



Characterization of Tornadoes on the Sun

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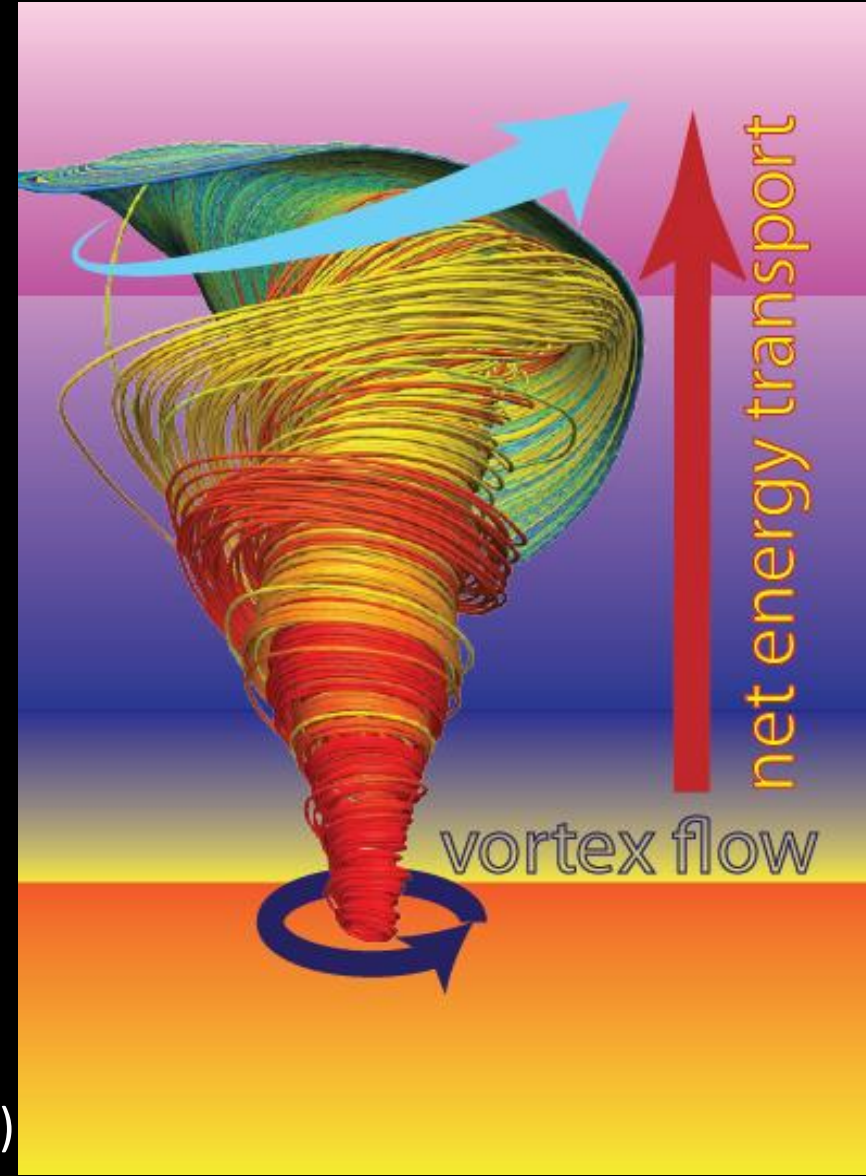
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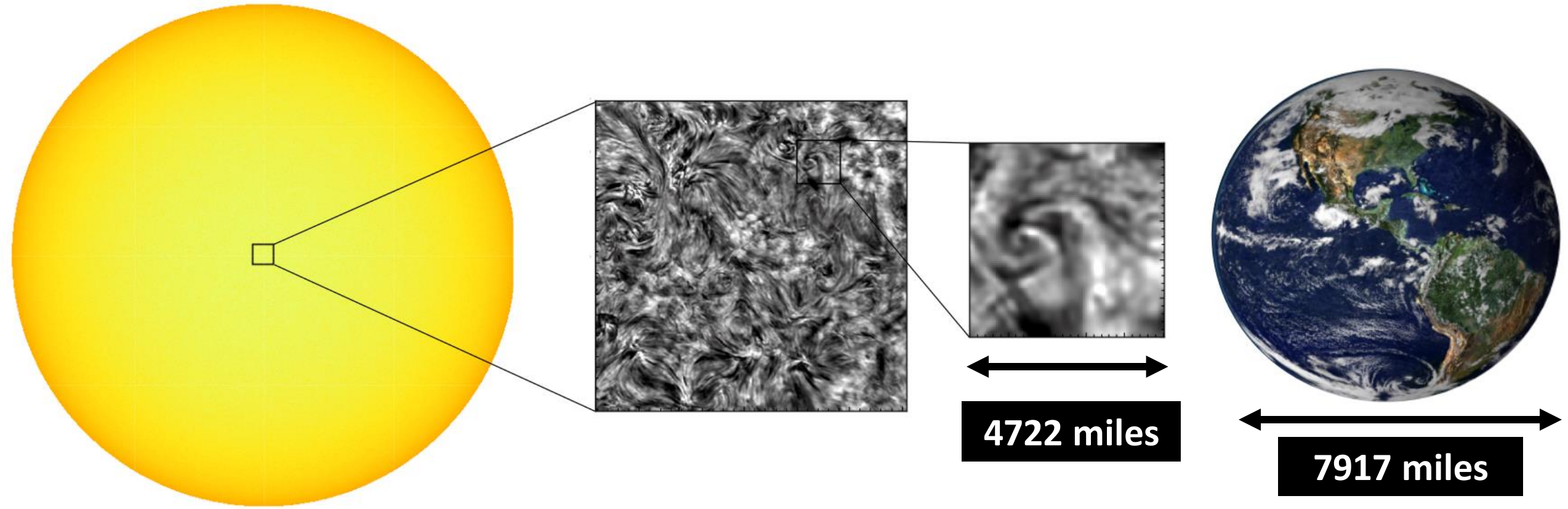
Solar Tornadoes are Rotating, Magnetic Structures that Propagate Upwards Throughout the Sun's Atmosphere

- Magnetism vs plasma
- Diameter: small city to planet sized
- Duration: minutes to hours
- Small-scale solar tornadoes:
"Chromospheric Swirls"



(Credit: EST)

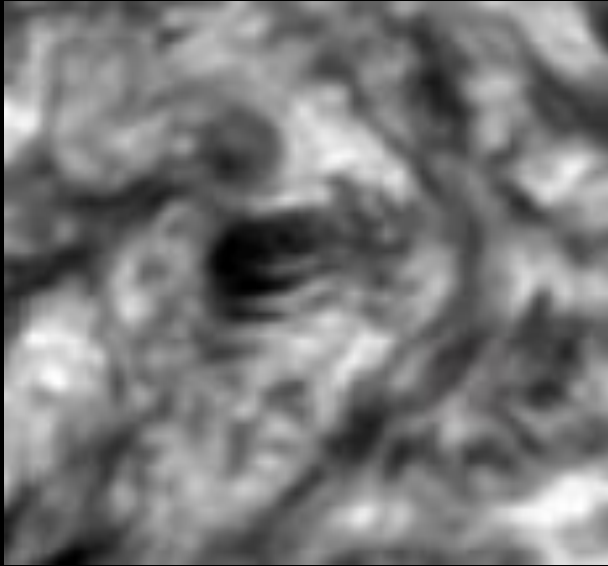
Dunn Solar Telescope Imaged 84 Solar Tornadoes



Tracked 33 solar tornadoes up to 1500 km above the Sun's surface

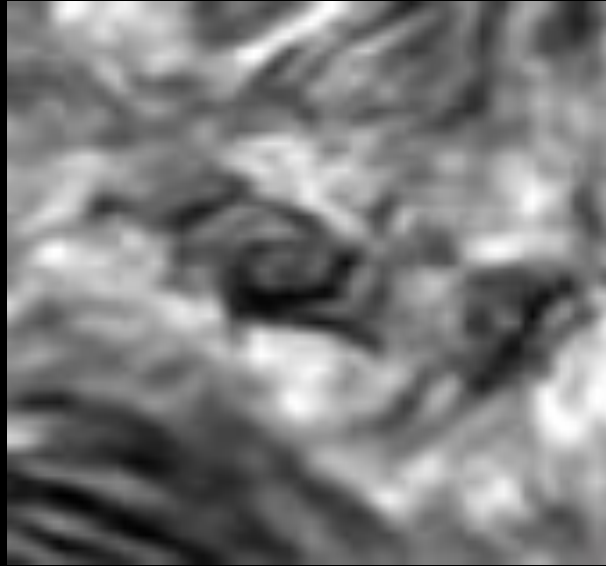
Tornadoes Come in Different Shapes and Sizes

36.4%



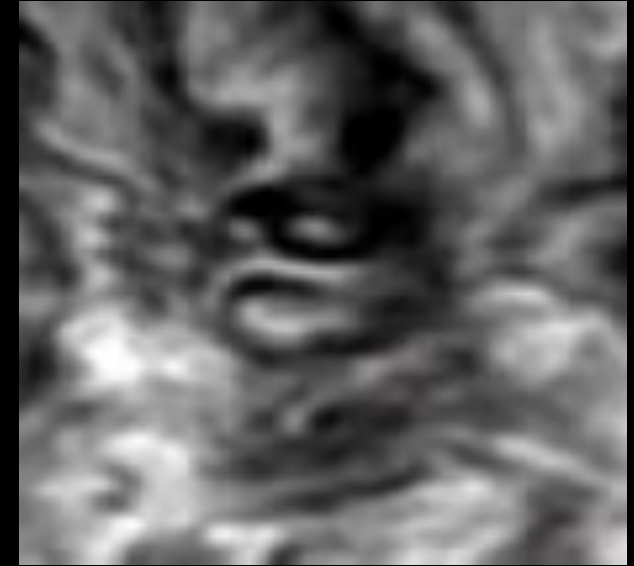
Circular

24.2%



Spiral

39.4%

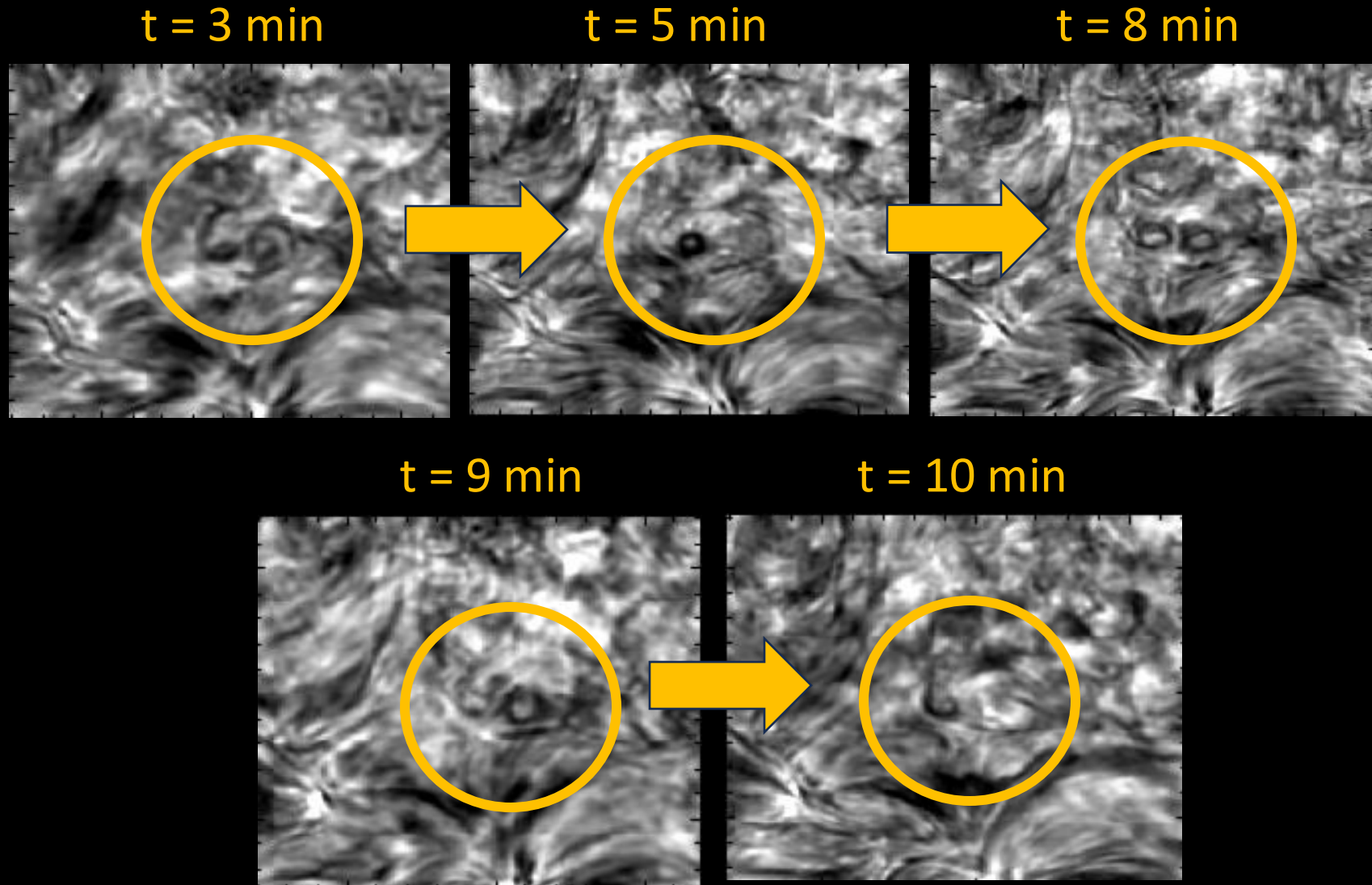


Complex


- Average Diameters: 2400 miles
- Average Lifetimes: 7.8 minutes

Solar Tornadoes Exhibit Complex Dynamics

- 15% show no magnetic footprints
- Appear and disappear
- Twin tornadoes



The Evolution and Formation of Solar Tornadoes is Still Largely Unknown

Approx. size of Earth → 

- Relatively new field (2008)
- Increasing sample size of clear examples
- Estimated 11,000 tornadoes
- Potentially trigger Coronal Mass Ejections



(Credit: NASA/SDO)

Solar Tornadoes are Complex

- Rotating, magnetic structures
- Propagate upwards throughout the Sun's atmosphere
- 84 potential candidates
- Average diameters: ~2400 miles (3.8 Mm)
- Average lifetimes: 7.8 min
- Exhibit complex dynamics

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