of these, Beta Regio, is the young and very active region near which Venera 9 and 10 landed. On the whole the equatorial belt of highlands on Venus (Aphrodite Terra, Beta Regio, and so on) appears to be associated with the tectonics of the hot spots; no wonder, then, that the Venera craft which landed in the equatorial zone encountered volcanic basalt underneath.

We have touched on just a very few of the matters discussed in the book. More than half of it is devoted to studies of the Venus atmosphere — altogether unlike the earth's but casting new light on certain problems in geophysics. Much information is also included on the ionosphere of Venus and on the interaction between the planet and the solar-wind plasma. It would be hard even to list all the topics treated in this voluminous compilation. By perusing the book you will learn about the dust cloud that Venera 10 discovered near the planet, and about the huge thunderstoms in the Venus atmosphere, places where lightning strikes far more often than on the earth.

The book is now in the Shternberg Astronomical Institute library.

Translated by R. B. Rodman

Reports on Astronomy*

Reviewed by V. G. Surdin

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Once every three years, on the eve of the IAU General Assembly, a publication such as this one comes out, reviewing the advances made in every branch of astronomy. The volume at hand was compiled for the 18th General Assembly, which convened in August 1982 at Patras, Greece. Each of its chapters was prepared by the President of the corresponding Commission.

Three years, one would think, is just a short span for a science so ancient as astronomy. But even by its very bulk, this book, written in a notably telegraphic style, testifies to how much work has been done in the interim. Not all the research, of course, is of equal merit. Of outstanding interest are the instruments which have been built and the ideas and results that have been obtained for the first time. And in these three years there were quite a few. Let us single out some examples.

On Mt. Hopkins in southern Arizona the first large multiple-mirror telescope (6 × 1.8 m) has been created; its combined aperture is equivalent to a 4.4-m diameter mirror. The Soviet 6-m telescope has received a new and better-quality mirror made of Sitall. It is planned to use the old mirror for a stationary polar telescope designed for studying the 36' polar cap of the sky to the greatest possible depth. During the three years several new 3.5-4 m telescopes were built at observatories around the world. But the future plans of telescope builders strike one as almost pure fantasy: Soviet engineers are busy on a 25-m telescope project, whose mosaic primary mirror will be accompanied by a monolithic 6-m secondary. American engineers are looking into the prospects for building a 15-m reflector. They have not yet decided whether it should be a multiple-mirror concept, like the Arizona facility, or should have a primary consisting of separate segments.

Not only are new telescopes being designed, but also the instruments to be attached to them. Fiber optics are becoming increasingly common: the technique enables one to feed images of several objects in the telescope field of view to a single spectrograph slit. Electronographic technology is well developed; in 1^h the 3.6-m Hawaiian telescope can reach stars as faint as $V = 25^m.2$. And there are the solid-state detectors: charge-coupled and charge-injection devices, Reticons, and so on, each of them well suited to solving a particular class of problems. Impressive arrays of devices have been assembled, such as 576 × 385 or 512 × 512 pixel systems. Detectors of this class have sensitivities covering the range from x rays to the infrared. Speckle interferometery and image-recovery techniques enable existing instruments on the ground to achieve better than 0".1 resolution. In fact the prospects are still more captivating: in principle it should be feasible to build a long-baseline optical interferometer. Plans are now being worked out for a space interferometer with a 10-km baseline; it would furnish an optical resolution of 10^{-5} arc sec!

Fundamentally new observational data can, as a rule, be acquired only with large new instruments. In this respect the oldest branch of astrophysics, solar physics, by no means lags behind the youngest and most fashionable fields. New ground-based instruments are coming into service, such as the 76-cm vacuum telescope at the Siberian Institute of Terrestrial Magnetism, the Ionosphere, and Radio-Wave Propagation. Specialized spacecraft for solar research are being launched. The Japanese satellite Hinotori (Astro A), orbited in early 1981, has observed solar flares in the x-ray and γ-ray energy ranges. The multiple-purpose Solar Maximum Mission satellite has monitored the sun throughout the electromagnetic spectrum; it even carried a small noneclipse coronagraph. Apart from being able to cope with pure sun-oriented problems this instrument has enabled a rare phenomenon to be detected: the impact of a comet on the sun.

Many interesting results have been acquired by observing the small bodies of the solar system. The Arecibo radio telescope was the first to contact the nucleus of Comet Encke by radar; the target proved to be 1.3 ± 0.2 km in radius. Analysis of data on the intrinsic rotation

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of 47 comet nuclei indicates a median period of about 15^h, considerably longer than for asteroids. Comet rotation periods increase with luminosity but are not correlated with other parameters of the comet. Soviet, West European, and Japanese scientists are all preparing to launch spacecraft intended to encounter Halley's Comet in early 1986. Perturbations in the motion of small bodies have yielded values for the mass and mean density of the largest asteroids: the density of Ceres and Pallas is 2.5 g/cm^3, and of Vesta, 3.5 g/cm^3.

It goes without saying that even if we were just to touch on the highlights of the astronomical research covered by this book, we could not do justice to it in a review of manageable scope. And that has not been our aim. We simply wanted to acquaint the reader with a work that will tell him something of every aspect of modern astronomy. The volume is no encyclopedia, to be sure, but rather a guide for professionals – a guide to the very frontiers of our beloved science.

Translated by R. B. Rodman