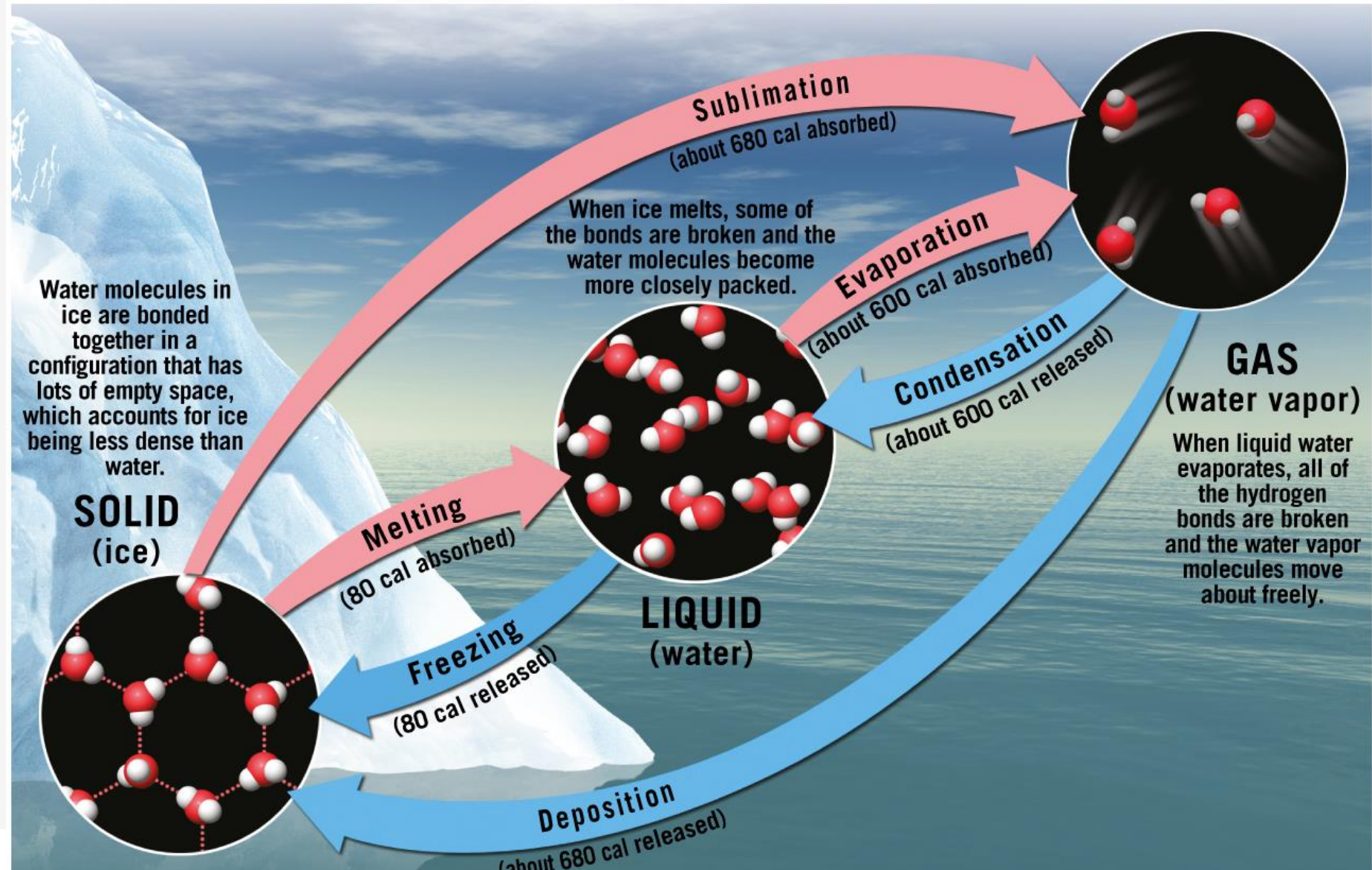


# States of Water and Clouds

# Water State Changes

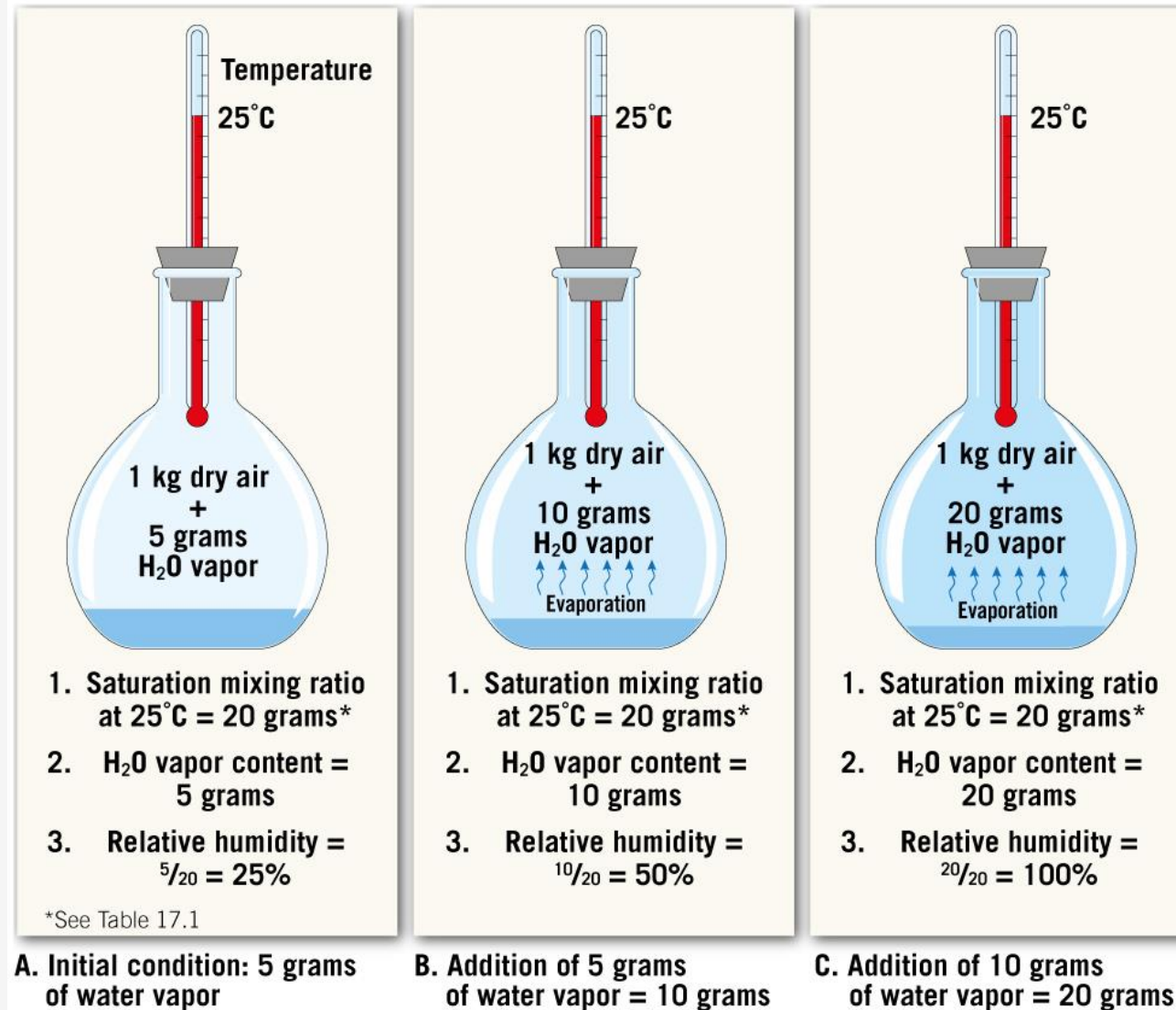


# What do you remember?

---

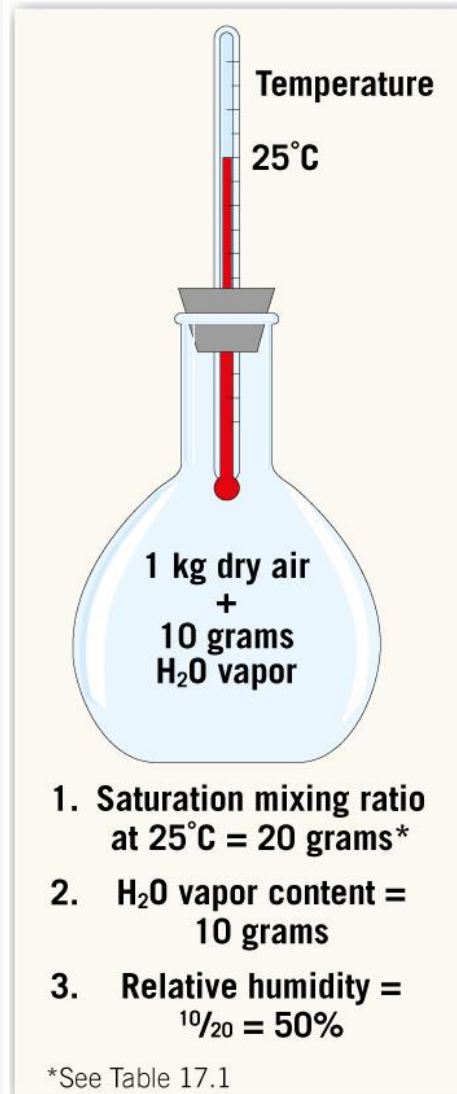
- 1 Water appears on the outside of a glass of iced tea on a warm day
- 2 Snowflake crystals appear on a window in the winter
- 3 You put a glass of water on a table, undisturbed, and in two days it is gone
- 4 You notice the ice cubes are getting smaller in an ice tray in the freezer.

# Relative Humidity at Constant Temperature

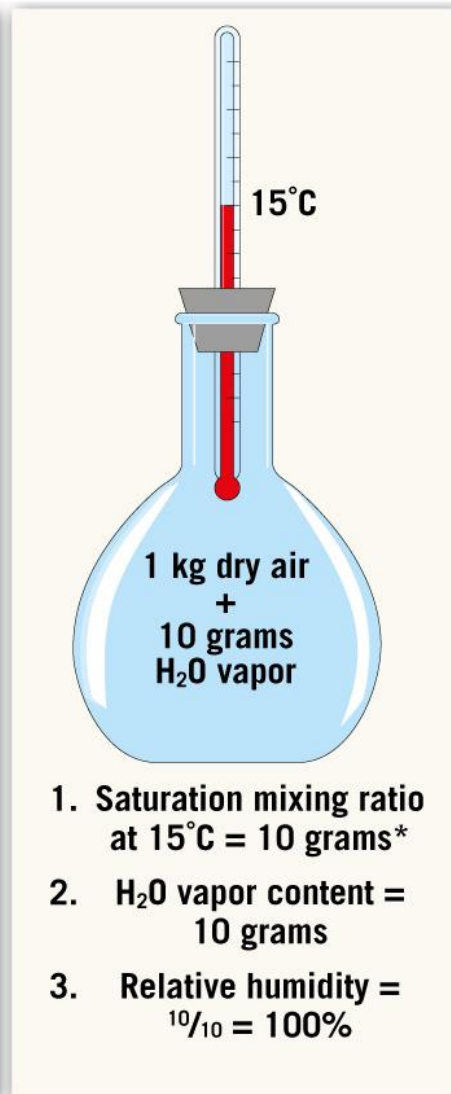


\*See Table 17.1

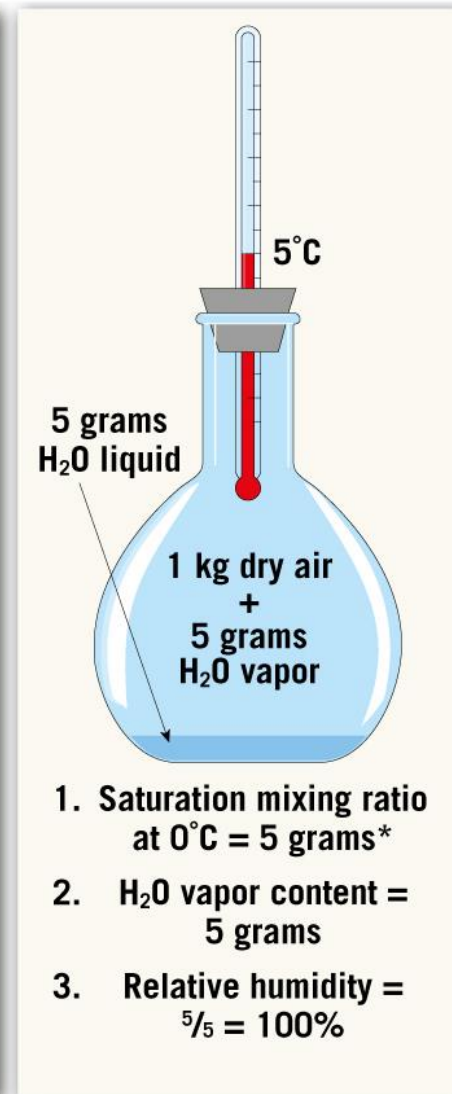
# Relative Humidity at Different Temperatures



**A. Initial condition: 25°C**



**B. Cooled to 15°C**



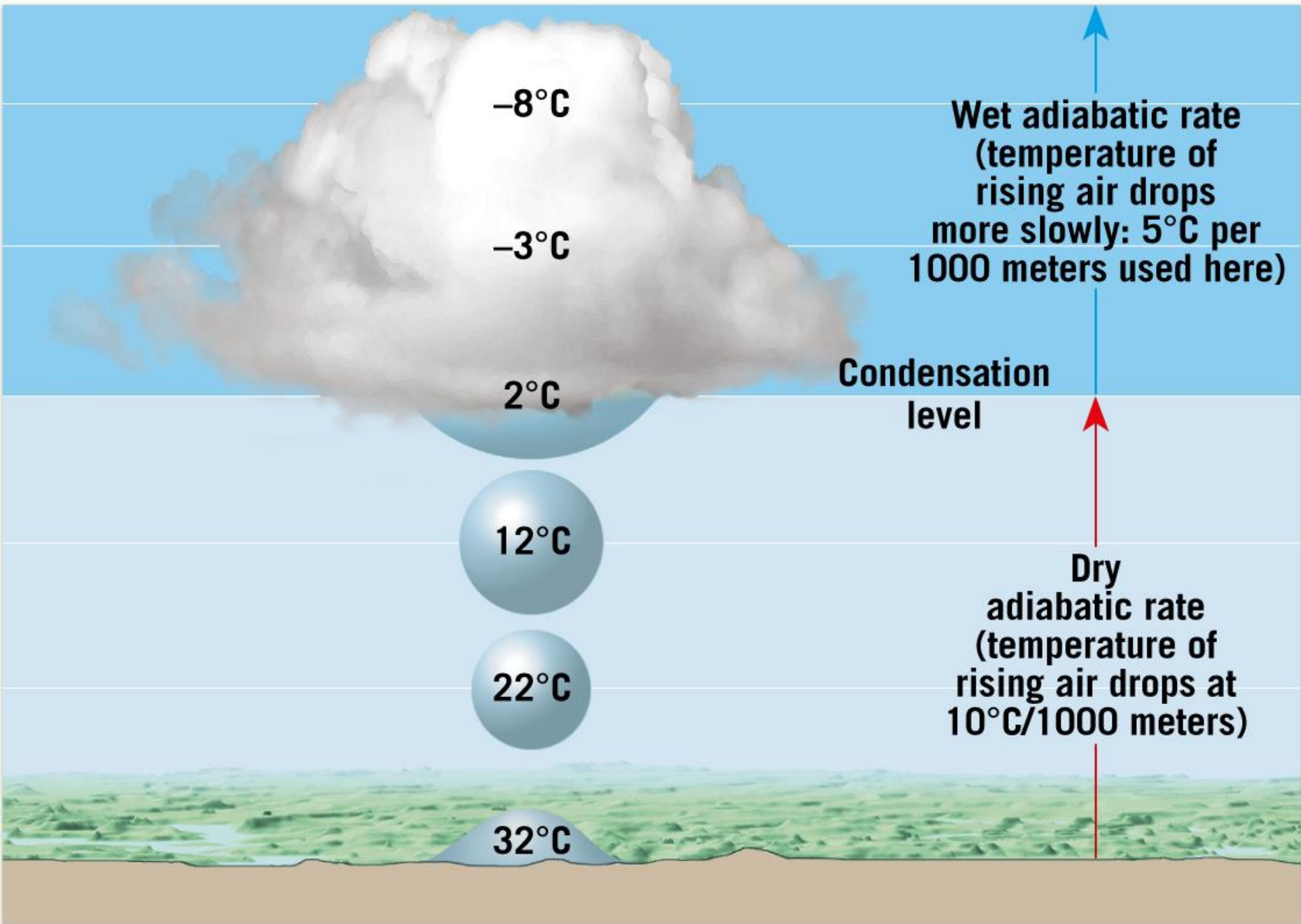
**C. Cooled to 5°C**

Finding the outside humidity using your weather app

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Height (m)

5000  
4000  
3000  
2000  
1000  
Surface



-8°C

-3°C

2°C

12°C

22°C

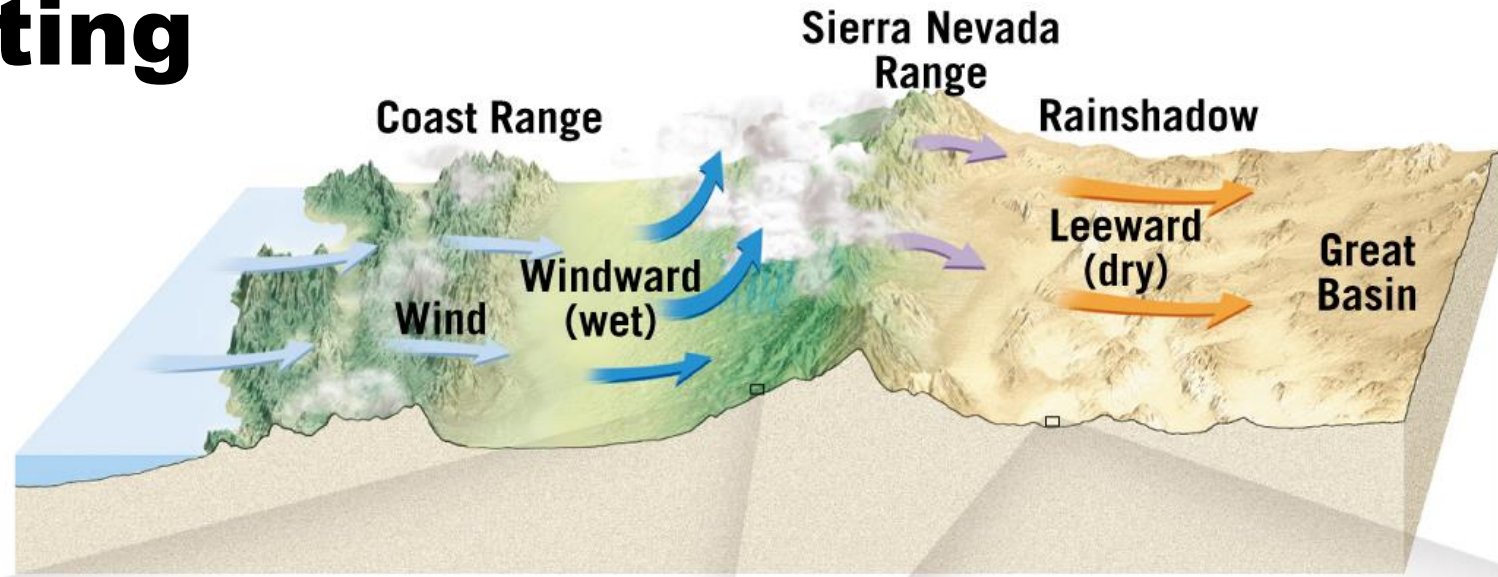
32°C

Wet adiabatic rate  
(temperature of  
rising air drops  
more slowly: 5°C per  
1000 meters used here)

Condensation  
level

Dry  
adiabatic rate  
(temperature of  
rising air drops at  
10°C/1000 meters)

# Orographic Lifting



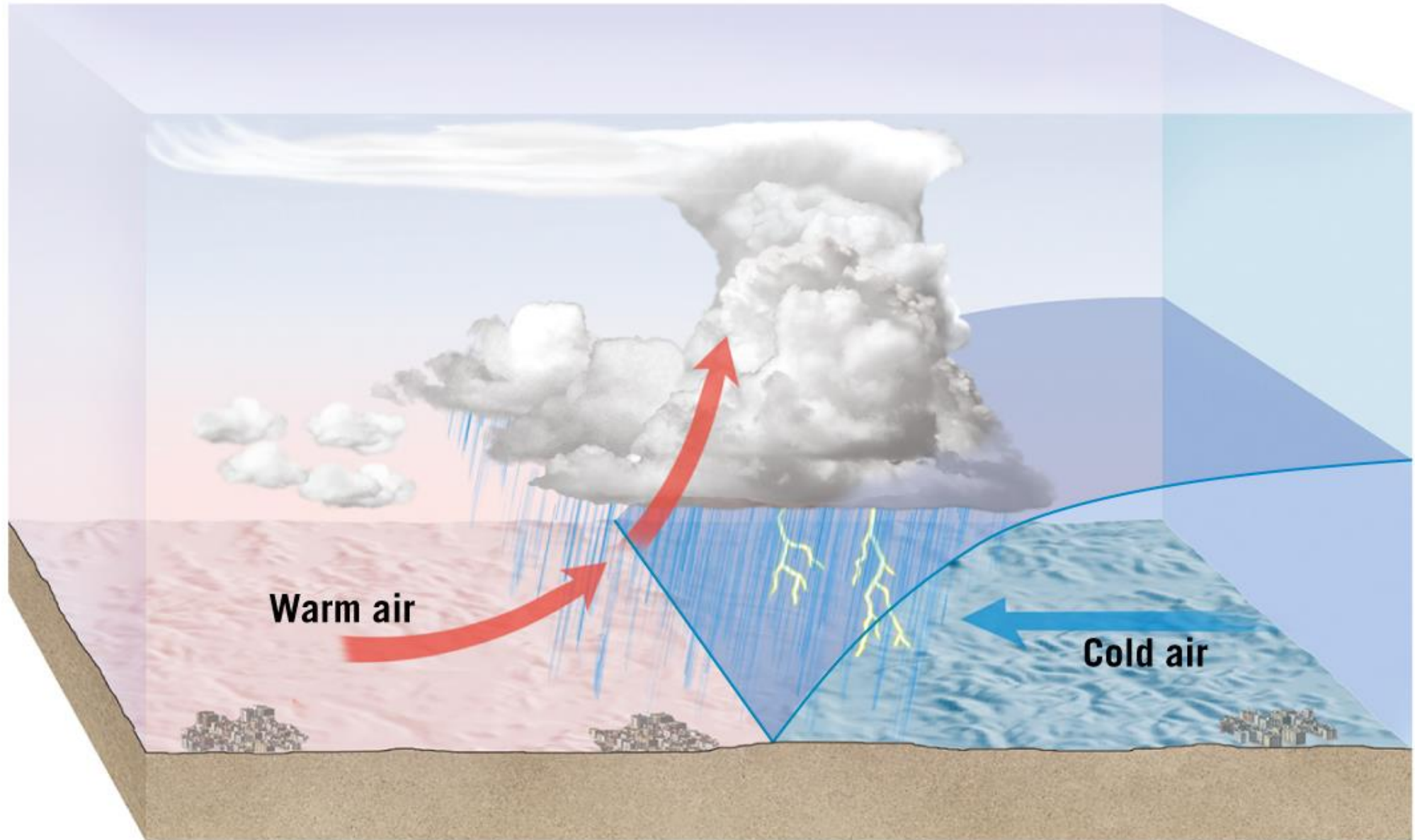
**A.** Orographic lifting leads to precipitation on windward slopes.



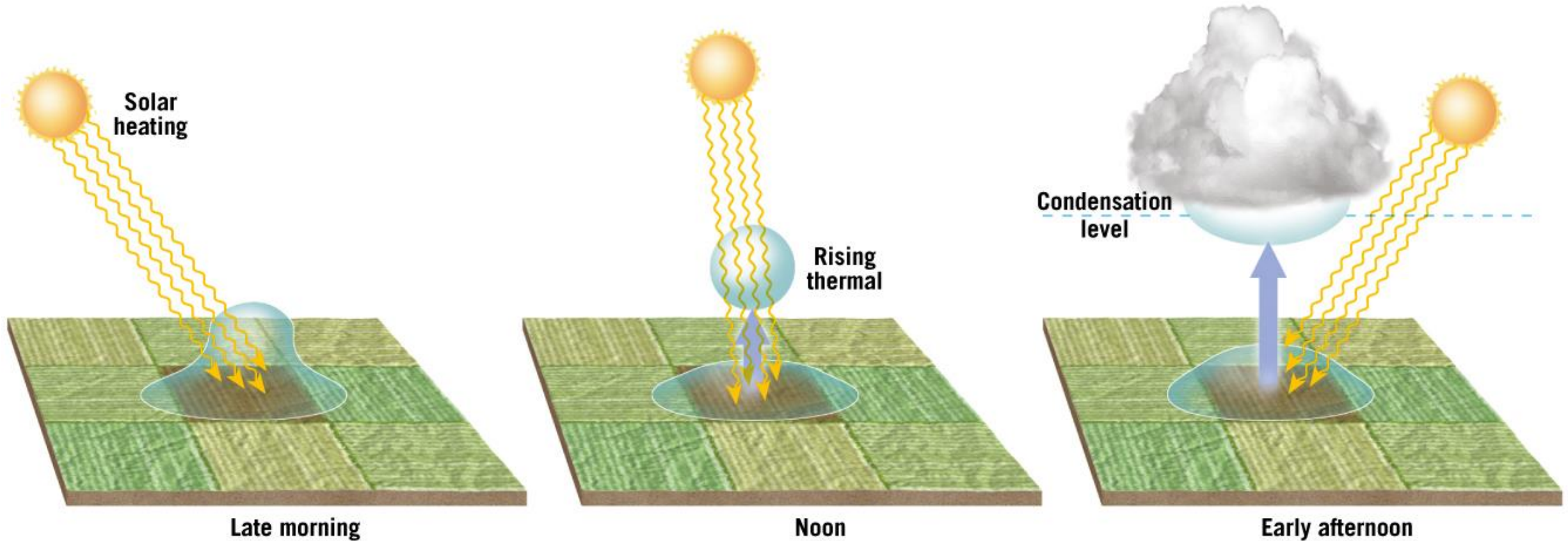
**B.** By the time air reaches the leeward side of the mountains, much of the moisture has been lost, resulting in a *rainshadow desert*.



# Frontal Lifting



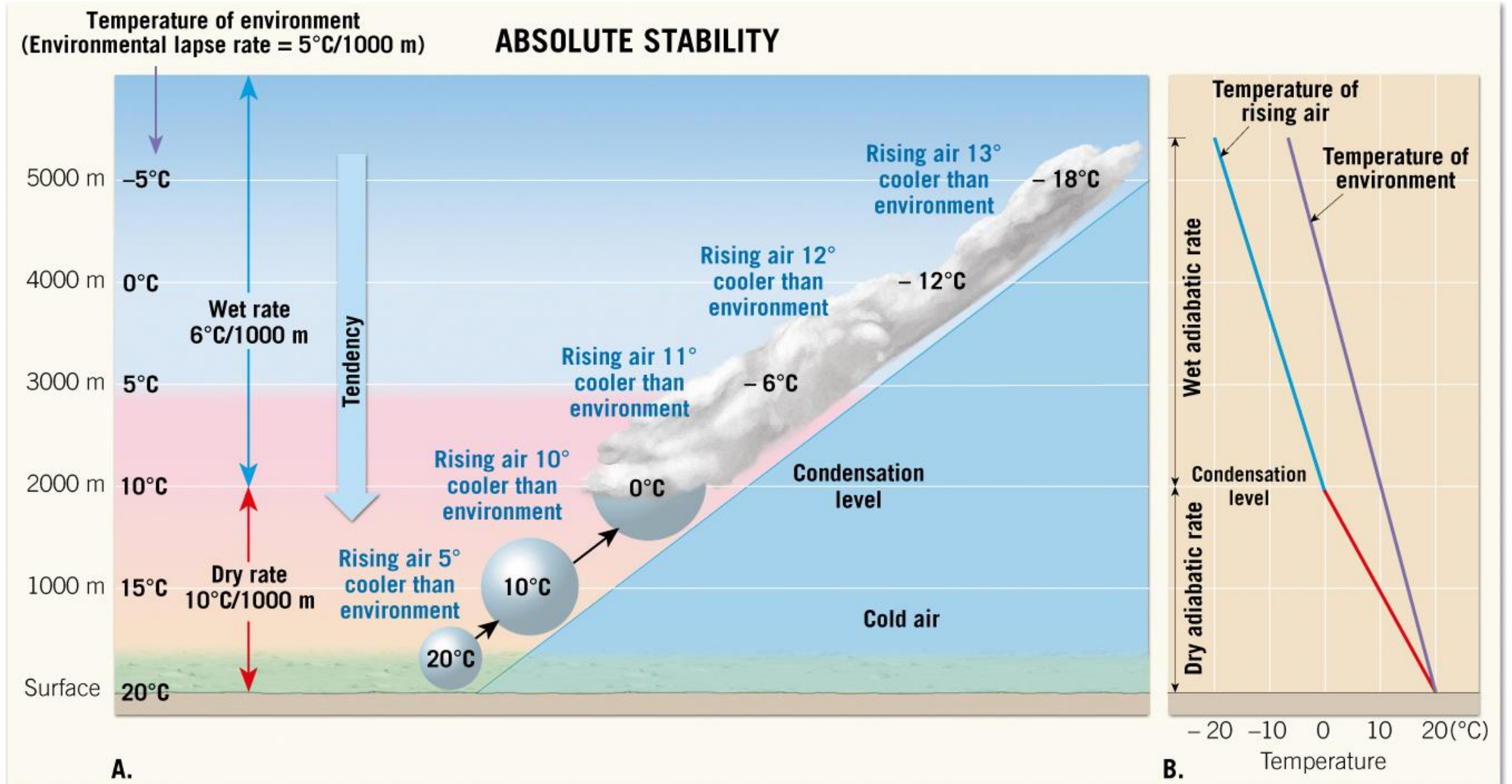
# Localized Convective Lifting



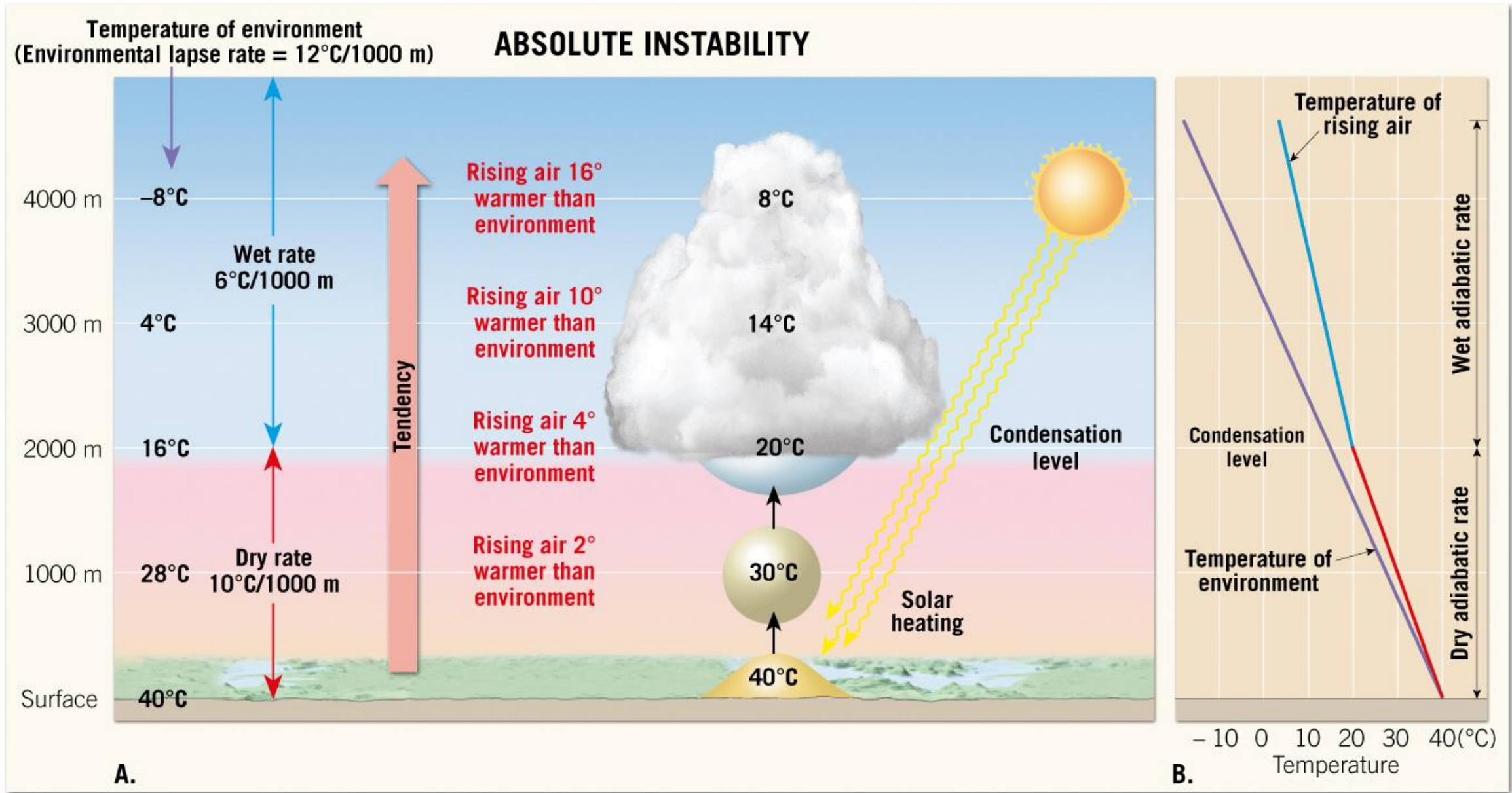
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**What is different about the patch of land in the middle and why does that matter?**

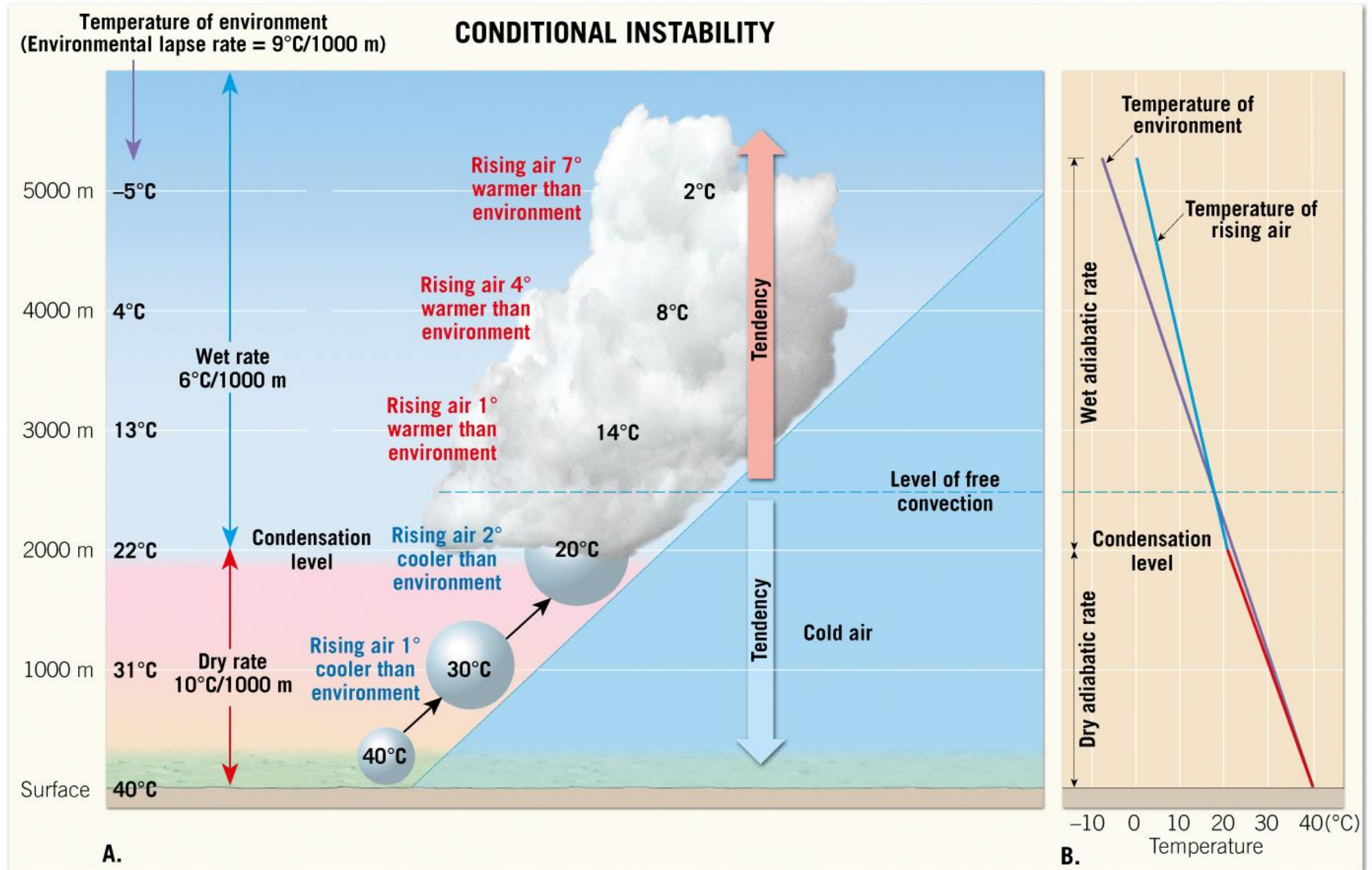
# Absolute Stability



# Absolute Instability



# Conditional Instability



## What Am I?

I'm sometimes fluffy but I'm not a bunny

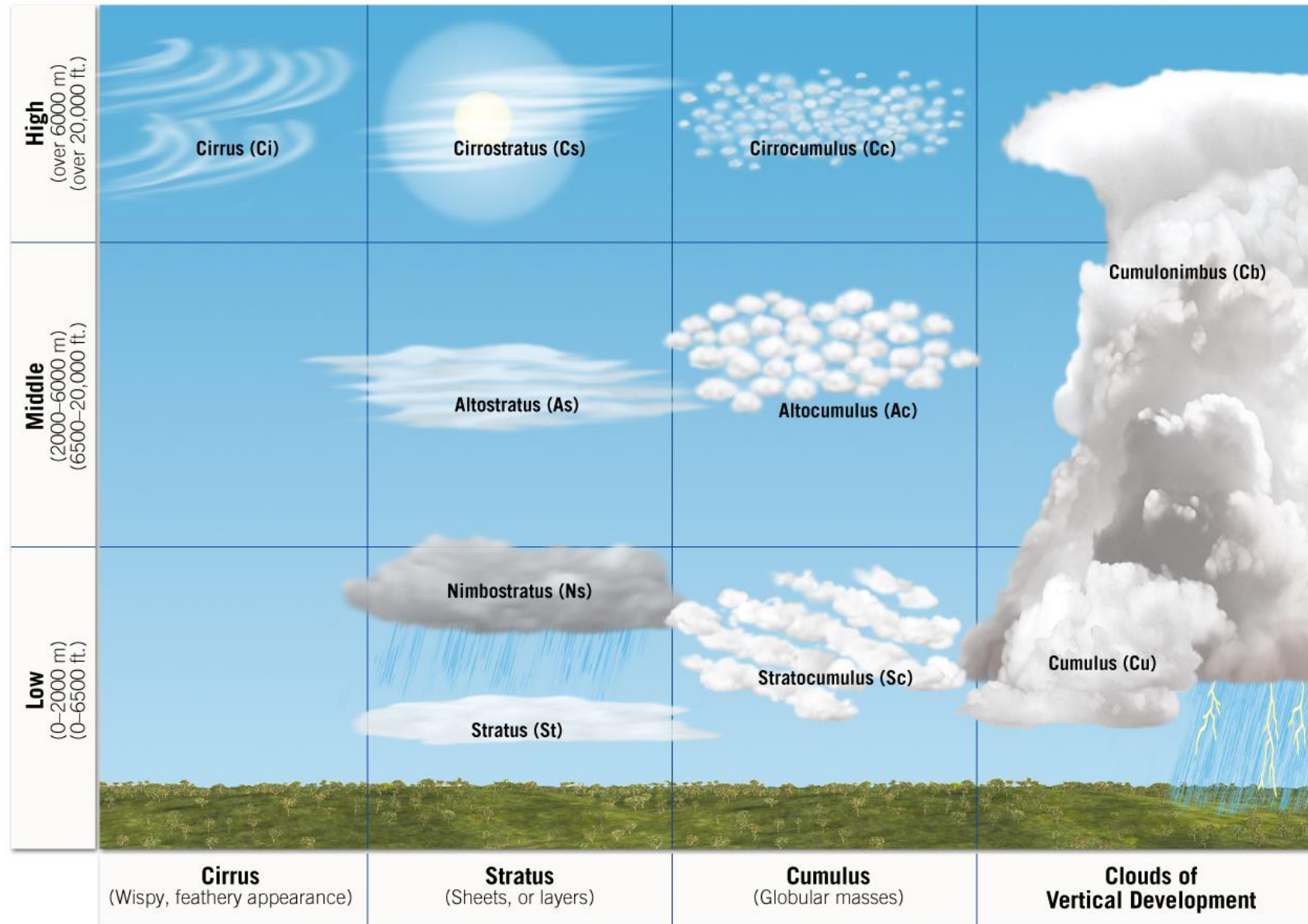
I can be a mushroom but I'm not eaten

I can drop water on you but I'm not a shower

I'm in the sky but I'm not a bird

I can cover the sun but I'm not the moon

# Cloud Classification Based on Height and Form





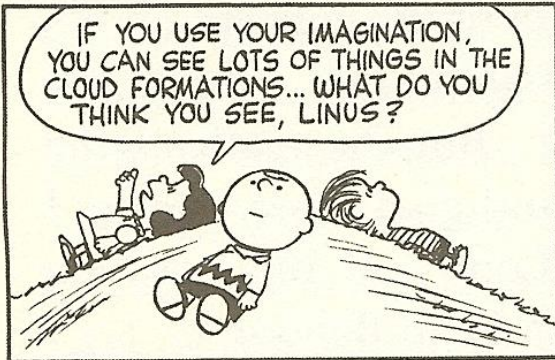
AREN'T THE CLOUDS BEAUTIFUL?  
THEY LOOK LIKE BIG BALLS OF  
COTTON...

# PEANUTS

by  
SCHULZ



I COULD JUST LIE HERE ALL DAY,  
AND WATCH THEM DRIFT BY...



IF YOU USE YOUR IMAGINATION,  
YOU CAN SEE LOTS OF THINGS IN THE  
CLOUD FORMATIONS... WHAT DO YOU  
THINK YOU SEE, LINUS?



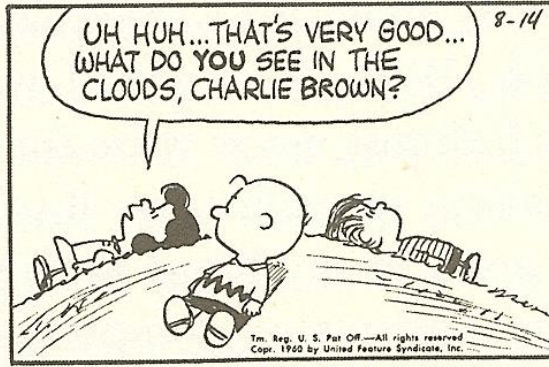
WELL, THOSE CLOUDS UP THERE  
LOOK TO ME LIKE THE MAP OF THE  
BRITISH HONDURAS ON THE CARIBBEAN..



THAT CLOUD UP THERE LOOKS A LITTLE  
LIKE THE PROFILE OF THOMAS EAKINS,  
THE FAMOUS PAINTER AND SCULPTOR...



AND THAT GROUP OF CLOUDS OVER THERE  
GIVES ME THE IMPRESSION OF THE STONING  
OF STEPHEN... I CAN SEE THE APOSTLE  
PAUL STANDING THERE TO ONE SIDE...



UH HUH... THAT'S VERY GOOD...  
WHAT DO YOU SEE IN THE  
CLOUDS, CHARLIE BROWN?

8-14



WELL, I WAS GOING TO SAY I  
SAW A DUCKY AND A HORSE,  
BUT I CHANGED MY MIND!

SCHULZ