

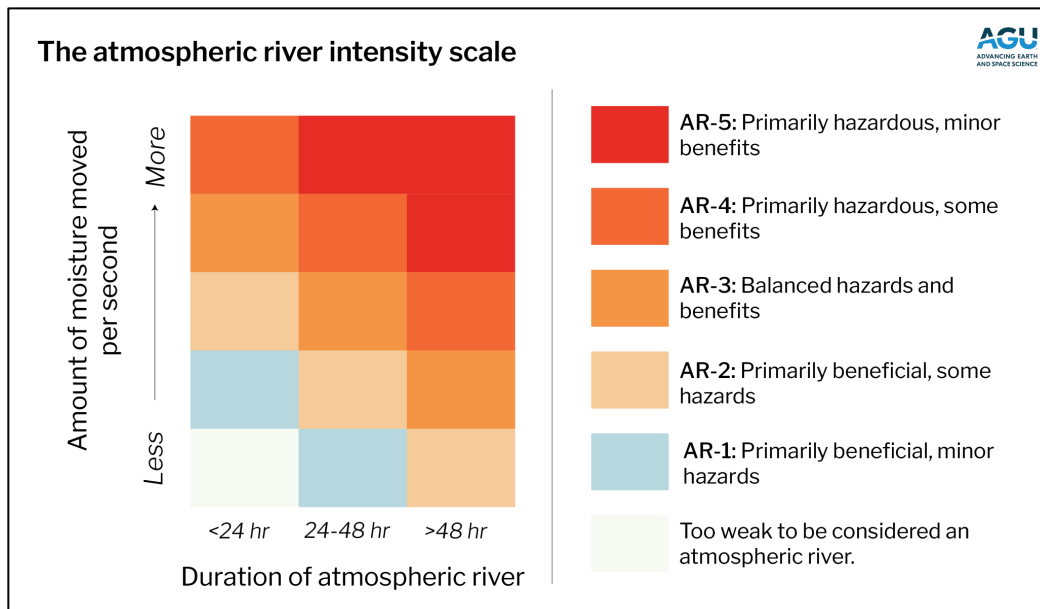
What's an Atmospheric River? Are they always bad?



<https://www.yahoo.com/lifestyle/california-break-storms-not-long-182418246.html>

We hadn't heard the term, "atmospheric river" until recently. Evidently it was first coined in 1994 to describe large swaths of water vapor moving across the mid-latitudes in narrow bands. These currents of water seem to exist globally between the latitudes of 30 and 60 degrees all over our world. Warm moist air from tropical regions are carried by intense winds to the middle latitudes where the moisture is released. These rivers are found in California, Portugal, and Pakistan.

Until recently, there hasn't been a scale to rate the impact of these atmospheric phenomena. It is hoped that this new scale will help identify for meteorologists and citizens the expected beneficial or destructive affects of the upcoming atmospheric river (AR).



1. What can you observe from this chart?
2. What information is missing from this chart?

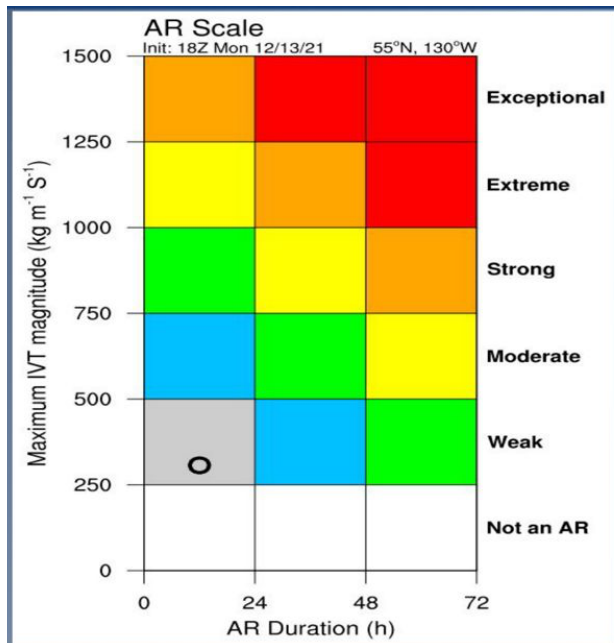
Here's another AR scale that we found.

The vertical scale is identified in this ranking as Maximum IVT magnitude ($kg\ m^{-1}\ s^{-1}$).

IVT stands for Integrated water Vapor Transport.

3. What do you think $kg\ m^{-1}\ s^{-1}$ means?

4. How could you concretely describe the power of this movement? Take a guess.
 - A Mack truck barreling down a highway?
 - A peaceful river?
 - A person running?
 - A snail crawling?
 - Something else?



Courtesy of [Scripps Institution of Oceanography at UC San Diego](https://scrippscoast.ocean.ucsd.edu/)

This chart starts recording atmospheric rivers at $250\ \frac{kg}{m/s}$. Lets figure out how fast a 35,000 pound (15,900 kg) truck would have to be going to achieve this power.

5. We think that solving the following equation might help us to understand how fast a Mack truck would have to be going to be like a similar to a recordable atmospheric river. Try to solve this equation?

$$250\ \frac{kg}{m/s} = \frac{15,900\ kg}{X\ m/s}$$

6. Once you've figured out the meters/second speed of that Mack truck, use our conversion factors to calculate the truck's speed in miles/hour.

1 kilometer = 0.62137 miles
 1 hour = 3,600 seconds
 1 kilometer = 1,000 meters

7. Describe, in words, how fast the minimum speed and weight of an atmospheric river must be to be included on this chart.

Sources: <https://www.nytimes.com/2023/01/14/climate/california-atmospheric-river-noaa.html>
<https://news.agu.org/press-release/the-worlds-atmospheric-rivers-now-have-an-intensity-ranking-like-hurricanes/>
<https://www.mathsisfun.com/physics/momentum.html>