

# Art & Science

*A presentation by Shishira*





“The finest scientists are artists”  
- Albert Einstein





# Turbulence

**"Turbulence is the most important unsolved problems of  
classical physics"**

**-Richard Feynman**

**"When I meet God, I am going to ask him two questions:  
why relativity? And why turbulence? I really believe he  
will have an answer for the first."**

**- Werner Heisenberg**

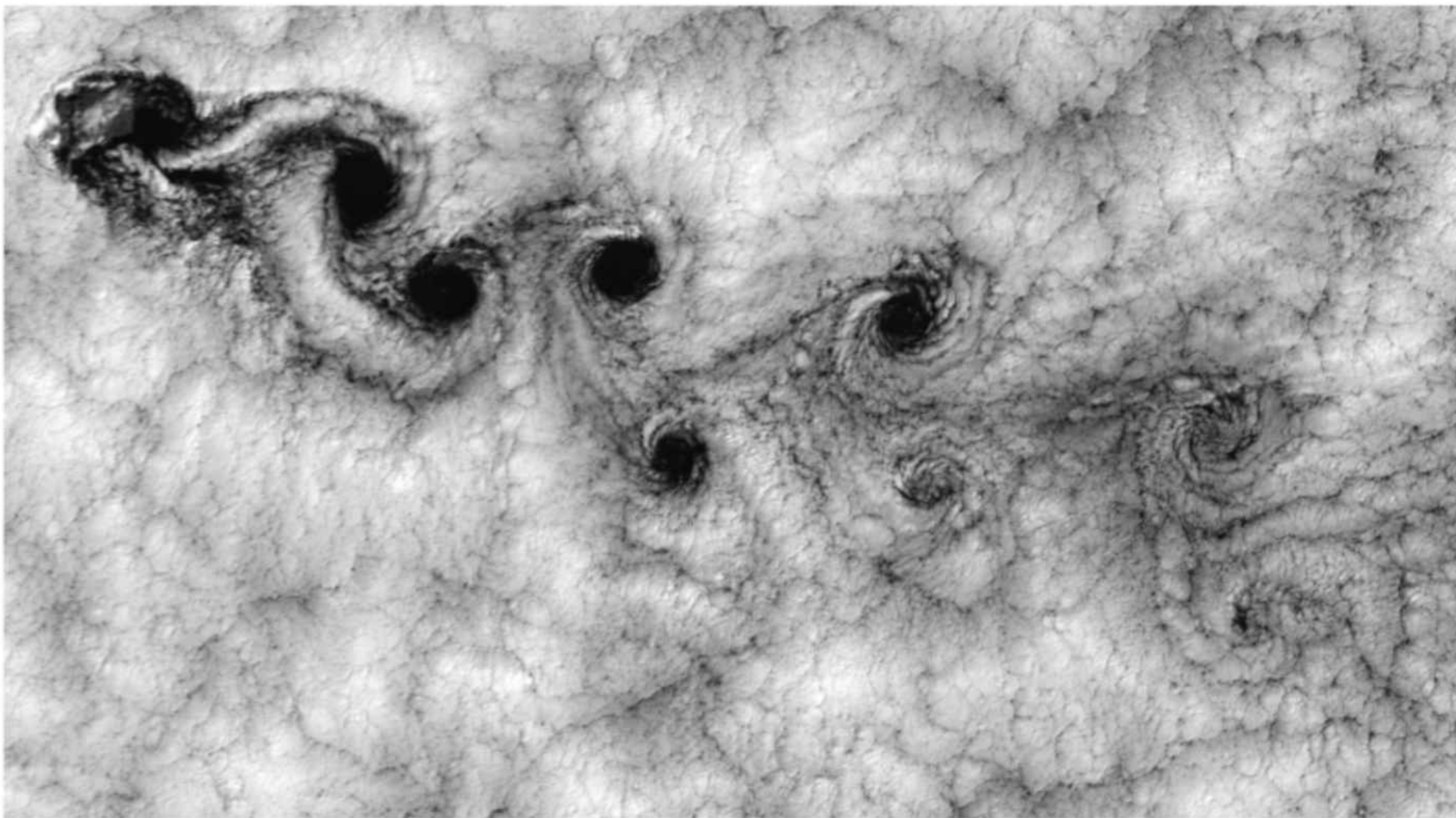




# What is TURBULENCE?!

WHAT IS FEAR?  
WHAT IS LOVE?

YOU WILL KNOW IT WHEN  
YOU SEE IT!

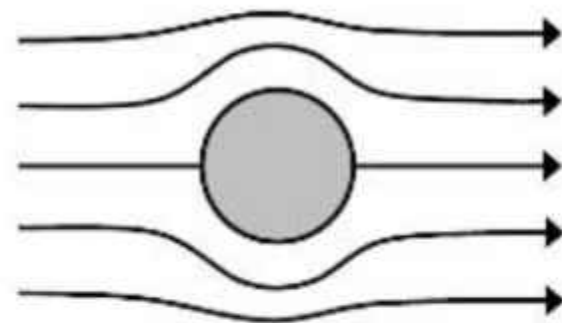


NOAA/Univ. of MD Baltimore County, Atmospheric Lidar Group

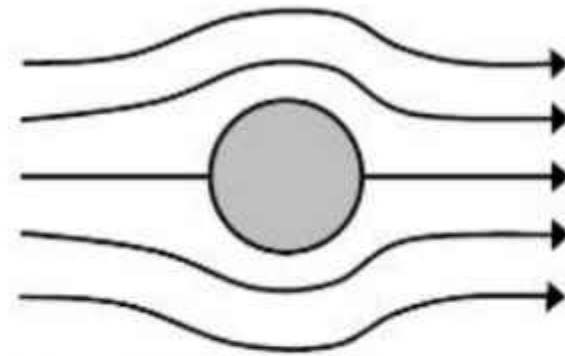
**Islands in the sky.** A vortex street in the atmosphere.



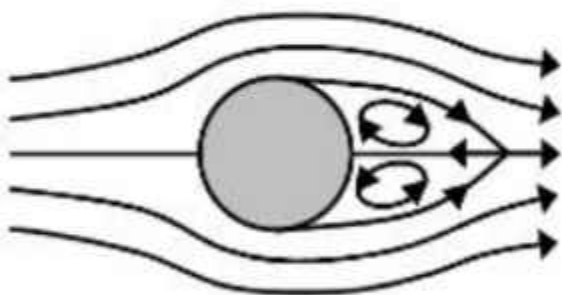
- Larger vortexes are found at lower Reynolds number.



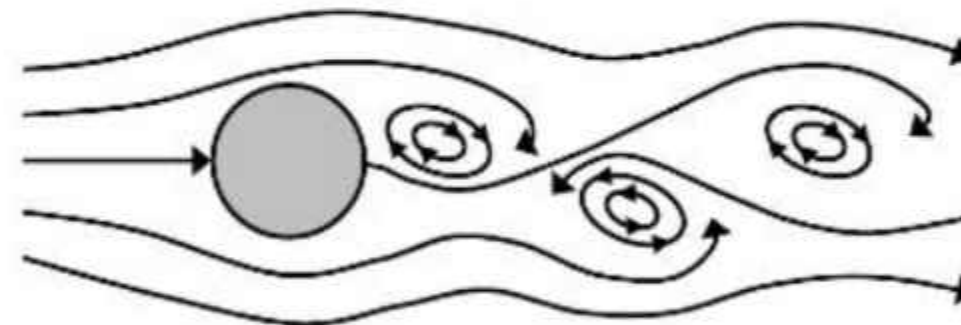
Inviscid flow:  $Re = \infty$



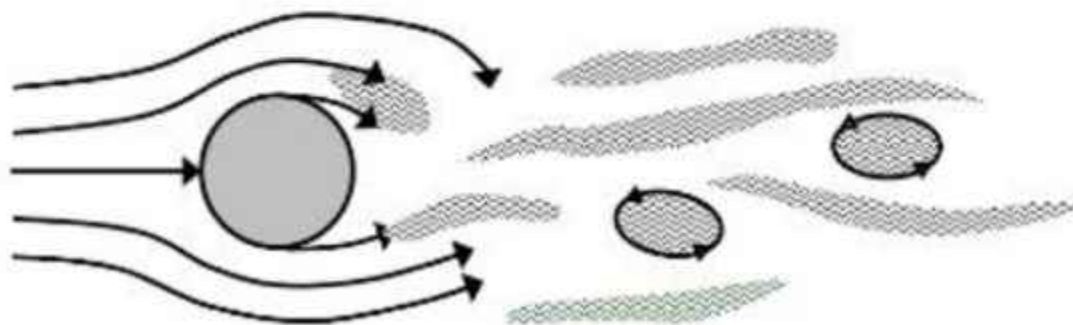
$Re \approx 0.01$



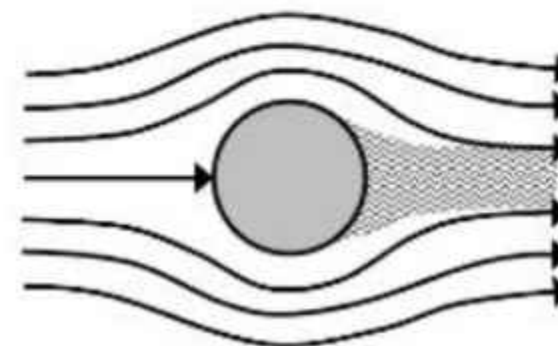
$Re \approx 20$



$Re \approx 100$



$Re \approx 10\,000$

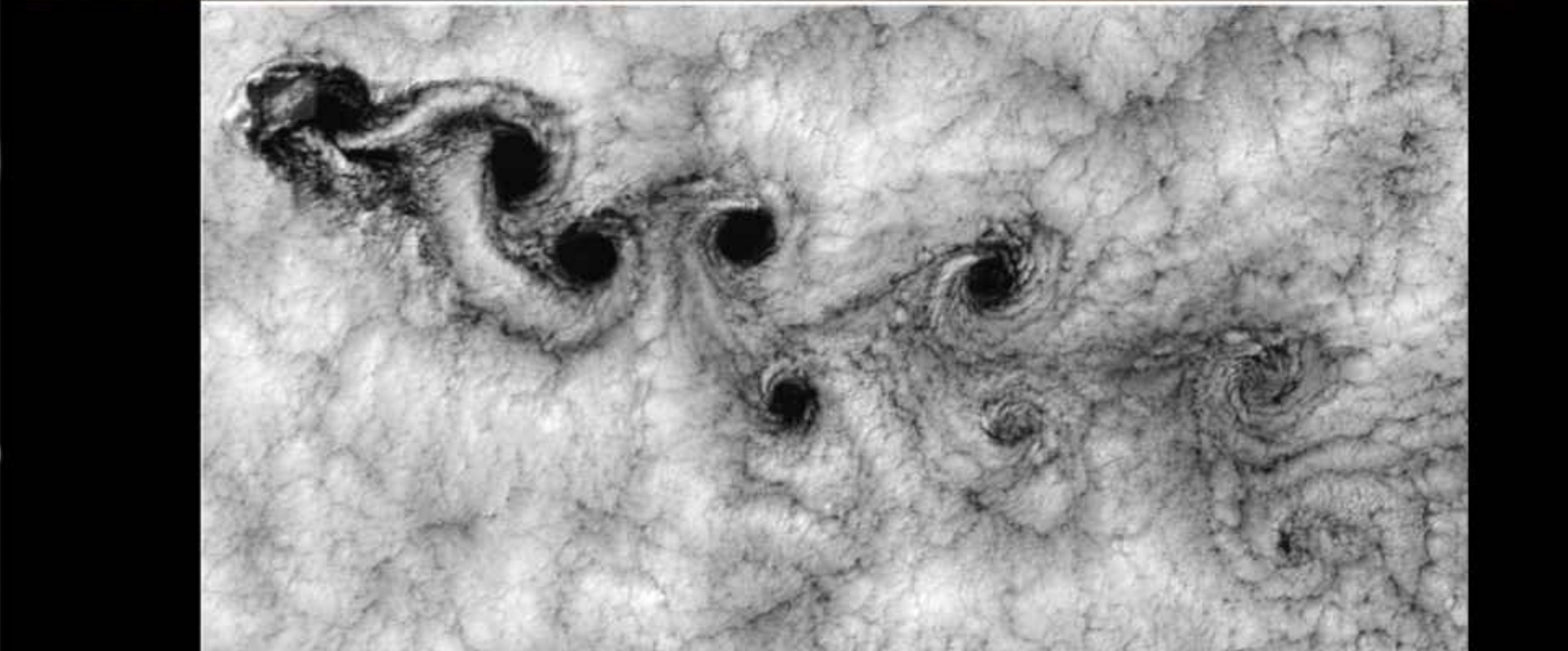
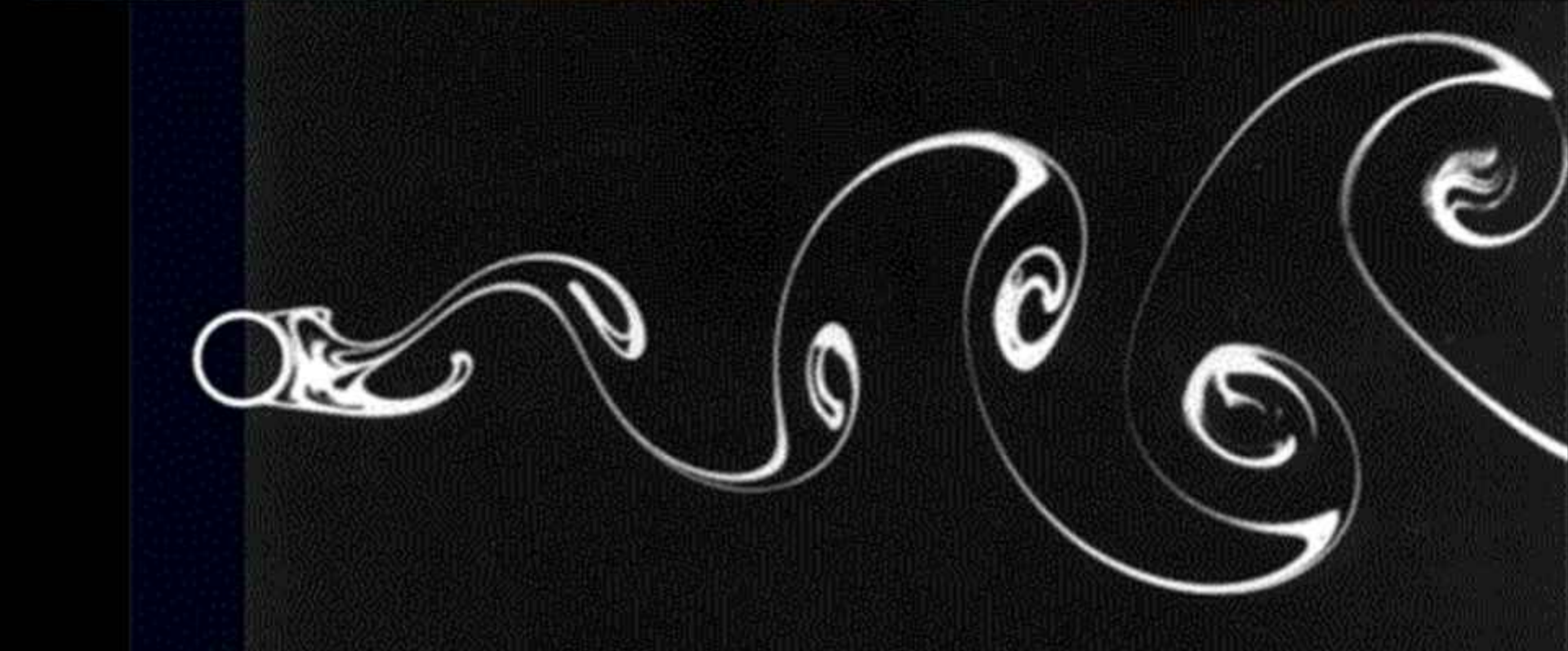
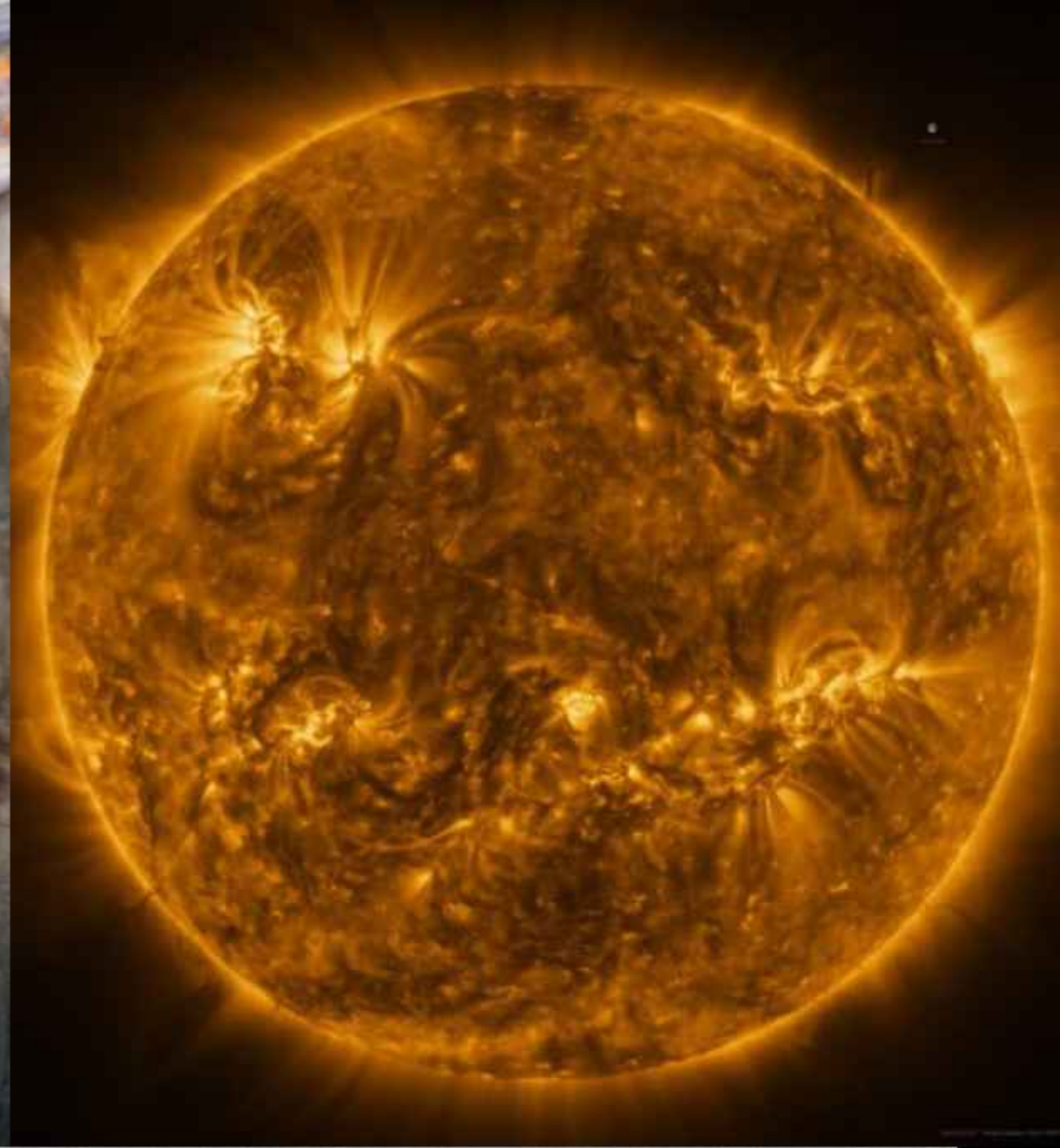
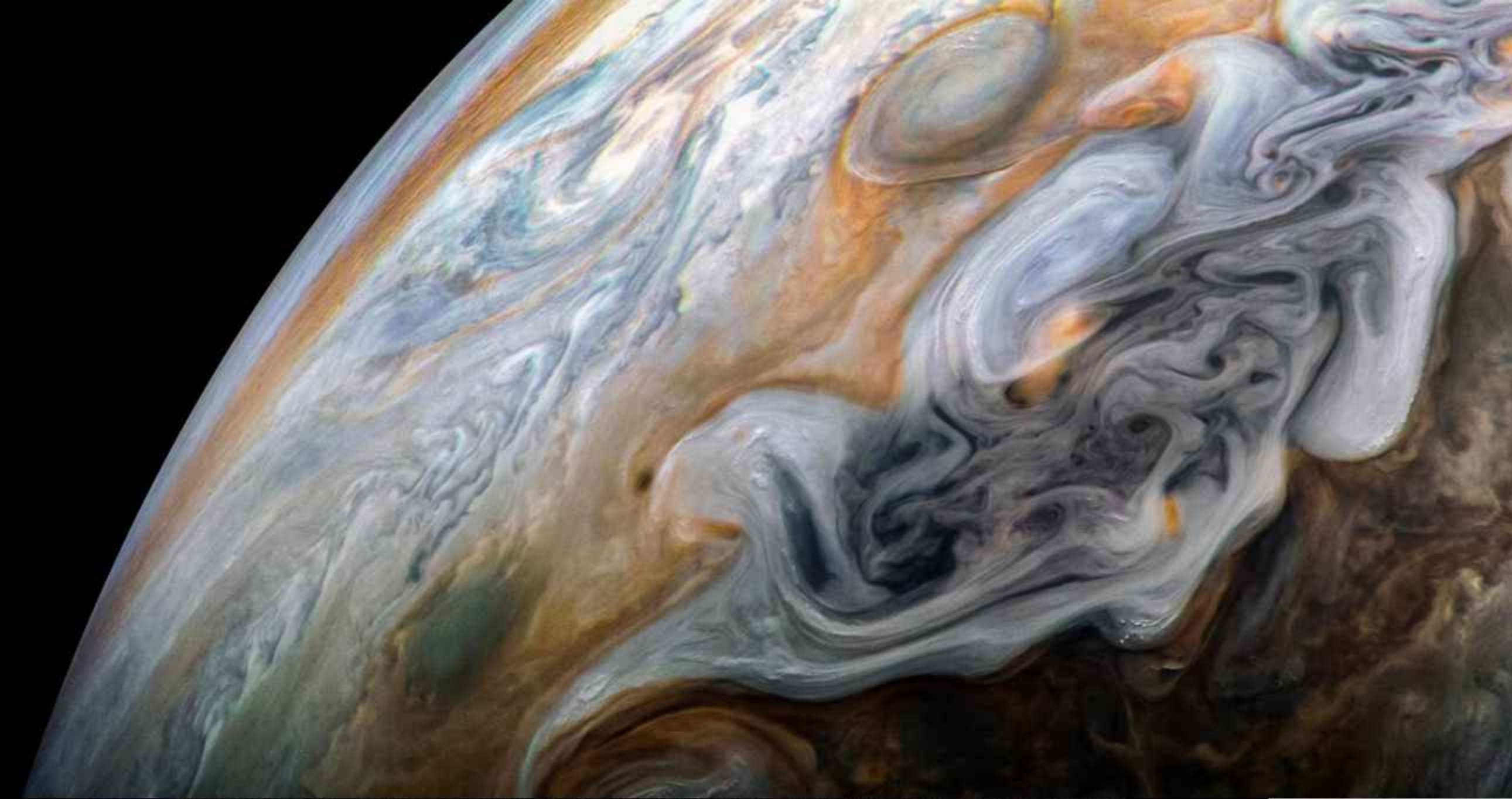


$Re \approx 10\,000\,000$

**Turbulence is chaotic, unpredictable but not random. there is an order amidst chaos and tranquility within turbulence.**

**Turbulence is ubiquitous! It is found everywhere...where there is flow of gas, liquid..lungs, arteries, water, atmosphere, planes, coffee, sun plasma solar winds, jupiter giant red spots, star formation!! Yet an unsolved mystery of century**







# Genius of Vincent Van Gogh

Starry Night is a painting he made during psychotic episode of his life from the window of his asylum room. The patterns in the painting match astonishingly accurate with the math of Kolmogorov equations of Turbulence

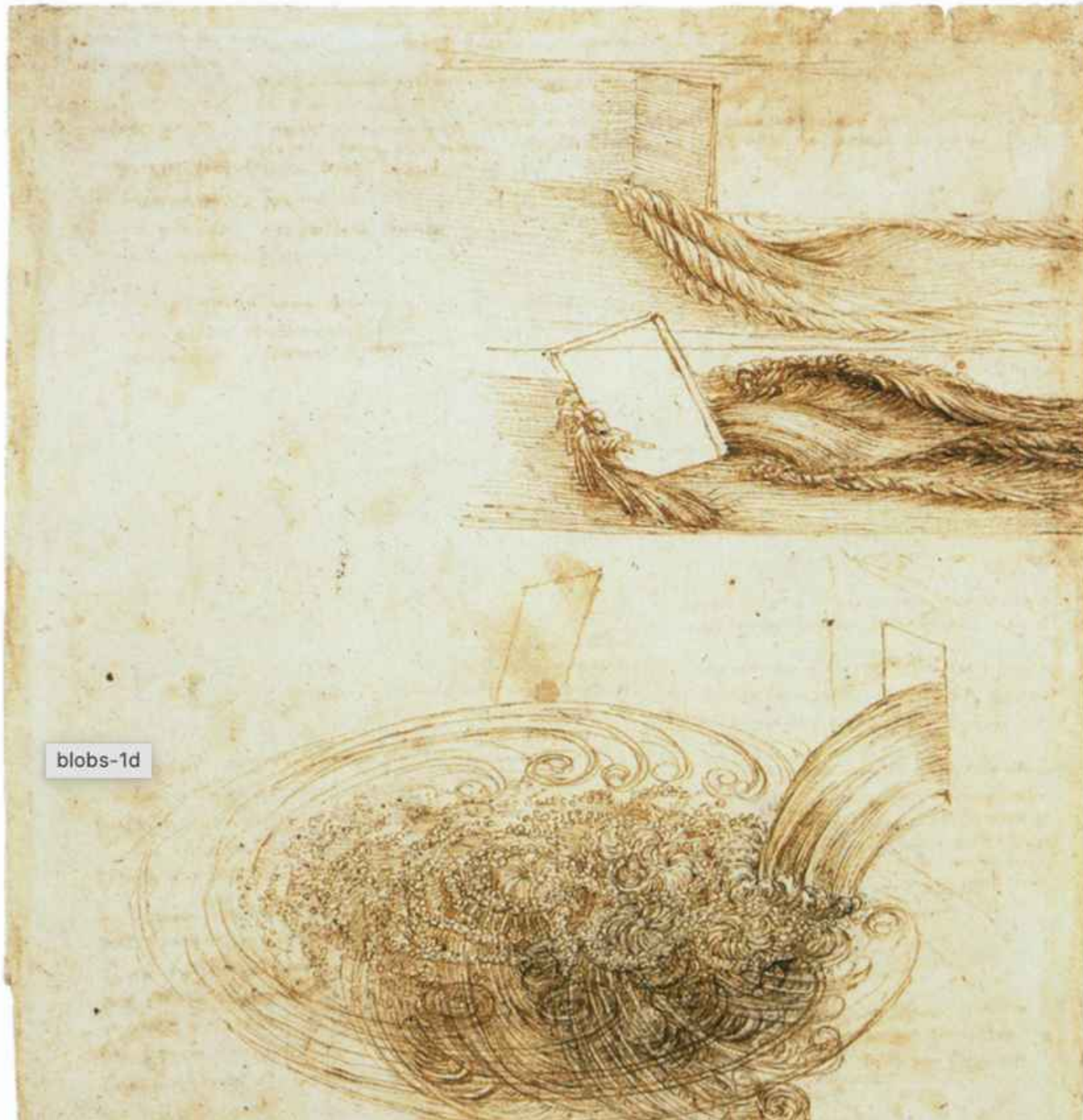


Though I am often in the depths of misery, there is still calmness, pure harmony, and music inside me.”

-Vincent van gogh



(below) Turbulence in a smoothly flowing stream of water (or air) is caused by the insertion into the stream of an obstacle. Da Vinci made many studies of such a situation and was especially interested in the effect of geometric obstacles. A completely different form of turbulence is caused by a smoothly flowing fluid stream pouring into—and colliding with—a still fluid body.



# Da Vinci Blobs



A note on spirals: When any particle with mass begins to lose energy (a particle of water or a sub-atomic particle) it enters a spiral until its energy is spent. It is more than interesting that Da Vinci hypothesized this in his drawings, as it difficult if not impossible to observe with the unaided eye.



# Just how beautiful is the mind's eye!



**Surf's up:** "The Great Wave off Kanagawa" by Hokusai is often assumed to depict a tsunami, but is more likely to be a rogue wave.  
Wikipedia

"Nature has this wonderfully rich behavior, and artists have noticed this for many years and recorded it as best they could, Now we have the science to provide more insight into what's going on."

-Dudley on Internet





Thank  
you