ABSTRACT

A section of an Apollo space photo relating to the Magadh area of Bihar state was monoscopically interpreted resulting in six delineations based upon tone and texture variations. Small scale aerial photographs were used for the preparation of soil map of a part of the area using a systematic air photo-interpretation procedure; this served as a basis for defining the soil composition of four out of the six space photo analytical units. In respect of the remaining two units soil information was obtained by reference to an existing small scale soil map of Bihar State. The data thus obtained have been used to prepare a small scale soil map of the selected section of the Apollo space photo.

The soil map of the part of the space photo area that is based on support to-interpretation has been found to have the quality and accuracy expected of very small scale soil maps.

INTRODUCTION

It is now widely acknowledged that Land Resource Maps serve as the best basis for planning and execution of long range land development programmes. The land resource units shown on such maps are generally co-extensive with soil mapping units of small scale soil maps. Because of this, there is an urgent need for the preparation of a small scale Soil Map of India, as only about one fourth of the total geographical area of the country has so far been covered by field soil surveys.

Reconnaissance Soil Surveys leading to such small scale soil maps were conducted till recently with the use of toposheets as base maps. With the increasing availability of air photos, a gradual switch is being made to the use of these photographs coupled with the adoption of air photo-interpretation techniques for small scale soil mapping. Shama-charya and Srinivasan (1972) have described a basic procedure for preparation of small scale soil maps using small scale (1:60,000) air photos. This procedure can be employed with advantage for expediting the preparation of soil maps for the country.

In the meantime, satellite photos are becoming available for Natural Resource Surveys. Though the SKY-LAB and ERTS imageries are the latest in the series, earlier Gemini and Apollo Projects also produced very small scale space photos of the earth's surface. These photos have been studied quite intensively in countries like America, where both the photos and sophisticated
new facilities for interpretation are readily available. Examples of such work are to be found in the studies of Wilson (1967), Aldrich (1971) and Langley (1971). Some workers like Rudd (1971) tested the use of small scale simulated space photos. Sapp (1971) prepared thematic maps from space photos by using monoscopic enlarging devices. On the other hand Anuta (1971) identified soil types through digitised multispectral interpretation of satellite photography.

Sophisticated instrumentation for automation of photo-interpretation is not readily available in India at present. Even so, the possibility of using low resolution space photos for soil mapping in India appeared attractive. Some of the distinctive features of space photos are (1) large areal coverage per image, (2) rapid repetitive coverage, (3) low resolution, and (4) small scales. As such, only a few space photos, each covering an area of as large as 25,000 sq. km. would be needed for the preparation of a first approximation to a small scale soil map of India in scale of about 1:1000,000. Krishnamurti and Srinivasan (1973), therefore, tested the utility of a Gemini space photo for Soil and Land Use Mapping of an area in U.P.; they achieved the space photo-interpretation by using support air photo interpretation for part of the area and spot checks for the remaining parts to arrive at a Soil and Land Use Map for the area; the pronounced relief differences in the study area and rather distinctive variations in tone and texture of the space photo were helpful in accomplishing satisfactory delineations. In order to determine the applicability of such an approach to the interpretation of a space photo without such distinctive characteristics, they undertook the study reported in this paper; additionally the study area in this case is not characterised by the same degree of pronounced relief differences as in the case of the U.P. study area.

EXPERIMENTAL

The space photos used in this study comprise a colour print (size 18 x 18 cm) and a black and white print (19 x 19 cm) of NASA No. As 7-11-1980 of the Apollo 7 project. The photos were taken from a height of approximately 126 nautical miles. Extreme variations in scale were, however, noted in this Apollo photo, ranging all the way from 1:1.5 million to over 1:10 million; as such only a section of the space photo was chosen in which the scale ranged between 1:1 million to 1:2.5 million.

For a part of this selected section of the space photo, air photos in scale of about 1:63,000 were used for photo-interpretation for the preparation of a small scale soil map. This comprises the support photo-interpretation.

A mirror stereoscope was used for photo-interpretation in the field camp, while a pocket stereoscope was used during field survey.

Soil profiles studied in the course of the field survey were described in standard terminology; the classification of the soil was done according to the American comprehensive system of soil classification (USDA, 1960, 1967 and 1970).

STUDY AREA

The selected section of the Apollo photo corresponds to an area lying between 24°30’N to 26°30’N and 84°E to