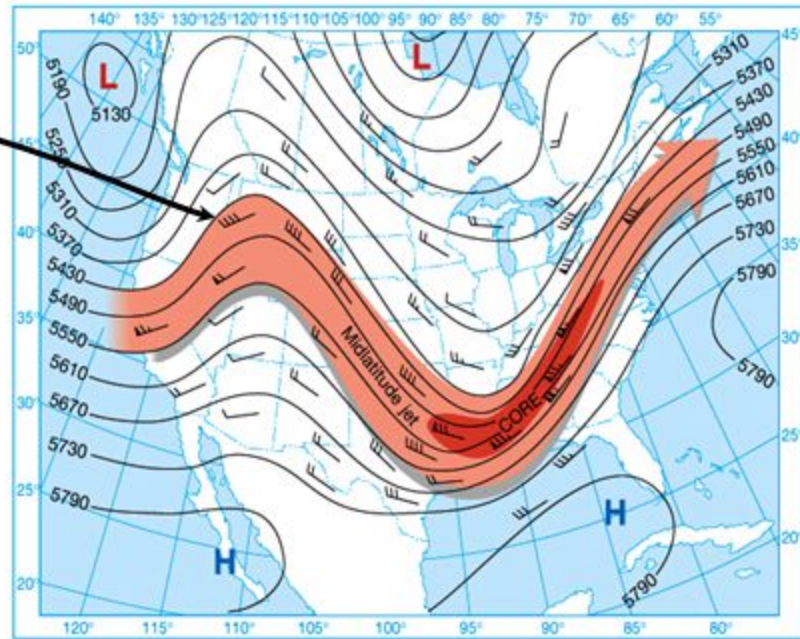
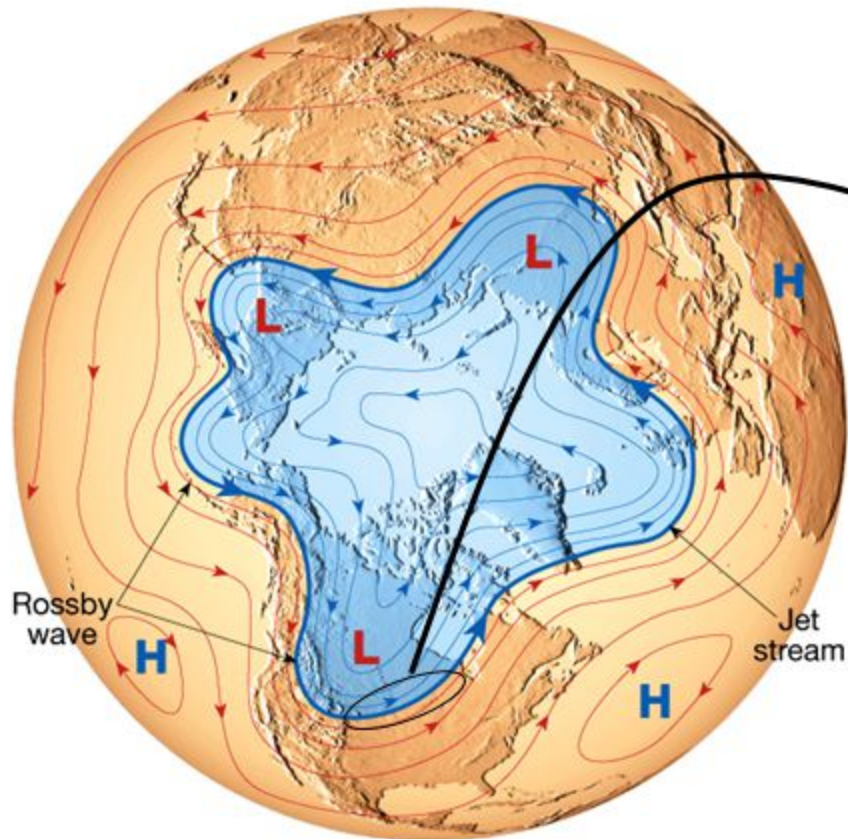


# Waves (Rossby Waves) in the Westerlies

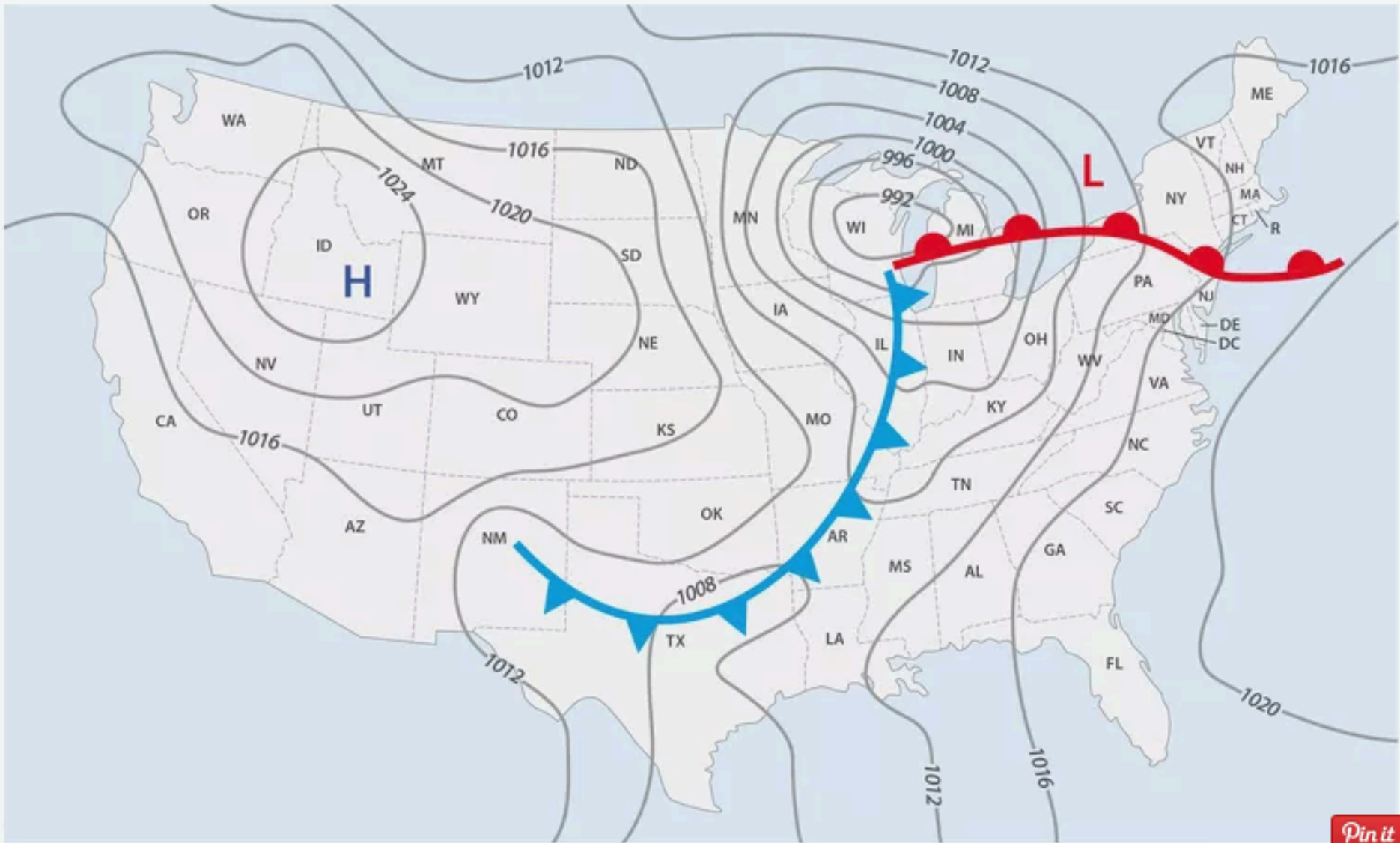
Rossby waves are very long wave 4000-6000 km named after C.G. Rossby, who first explained the nature of these waves.

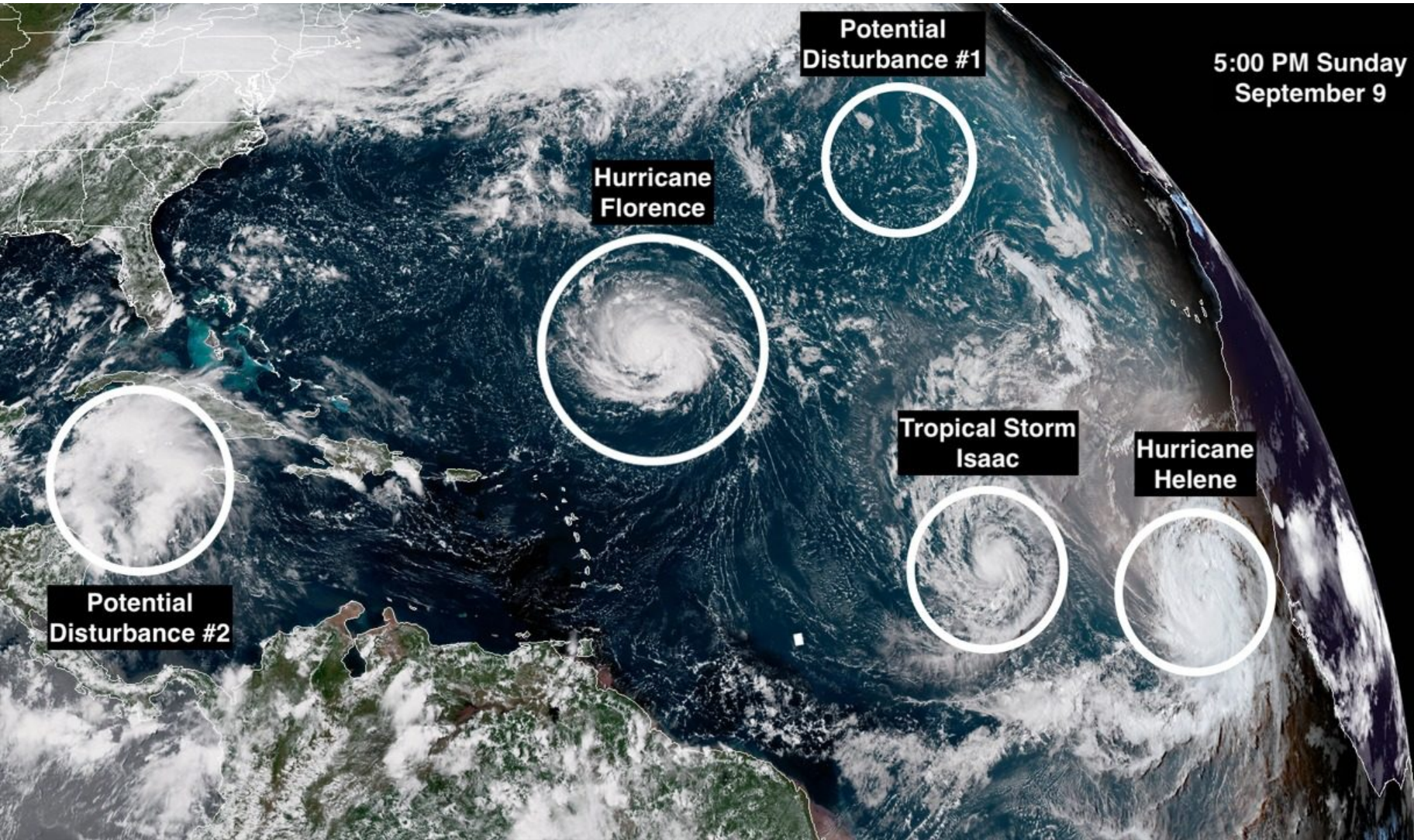


ff	Miles per hour
☉	Calm
—	1-2
—	3-8
—	9-14
—	15-20
—	21-25
—	26-31
—	32-37
—	38-43
—	44-49
—	50-54
—	55-60
—	61-66
—	67-71
—	72-77
—	78-83
—	84-89
—	119-123

Simplified 500-millibar height contour chart for January. The position of the jet stream core is shown in dark.

Idealized flow at 500 millibar level. The five long-wavelength undulations, called Rossby waves, compose the flow. The jet stream is the fast core of this wavy flow.





5:00 PM Sunday  
September 9

Potential  
Disturbance #1

Hurricane  
Florence

Tropical Storm  
Isaac

Hurricane  
Helene

Potential  
Disturbance #2

# Hurricane size Comparison 2018

5,200 KM

## 5 Hurricane Matthew 2016 | 1,800 KM

270 km/h | 603 | \$15.09 B | 5

Hurricane Matthew was the first Category 5 Atlantic hurricane since Hurricane Felix in 2007, and also caused catastrophic damage and a humanitarian crisis in Haiti, as well as widespread devastation in the southeastern United States.

The deadliest Atlantic hurricane since 2005

## 4 Hurricane Patricia 2015 | 1,800 KM

345 km/h | 6 | \$460 M | 5

Hurricane Patricia was the second-most intense tropical cyclone on record worldwide, behind Typhoon Tip in 1979, with a minimum atmospheric pressure of 872 mbar. Patricia was first classified a tropical depression on October 20.

Most intense tropical cyclone on record

## 3 Hurricane John 1994 | 1,600 KM

280 km/h | 5 | \$15 M | 5

Hurricane John, also known as Typhoon John, was both the longest-lasting and the farthest-traveling tropical cyclone ever observed. Over the course of its existence it followed a 7,165-mile (13,280-km), lasting 31 days in total.

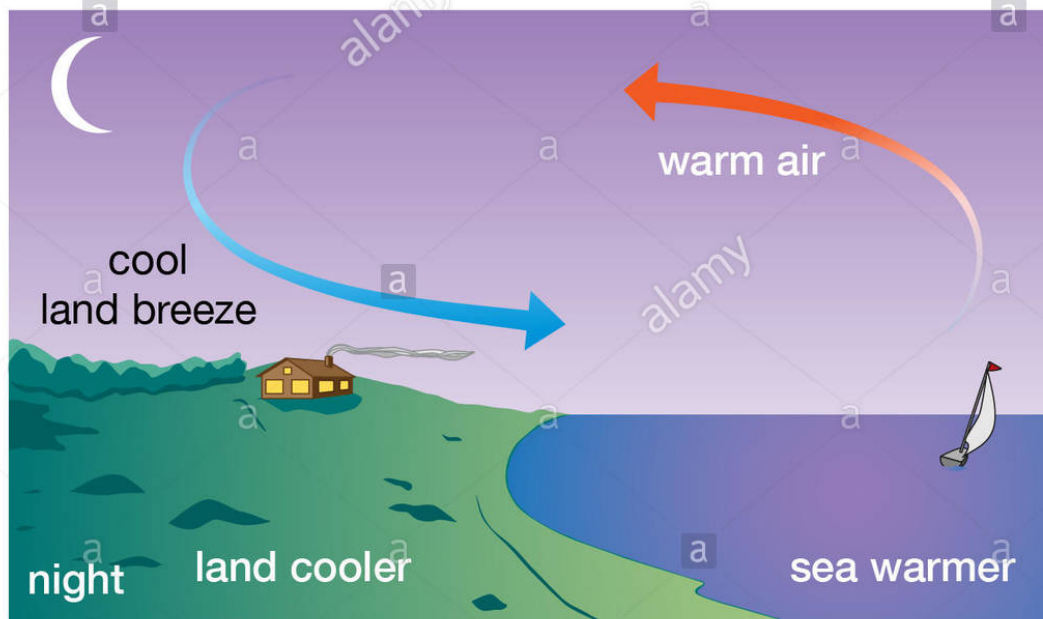
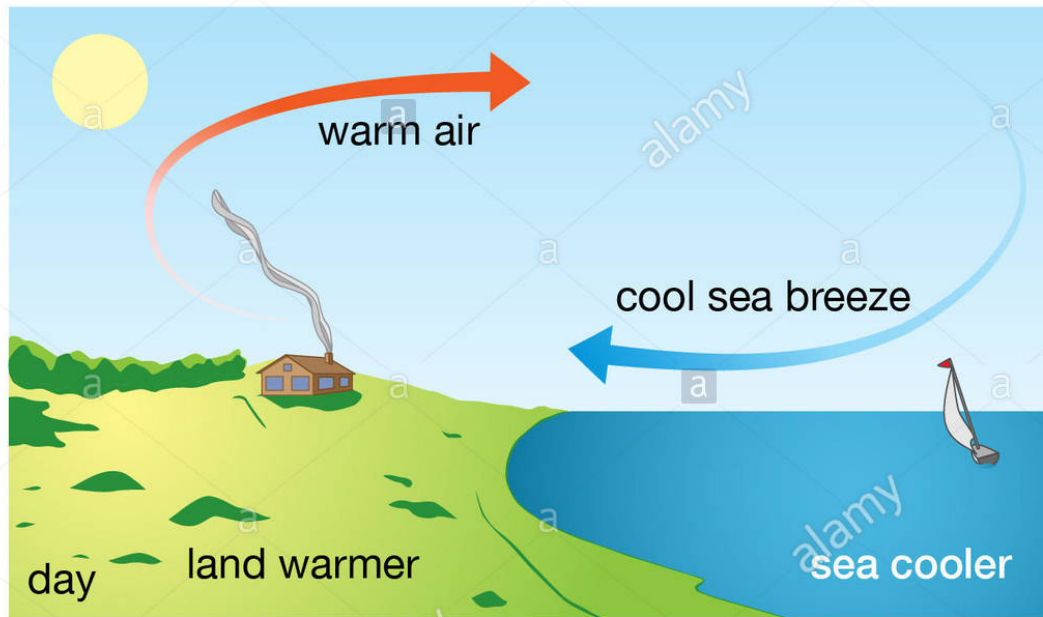
Longest ride 13,280 km for (31 Days)

## 2 Hurricane Sandy 2012 | 1,800 KM

185 km/h | 285 | \$68.7 B | 3

Hurricane Sandy was the deadliest and most destructive hurricane of the 2012 Atlantic hurricane season. Inflicting nearly \$70 billion (2012 USD) in damage, it was the second-costliest hurricane on record in the United States until surpassed by hurricanes Harvey and Maria in 2017.

The deadliest and most destructive of the 2012

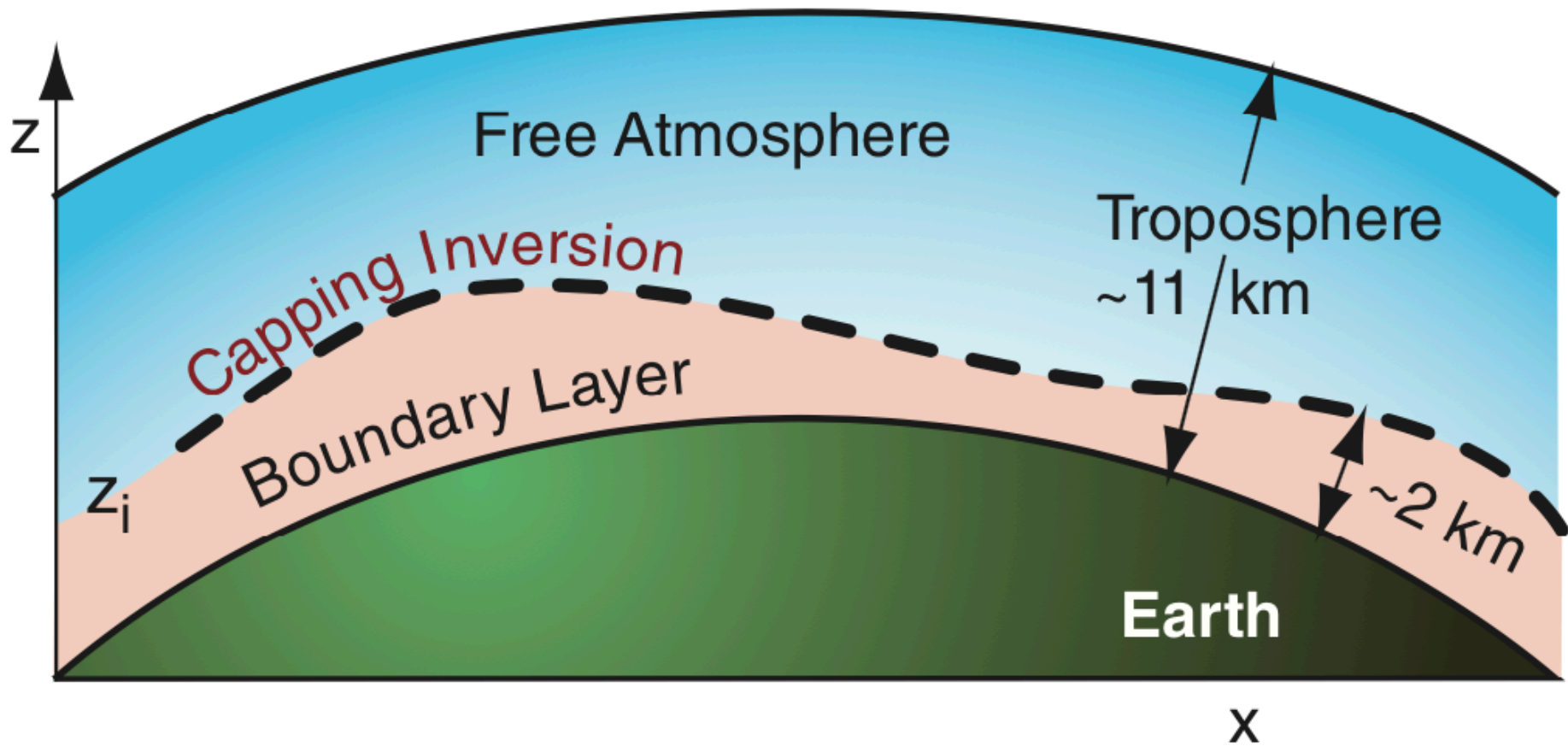


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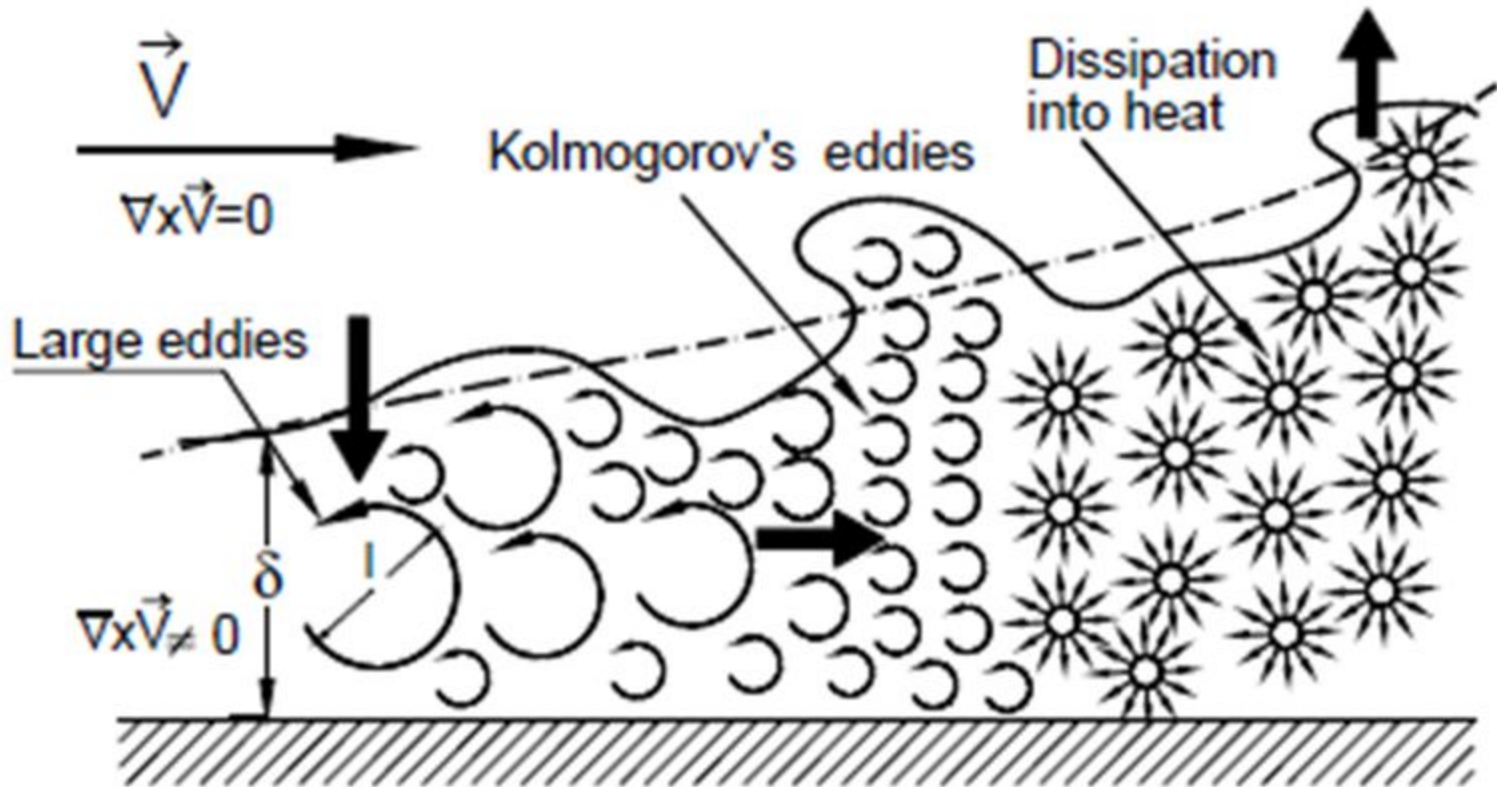




**Figure 18.1**

*Location of the boundary layer, with top at  $z_i$ .*

# Instantaneous Energy Cascade in Turbulent Boundary Layer.



*A state of universal equilibrium is reached when the rate of energy received from larger eddies is nearly equal to the rate of energy of when the smallest eddies dissipate into heat.*



<https://www.youtube.com/watch?v=jn5KuSHguUE>