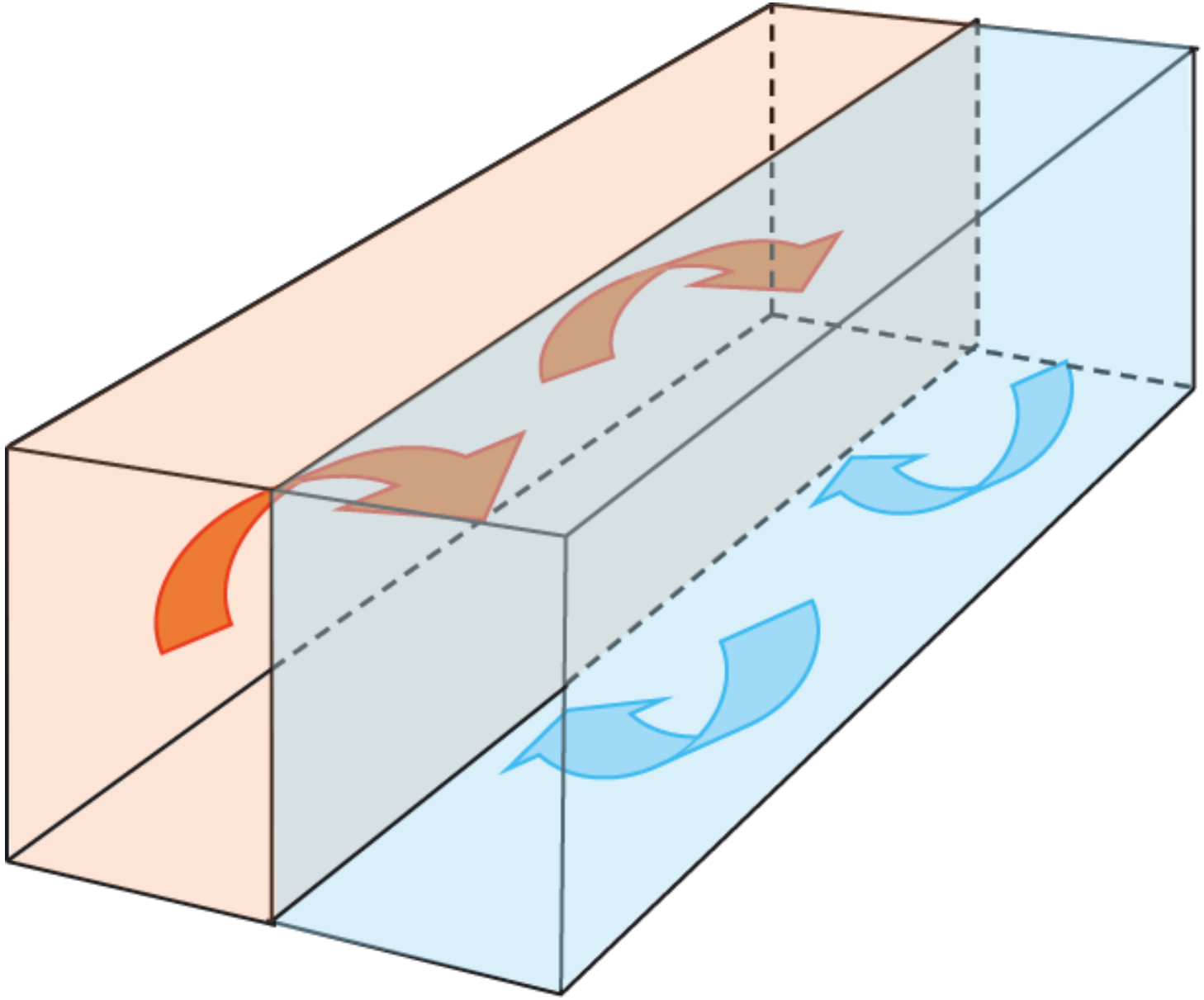


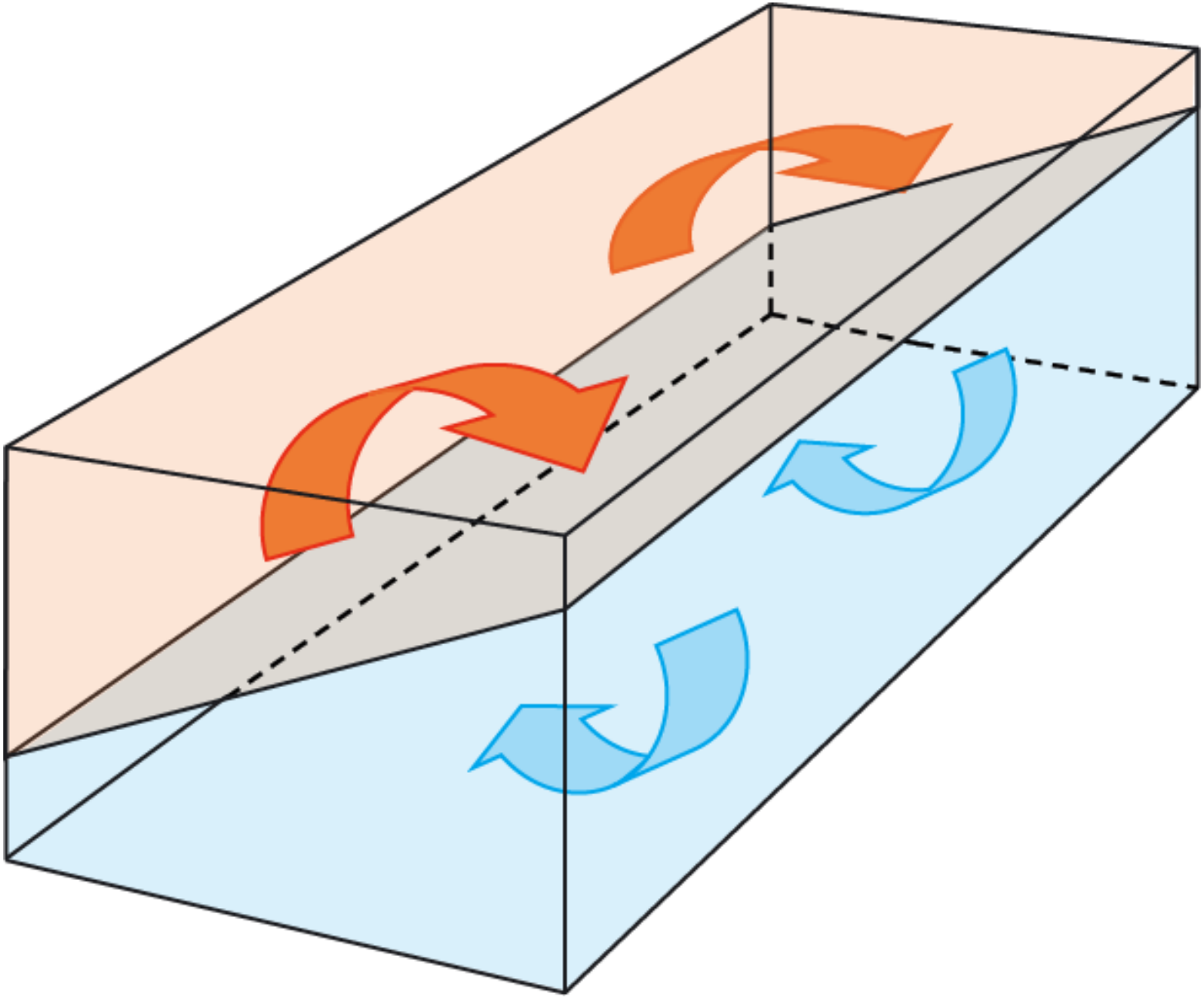


With rotation the Coriolis force tries to turn back the air...

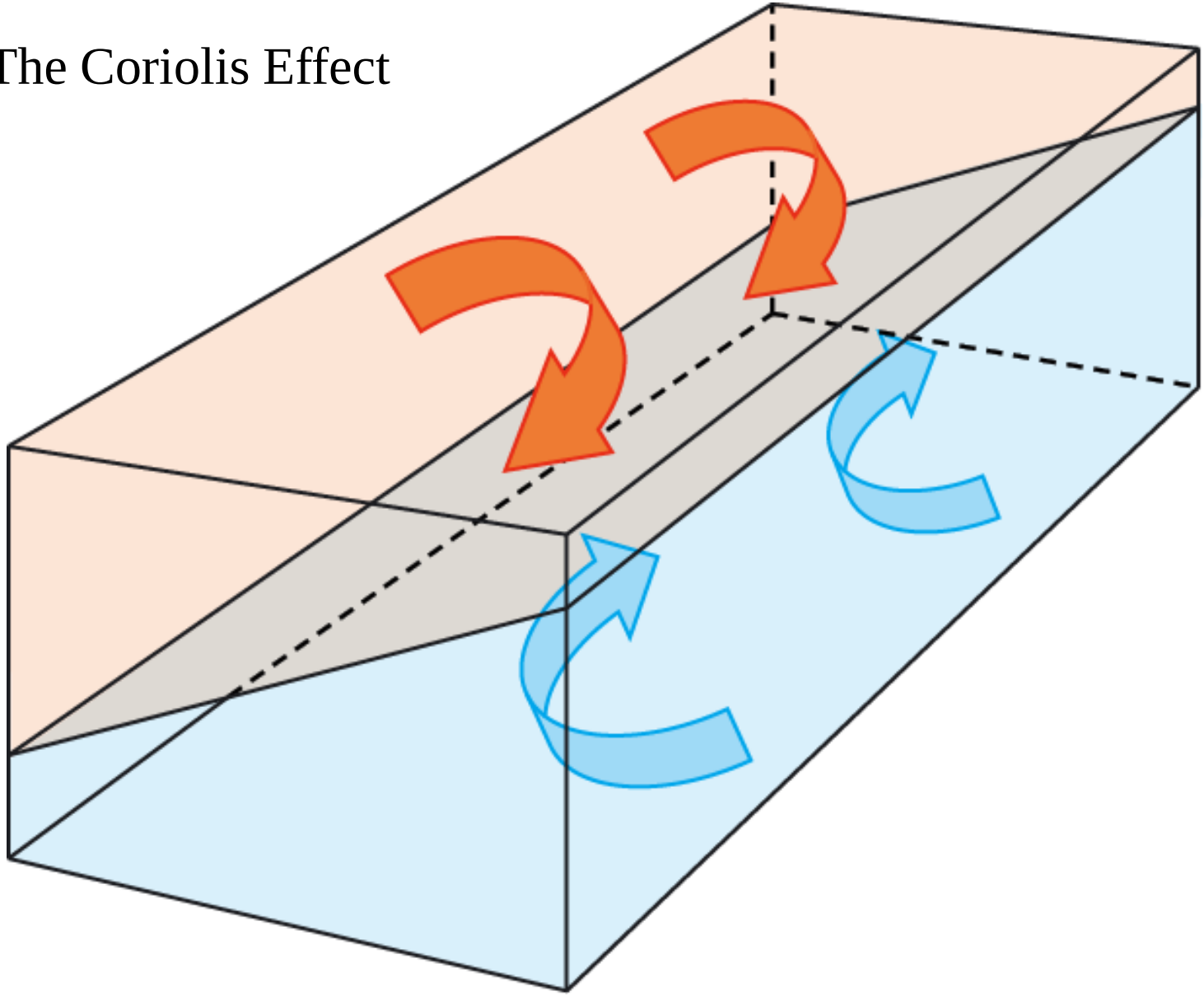
The slope of geopotential surfaces and the creation of frontal jet streams

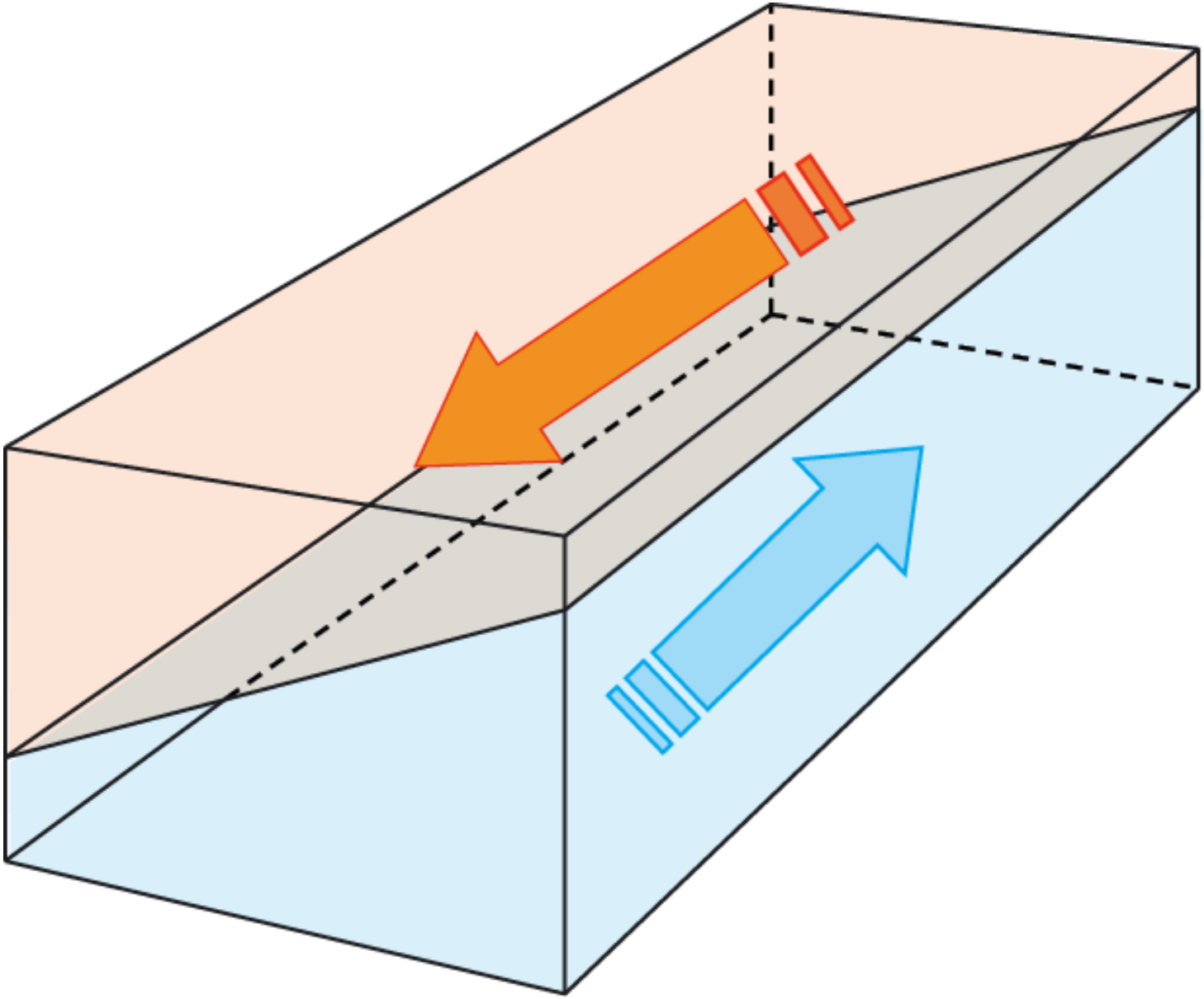


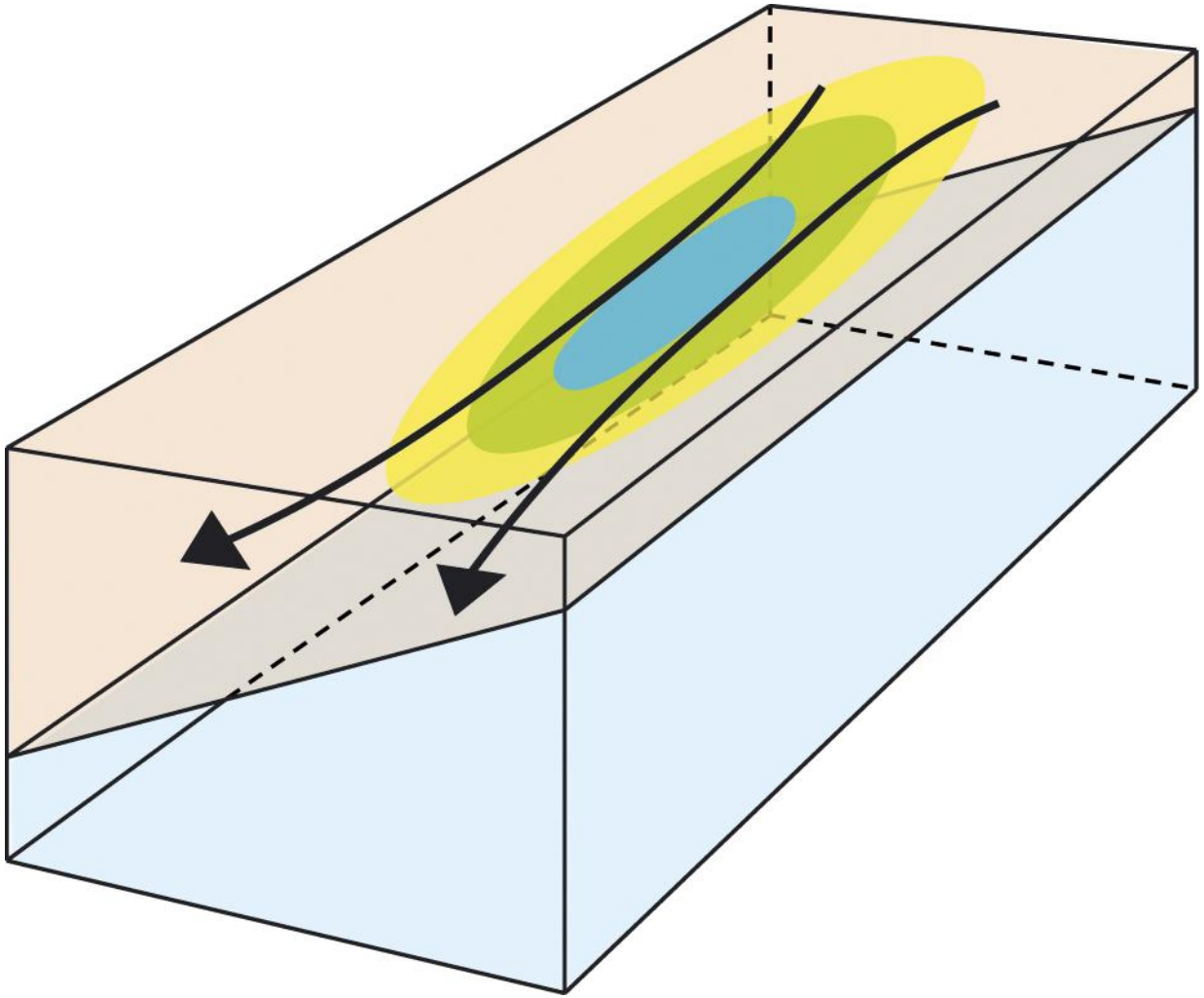




The Coriolis Effect

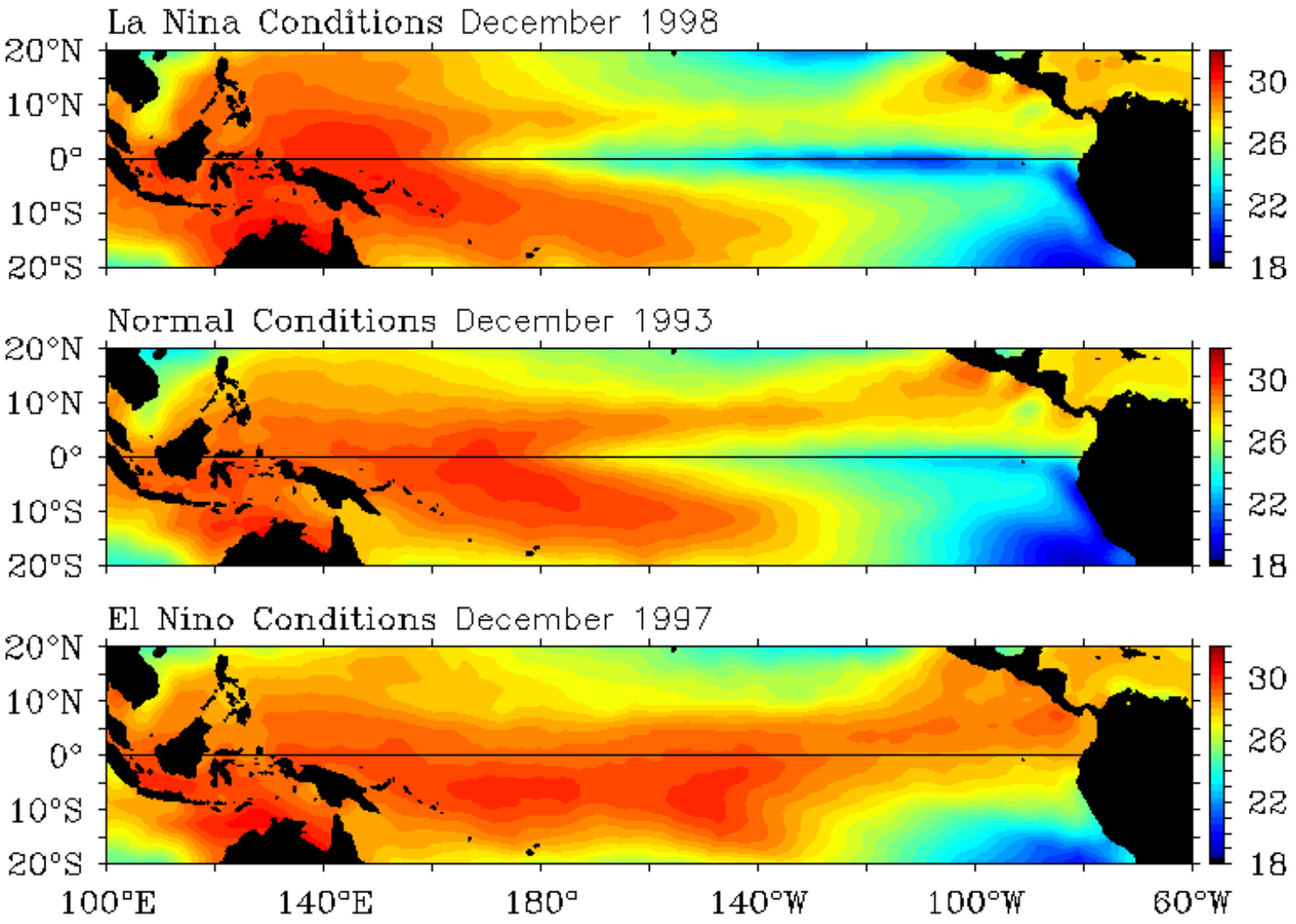






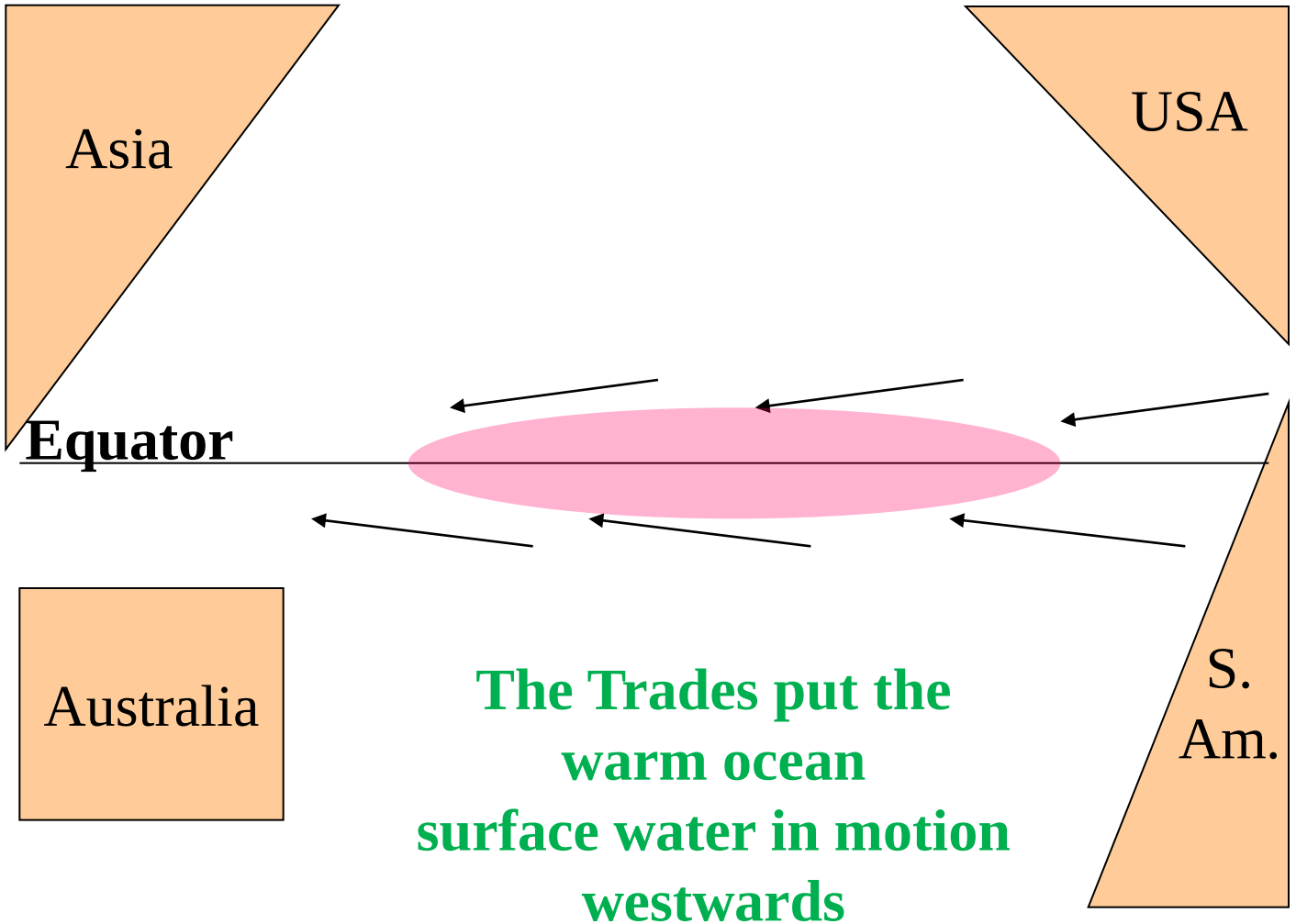
4.El Niño and La Niña

Monthly Sea Surface Temperature °C

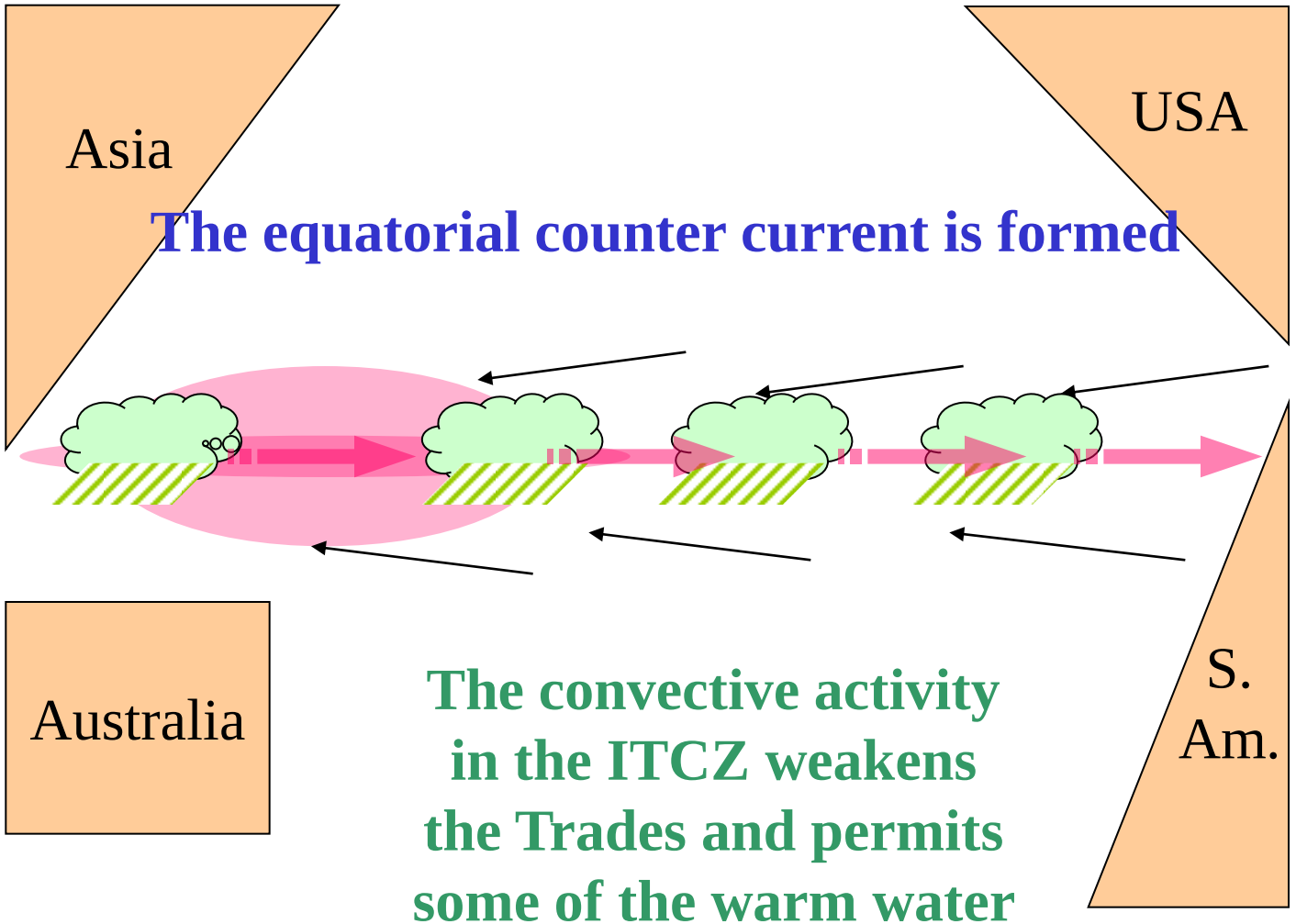


TAO Project Office/PMEL/NOAA

The warm equator

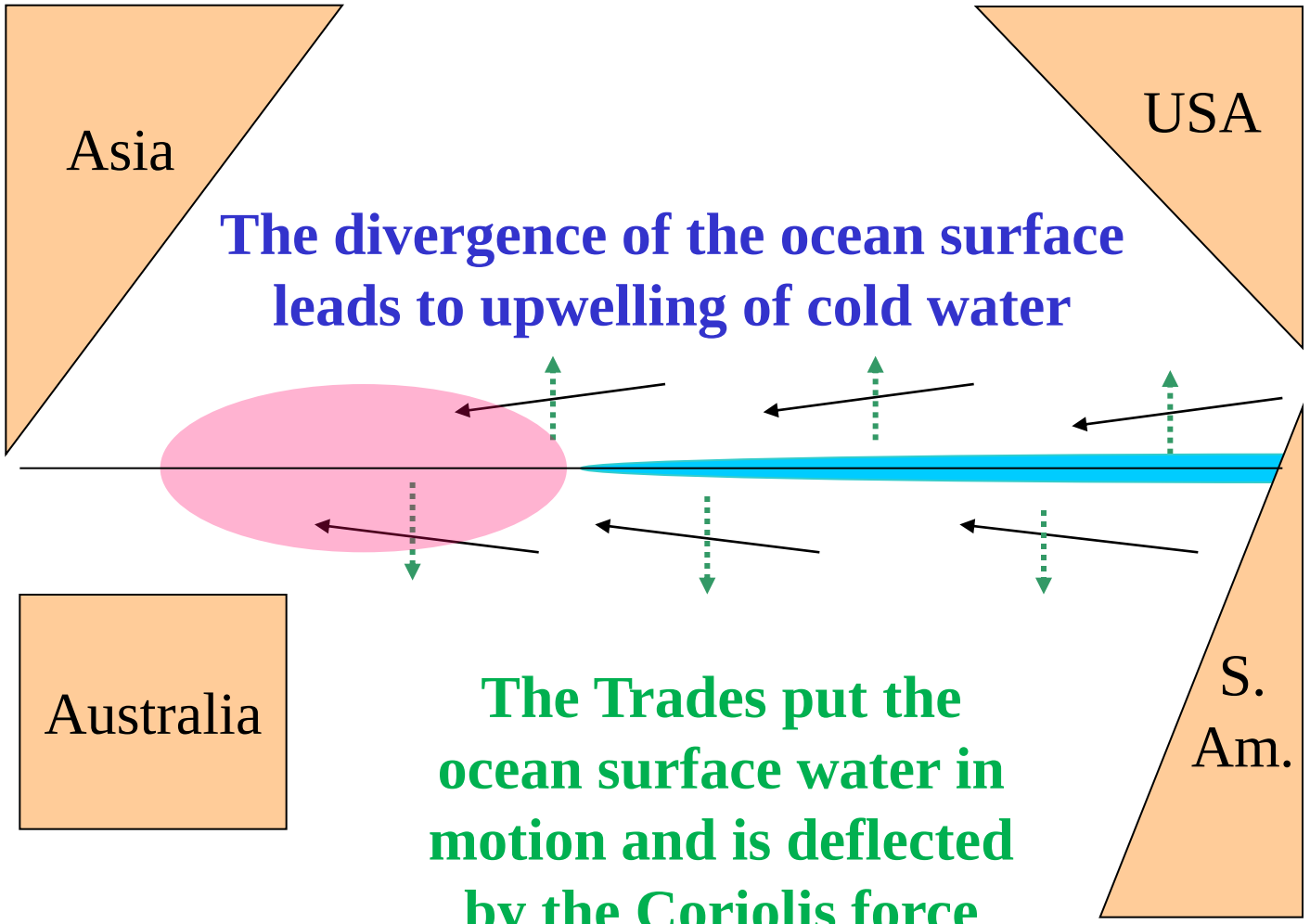


The warm equator

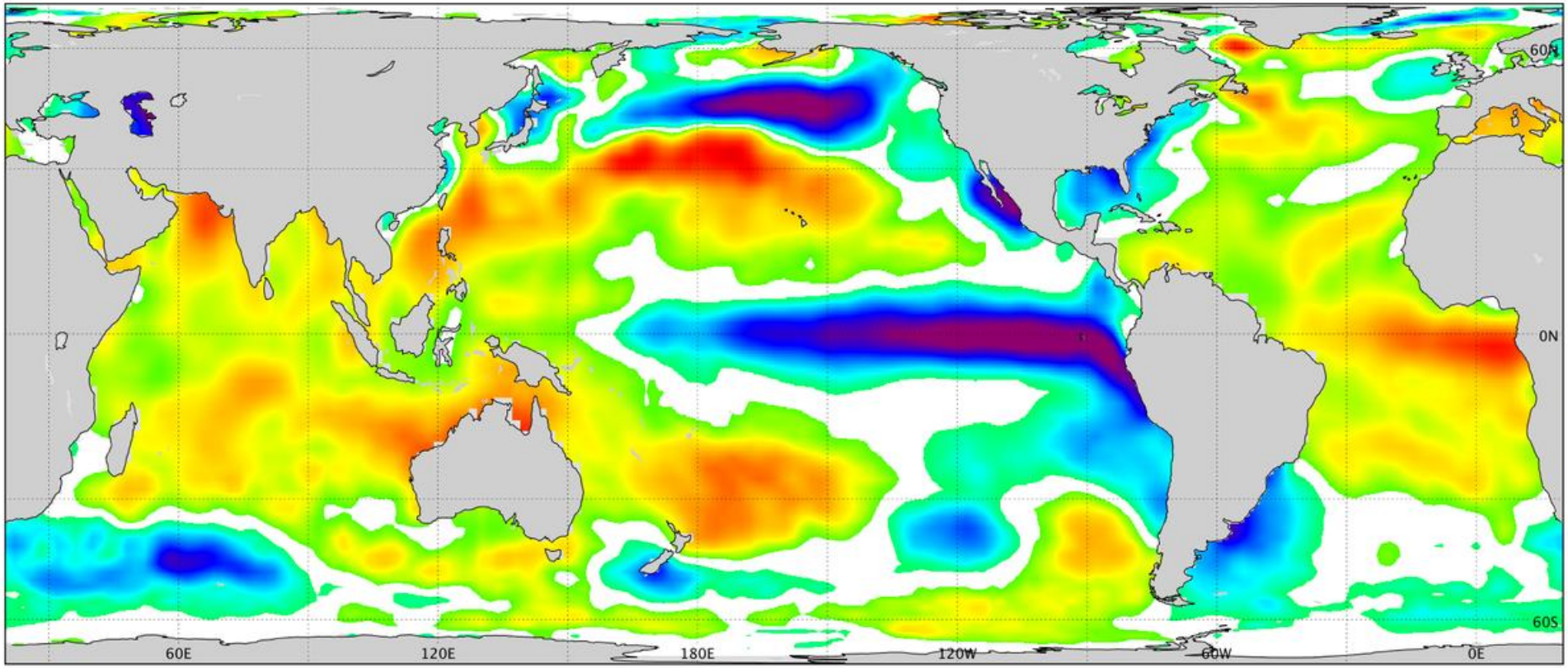


The convective activity in the ITCZ weakens the Trades and permits some of the warm water to slip back

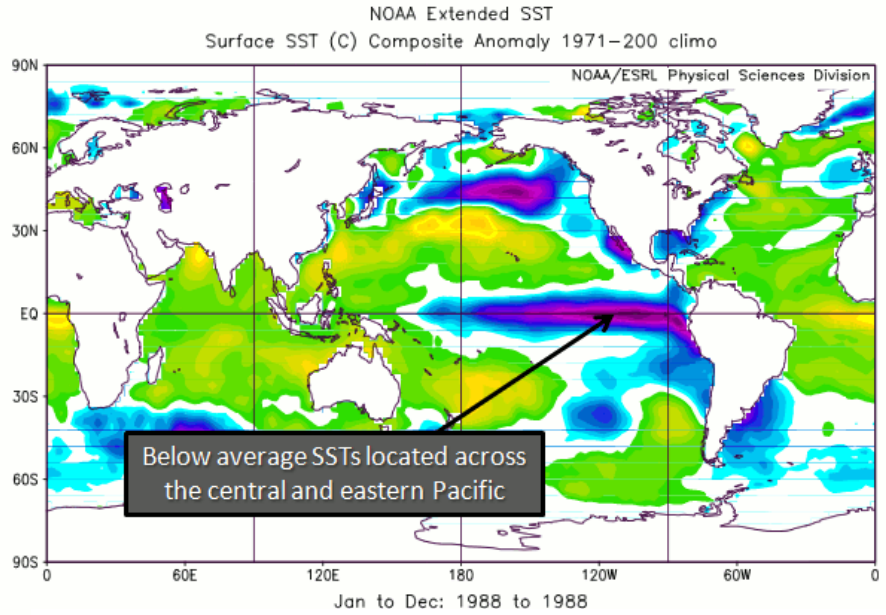
The cold equator

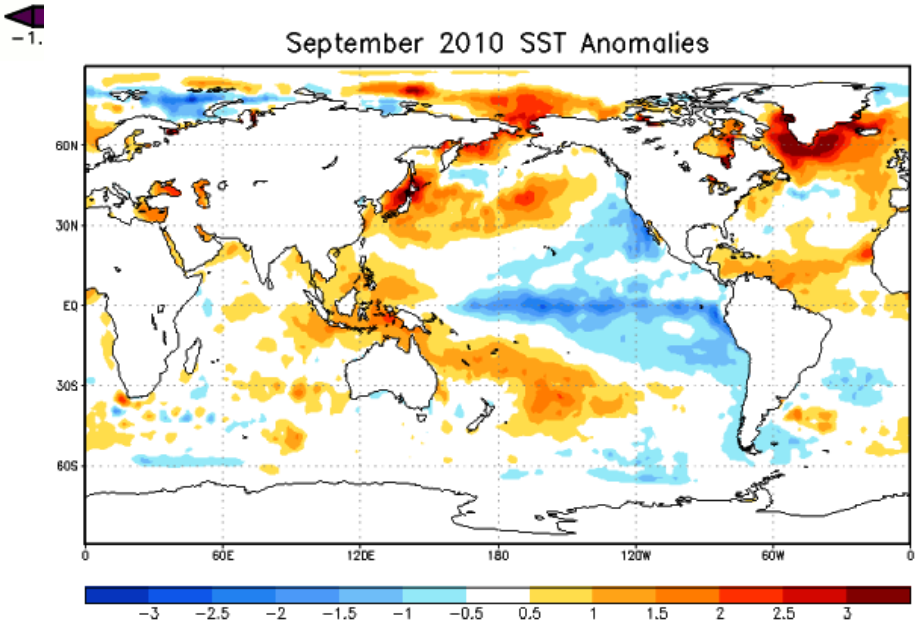


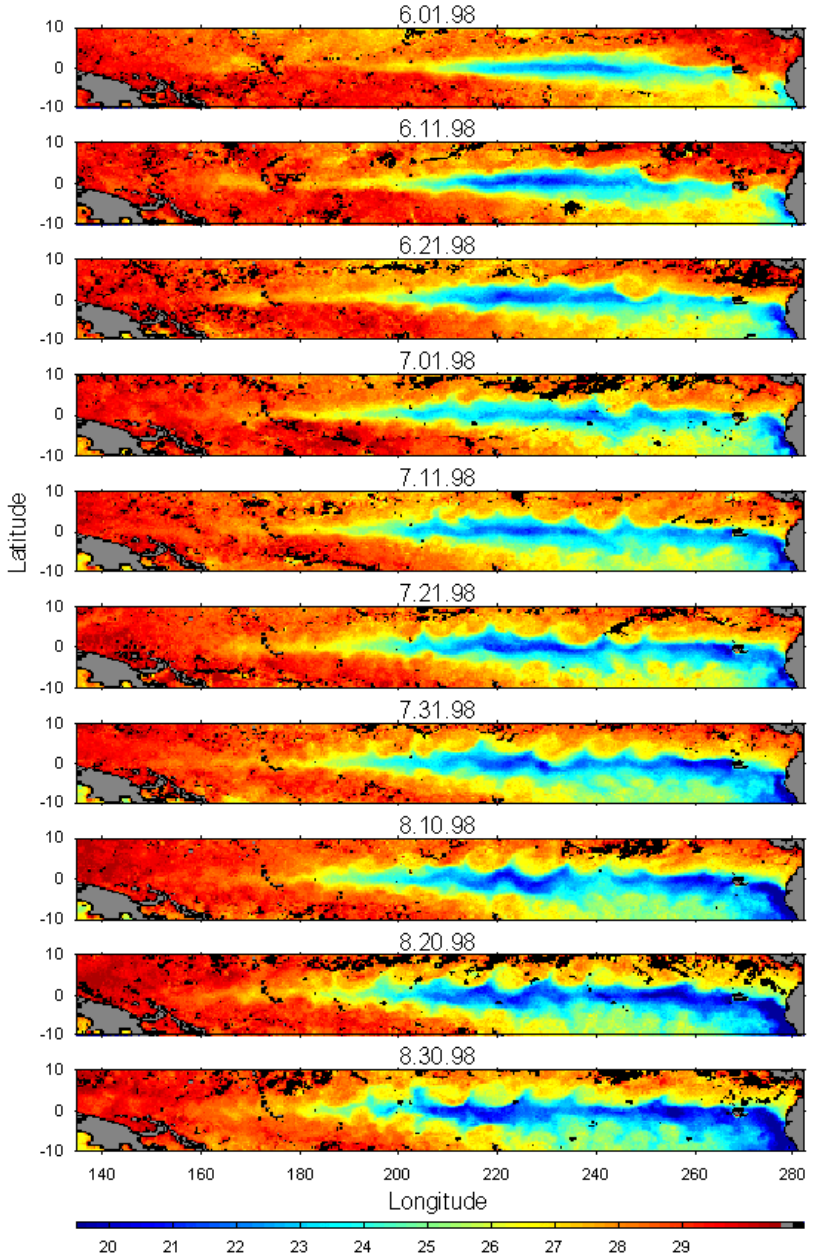
La Niña 1988 jan-des



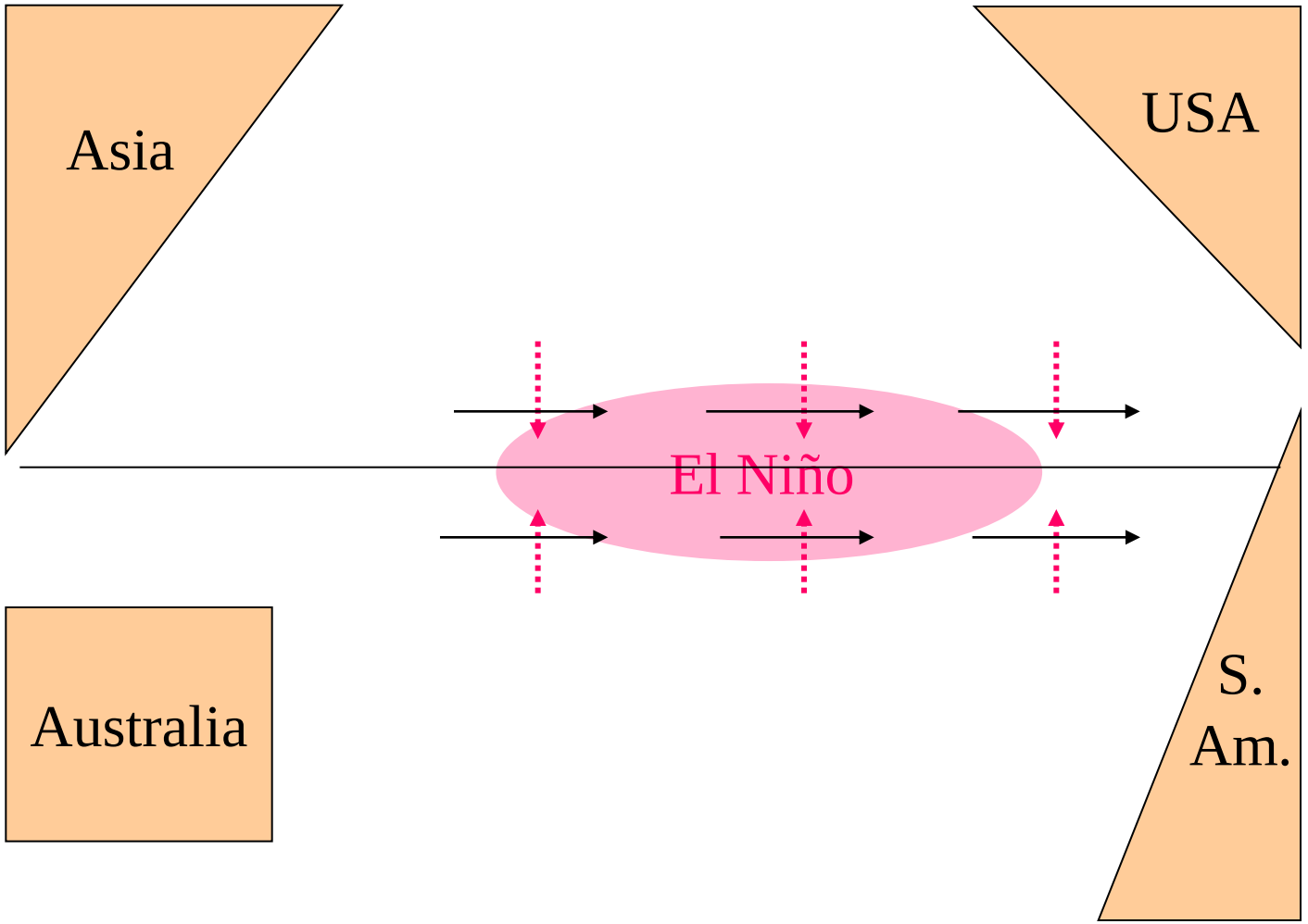
Overflatetemperatur relativt til 1971-2000


NOAA Extended SST
Surface SST (C) Composite Anomaly 1971–200 climo
NOAA/ESRL Physical Sciences Division
90N
60N
30N
EQ
30S
60S
90S
0
60E
120E
180
120W
60W
0
Below average SSTs located across the central and eastern Pacific
Jan to Dec: 1988 to 1988


September 2010 SST Anomalies
60N
30N
EQ
30S
60S
0
60E
120E
180
120W
60W
0
−3
−2.5
−2
−1.5
−1
−0.5
0.5
1
1.5
2
2.5
3


6.01.98
6.11.98
6.21.98
7.01.98
7.11.98
7.21.98
7.31.98
8.10.98
8.20.98
8.30.98
10
0
-10
Latitude
140
160
180
200
220
240
260
280
Longitude
20
21
22
23
24
25
26
27
28
29

The warm El Niño



5. The Gulf stream

The ”beta-effect”

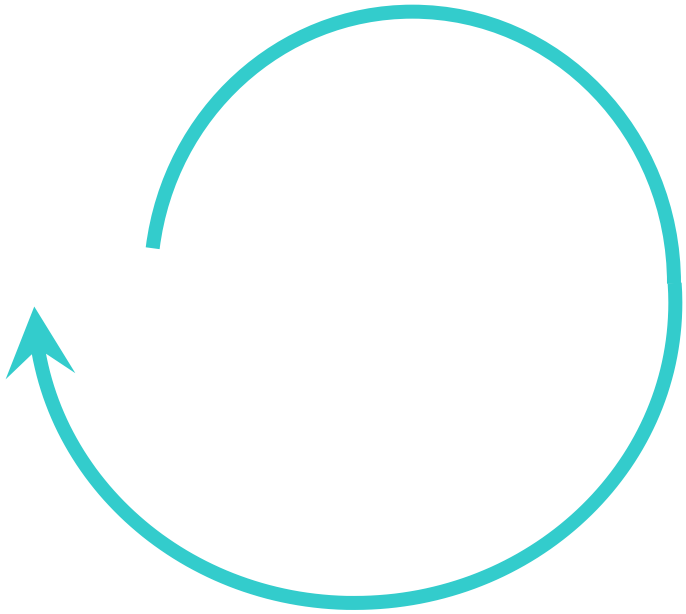
The Coriolis parameter $f = 2\Omega\sin\varphi$

depends on latitude

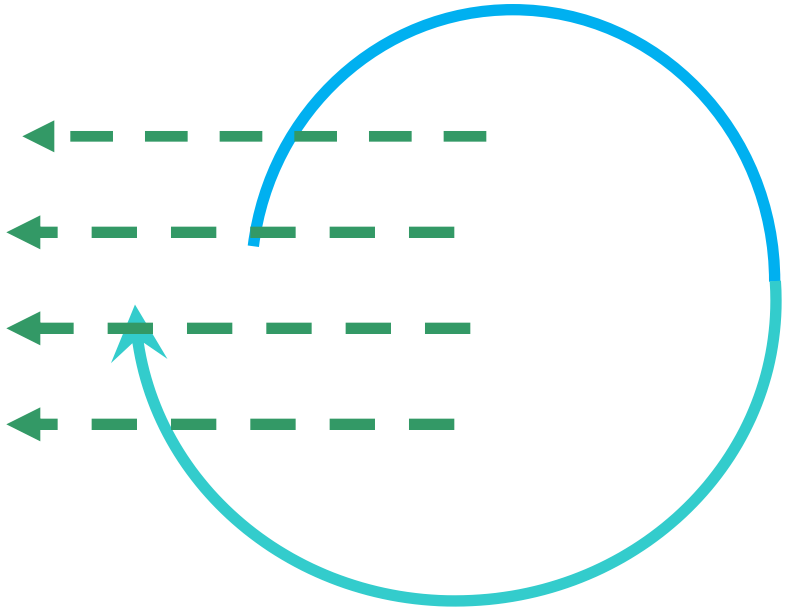
$\therefore$ the radius of the inertia circle

$R=V/f$

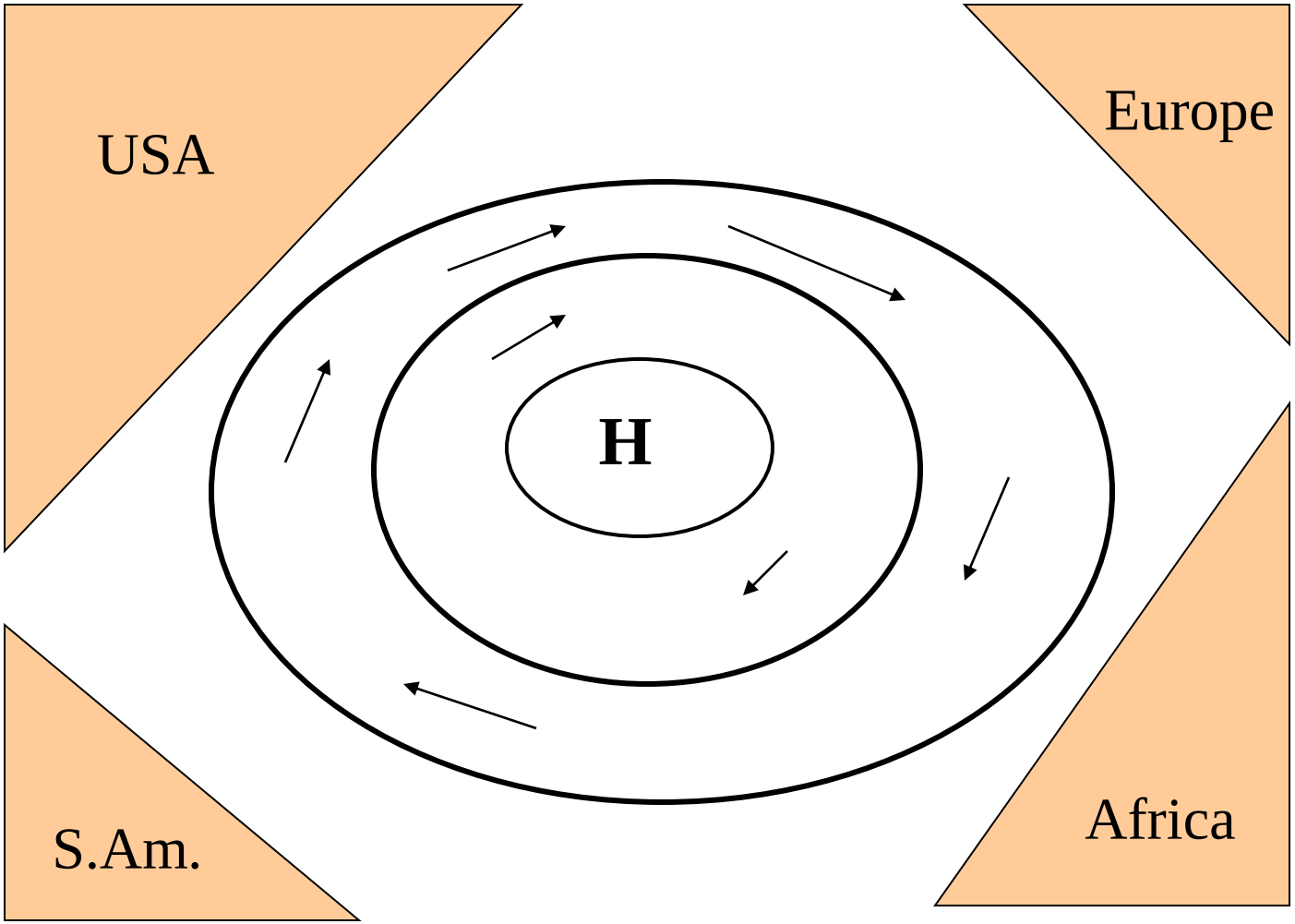
depends on latitude



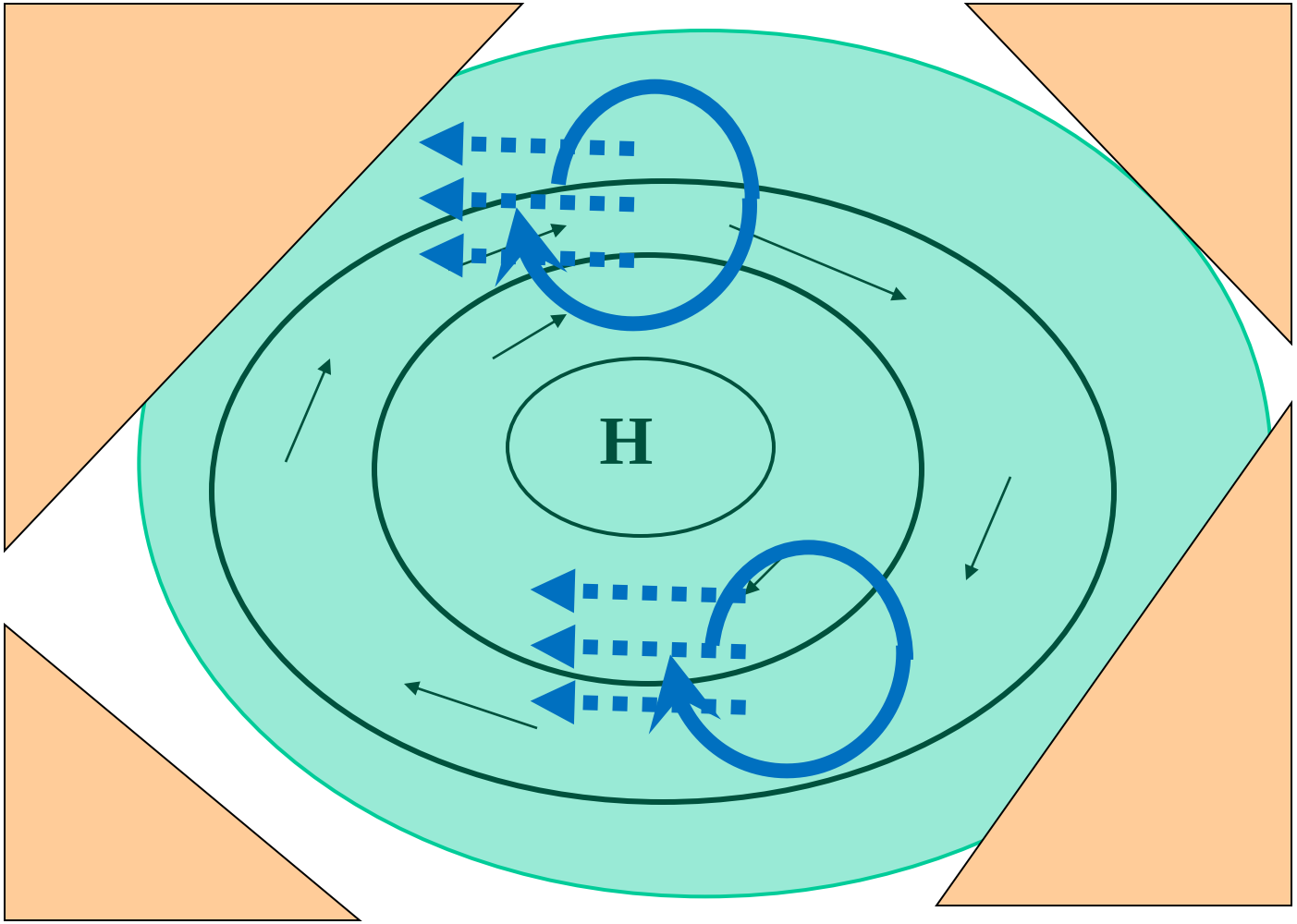
The ”beta-effect” gives rise to a slow westward propagation of mass



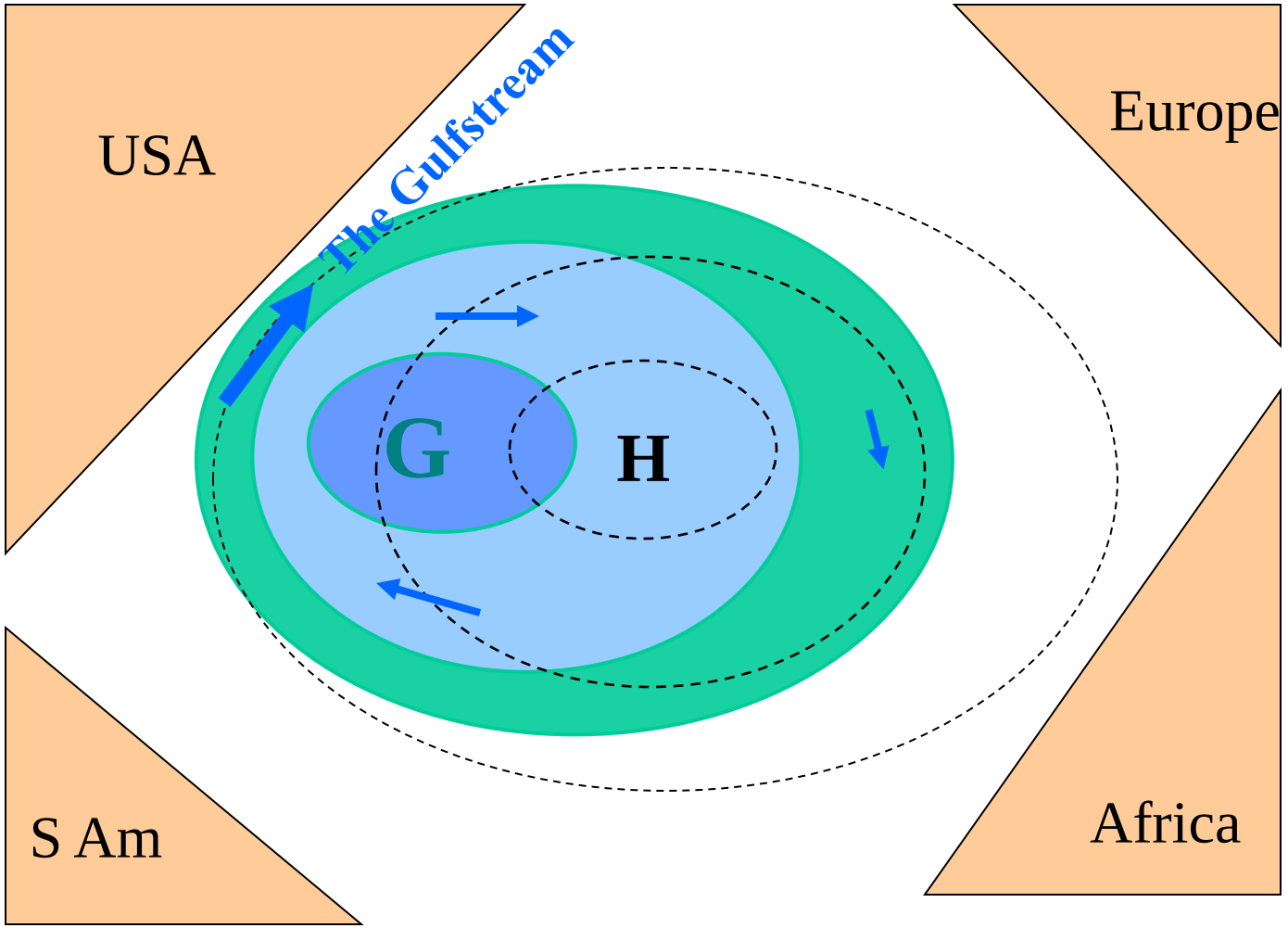
The subtropical high pressure area ("The Azores High")



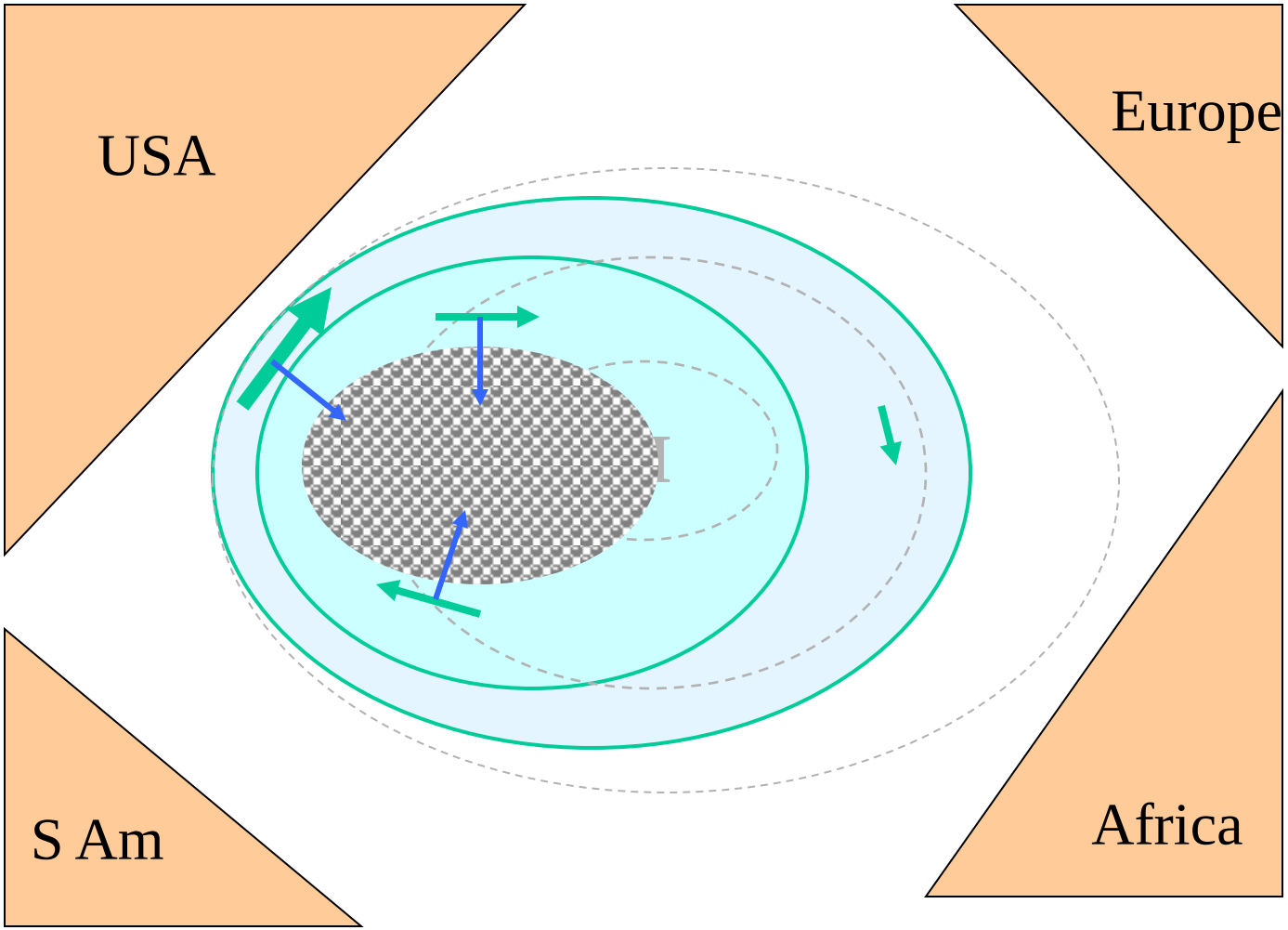
The beta effect would drive the water westward



Instead we get an asymmetric Gulf Stream circulation



The Sargasso Sea ("Ekman pumping" of the surface debris)



Break