

Chapter 7

Teaching Aids and Resources

Astronomy lectures benefit from the availability of many beautiful and interesting slides, and the first paper discusses how these are made more valuable by providing background information to teachers. Several papers then discuss innovative demonstrations. One set for elementary-school students uses, memorably, the students themselves as participants. Another uses special materials to show concretely how the seasons result from the tilt of the Earth's axis, a concept that a paper in Chapter 9 shows is widely misunderstood. Finally, we read of a valuable book to aid observing the sky, and about an International Astronomical Union project that provides lists of useful astronomy educational material.

INFORMATIVE SLIDE SETS IN ASTRONOMY

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In astronomy, perhaps more than any other science, the cliché is true: A picture *can* be worth a thousand words. Unfortunately, with the illustrations in some astronomical textbooks, a picture can sometimes *require* a thousand words. And for beginning or inexperienced instructors, the worst thing can be that a picture may *deserve* a thousand words, but the instructor has only 50 words at his or her disposal.

Even for experienced instructors, unless the image happens to be in one's own area of expertise, it can sometimes be difficult to appreciate or convey the full significance of a modern deep-sky photo, radiograph, or satellite multicolor composite image.

In most cases, the image suppliers are of little help. Most audio-visual companies or astronomers will provide no more than a few words or at most a brief paragraph of caption materials. Yet, when we hear a colleague give a wonderful lecture with slides, using just a few key images to weave a marvelous story of discovery, we see that slides can be wonderful educational aids, even though we ourselves may not know or remember enough about each slide to put them to such effective use.

At the Astronomical Society of the Pacific, we have been working for the last ten years to change this situation for astronomy instructors. (This work has been supported in part by the A.S.P.'s Bart J. Bok Memorial Fund, designed to underwrite some of our Society's programs in astronomy education. Those of you who knew Bart Bok will remember how much he loved showing and explaining good images in his lectures.)

We have been producing a wide variety of astronomical slide sets assembled by noted experts in each area of astronomy or by the A.S.P. staff in consultation with such experts. Each set contains 6 to 50 excellent images, plus a booklet up to 40 pages in length, with detailed captions, background information, a thorough reading list, and, in some cases, classroom activities and projects.

The slides are carefully reproduced from early generation masters whenever possible, and the cost of the sets is below the price of commercial slide sets.

Among the sets currently offered by our nonprofit Society are:

1. *Telescopes of the World*: Assembled with the assistance of observatory staff members around the world, this set of 50 slides shows some of the most important astronomical instruments on Earth and in space. It comes with a 32-page book featuring a detailed introduction to telescopes and descriptions of each specific instrument. It can be used by a middle-school general-science teacher, a high-school physics teacher, or an astronomer teaching a university course.
2. *Astronomers of the Past*: These 50 portraits of noted astronomers were selected by the A.S.P. History Committee — chaired by Donald Osterbrock (Lick Observatory) — and range over time from Copernicus to Rudolph Minkowski. The set includes a 24-page book of capsule biographies and a thorough introductory reading list about the history of astronomy.
3. *The Radio Universe*: This set features 50 radiographs constructed from data gathered with the VLA, including the sun, planets, supernova remnants, planetary nebulae, the galactic center, active galaxies, and quasars. It is accompanied by a 24-page booklet written by Gerrit Verschuur, with a clear introduction to radio astronomy, detailed captions, and a bibliography. It won an award for “one of the outstanding non-print materials of the year” from *Choice*, the magazine of the Association of College and Research Libraries.
4. *Worlds In Comparison*: In these 20 “visual analogy” slides, NASA's Stephen Meszaros compares the sizes of objects and features in the Solar System. For example, Earth is seen projected to scale near Jupiter's Red Spot; radar maps of Earth, Mars, and Venus are compared; and a map of the U.S. is drawn to scale on a detailed photo mosaic of Valles Marineris on Mars. A 20-page book includes captions, classroom activities, a solar system reading list, and a table of the characteristics of all known planets and satellites.

Other slide sets available from the A.S.P. include:

1. *The Moon Kit* (18 slides)
2. *Mars Kit* (6 slides)
3. *Venus Kit* (6 slides)
4. *The Solar System Close-Up* (2 sets of 50 slides, 1 set of 30 slides, with captions by David Morrison)
5. *Voyager at Uranus* (15 slides)
6. *Halley's Comet Revealed* (17 slides, with a booklet by John C. Brandt)
7. *Splendors of the Universe* (15 slides with captions and background information by David Malin; shows color views of Southern Hemisphere objects)
8. *The Sky at Many Wavelengths* (11 slides, with an extensive booklet by Christine Jones and William Forman)
9. *The Infrared Universe: An IRAS Gallery* (25 slides with captions and background information by Charles Beichman)
10. *The Search for Extraterrestrial Intelligence* (20 slides with captions and a basic introduction by Frank Drake)
11. *Portraits of the Solar System* (20 slides of paintings by William Hartmann)
12. *Supernova 1987A* (6 slides)
13. *Science from the Space Shuttle* (30 slides with captions by Michael Lampton)

We welcome suggestions for other sets we should do and also offers to put together a set for us on a subject of special interest to you.

For a complete catalog of A.S.P. slide sets, please write to: Catalog Requests Dept., Astronomical Society of the Pacific, 390 Ashton Ave., San Francisco, CA 94112, U.S.A.

DYNAMIC HUMAN (ASTRONOMICAL) MODELS

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Many educators have found that models can add a lot to the understanding of astronomical concepts. Attractive commercial models of the solar system and celestial globes are readily available. Many models can be constructed of common materials — I found in my doctoral dissertation work that models made and ma-