RELATIONSHIP BETWEEN SNOW COVER AND DISCHARGE AND WATER QUALITY OF WATERSHEDS, ARDENNES (BELGIUM)

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1. OBJECTIVE

It was expected that the areal extent of a snow cover could be measured on space imagery and that the thickness of the snow cover could be evaluated by using multispectral techniques and densitometry. Repetitive coverage would allow to follow the evolution of the snow cover in time and link this to the run off of the area.

The area, chosen for the investigation, the "Plateau des Tailles", covers a surface of approximately 200 km^2. It is being drained to all directions by four large watersheds and some rills belonging to other basins. The area has been under investigation for several years from several points of view.

For the present project the following imagery was requested
bulk processed B&W 70 mm Neg Transparencies M.S.S. band 4,5,6,7
bulk processed B&W 9,5in. Pos Transparencies M.S.S. band 4,5,6,7
Coverage from November to April was required. Cloud cover was allowed up to 20%.

2. ACCOMPLISHMENTS

2.1. Imagery received and recorded

On April 17, 1973 a first set of photographs was received. They were taken on December 22, 1972. On June, 14, 1973 the second set of photographs was received. This set was taken in the adjoining

strip on December 21, 1972. The area under investigation was covered by clouds on December 22.

In this period no detectable snow fall was recorded.

In March a snow fall has occurred in the period of the overflight. This imagery has not been received.

2.2. Field investigations

A field crew has visited the area every time it was covered by snow during the overflight period. Unfortunately this happened only twice, namely on February 13 and 14, 1973 and on March 21 and 22, 1973. During the latter period only melting snow at a few sites was recorded. Snow thicknesses and densities were measured at 23 selected sites. At the same time discharges on the four main watercourses have been measured. These measurements have been continued monthly. Water samples were collected on February 28, April 1, April 26 and 27, 1973.

2.3. Laboratory studies

Eight water samples have been analyzed. Density measurements have been performed on the ERTS-imagery. Optical densitometry was made on the Joyce-Loebl densitometer MK III CS. Since only imagery without snow cover was received, the measurements could not be compared to snow-covered areas. Photographic density slicing was also experimented.

2.4. Determination and location of striking points

Some striking features have been located. The list of these points are given in the table below. The coordinates have been read on the existing topographic maps.

Identification and location of characteristic points

Identification	NB	EL
1. Aachen (Aix-la-Chapelle)	50°46'18"	6°05'00"
2. Dam on the Vesdre River	50°36'58"	6°05'35"
3. Rhine bend South of Cologne	50°50'07"	6°58'50"
4. Confluence of Ourthe and Aisne	50°22'45"	5°31'17"
5. Laroche-en-Ardenne	50°11'03"	5°34'40"
6. Confluence of West-and East-Ourthe	50°08'00"	5°40'48"
7. Our bend West of Steinebrück	50°13'13"	6°10'12"
8. Laacher See	50°24'16"	7°16'55"
9. Confluence of Rhine and Moselle	50°21'14"	7°36'20"
10. Moselle bend West of Fdinger	50°04'03"	7°07'30"
11. Confluence of Semois and Mellier	49°41'21"	5°31'32"
12. Our bend North of Vianden	49°57'59"	6°09'29"
13. Confluence of Saar and Moselle	49°42'08"	6°33'40"

3. DISCUSSION OF RESULTS

Only one period was covered so far. At that period there was no snow cover. One of the two imagery sets (MSS 4,5,6 and 7) is very clear and will serve as background for the measurements on the imagery taken, in March, the only period in which the area was covered by snow.

The area may be too small for accurate measurements although we prefer to wait until the reception of the Marc' imagery to draw a final conclusion.

The band 5,6 and especially 7, seem to be of extremely good quality for geologic interpretation. The river pattern is easily distinguishable.

Since only a set of imagery has been received, no changes in data requirements are needed.

November, 15, 1973.

Prof. Dr. R. TAVERNIER.


KÖLN
(COLOGNE)
3
Rhine (Rhein)
AACHEN
(AIX-LA-CHAPELLE)
2
LIEGE
8
Laacher See
9
10