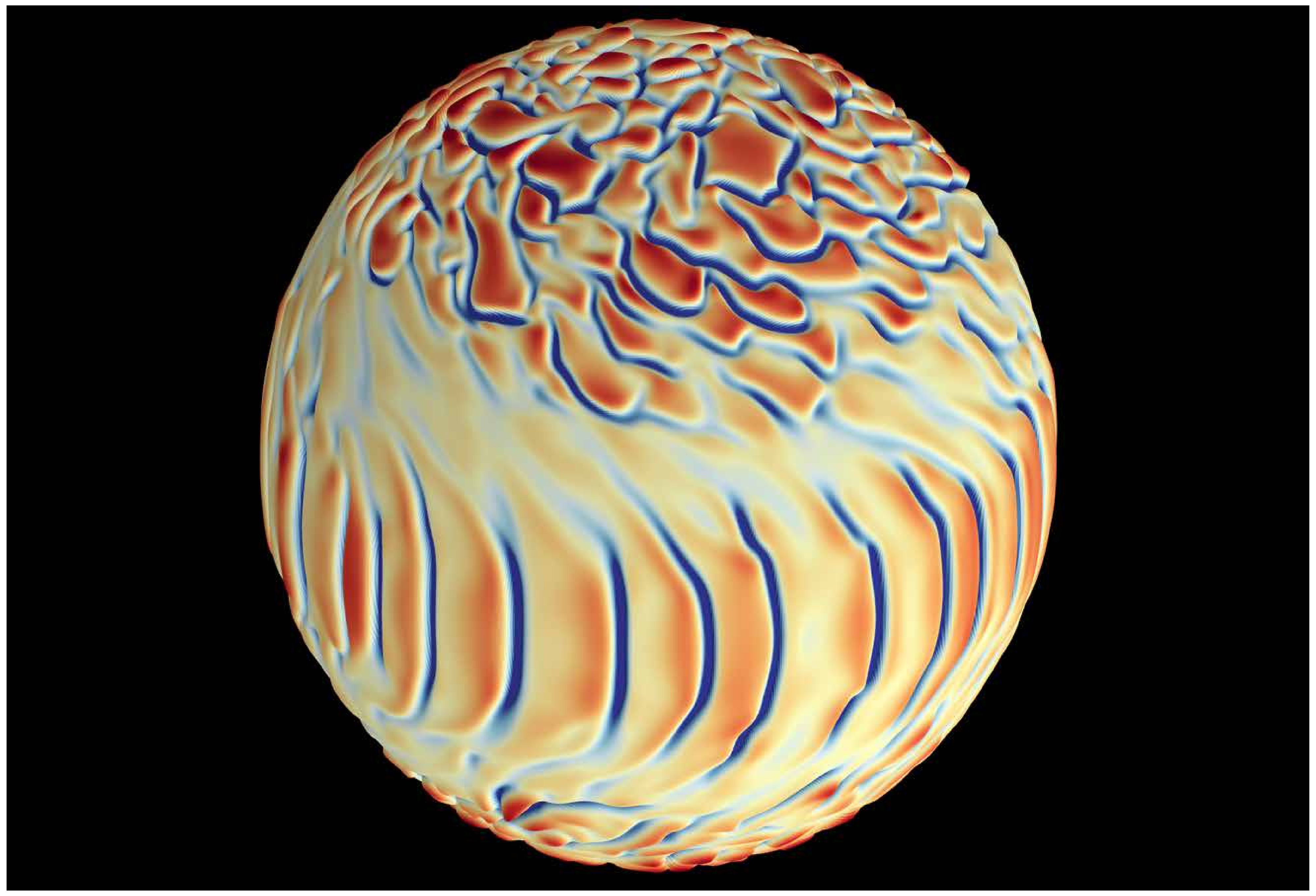
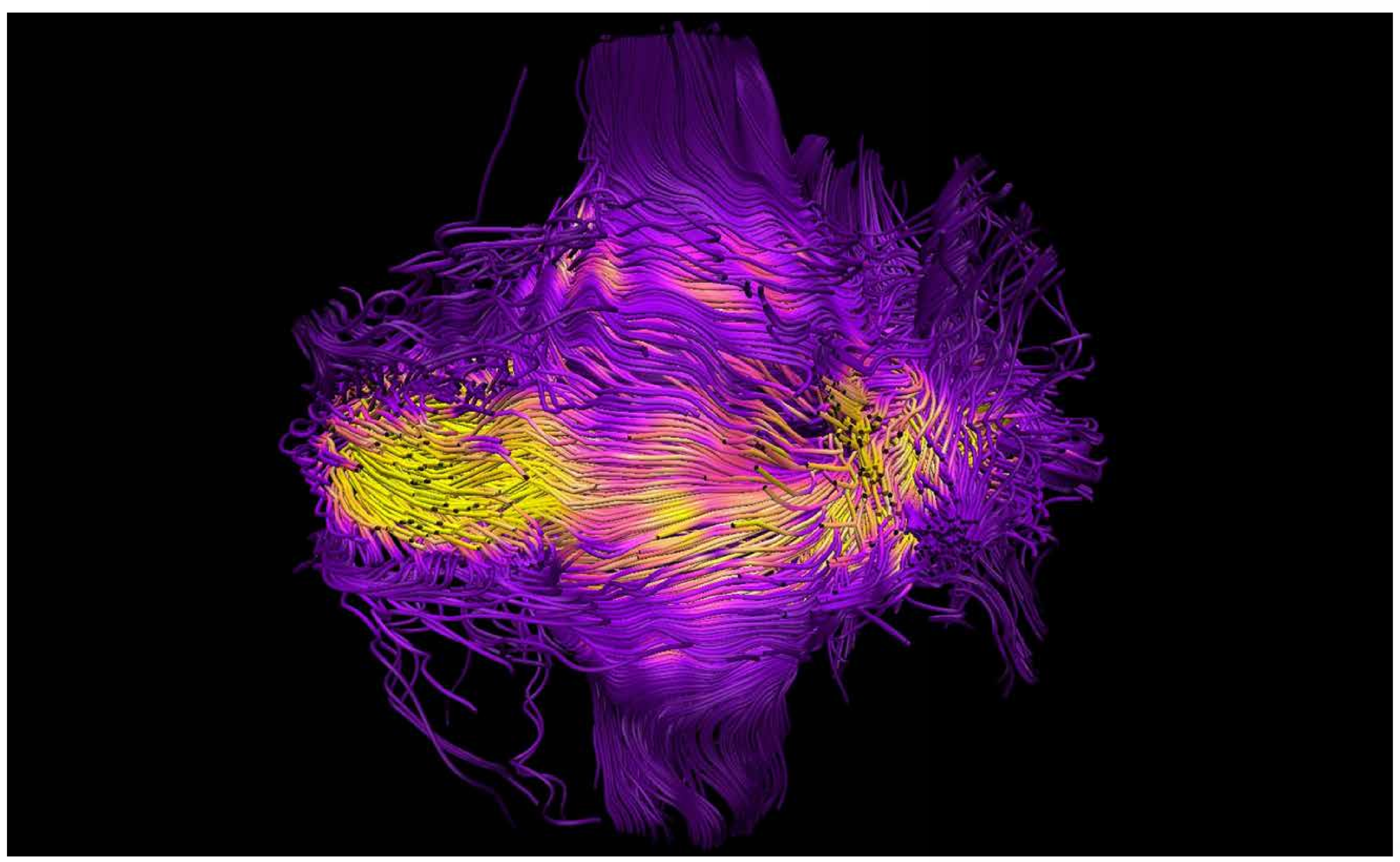


Near-surface convection achieved in one model of an M-type star, with its northern pole tipped foward to reveal structure. Red upflows are separated by blue downflows. Near the equator, the influence of the fast stellar rotation causes the convection to organize into banana-shaped cells. A band of diminished convection separates these structures from the more isotropic flows at high latitudes *Connor Bice, Juri Toomre, University of Colorado Boulder and JILA*



Magnetic fields achieved in one model of an M-type star, with a rectangular section removed to reveal the internal structure. Brighter colors denote stronger fields. A wreath of intense magnetism wraps 360 degrees around the star's equator. Fields turn radially near the poles, where they collectively extend beyond the stellar surface. *Connor Bice, Juri Toomre, University of Colorado Boulder and JILA*

National Aeronautics and
Space Administration

Exploring the Origins of Extreme Magnetism in Red Dwarf Stars

The majority of stars in the universe are red dwarfs, but not one of them is visible to the naked eye. Compared to the Sun, red dwarfs—also known as M-dwarfs—are small, cold, and very dim, but this has done little to diminish their magnetic activity. Instead, many appear to have surfaces carpeted by strong magnetic fields, and give off frequent flares that may be a thousand times more energetic than those typical of the Sun. By employing high-resolution magnetohydrodynamic simulations of these unassuming stars' interiors on NASA supercomputers, we are learning how M-dwarfs generate such intense magnetism, how that magnetism shapes their multi-billion-year evolution, and what it might mean for the exoplanets orbiting them.

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