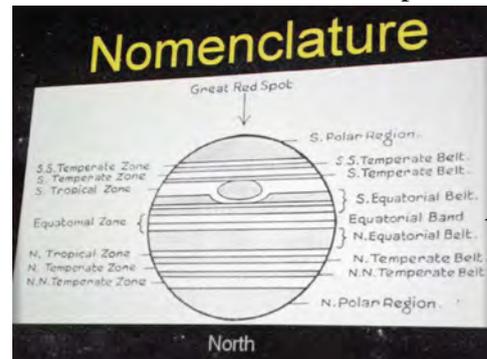


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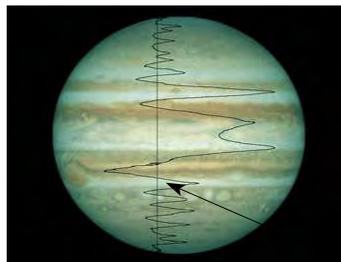
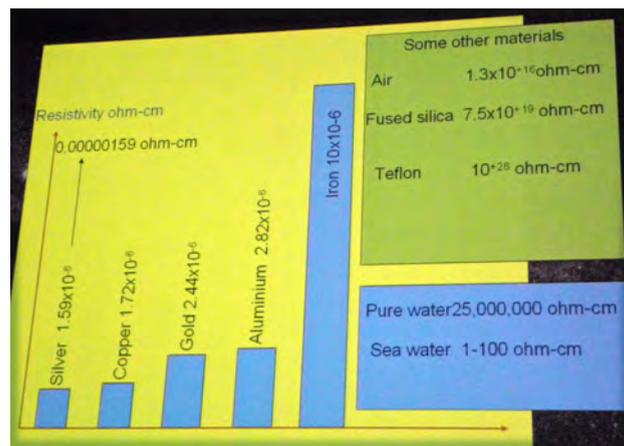
Dynamic Jupiter, with Barry Adcock, ASV President

Although astronomy is as ancient as recorded history itself, it was for the most part separated from the study of physics. In the Aristotelian world-view the celestial world tended towards perfection, perfect spheres moving in perfect circles. For 4,000 years of recorded history astronomy has been a passive subject, used for telling the time, for navigation and for fore-telling the future. Even after the technological revolution in the 17th century, when "how" in physics replaced the "why" of antiquity, dynamics the purely mechanics, study was still limited to geometrical measurements and gravitational interaction. Astrophysics, the study of physical and chemical characteristics of celestial objects and their dynamic interactions first became a university subject in 1892, when George Ellery Hale joined the University of Chicago as Professor of Astrophysics. Dynamic, from the Greek *dynamikos* or *dynamis* meaning "powerful" or "able to have power" was first used in modern language by Gottfried Leibnitz in 1691 in his publication *On Power and the Laws of Corporeal Nature*. – Jupiter rotates unusual fast ; its sidereal period is only 9hrs 55m 30s. Surface gravity is 2.528 times that of Earth



Barry is a lecturer by nature. He cleverly weaves in the right amount of technical details into his talks to challenge an audience's attention. Dynamic Jupiter is a gas giant with a mass slightly less than one-thousandth of the Sun, but two and a half times the mass of all the other planets in our Solar System combined. But what of its structure and the forces driving its varying banded displays, the stratified wind rotation, the giant whirlpool of the Red Spot and the other numerous local currents? Is it gravity? Jupiter generates twice as much heat from gravitational contraction as it receives from the Sun. Is it magnetism?

Evidence of Jupiter's powerful field can be seen in its effect on its inner moon, Io. A bit of primary physics followed on how magnetism is created with electron flow and a range of *Material Resistivity*. The peculiar



wind patterns made visible by the different colours of the atmosphere of Jupiter still defy definition. The vertical black line equals zero wind speed. The highest velocities measured exceed 150m/s ~ 550k/h. Jupiter equatorial rotation Speed = 12.6km/s. Modern telescopes and spacecraft flyby and orbital missions (Pioneer, Voyager, Cassini, Galileo) have provided stunning



pictures of the Jupiter system and widened our awareness, but we are still far from an understanding of the full forces that drive this giant planet.

Barry ended his presentation inviting questions on the subject of Jupiter.

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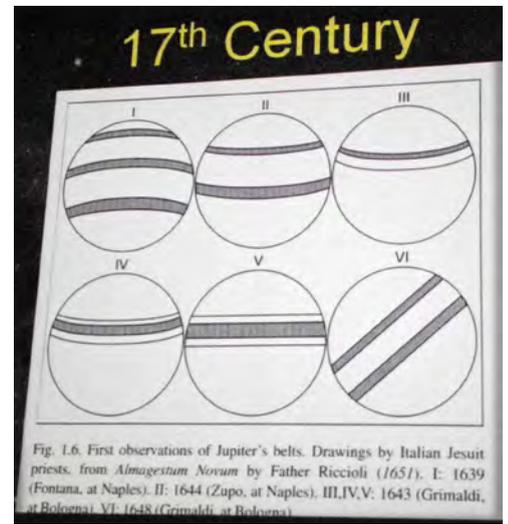
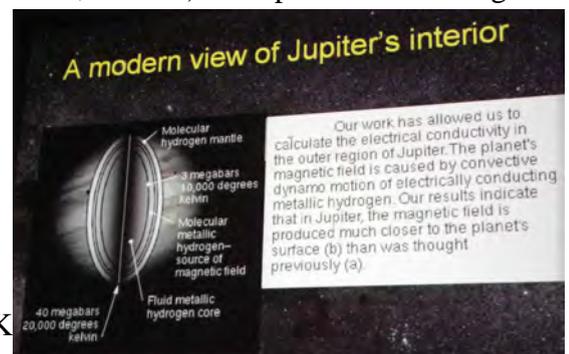
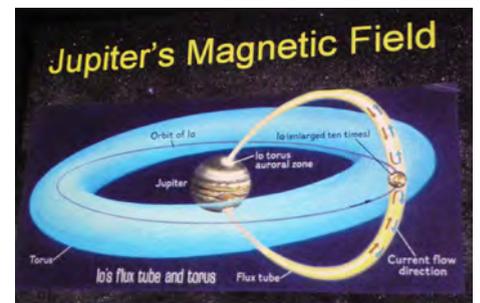
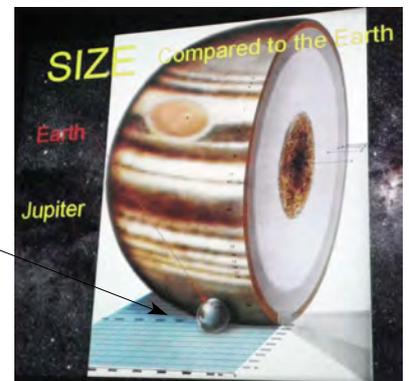


Fig. 1.6. First observations of Jupiter's belts. Drawings by Italian Jesuit priests, from *Almagestum Novum* by Father Riccioli (1651). I: 1639 (Fontana, at Naples). II: 1644 (Zupo, at Naples). III,IV,V: 1643 (Grimaldi, at Bologna). VI: 1648 (Grimaldi, at Bologna).



Our work has allowed us to calculate the electrical conductivity in the outer region of Jupiter. The planet's magnetic field is caused by convective dynamo motion of electrically conducting metallic hydrogen. Our results indicate that in Jupiter, the magnetic field is produced much closer to the planet's surface (b) than was thought previously (a).