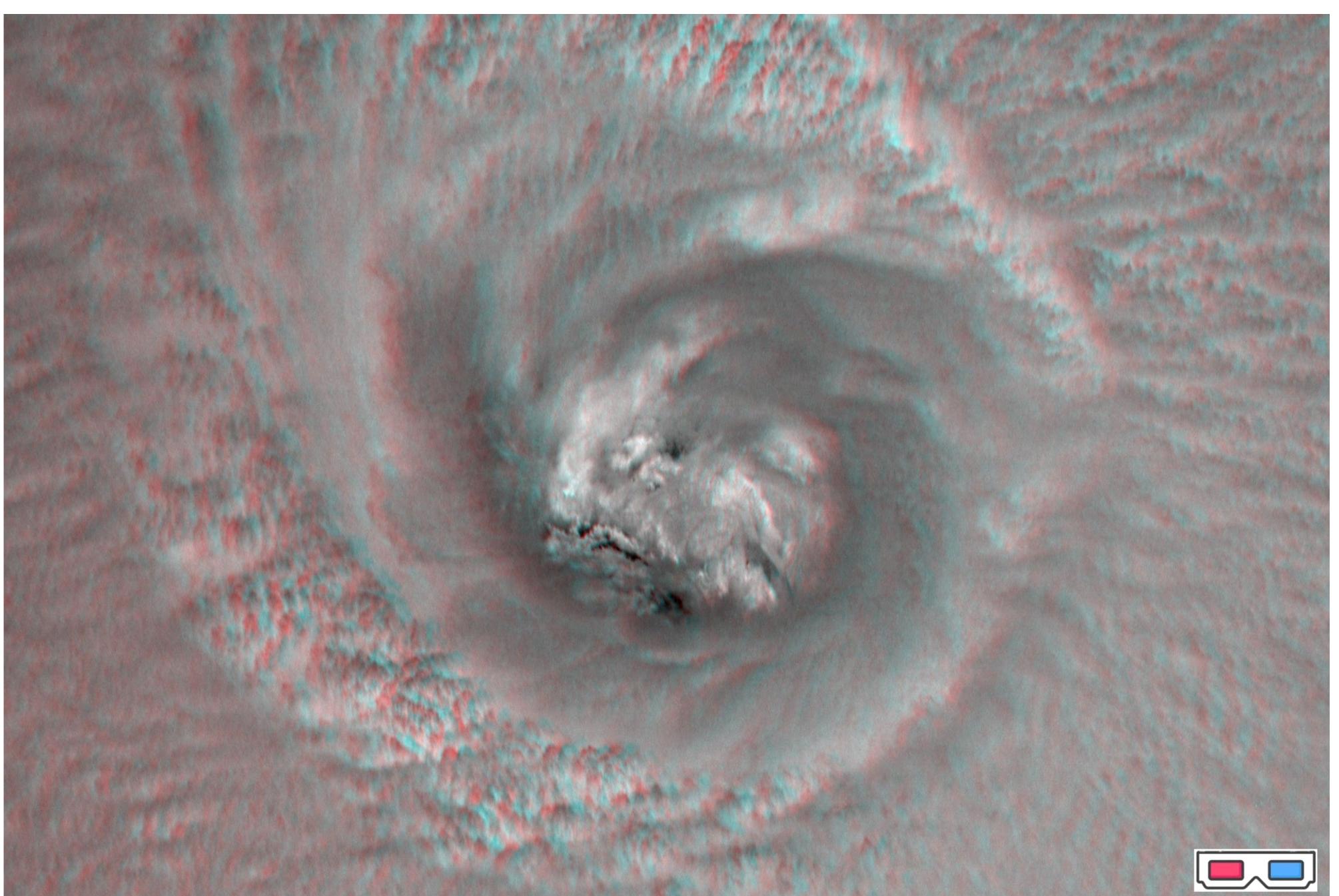


- Boston-based Tropical Weather Analytics, Inc. (TWA) and its partner, the Montreal-based Canada Weather Analytics, Inc. (CWA), are developing the Orbital Weather Warning System (OWWS)
- The Hurricane Hunter Satellites (HHSats) will be the first orbital element of OWWS and will provide data on cloud height and 3D winds using stereography
- TWA scientists have been studying precision stereo imaging of clouds and hurricanes for decades
  - Our CASIS-funded CyMISS project gathered data from ISS in 2015-19 to support development of stereo techniques needed to achieve 100-m cloud height measurement accuracy

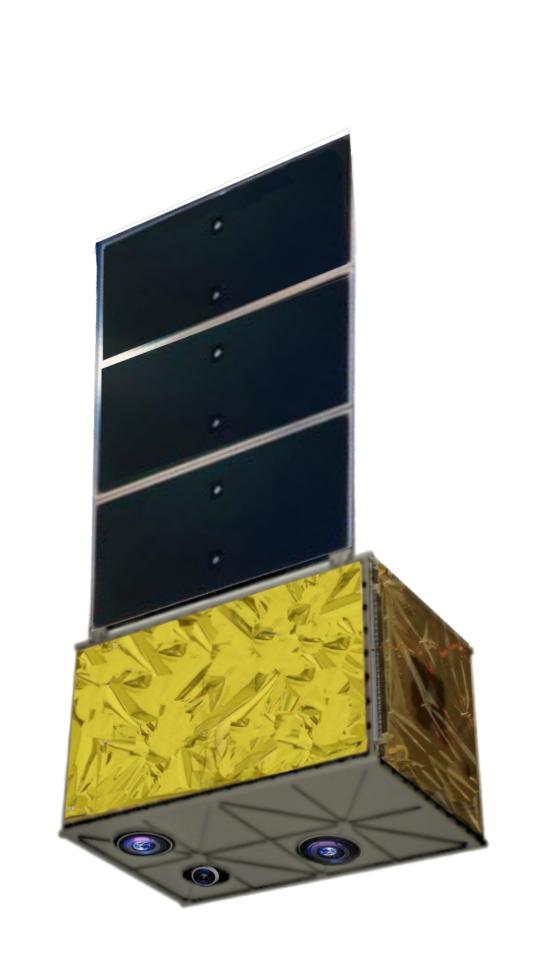


A 225x150-km 3D image of the eye of TyphoonAtsanias viewed from the ISS on August 19, 2015 taken in support of CyMISS

## Accurate Characterization of 3D Winds Using Stereographic **Observations from the Hurricane Hunter Satellites**

Andrew J. LePage, A.T. Stair, I. Schiller, J. DeVore, J. Jordano, P. Pauliukonis, D. Harkins, J. Genest, and L. Goodman

- Initial HHSat constellation to include five 12U satellite pairs in 500-km, Sun synchronous orbits with planes spaced to provide regular observations during the day
- Instrument payload carried by 1<sup>st</sup> Gen HHSats to be a set of monochromatic cameras to provide a 30°x120° FOV (daylight operation only)
  - Stereo image swath width to be ~2,000 km
- Satellites to be built, launched, and operated by expected in early 2026
- HHSat data products will include 2D & 3D image mosaics with 100-m pixel scale
  - Up to 10X better resolution than GOES Vis/NIR imagery & 4X better than JPSS Vis imagery
- Cloud height measurements with sub-km spatial footprint & as good as ~100 m altitude accuracy
  - spatial footprint
- m/s and unique *vertical* wind measurement capability
  - altitude accuracy



with scale of ~100 m/pixel along the ground track

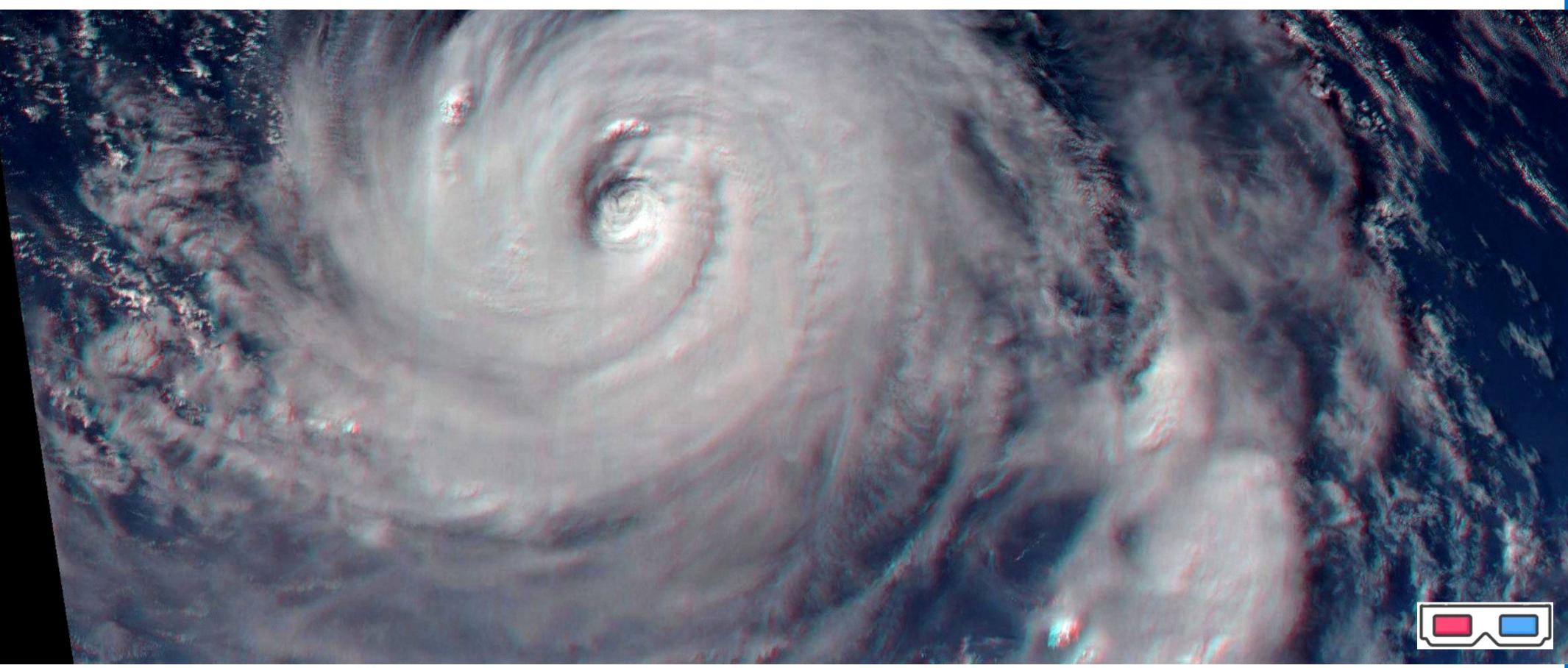
Phantom Space Corporation with launch of first pair

Altitude accuracy over 5X better than existing satellite sounding methods with over 10X finer

3D wind measurements with accuracy as good as 1

Wind speed measurements with up to ~7X better accuracy than GOES Derived Wind Motion data product with up to 40X better spatial footprint and

- - rates and totals



A 1,200x500-km 3D image of TyphoonNoru as viewed from the ISS on August 1, 2017 taken in support of CyMISS



Wide-area, high-resolution cloud height and 3D wind data from HHSats will provide vital inputs for NWP and new AI-based weather forecasting tools More accurate characterization of vertical wind sheer over wide areas

Critical data on the tropospheric component of the jet streams and polar vortex

Unique measurements of vertical component of wind to determine strength of kilometer-scale convection in severe weather systems

Better predictions of turbulence for air travel Support wildfire monitoring and forecast the propagation of their smoke plumes

More accurate predictions of cloud-free lines of sight (CFLOS) for remote sensing and laser communication Provide more accurate predictions of precipitation

Critical data for hyperlocal forecasting

Allow more accurate characterization of the 3D wind fields and heights of clouds associated with tropical cyclones (TC) and their surroundings for improved track & intensity forecasting

Using a Carnot Engine model, it will provide more accurate measurement of TC strength than existing overhead remote sensing techniques