trum, β is the instrumental resolution width, and W is the width of the signal (the full width to half amplitude in both cases). However, Fig. 1 shows that this feature is not gaussian; since the scatter in the frequency offset depends strongly on the shape of the feature, our error calculation is only approximate for this reason as well.

Using this formula, we calculate the error limits to be about 25 hz for the Haystack and about 50 hz for the Agassiz data for daily averages on days when the sun was not in the beam, and about 50 hz for Haystack and 150 hz for Agassiz on the 3 days surrounding the sun's closest approach. We believe that other sources of frequency errors, such as filter drifts, are substantially smaller than these limits.

Our results for the daily averages are shown in Fig. 2 and for some of the 5-minute averages in Fig. 3. These results show that any anomalous frequency shift of the kind reported by Sadeh *et al.* (*1*) is less than about 50 hz. Since Sadeh *et al.* observed Taurus A to within about 77 minutes of arc of the center of the sun and we observed W28S to within 36 minutes of arc, our frequency shift should be larger than the 100 hz measured by Sadeh *et al.*, whether due to the sun's mass or to the solar corona, provided that the solar corona has not changed significantly in the intervening months. Pulsar measurements made in June 1969 during the occultation of Taurus A, however, show that changes in the integrated electron density are unlikely to cause more than a few cycles change in the observed Doppler shifts at either the OH or hydrogen-line frequencies (*5*).

We have been informed (*6*) that the Taurus A observations reported by Sadeh *et al.* (*1*) were obtained by a direct measurement of the 21-cm absorption line with the main beam of the Naval Research Laboratory antenna directed toward Taurus A. We suggest the possibility of a systematic effect: the continuously changing extinction of the background hydrogen emission as the sun moves along the ecliptic could provide a variation in the Taurus A profile. An evaluation of this possible error requires a detailed knowledge of the antenna pattern and the precise hydrogen spectrum occulted by the sun.

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7. We thank J. C. Carter and the staffs of the Haystack Research Facility and the G. R. Agassiz Station for their support of this project. Lincoln Laboratory is operated by Massachusetts Institute of Technology with the support of the United States Air Force. Radio astronomy at the G. R. Agassiz Station is supported by NSF through grant GP-7337, and by the Smithsonian Astrophysical Observatory.

7 November 1969

Sunglint Patterns in Satellite Pictures

Bowley *et al.* (*1*) recently presented a brief report on unusual dark patches appearing in sunglint patterns viewed by geosynchronous satellites. We had presented a very similar paper at an American Geophysical Union meeting in April 1969 (*2*), and it later became known to Bowley *et al.* that we had submitted an article on this work to the *Monthly Weather Review* (*3*). They fail to acknowledge this anywhere in their report.

Bowley *et al.* make extensive reference to a "model" that explains these sunglint patterns. Such a model was described in considerable detail in the oral and written versions of our paper cited above. They also fail to cite a number of earlier publications on this subject. Dark patches in satellite-viewed sun-glitter areas were noted as early as 1963 (*4*), and they have been mentioned in several other publications as well (*5*).

We would hope that in the future they take greater care in making proper attribution to previous work on their subject.

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4 December 1969; revised 12 December 1969

Our work was accomplished independently but at a later time than that of McClain and Strong. Our discovery of the anomalous sunglint areas was a side result of research performed for the Woods Hole Oceanographic Institution. We showed that satellite data (especially Applications Technology Satellite data) could be used directly and indirectly to infer upwelling in the ocean and hence aid in finding possible fishing areas. Our work was reported verbally to the Woods Hole Oceanographic Institution in May and in report form in June. The work was subsequently reported in the Quarterly Contract Report to the National Aeronautics and Space Administration, Electonic Research Center, in July 1969.

We did not become aware of the paper that Strong and McClain presented at the American Geophysical Union until very late in July, nor did the article in the *Monthly Weather Review* become known to us until well after we had completed our manuscript. It was felt that it represented independent research, and, as such, it did not alter our plans for submission to *Science*. Thus, we believe that any impropriety on our part, if it exists, was to continue our submission to *Science* without asking for an editor's note referencing the paper we belatedly knew McClain and Strong had submitted to the *Monthly Weather Review*. We wish to apologize for this oversight on our part and for our not being aware of their paper presented at the April meeting of the American Geophysical Union. All of the other published references cited by McClain and Strong provide background information on sunglint patterns, but only make passing comment about anomalous patterns.

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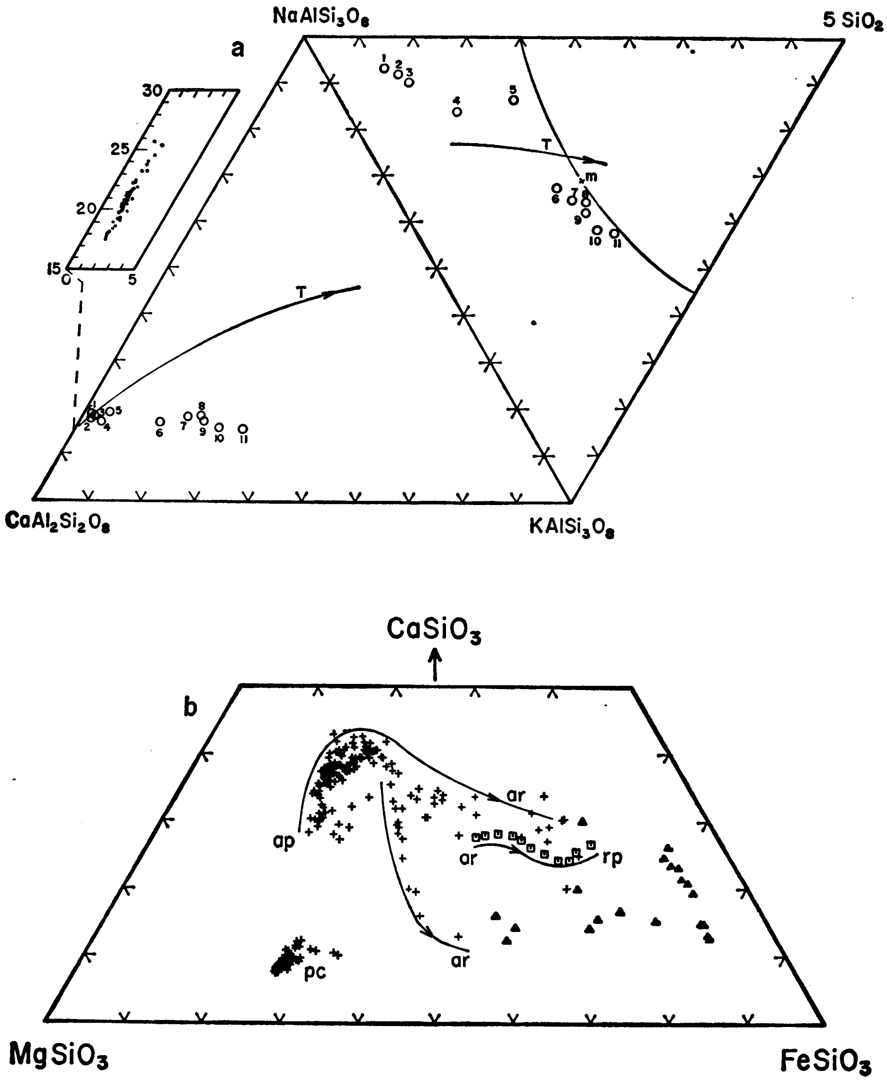
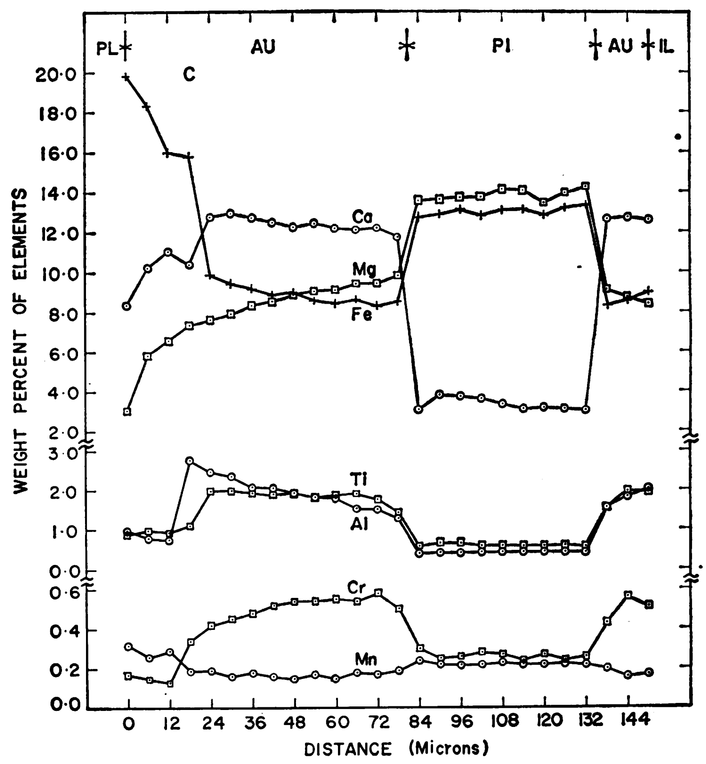
4 December 1969





Mission to Martian Satellites

Alfvén and Arrhenius (*1*) argue persuasively for a manned landing on an asteroid, a representative of a stage in the development of the solar system before the assembly of the planets. Phobos and Deimos, the two moons of Mars, are of asteroidal dimensions. Very likely they are captured asteroids; their histories should at least be very similar. Admittedly, satellites of Mars are hardly typical asteroids, but the few asteroids that are in earth-crossing orbits may not be typical either.

Missions to the martian moons may intrinsically be more or less difficult than missions to asteroids. Such missions can, however, be carried out as byproducts or side trips on martian missions. For example, the Mariner Mars Orbiters in 1971 are expected to transmit photographs of one or both of the moons from as close as 6000 km. These photographs will have a line-pair spacing of about 150 m, or more resolution elements for the whole body than there are for Mars itself on the best earth-based photographs (*2*). Alfvén and Arrhenius suggest that a program for the investigation of asteroids is more important than one for the investigation of Mars; the presence of Phobos and Deimos in orbit around Mars makes it possible for both programs to be carried out for the price of one.

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21 January 1970

Sunglint Patterns in Satellite Pictures

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Science **167** (3926), 1757-1758.
DOI: 10.1126/science.167.3926.1757

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.