Landsat's Role in Brine Discovery

In his Research News article of 29 April "Remote sensing (I): Landsat takes hold in South America" (p. 511), Allen L. Hammond attributes the recent discovery of lithium- and potassium-rich brines in Bolivia to analysis of Landsat imagery. This statement should be clarified. The brines were discovered in Salar de Uyuni, which is a 9000-square-kilometer salt pan in the southern part of the Bolivian Altiplano and the largest hard, flat surface on Earth. The suggestion that lithium- and potassium-rich brines might occur in this salar was first made in a paper (*1*) presented at a symposium on lithium in Denver in January 1976. The paper was based primarily on an evaluation of the environment of lithium- and potassium-rich brines in salars of nearby northern Chile. As a consequence of this work, brine samples were collected by a Landsat team that visited Salar de Uyuni in April 1976 for the purpose of gathering data about the salar surface to aid in interpreting patterns recorded by Landsat. Two samples collected and analyzed in laboratories of the U.S. Geological Survey proved to be high in lithium and potassium.

GEORGE E. ERICKSEN
U.S. Geological Survey, Reston, Virginia 22092

References

1. G. Ericksen, G. Chong, T. Vila, *U.S. Geol. Surv. Prof. Pap. 1005* (1976), p. 66.

Nighttime Driving Accidents and Selective Visual Degradation

It has been established that the incidence of serious traffic accidents, particularly those involving pedestrians, increases at night (*1*). While variables such as fatigue and drinking behavior are more prevalent at night, and variation in traffic flow may be important, the striking reduction in the nighttime accident rate as a result of illuminating highways argues for the importance of vision (*2*). In view of the significance of visual factors, the influence of low illumination on specific aspects of driver performance merits further attention. In this context, the recent emphasis on multiple modes of visual information processing provides a heuristic basis for analyzing the driver's perceptual-motor tasks (*3–5*). According to this point of view, visual processes can be dissociated into at least two subsystems. "Focal" vision is mediated primarily by the central retina and subserves form perception (identification), while "ambient" vision is mediated primarily by the peripheral retina and provides information regarding spatial localization. These processes differ with respect to their subserving neurological structures (*3*), modifiability (*4–5*), sensitivity to blur (*6*), degree of consciousness, temporal courses, and luminance response characteristics (*7–8*), all of which suggest physiological as well as behavioral dissociation of function.

Held (*4*) has suggested that localization and mobility in space are primarily dependent on the ambient peripheral system, and Dichgans and Brandt (*9*) have shown that peripheral vision is of great importance, both for the perception of body orientation and motion and for the control of posture. Since the automobile driver's primary task, which demands his immediate and continuous attention, is dynamic spatial orientation, one would expect this activity to be mediated mainly by the peripheral retina. It has been established that peripheral localization is independent of target luminance (*7*), that resolution acuity in the periphery is relatively unaffected by optical blur (*6*), and that dynamic spatial orientation is independent of both luminance and refractive error. Thus, there should be relatively little degradation of performance of the ambient system with lowered illumination. The driver should suffer little or no loss of steering ability under low illumination and his self-confidence should remain high. Therefore, he might neglect taking appropriate precautions at night. Such behavior is consistent with reports that drivers generally do not reduce their speed at night and with clinical observations that many individuals with central scotomata continue to drive (*10*).

In contrast with the relatively high level of performance of the ambient system, the performance of the focal (form identification) system is seriously degraded under low illumination. Major visual functions, such as resolution acuity, contrast sensitivity, and stereoscopic depth perception, are reduced substantially at lower luminance levels. In addition, darkness-induced refractive errors or "night myopia" will, for many individuals, increase the blur of the optical image and further reduce performance for those functions requiring a sharp retinal image (*11*). Such blurring will also hinder the detection of dim stimuli (*12*), which is of great importance to the driver at night. While some stimuli containing important information, such as pavement markings, road signs, and other traffic, are usually sufficiently illuminated to be easily seen under favorable weather condi-