particle phase function were calculated from the quantities derived from the pure samples and compared with those derived from the mixture.

15.5

The 52-Color Asteroid Survey: Results and Interpretation

J.F. Bell, B.R. Hawke, P.D. Owensby, (Planetary Geosciences Div., Hawaii Institute of Geophysics, Honolulu HI 96822); M.J. Gaffey (Dept. of Geology, Rensselaer Polytechnic Institute, Troy NY 12181)

Infrared spectrophotometry in 52 passbands between 0.8 and 2.5 μm has been obtained of more than 60 asteroids. Comparisons with laboratory spectra of simulated asteroidal regoliths have been made to infer the mineralogical composition of the taxonomic types identified in the Arizona 8-color survey (D.J. Tholen, Ph.D. dissertation, 1984). Some important conclusions include: 1.) Many common asteroid classes rarely or never deliver meteorites to Earth. 2.) Classes C, P, and D form a continuous sequence due to increasing abundance of organic compounds with solar distance which is divided by dynamic and observational artifacts. 3.) Class A does not appear as distinct as in broadband data and may be a pyroxene-poor extension of the S class. 4.) The taxonomic classes may be grouped into three "superclasses" of igneous, metamorphic-chondritic, and primitive-chondritic origins. 5.) The spatial distribution of superclasses shows that the post-accretional heating mechanism declined rapidly with solar distance and was probably produced by some form of magnetic induction rather than short-lived radioisotopes.

15.6

A Search for Material Around Asteroid 29 Amphitrite

J. Gradie, (Planetary Geosciences Division, Hawaii Institute of Geophysics, Univ. of Hawaii) H. Hammel and C. Pilcher, (Inst. for Astronomy, Univ. of Hawaii, Honolulu, HI 96822)

A search for circum-asteroidal material around the S-type asteroid 29 Amphitrite has been initiated using a 500x500 CCD in a coronagraphic mode at the UH 2.2m telescope on Mauna Kea. The coronagraph used consisted of a 9x12 arcsec occulting square on a glass plate to occult the asteroid image at the principle focal plane of the IFA 4.5X Focal Reducer and a suitable machined Lyot-stop at the exit pupil formed by the collimator to remove light scattered and diffracted by the telescope structure. Eight 5 minute exposures of the asteroid were taken in bright moonlight through a 1 micron broad band filter between 7:44 and 8:40, 07/01/85 UT. At the time of the exposures the asteroid was at r = 2.741 au, Δ = 2.035 au, α = 17.8 deg., and V = 10.4 mag.; the asteroid motion was 0.2 arcsec/hr W and 4.25 arcsec/hr N. BD +26 2606 was used as a photometric standard (Oke and Gunn, Ap. J. 266, 713, 1983). A limiting magnitude of V = 20.6 per 0.6x0.6 arcsec pixel can be placed on the pixels immediately surrounding the asteroid. No point or extended sources moving with the asteroid were identifiable to within a pixel of the edges of the occulting square which at 2.035 au are about 7500 km from Amphitrite. This limit can be used to place upper limits on the sizes and particle density at distance greater than about 7500 km. For objects with albedo of 0.15, the minimum effective surface area detectable was about 3 km sq. This area corresponds to either one object 2 km in diameter or a cloud of particles with the same effective area per pixel. For a cloud of particles, assuming that Poynting-Robertson effect has removed all particles less than 10 cm in 5 b.y. and no particles are greater than 10 m, the corresponding surface density upper limit is about $10^{-5}/m^2$. If the particle size distribution extends to 1 mm, then the corresponding surface density upper limit is $10^{-1}/m^2$. Future observations are planned to search for material to within 3500 km of the surface with a factor of 10 more sensitivity.

15.7

The Occultation Diameter of Ceres

R. Millis, L. Wasserman, O. Franz (Lowell Obs.), W. Hubbard, L. Lebofsky, R. Goff, R. Marcialis, M. Sykes, J. Fecker, D. Hunten (U. Arizona), H. Reitsema (Ball Aerospace), B. Zellner, G. Schneider (Computer Sci. Corp. and Space Tel. Sci. Inst.), M. Rios (Obs. Astron. UNAM-UAZ), E. Dunham, J. Klavetter, K. Meech (MIT), T. Oswalt, J. Rafert (Florida Inst. Tech.), M. A'Hearn (U. Maryland), W. Osborn (Central Michigan U.), D. Parker (Southern Cross Astron. Soc.), A. Klemola (Lick Obs.), J. Pirronen (U. Turku).

The 13 November 1984 occultation of BD+8°471 by Ceres (Millis **et al.** 1983, **B.A.A.S.** 15, 822) was observed photoelectrically at twelve sites in the United States, Mexico, and the Caribbean. Based on these data, we find the diameter of Ceres to be 945.8±4.7 km, in good agreement with the recent infrared results of Brown **et al.** (1982, **Icarus** 52, 188) and Lebofsky **et al.** (1984, **B.A.A.S.** 16, 698). The occultation diameter is inconsistent with the diameter determined from VLA observations by Johnston **et al.** (1982, **Astron. J.** 87, 1593). Adopting Schubert's value for the mass of Ceres (1974, **Astron. Astrophys.** 30, 289) and the absolute V magnitude from Tedesco **et al.** (1983, **Icarus** 54, 23), the bulk density and visual geometric albedo are found to be 2.6±0.1 gm/cm³ and 0.069, respectively. The shape of Ceres and other implications of the occultation observations will be discussed. This research was supported in part by grants from the National Aeronautics and Space Administration, the National Science Foundation, and the National Geographic Society.

15.8

Refined Thermal Models for Asteroids Based on Infrared Observations and the Occultation Diameter of Ceres

L.A. Lebofsky, M.V. Sykes (U. Arizona), G.J. Veeder, E.F. Tedesco, D.L. Matson, R.H. Brown (JPL/Caltech), J.C. Gradie (Hawaii Inst. ofGeophys.), M.A. Feierberg (U. Maryland), R.J. Rudy (Aerospace Corp.)

Thermal infrared observations of asteroid 1 Ceres obtained over a period of two years have been used to refine both the "standard" thermal and thermophysical models used for the determination of asteroid diameters and albedos. These models all assume an infrared beaming parameter which characterizes the enhancement of thermal flux at small phase angles.
We have used the recently determined occultation diameter of Ceres (945-950km) to eliminate the diameter, and hence the albedo, as an unknown in these models enabling us to determine directly the infrared beaming parameter, for the standard thermal model. This parameter is substantially lower than that previously used (0.765 vs. 0.86-0.90). The refined standard thermal model results in smaller radiometric diameters for all asteroids. This is consistent with the results of Brown et al. (1982) which implies that radiometric diameters of large mainbelt asteroids should be reduced by 10-15%.
Using the more sophisticated thermophysical model presented by Lebofsky et al. (1984), the occultation diameter was predicted to within a few percent. With the diameter eliminated as an unknown, we are now able to determine with greater precision the thermophysical properties of Ceres and potentially determine its pole.

15.9

Radar Properties of Near-Earth Asteroids

S. J. Ostro (JPL/Caltech), D. B. Campbell (NAIC), and I. I. Shapiro (Center for Astrophysics)

We detected the following near-Earth asteroids with the Arecibo Observatory's 13-cm radar during 1980-85:

Target	Date	$\mu_c \pm 0.1$	$\sigma_{oc} \pm 30\%$ (km^2)	B ± 10% (Hz)
1620 GEO	2/83	0.2	0.9	26