RESEARCH INTO EARTH MOVEMENTS IN THE BARCELONNETTE BASIN

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INTRODUCTION

The Region of Barcelonnette, a sub-prefecture of the Alpes-de-Haute-Provence (04) in the Southern Alps, is particularly interesting to study in the context of research into earth movements. In effect it has numerous unstable areas containing several types of movement and erosion processes associated with varied vegetation covers and land uses. The south slope of the Barcelonnette basin in particular, between the communes of Jausiers and Enchastrayes, contains a whole series of landslips of various sizes, both active and dormant, some of which are developing into flowing slides, as well as sizeable ravined zones under forests and/or prairies. In fact this is a choice sector for the study of instability factors, either natural or anthropic. A 1/10,000 scale map of the current geomorphological dynamics has been drawn for the Enchastrayes commune (C. AUGIER and J.C.FLAGEOLLET, 1992) and another is being drawn for the Jausiers commune at the moment.

The spatial concentration of these phenomena in a basin 13 km. from east to west and 10 km from north to south can be explained by the conjunction of various unfavourable factors. Thus it is not only the geological, geomorphological,climatic and hydrological characteristics which influence the triggering and continuation of these land instabilities but equally the anthropic influence and the changes of land uses in the history of the valley.

Five km. to the south of Barcelonnette on the south-western border of the commune boundary of Enchastrayes and immediately next to the Super-Sauze station's ski-ing area, the "La Goutta" (or Super-Sauze) flowing slide has been the subject of specific study for the last two years because of its breadth and the risk (alea) of torrential lava.. Topometric monitoring of this zone has therefore enabled us to follow up its dynamic behaviour since August 1991. The movements recorded "in situ" have not so far been compared with rainfall.

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THE BARCELONNETTE BASIN

GEOLOGY AND GEOMORPHOLOGY

The Ubaye valley and the mountainous belt defining the Barcelonnette basin are the two major geographic elements of the region. Its present morphology is the result of the superimposition in time and space of three quite distinct elements:

- the passage of glaciers
- the working of the stream network
- consecutive transformations into slope movements.

It is also influenced by the diversity and the high variability of the lithological context.

THE GEOLOGICAL STRUCTURE

The Barcelonnette basin is part of the structural area of the Alpes Dauphinoises and is part of the intra-alpine zone of the nappes of Briançonnais, Embrunais, Queyras and Argentera-Mercantour. This basin of the middle Ubaye is occupied by a bedrock which is regarded as autochtone which develops fairly high up the slopes and which erosion makes apparent in the window.. The Autochtone sedimentary series stretches from Trias to the Upper Eocene; it continues from the Trias to the Upper Jurassic. The Callovo-Oxfordian (j3-4), consisting of black marl, is responsible for the very soft morphology which is a feature of the base of the slopes. This basin is confined on all sides by a series of massifs culminating at more than 3,000 metres. These peaks are crowned by drift units of varying power and size which are simple scales (sub-Briançonnaises and Briançonnaises units or flows (flysch) (DEBELMAS J., 1987).

QUATERNARY DEPOSITS

A further characteristic of the Barcelonnette window is the extensive area covered by quaternary deposits, both at the bottom of the valley and at altitude. This may play an important part in the geomorphodynamic behaviour of a terrain.

DEPOSITS AT THE BOTTOM OF THE VALLEY

Recent alluvial deposits carpet the whole of the zone liable to flooding at the base of the valley, i.e. the overflow sectors of Ubaye and Bachelard. The are formed on the surface of dark limon deposited during major floods (the most recent was in 1957), enriched at their depths with sand and gravel and with streaks of blackish clay representing calmer deposit zones (isolated arms, old meanderings) or mud-flow type spreads deposited during floods.

Quarries at various points downstream of Barcelonnette extract this sand and gravel which represents the accompaniment of minerals and rocks occurring in the slope basin - shingle consisting of coarse gravel, flysch and various limestones...

There are also a great many dejection cones in this valley. They accompany the outlets of the various streams which indent the slopes. On the right bank of the Ubaye several hamlets and villages have been established on these cones because of the fertility of the plains and their shallow slopes: les Sanières, le Bourget, Faucon, Saint-Pons, la Lauze, la Bérade, les Thuiles. The inhabitants regarded Riou-Bourdou, the largest dejection cone on this bank, as undesirable, because they thought it very dangerous (and rightly!). It was only stabilized by reforestation in the 1900s. Since then extensive concrete works have been built throughout the length of the stream's flow channel to reduce its strength. The Riou-Bourdou dejection cone is occupied at present by the airfield and the industrial zone of Barcelonnette Saint-Pons.

On the left bank the houses of the hamlet of Guégnier spread over the cone of the Abries stream. In November 1843 half this village was carried away by a flood. South of Jausiers the waters of the Riou-Versant and the Frache stream mingle with the Ubaye, which undercuts their cones widely. Further downstream the Poche and Galamonds streams (of which the Sauze stream is the major tributary) are well-known for their mudstreams. Both have a tendency to push the Ubaye to the north.

All these deposits at the bottom of the valley are the materialisation of the intense torrential activity which is a feature of the countryside.

SLOPE DEPOSITS

The glacial terrains also represent a sizeable part of the quaternary deposits to be seen in the region, occupying a large part of the slopes of the Barcelonnette window, in very variable thicknesses. In some talwegs they appear to be as much as 20 to 30 metres, sometimes even more in particular places. This moraine covering pays a determining part in the behaviour of unstable areas. Very often, we fail to take the precautions needed in respect of these glacial deposits, particularly with regard to the balance of their slopes, though they affect the majority of developments. The spectacular landslide at Super-Sauze is a perfect example the importance of the role of moraine, particularly as it affects the land's hydrological characteristics.

Other types of slope deposits can often be seen on these mountains, particularly in the Sauze basin. In this category we may mention boulders, rocky glaciers, alterities, colluvial deposits, debris flows and various material resulting from occasional gravitational movements.

CLIMATIC AND HYDROLOGICAL ASPECTS

CLIMATE

Meteorological factors, variable and evolving, generally condition the irregular movements of unstable land. In this respect, it is advisable to monitor climatic and surface movement parameters at the same time. We have not been able to take this approach for the moment in the context of this work, as there is no equipment for it at the site.

The Barcelonnette basin bathes in a Mediterranean climate moderated by the mountainous environment, with some features which exercise a weak continental influence.

Temperatures can vary considerably depending on altitude and direction. The meteorological readings for the middle Ubaye are taken from the Barcelonnette observation station (1,140 m.) and therefore relate only to the bottom of the valley. There is no reliable data (i.e. recorded "in situ") for the thermic phenomena affecting the neighbouring contours.

Rainfall in the Ubaye valley is typical of an attenuated Mediterranean regime, influenced by the surrounding mountain region. In the same way as for temperatures, readings are taken only at the posts at Barcelonnette and Jausiers and none are recorded on the slopes. It is a delicate matter to try to establish a relationship between the rainfall recorded at the bottom of the valley and that affecting high-altitude sectors such as Super-Sauze. In fact the spatial variability of rainfall is considerable in mountainous regions. This is due both to the local winds and to the orientation of the slopes. Furthermore, the installation of an observation post in a specific topographic configuration can affect the readings taken there. When we compare the rainfall data from the Barcelonnette and Jausiers posts we notice that the very much higher station at the Jausiers station shows a clear rainfall deficit, other than for a few isolated years. These differences observed between two stations approximately 8 km. apart is explained primarily by the different orientation of the slopes in the neighbourhood of the recording posts, more so than by the presence of a real horizontal rainfall gradient within the Barcelonnette basin. Whether measured monthly or annually, a very localised and relatively considerable rainy or snowy period (for example, a heavy summer storm) can radically alter the totals, and, therefore, the average rainfall figures, and would inevitably affect a comparative analysis of the two stations.

The analysis of rainfall readings also throws light on their temporal variability, which is a determining factor in the geomorphodynamic behaviour of unstable land. In 1970 C. PEGUY advanced the following proposals on this subject in his "Précis de Climatologie": "Fifty millimetres of rain may fall in 24 hours several times in a year or only four or five times in a century. In the second case flooding is certain and the slopes will be subject to accelerated morphological processes". Thus in June 1957 the exceptional flooding in Ubaye followed 105 mm.

of water falling in 3 days and a speed-up in the melting of snow still present at altitude. This flood was accompanied by numerous small flows and by torrential flows which partly blocked the Ubaye.

Over periods of several years we observe the extreme variability of rainfall from one year to another, and the wetter series seem to be distinct from the drier periods. The readings available certainly reflect the rainfall regime for the whole of the middle Ubaye, but we have no information either about exceptional rainfall or about the amount which fell in 24 hours. The study of rainfall for geomorphological purposes must be more specific. The analysis of averages is insufficient and can conceal major reasons for the triggering of catastrophic events. Yet again we see the need for the a rainfall measurement network "in situ" to monitor rainy periods and their effects on the behaviour or the land.

In the absence of such data, however, we know that spring, and above all, autumn, are the wettest seasons. Summer is punctuated by brief stormy showers which can be very violent and intense near the line of the crests. Winter presents a minimum of showers in the form of snow, giving a shallow snowy layer (1.30 m on average at Barcelonnette), which, however, is thick enough for winter sports at the station; 2,500 to 3,000 m. and as much as 8 m. of fresh snow (approx 3 m. of packed snow) can fall on the peaks. The ski-ing areas on the shady side of the mountain on the south slopes of the valley keep this snow covering for between 4 and 5 months, like those of Sauze, Super-Sauze and Pra-loup.

HYDROLOGY

The flow of the Ubaye features the following points which define it unambiguously as a "nivo-pluvial" type regime.

-The high waters are recorded from April to June and correspond to the melting of snow accompanied by spring rain:

- The low water period extends from the beginning of December to the end of March;

- Between the two there is a dry summer period from July to September, interrupted by a fairly marked flood peak in October, due to autumn rains.

Torrentiality is the major hydrological factor throughout the southern Alps and this valley is no exception - far from it. The intense torrential erosion which can be observed over the whole of the Barcelonnette basin is proof of it. Numerous installations have been constructed to limit the effect of torrential flooding, some of them very large, such as those on the Riou-Bourdou.

Torrentiality has also been frequently related to deforestation (SURREL, 1841, and DERRUAU, 1988), and it has been concluded that reforestation would "extinguish" the streams. In fact, this statement is an exaggeration, as reforestation can only limit or restrict erosion where this is possible. Thus, when the rick substratum is particularly sensitive to erosion (marl, for example), the steep slope and the climate, with heavy showers separated by long dry periods during which the vegetation thins, reforestation is shown to be precarious, particularly near the upper altitude limit for trees. It is in these very areas, therefore, that the streams so typical of the Southern Alps can develop extensively.

SOCIO-ECONOMIC DEVELOPMENT OF THE VALLEY

A brief historical reminder about the development of the region's population can help us to understand the anthropic influence on the operation of the natural environment.

For a very long time the Ubaye valley was politically independent and lived in almost total autarchy. This rural economy was based on crafts, on its little textile industry and its feeding agriculture. Sheep-breeding and the weaving were the main activities and they gave a seasonal rhythm to the life of the valley; in summer the shepherds brought their flocks to the alpine pastures and in winter some of the inhabitants emigrated temporarily, partly to escape the rigours of the climate but mostly to help the sale of the local textile production. The Ubaye was thus autonomous and overpopulated for a very long time. In the 15th and 16th centuries in particular the forests were seriously affected by this and soil erosion caused considerable damage. In order to remedy this, many local laws, some of them very old, were enacted to regulate wood-cutting and the passage of animals. In the more recent past, in the middle of the 19th century, huge reforestation operations were undertaken throughout the whole of the Ubaye valley (ARNAUD F., 1906).

The disenclosure of the region occurred at the end of the 19th century with the commencement of national route 100, the main axis of road communications at the bottom of the valley. Roads were grafted onto it which gave access to neighbouring valleys through the cols. Curiously, this opening up to the national territory and even beyond increased the emigration phenomenon which had started at the end of the 18th and the beginning of the 19th centuries. It was the famous "Mexican" epoch of the Ubaye, most of whom returned after making a fortune across the Atlantic. The many luxurious villas built at Barcelonnette between the old town and the Ubaye bear witness to this. The recorded population in 1836 was 14,846, and depopulation in the valley has continued, having only 6,350 inhabitants in 1968, 3,000 of whom were Barcelonnets (or Barcelonnettais).

The exodus over almost two centuries is thus above all rural, expressing itself in a strong agricultural undervaluation. The numerous houses in ruins in the countryside and isolated hamlets, the fields lying fallow and the impracticable roads illustrate this. Many streams and rivers previously maintained are left to themselves and are at the origin of numerous disorders (overflows, ravining, landslips...). In summer herds of transhumants invading the Alps from Provence are increasingly rare.

The present-day economy, therefore, is no longer based solely on agriculture - far from it; tourism now has pride of place, with all its related activities. Winter tourism has already been present for a very long time on the slopes of this valley (the Super-Sauze winter resort is one of the oldest in France) and for several years now the Ubaye has begun to profit from the extrordinary development of summer leisure activities in the mountains.

LOCATION OF THE MAIN KNOWN EARTH MOVEMENTS (Fig. 1)

The whole of the Barcelonnette basin as it has been described previously includes numerous earth movements of varying significance. The major interest is that they are concentrated within a restricted, relatively homogenous from all points of view.

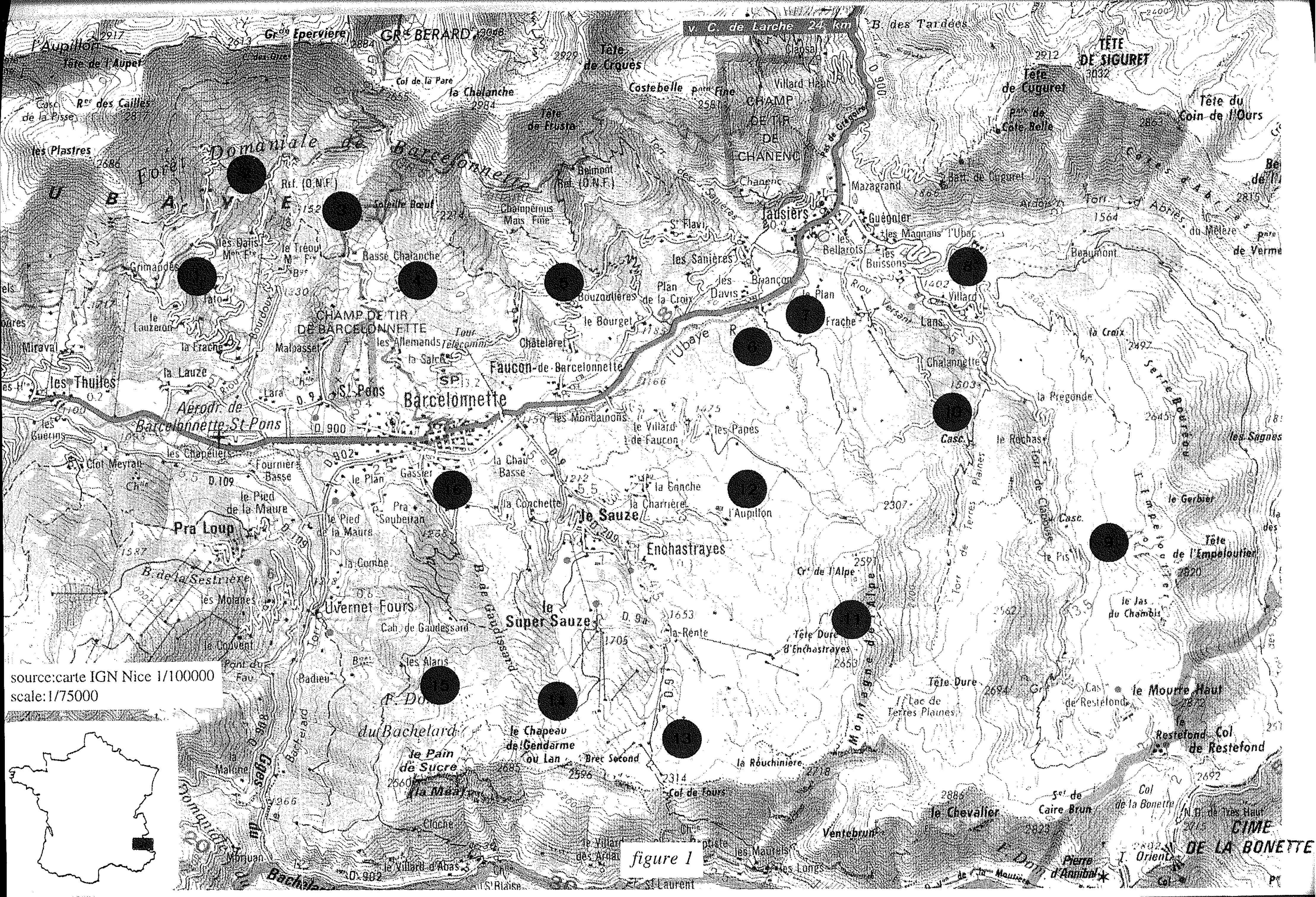
The most spectacular and the best-known in the region is the Valette landslip which appeared suddenly in 1982. In effect, in the spring of that year a rupture appeared at the level of a geological accident: contact between the native black marl and the alluvial deposit of the Autapie (unconnected flysch). Apparently this subsidence as provoked by the line of streams which predispose to abnormal contact. Little by little the active landslip is extended. The surface area affected by visible disorders increased from 26 hectares in 1983 to 32 in 1984, 50 in 1985 and 57 in the spring of 1987. After 1983 there was a study showing the extent of the phenomenon: the plane of the landslip was found to be 35 metres deep in some places, which makes all drainage of the sliding mass impossible. The volume of material in movement was estimated at 3 million cubic metres in 1983. It was in the region of 6 million in 1987. Between these dates, movements could have been rapid; the commune road slipped some thirty metres during the summer of 1985 (R.T.M. Note, May 1987). At present it seems that the numerous works carried out on the Valette site have succeeded in stabilizing this very extensive movement, but an important monitoring system is still in operation.

The Riou-Bourdou is the best-known river in the Ubaye valley. In 1894 the engineer Demontzey made an extensive study of it in his book entitled "The extinction of the Rivers of France by Reforestation". In particular we read that "the Riou-Bourdou, known throughout the country for its devastations, is the most terrible and the largest of all those actually active in the Alps". Although the Riou-Bourdou was reputed to be beyond rectification Demontzey undertook to deal with it, his aim being to extinguish it completely. Work on the basin was therefore commenced in 1868 and is still going on under the supervision of the R.T.M. services at Dignes. Within this huge basin (2,000 ha.) the Pra-Bellon sector is particularly unstable and includes a landslip representing several million cubic metres in slow and continuous movement. A wall 7 metres high was built in 1972 in an attempt to shore up the foot of this landslip (at a cost of 2 millions francs). During a rainy period the river could move some 700,000 cubic metres of material in the form of lava. "In spite of existing work to the bed, some 200,000 cubic metres could reach the Ubaye, with all the problems which this could entail for the airfield

LOCATION OF THE MAIN UNSTABLES SITES IN THE BARCELONNETTE BASIN

1. Bouzon's combe : **S** and **F**
2. Aiguettes ravine : **S**
3. Pra Bellon : **L-F**
4. La Valette : **S**
5. Bouzoulières road : **S**
6. Poche and Ribes streams : **S** and **L-F**
7. le Plan : **F**
8. Lans : **S**
9. le Pis : **S**
10. la Frache/Bois noir : **S**
11. Chamoussières rock : **R**
12. l'Aupillon : **F**
13. Routres ravine : **S** and **F**
14. Super-Sauze : **L-F**
15. les Alaris : **S** and **F**
16. Jalet (Gaudissard stream) : **S**

S = Slide
F = Flow
L-F = Landslip-Flow
R = Rockfall



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scale:1/75000

figure 1

and the road. Furthermorè, this torrential lava could provisionally dam the Ubaye, the waters of which could drown the valley over a considerable length upstream of Saint-Pons" (RTM report, F. COMBES, 1979).

The landslips of Pra-Bellon and la Valette, less than 2 km. distant as the crow flies, are both exposed to the sun on the north slope of the Barcelonnette basin. There are also several landslips on the opposing south slope, between Jausiers and Enchastrayes. The most recent, breacked out in the course of April 1993, is located at about 4 km south from Jausiers, in the sector of La Frache. A stretch some 40 metres wide and more than 200 metres long has subsided and slipped, carrying away all the forest which it supported as well as the road leading to Bois Noir. What is original about this landslip is that it developed entirely under relatively dense forest at an altitude of around 1,600 metres.

For many years there has been a very active landslip flow in the Poche river basin, which mobilizes some 600,000 cubic metres of material at an altitude of between 1,230 and 1,500 metres; at the moment the front of the flow reaches almost to the bed of the Ubaye, which could therefore be obstructed very quickly if there were generalized torrential lava. In this same sector of the Poche river, on the left bank, we also note the presence of a smaller landslip (20 to 30 m. wide over less than 100 m. long) situated on the prairie zone near the Rayne sheep run.

A final sector of particular interest is the Super-Sauze, and the second part of this article is devoted to it. The unstable zones briefly described in this opening chapter are the most important and the most interesting in the Barcelonnette basin at present. However, many other earth movements have occurred in the past or are still active at present in the region. Mr. André LEGIER recorded around a hundred in 1977, some twenty of which are described in his thesis "Earth Movements and Recent Development of the Relief in the Barcelonnette Region" (A. LEGIER, thesis, 1977). All these declared instabilities demonstrate the considerable susceptibility of land in this region, in liaison with the geological context and the climatic conditions

THE SUPER-SAUZE LANDSLIP-FLOW

PRESENTATION OF THE UNSTABLE SITE

In the Restefond massif on the south slope of the Ubaye valley, the Super-Sauze winter sports station is situated 5 km. from Barcelonnette on the Enchastrayes commune's land. The site studied is located exactly at the foot of the Chapeau de Gendarme (2,685 m.) and the Brec Second (2,596 m.), at altitudes of between 1,700 and 2,150 metres; it takes the form of a vast bad-land consisting of the black soil of the Autochtone, the mediocre mechanical characteristics of which local people have recognized for generations. This sector, covering an overall area of some 75 hectares, is known in the local language as the "Roubines".

The crown d'arrachement is certainly the most spectacular geomorphological element in the landscape of this slope. Mainly oriented north-east/south-west, this escarpment bounds the study zone on the south over a length of nearly 1,000 m., presenting undulations or notches consecutive to subsidence or localised landslips. The altitude of the edge of the crown spreads from 1,970 to 2,150 m. from east to west. The Sauze rises at an altitude of 2,070 metres at a place called "La Goutta", only a few metres behind the edge of the crown.

The main stepped slope of the landslip presents a departure from level of 80 metres under the shepherd's cabin which is threatened with subsidence by the withdrawal of the crown. It is also in this sector that the walls have the steepest slopes, more than 80%. Two very different formations touch each other in this escarpment - a moraine layer some ten metres thick is superimposed on the black soil upper Oxfordian marl/chalk shingle. Two very visual elements demonstrate this discord on the terrain: on the one hand, the light beige colour of the moraine bed contrasts with the darkness of the black marl. Secondly, a very marked break in the slope demonstrates the differently balanced positions of two formations of different textures and degrees of granulometry. This superimposition also creates a plane of discontinuity from a hydrological viewpoint.

The retreat of the crown occurs by the combination of various processes which affect the walls. In the upper morainic part these are gravitational movements of the rockfall type, subsidence and landslips which continually alter the outline of the edge of the crown. Underneath, in the Autochtone formations, the layered structure of the marl favours decomposition by plaques in the walls where the marl flakes are oriented almost parallel to the topography. Subjected to alternate freezing and thawing, humidity and drying-out, the rock splits and gives rise to a large quantity of debris which is added to the floor of fine scree which covers the base of the walls.

The very active body of the landslip flow is spread out at the foot of this escarpment and of a number of ravined slopes nearby. The whole of this reworked material is spread between the 1,730 and 1,960 m isohypses over a length of approx. 600 m. The average slope is of the order of 40%. In the upper part the flow is almost 200 m. wide, whilst the terminal fold narrows down to only ten metres or so. A graphic estimation of the total area covered by reworked material sets this at 54,600 m^2. It is a delicate matter to estimate the thickness of this material without drilling "in situ" as it is impossible to have a precise knowledge of the underlying topography of the land covered by landslips and/or flows. A very rough idea of the size calculated from aerial photographs taken at various times and from observations of the land sets the volume of material which can be moved in the form of a flow at around 500,000 m3. This figure can give rise to some anxiety when we imagine that one day this mass could flow towards the Ubaye in the form of a catastrophic mud flow, like those which this slope has already known in the past.

There is another very unstable perimeter at the "Roubines road", at an altitude of around 1,700 m and beyond the main landslip flow studied. This is a confluence zone between the Sauze itself, which descends directly from "La Goutta" and the drain from the roubines. One slope here has been particularly active for

Aerial view of the Super-Sauze landside-flow

GEOMORPHODYNAMICAL MAP

SUPER-SAUZE LANDSLIDE

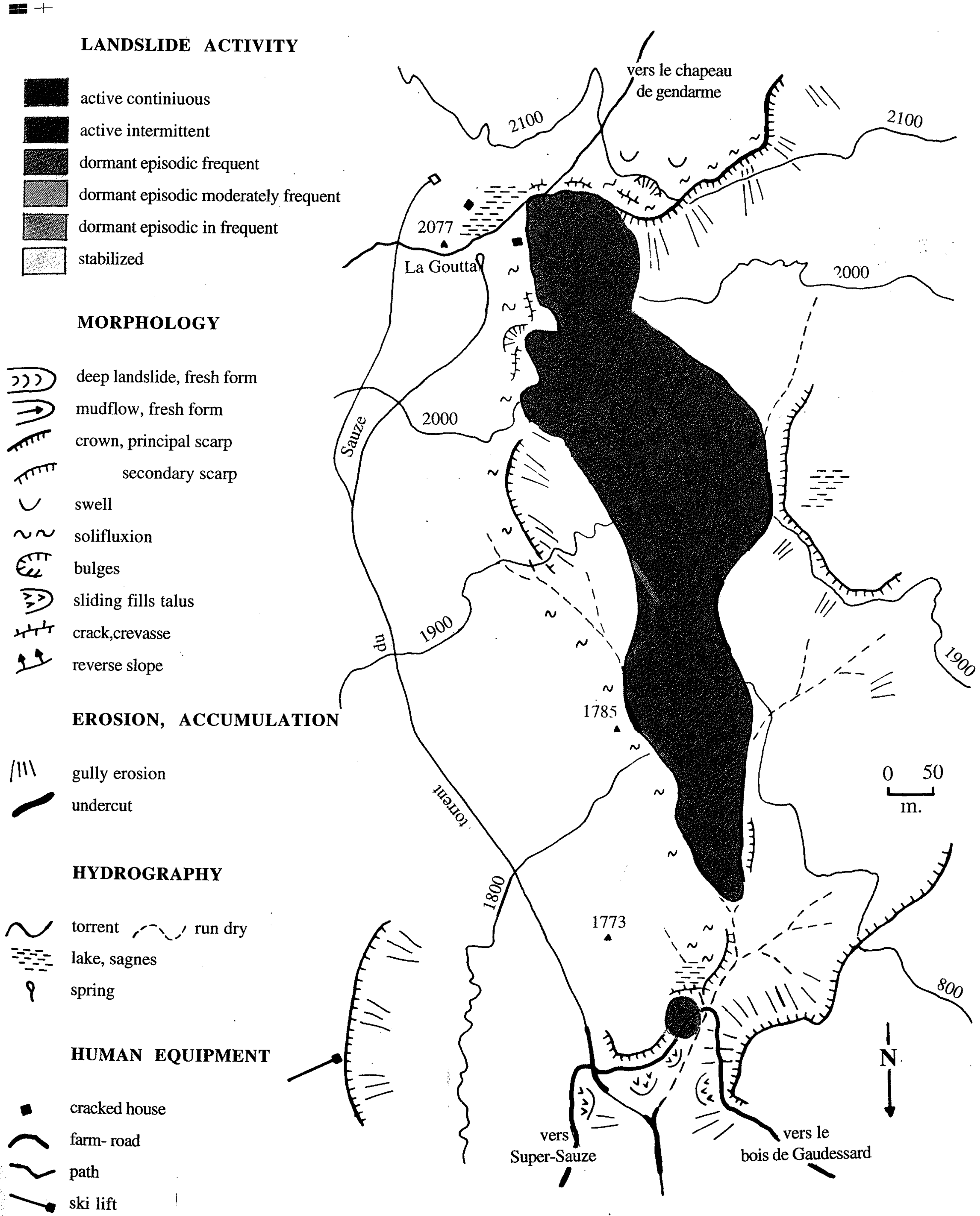

figure 2

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several years, presenting a clear excavation scar some sixty metres long with several intermediate slipped scattered over the slope. Because of the intense activity over the whole of this zone almost 500 metres of roadway have been systematically destroyed and have been relaid regularly every summer with heavy earth-banking machinery.

A MONITORING OPERATION

Since August 1991 the unstable land described earlier has been monitored and subjected to special morphodynamic follow-up carried out "in situ" using a network of topometric measures. Measurements are made with high-precision electro-optic apparatus (WILD T 1600 theodolite with a DI 3000 distancemetre). Furthermore, a whole series of supplementary measurements are carried out with a 50 metre ribbon rule. Given the configuration of the site in the form of a circus, with a central landslip-flow in the axis of the talweg, encased between lateral slopes subject to ravining and surmounted upstream by an imposing cornice, we decided to install a network which would enable us to cover a maximum of points from a minimum of stations. This design, which we preferred to the more traditional closed polygon, was expressed graphically by this radial aspect around the two main station points. This choice was also justified by practical considerations, as it limited the movement of equipment, irksome and difficult on these reliefs. A monitoring system of the same type, based on two stations set up opposite the unstable slope, was installed some years ago on the La Clapière site, near Saint-Etienne de Tinée (J.P.FOLLACI, 1984).

More than two years ago, then, in August 1991 the monitoring network, based on 40 electro-optical readings supplemented by some fifty ribbon rule readings, was installed in accordance with the land's morphological indications to follow up the development of two particular phenomena on the Super-Sauze site: the retreat of the main excavation crown and the advance of the body of the landslip-flow. The roubines road sector was also provided with a few landmarks. (Fig. 3).

Up to now the results of the first five recording campaigns have shed light on several notable movements of landmarks, some of them spectacular (a sixth campaign was carried out a short time ago). Thus the most significant movements are recorded in body of the landslip-flow; one of the pickets (no. 20) even disappeared during the first months after its installation, buried under the moving marl mass. Between August 1991 and June 1993 picket no. 18 moved some 27 metres in the axis of the flow. Significant movements of rocky block and sliding packets have also been recorded for the unstable slope which regularly destroys the roubines road. A moraine block of some 4-5 cubic metres the movement of which have been monitored by ribbon rule measurements has thus slipped some twenty metres down the slope in less than two years. The main crown, at an altitude of about 2,000 metres, also shows numerous signs of activity, even if most of the markers installed do not record significant movements. Two sectors, however, are more active, at the level of boundaries 6 and 7 as are 12, 14 and 15. The figure 4 gives the most important movements recorded on the unstable site during successive measurement campaigns.

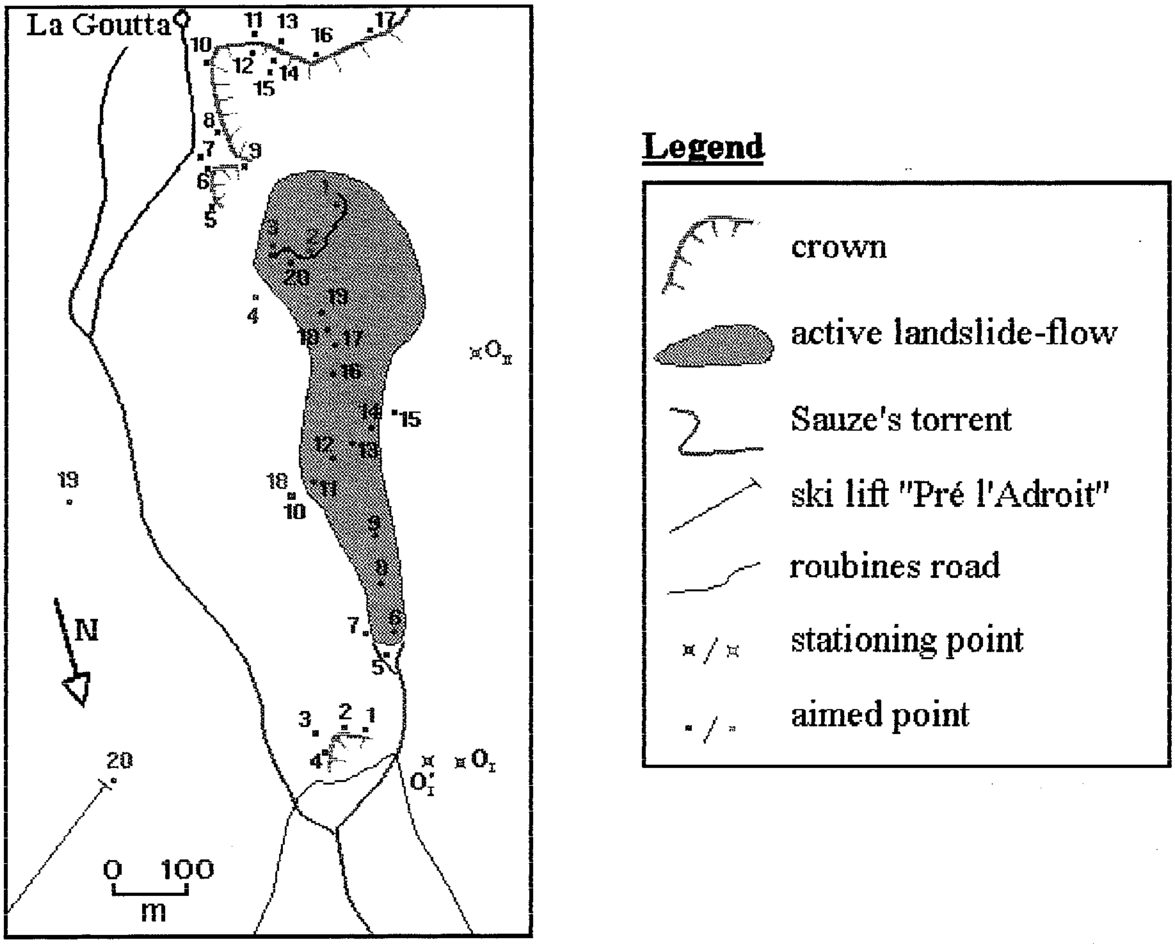

Figure 3 ; The topometrical network installed on the Super-Sauze site.

point n°	8/91-5/92	5/92-10/92	10/92-5/93	5/93-6/93
1	1,56	2,69	3,20	
2	1,64	2,77	1,98	0,63
3	1,66	2,88	2,27	0,47
6	0,05	0,03	0,21	
12	0,19	0,33	0,39	
14	0,23	0,42	1,85	
6	0,75	0,96	2,55	
8	0,55	0,70	1,60	0,06
9	0,52	0,63	1,64	0,05
11	0,82	1,12	2,35	0,08
12	1,84	2,40	4,80	—
13	1,56	2,07	4,25	0,11
14	1,41	1,45	2,85	0,10
16	2,76	3,81	7,41	
17	4,55	7,35	10,33	0,15
18	5,91	8,95	12,02	0,21
19	15,69	3,83		0,34

Figure 4 ; Main displacements (in meters) recorded on the Super-Sauze landslide-flow between the five first measurement campaigns.

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