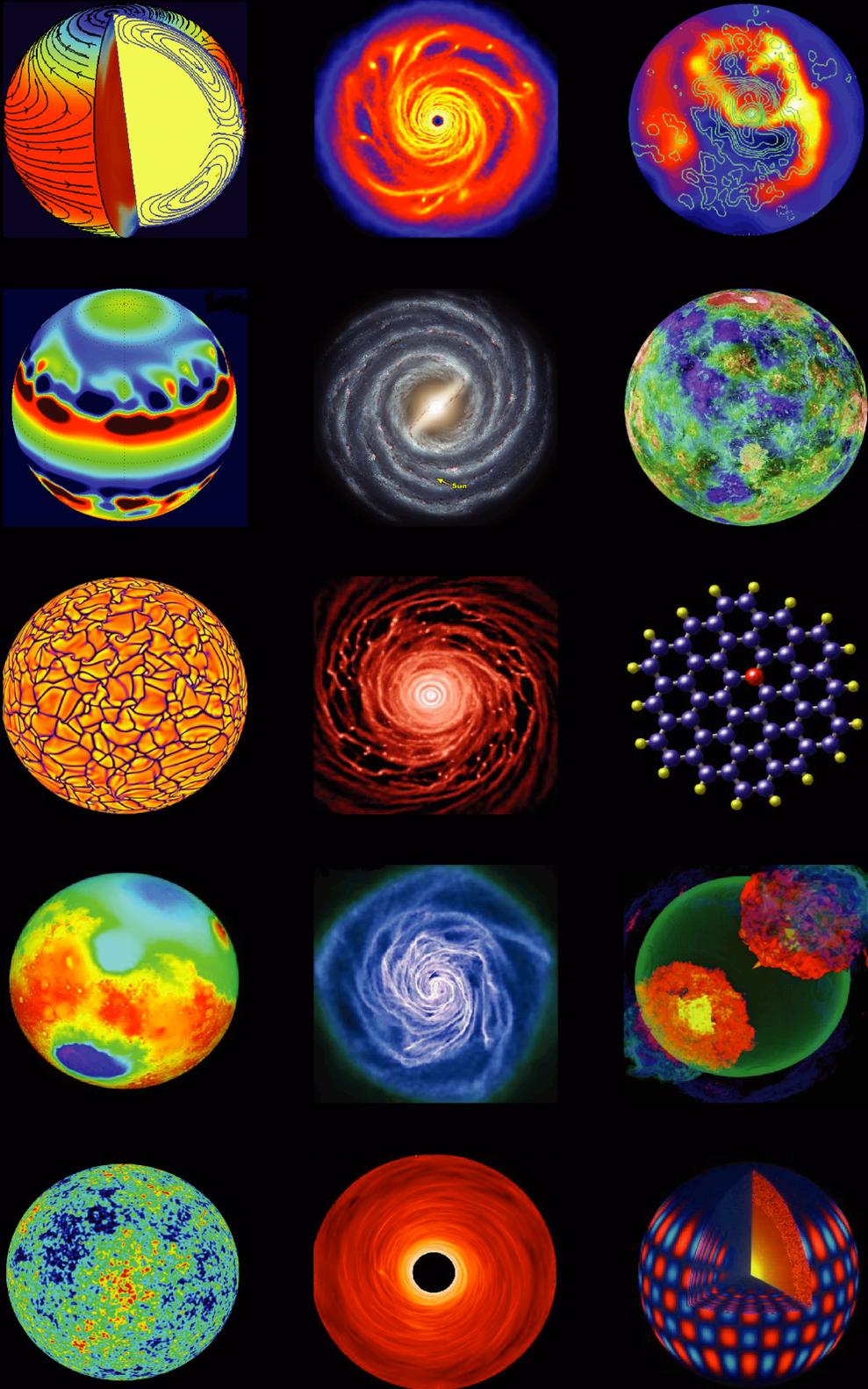
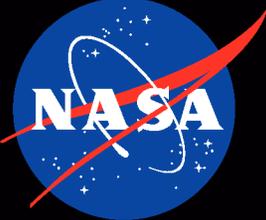


National Aeronautics and Space Administration



# mathematics

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| 2 | 7  | 12 |
| 3 | 8  | 13 |
| 4 | 9  | 14 |
| 5 | 10 | 15 |

# Mathematics: the essential language of science.

The front of the flyer show some of the many applications of mathematics in astronomy. The figures range from studies of the sun to the formation of stars and galaxies. All of these images are based on actual outputs from the mathematical modeling of the underlying physical phenomena.

- 1 - Solar convection and circulation (*Robert Stein, Michigan State University*)
- 2 -Magnetic field generation in cool stars (*Emre Isik Max Planck Institute*)
- 3 - Giant cell convection patterns on the sun (*Mark Miesch, NCAR and UCARA*)
- 4 - Mars altimetry map (*NASA/Mars Orbiter*)
- 5 - Cosmic background radiation all-sky map (*NASA/WMAP*)
- 6 -Accretion disc modeling. (*Ken Rice, U.C. Riverside*)
- 7 - *The Milky Way* (*R. Hunt, NASA/JPL/Caltech*)
- 8 - Planet formation in a clumpy accretion disk (*Phil Armitage JILU*)
- 9 - Spiral galaxy model (*Brant Robertson, U Chicago*)
- 10 -Protoplanet formation in a turbulent disc. (*Richard Nelson, Queen Mary University, London*)
- 11 -The central part of the cluster of galaxies Abell 2052, with radio emission map overlaid (*NASA/Chandra*)
- 12 - Venus surface detail seen by radar (*NASA/Magellan*)
- 13 - Model of a complex molecule showing carbon(blue) and nitrogen(red) atoms. (*Louis Allamandola, NASA/Ames*)
- 14 - Simulation of a Type Ia supernova. (*Alan Calder, SUNY*)
- 15 - Model of Solar Surface Oscillation (*SOHO/MDI*)

Without mathematics, astronomy would just be a collection of pretty pictures!

- ✓ We would not know how big anything is, or how far away.
- ✓ We would not be able to figure out how things move in space, and why.
- ✓ We would not be able to examine our measurements to look for interesting patterns.
- ✓ We would not be able to predict eclipses, the phases of the moon, the seasons, or the movement of the sun, moon, stars and planets in the sky.

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*Dr. Sten Odenwald*