CHAPTER III

AIR PHOTO INTERPRETATION

III.1 INTRODUCTION

In the fields of geology and geomorphology, the aerial photo interpretation not only contributes to the accuracy of the results, but it also speeds up the investigation. The air photos provide a bird-eye-view of a vast amount of terrain data of the areas under study.

In general, the geologic interpretation can be considered to be a two step process. The first step includes, observation, fact gathering, measurement, and identification of features on the photographs. The second step involves deductive or mental processing of these data in terms of geological significance. In the first step, landforms or geomorphic expressions, structurally controlled lines, vegetation, rock outcrop boundaries etc. are interpreted. Interpretation of geological structures and lithology form the essence of second part. The quantitative information consists of 1) height differences, 2) slopes of river gradients, 3) dip and strike, 4) formational thickness and 5) construction of structural contour maps.

The aerial photographs studied were taken by a camera of 15 cm (6") focal length , from 25400' - 25500' altitude. The photos had approximately 1 : 50,000 scale and ideally exhibited all the features and structures clearly.

The study mainly comprised examination of individual photographs under the mirror stereoscope to decipher different structures like coastal cliffs,

stacks, broken grounds, mud-flats, creeks, inland water bodies, sand ridges, sand dunes, islands etc. along with drainage, lithology and some major morphogenetic units. These features were verified by subsequent ground checking and the inferences drawn were found to be quite reliable.

III.2 OFFSHORE FEATURES

Airphotos under mirror stereoscope, typically showed the extension of stream channels inside the Gulf, easily recognised by tonal variation, with the help of which channel courses were traced. These were later on verified with Bathymetric Datum Chart prepared by Naval Hydrographic Department. The extension of stream channels measured from the low water line to the off shore extremity, and their depths below mean sea level at this extremity measured on airphotos are given in the Table III.1

From the data (Table III.1) it is obvious that the streams of 5th and 6th order have their channel extensions submerged within the Gulf and extending to distances varying between 11 km to 18 km.

Table III.1 : Length and depth of submerged channel segments.

Name of the River	Order	Length in Km	Maximum depth in metres
1) Ruparel	5	13	10
2) Nagmati	5	11	8
3) Lakhabwal stream	4	14	16
4) Khavdi stream	4	6	6
5) Sasoi River	6	14	13
6) Phuljar River	6	16	16
7) Bharana stream	4	8	20
8) Chudeshwar stream	3	7.5	16.5
9) Ghi River	6	18	10.7
10) Sinhan River	5	13.5	16.5
11) Rani Nadi	4	23	20
12) Valotra Nadi	4	35	23
13) Mota Asota stream + Vedmati river	4	10.5	6
14) Beh stream + Dandawada Vokro + Khimapat Vokro	4	11	9.6

The 4th order streams extend their channels as much as 6 to 35 km with maximum depths below mean sea level from 8 to 16 m and 6 to 23 m respectively.

The inferred E-W fault in the Gulf has been responsible for the lengths of submerged channels to increase towards west e.g. Velotra Nadi 35 km, Rani Nadi 23 km and near Jamnagar (eastern side) it is Nagmati River 11 km, Lakhabwal 14 km, Khavdi 6 km. All these channels are terminated along the fault in the Gulf.

These channels are present both on the Deccan Trap lava flows as well as on the Tertiary rocks, indicating that these rocks were above the sea level during the Quaternary period when the streams were formed. Their present position is clearly a more recent phenomenon of submergence, with underwater stream channels and development of creeks, nars and islands reflecting the original diversity of unsubmerged topography.

III.3 DRAINAGE

Airphotos have provided useful information on drainage and water table conditions also. Apart from the overall pattern, the nature of the stream channels are also revealed.

It is seen that the stream channels in the limestone region are deep, narrow with steep banks

than as compared to those on the Deccan Trap. Shifting of channel course in the zones of curvatures could be clearly marked on the air photos and the information regarding the stages of development of curves and the width of the curvatures in the limestone and trap region was obtained.

III.4 SPRINGS

The airphotos typically reveal the presence of perennial springs. These springs, near the foot of small hills and hillocks or on the sides of large valleys, were recognised by the presence of dark toned lines of trees and green vegetation starting from the point of emergence of spring to downstream direction for a short distance where the water would completely percolate in the ground stopping the surface run off. The water table contour map has supported this phenomenon. The region being of irregular topography, the water table has a chance of intersecting the land surface. In the study area, the springs are located in the Pindara-Mewasa belt and south of Ran.

From field observation it has been found that though the springs are perennial, amount of water discharge reduces during summer.

III.5 GEOLOGIC AND GROUNDWATER CONDITIONS

Some important observations and inferences on geologic and groundwater conditions obtained from air photos are described below :

The natural lakes, perennial streams, rivers, and springs indicate the closeness of the water table near the surface, and the surrounding areas have been found to comprise ideal sites for dug wells as well as bore holes.

Drainage Density can be observed on air photos also, and in the areas where Drainage Density is more, the basin is well drained and hence percolation is less. The streams on Deccan Trap show a higher Drainage Density, more run off and hence less percolation. In the limestone area, the Drainage Density is low hence poorly drained. Water percolates to its maximum depth through cracks, crevices, solution cavities, caverns etc. On this basis relative permeability differentiation of tracts of rather different permeability could be obtained.

Airphotos are also helpful in the classification of streams in the two categories whether they are gaining or losing. The few streams in the area, which are gaining water from the ground, are Ghi, Sasoi, Nagmati, Nani Phuljar and Puna rivers. The water gaining segment is the last segment of the river. On the other hand most of the streams are losing streams. The dry channels are clearly marked on airphotos. Immediately after monsoon, gradually the streams become dry, as water-table goes below the river bed.

Presence and distribution of man made water features (other than wells) like dams, reservoirs and canals are distinctly marked on air photos. Some of the reservoirs are seasonal. These features constantly recharge the ground and help in raising water table which ultimately helps in rich growth of vegetation.