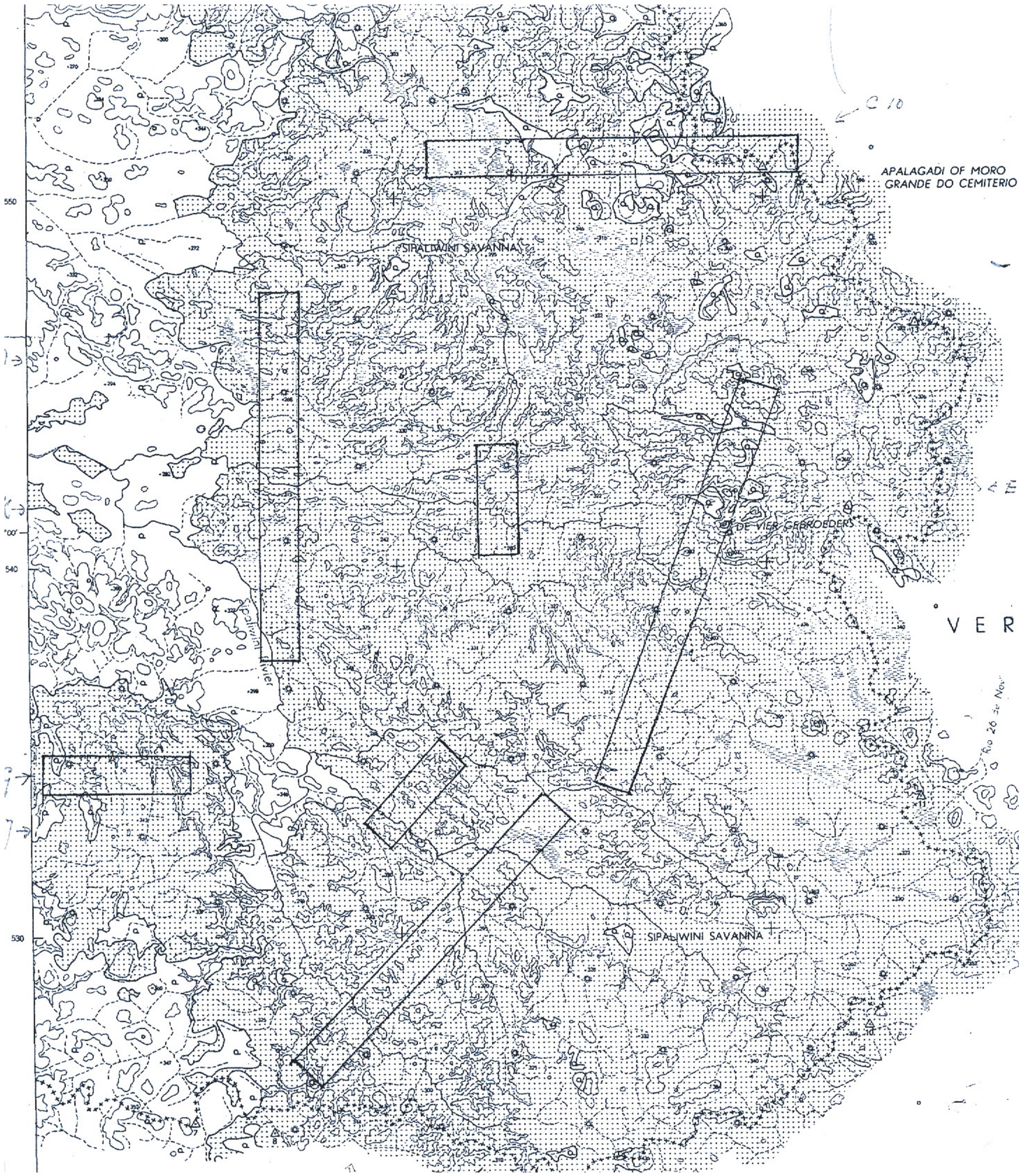
THE TRANSECTS



By Oldenburger,F.H.F. & Norde,R.*
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Correspondence author. Email r.norde@kpnplanet.nl

Apart from the floristic inventarisation, the syn-ecological and syn-systematic investigation of the vegetation and the research into the geomorphology and soils of the Sipaliwini Savanna (Riezebos, 1979), the production of vegetation maps was a main focus of our expedition.

LANDSCAPE

The Sipaliwini Savanna is situated at 2.00°N and 56.00°W (see our article 'Ecological Investigations ….' elsewhere on this site).
It is the minor part of a vast savanna complex on both sides of the flat watershed which forms the border between Surinam and Brazil, the far greater Paroe Savanna across the Brazilian border forming the major part.
The whole complex is situated on an extensive peneplain and is surrounded by the huge Amazonian Rain Forest

The general aspect of the landscape is that of an open plain with rolling hills of low to medium height. They are separated from one another by narrow to wide open valleys, intersected with creeks and small rivers.
The hills are often covered with scattered rocks and boulders, which gave rise to the local Amerindian name 'Diapokoimape' meaning 'Land full of Stones'. Sometimes isolated granitic dome like the Morro Grande or miniature mountain massifs like the 'Vier Gebroeders' rise 200 to 300 meters the general plain dominating the scene.

CLIMATE

Based on data collected at the Sipaliwini airstrip weather station (situated only 5 km west of the savanna border within the semi-evergreen forest zone) the Sipaliwini Savanna climate is, according to the Koppen climate standard, provisionally characterized as Am (Riezebos 1979).
There is a seasonal distribution of precipitation. Rainfall is maximal in May and June and minimal in September and October (Fig. 1.)
Alternating wet and dry seasons are often associated wit the occurrence of savannas in the Tropics.

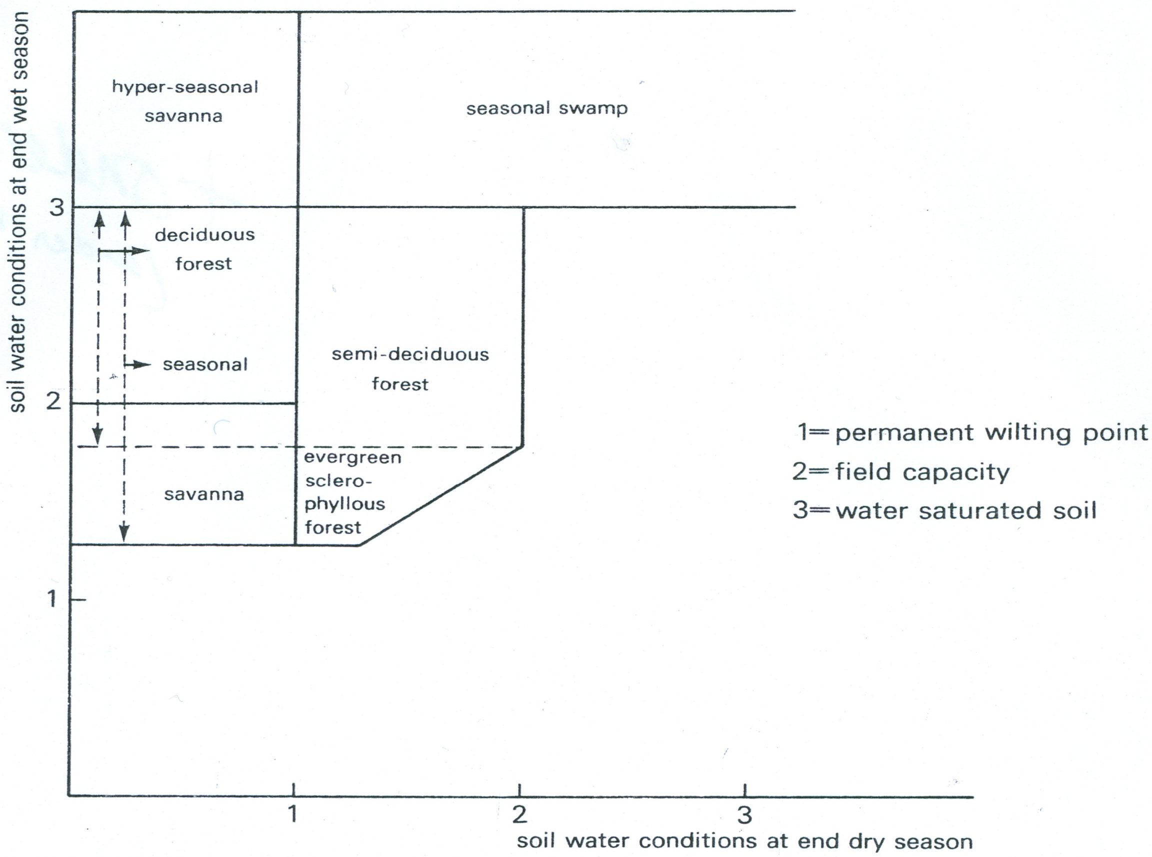
JAN	FEB	MARCH	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
153	153	215	267	453	313	205	108	47	42	85	73

ANNUAL MEAN: 2169

Fig. 1. Monthly precipitation in mm 1961 – 1972 (Riezebos 1979)

In relation to the climate three types of savanna ecosystems can be distinguished:
I. Seasonal savanna ecosystem
II Hyper seasonal savanna ecosystem
III. Non-seasonal savanna ecosystem (see Sarmiento and Monasterio, 1975)

The seasonal savanna ecosystem may be associated with the hills, covering 70% of the area. The hyper seasonal savanna ecosystem is represented by the valleys with their impeded water table as can be seen during the wet season when valleys are inundated and swamps are flooded.



Ideal distribution of ecosystems under tropical 'wet and dry' climates, in relation to maximal stress in two contrasting seasons. (After SARMIENTO & MONASTERIO, 1975, modified).

GEOLOGY

The Sipaliwini area is part of the Surinam Basal Complex which in turn is part of the Guiana Shield. It shows some characteristics of Precambrian orogenesis. Faults have a NE or NW strike.

The lithology of the Sipaliwini Savanna is not known in great detail.

Van de Lingen (1964) paid a short visit to the area. O'Herne (1966) published a map based on his interpretation of aerial photographs and on Van der Lingen's geological map. Riezebos (1979) added his own field observations to that and prepared a geological sketch map of the Upper Sipaliwini Area. See Fig. 2.

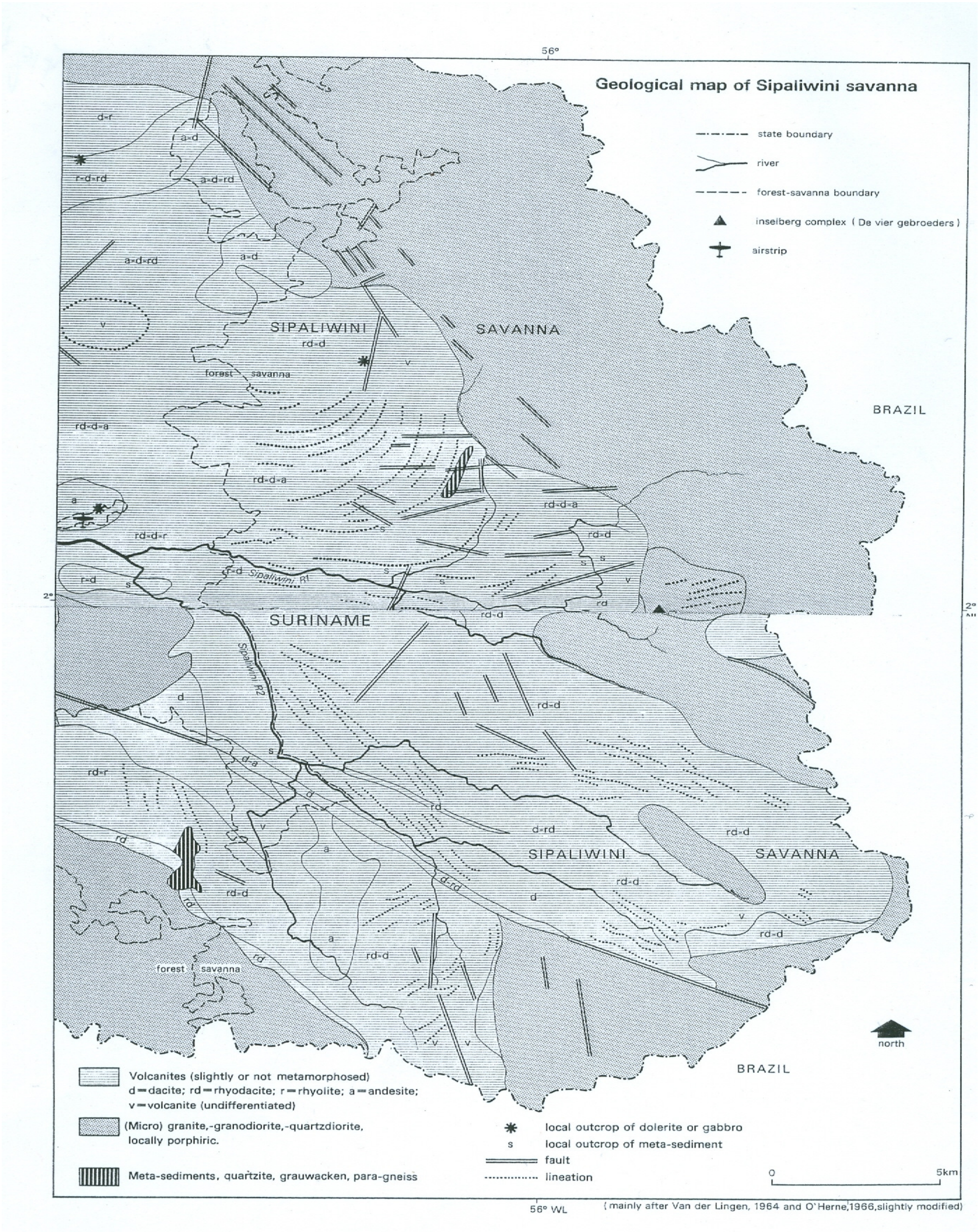

Geological map of Sipaliwini savanna
56°
state boundary
river
forest-savanna boundary
inselberg complex (De vier gebroeders)
airstrip
SIPALIWINI
SAVANNA
forest
savanna
BRAZIL
SURINAME
Sipaliwini R1
Sipaliwini R2
SIPALIWINI
SAVANNA
north
BRAZIL
2°
2°
Volcanites (slightly or not metamorphosed)
d = dacite; rd = rhyodacite; r = rhyolite; a = andesite;
v = volcanite (undifferentiated)
(Micro) granite,-granodiorite,-quartzdiorite,
locally porphiric.
Meta-sediments, quartzite, grauwacken, para-gneiss
local outcrop of dolerite or gabbro
local outcrop of meta-sediment
fault
lineation
0
5km
56° WL
(mainly after Van der Lingen, 1964 and O'Herne, 1966, slightly modified)

Fig.2.

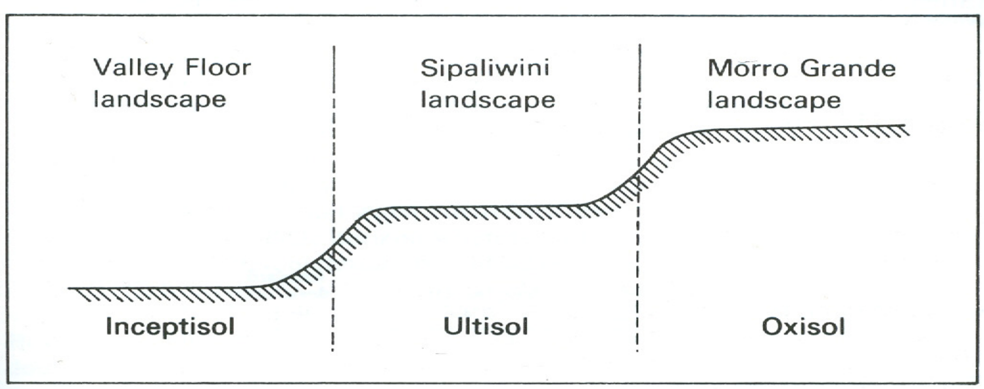
Apart from granite and vulcanite areas, the local occurrence of sediments like quartzite is indicated on this map.
Granites can be found in the East, vulcanites in the Western and Southern part of the savanna.
For further details we like to refer to Riezebos, PhD thesis, 1979.

MAPPING THE VEGETATION

To survey and map the vegetation of the whole savanna area - 630 km² - would have been an unrealistic endeavour (not to say impossible) since walking was our only mode of transport. So for practical reasons we decided to select a number representative cross sections or transects (1km wide and 3 – 11 km long) on a sufficiently detailed scale (1:10,000) to delineate the various vegetation types.
A set of aerial photographs scale 1:40,000 covering all of Surinam have been available since 1957.
Thanks to the efforts of the CBL (Central Bureau for Aerial Mapping of Surinam) we had to our disposal a photo-mosaic of the area, a topographical map 1:100,000 and a map 1:20,000 of the Sipaliwini Savanna proper. These tools proved to be of essential value for our research.

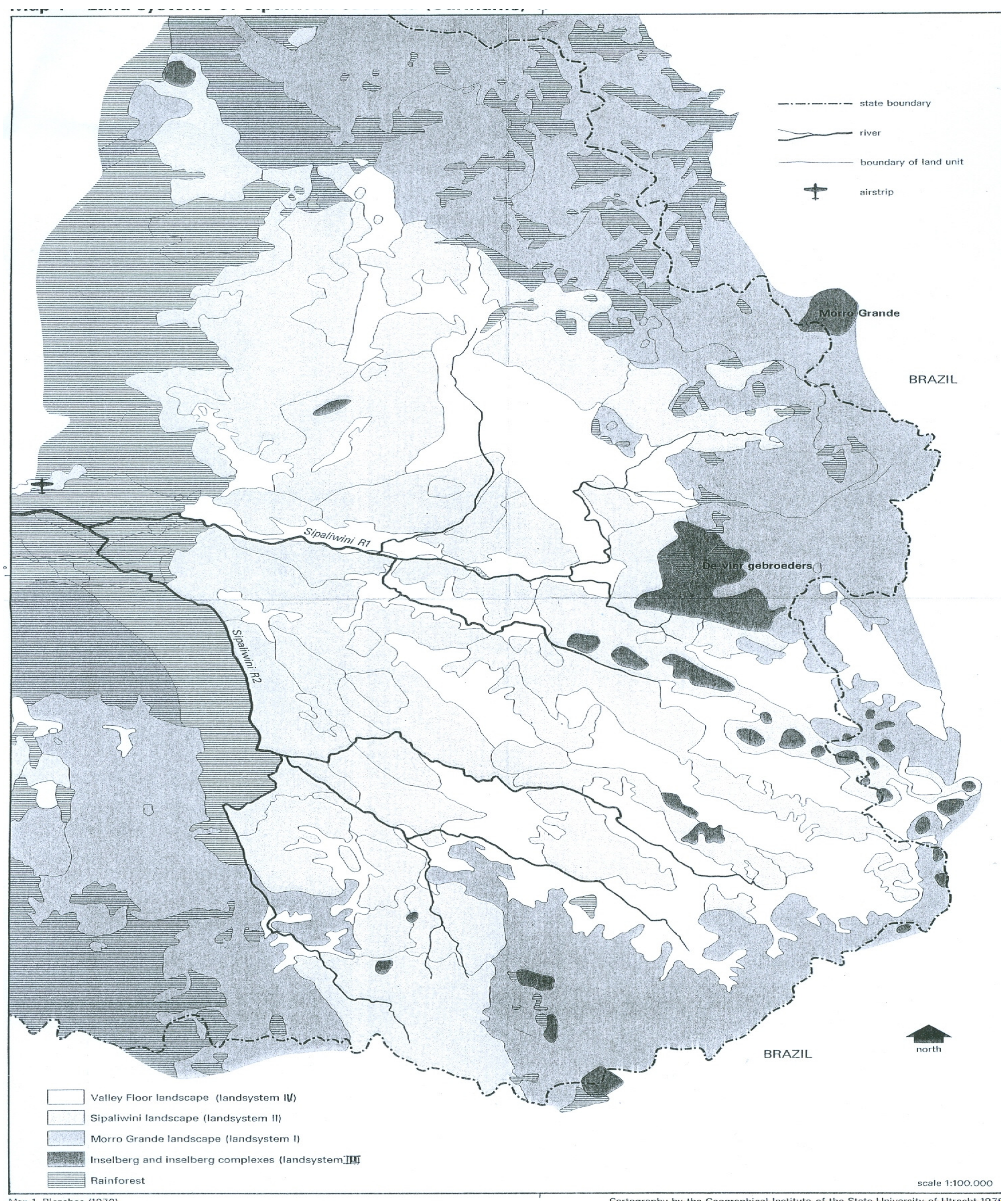
GEOMORPHOLOGY

Using aerial photographs Riezebos was able to distinguish 4 geomorphological landscape types:
I Morro Grande landscape
II Sipaliwini landscape
III Valley Floor landscape
IV 4 Gebroeders landscape See Fig.3. (next page)
Also, by using his method of 'simplified contour mapping' he found 3 so called summit levels, based on the regularity of the heights of the various hill tops.
These summit levels represent different phases of planation in the development of the landscape. See Fig.4.



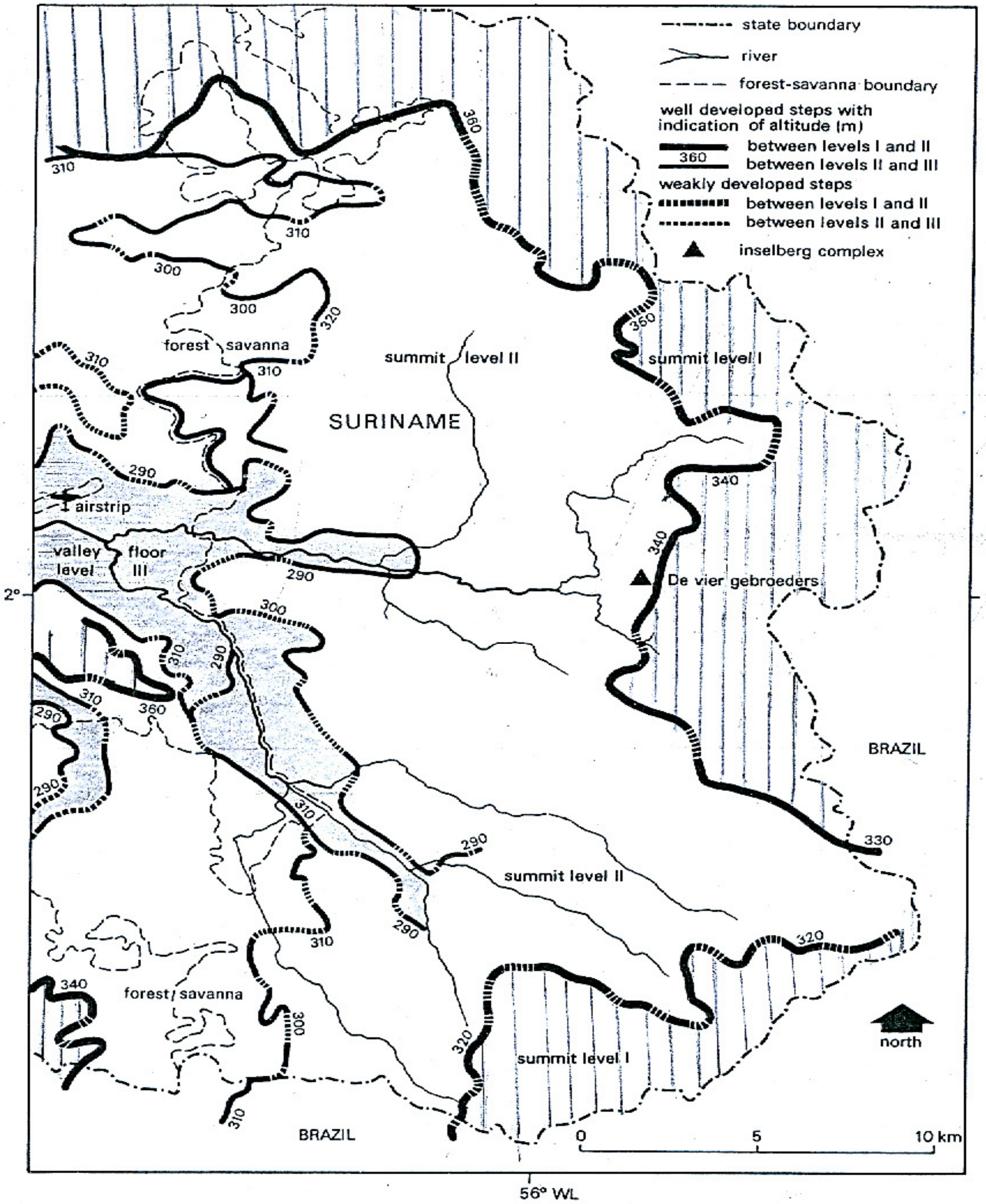
Provisional and schematic distribution of soil orders in relation with landscapes

Fig.4



state boundary
river
boundary of land unit
airstrip
Morro Grande
BRAZIL
Sipaliwini R1
De vier gebroeders
Sipaliwini R2
BRAZIL
north
Valley Floor landscape (landsystem IV)
Sipaliwini landscape (landsystem II)
Morro Grande landscape (landsystem I)
Inselberg and inselberg complexes (landsystem III)
Rainforest
scale 1:100.000

Fig.3.



Summit- and planation levels with accompanying steps in the Upper Sipaliwini basin.

Fig.5.

A simplified Summit Planation Level map is given above.

The oldest and highest landscape is in the NE on granite: the Morro Grande landscape.
The most recent and lowest level of planation coincides with the Valley floor landscape in the West, a decrease in altitude from 400m to 270m.
Fig.5.shows the occurrence of ‘steps’, each measuring 20 – 30 m.
Some relation with parent material may be assumed. The step between summit level I and summit level II coincides with the boundary between granite and vulcanite. At other places however summit level II is cut across the granite – vulcanite boundary without showing any ‘step’.
As Riezebos argues, these summit levels were initially formed as planation levels.Due to conversion of the conditions favourable to planation into conditions in favour of vertical erosion only remnants (hill tops) of the original plains were preserved.

SOILS
Some 150 soil profiles were described in the field of which 20 were sampled for further analysis.

Three orders of soil groups were - according to the USDA Soil Taxonomy – identified: Inceptisoils, Ultisoils and Oxisoils. Fig.4. shows their distribution among the various landscapes and summit levels.
The weathering and development of the soils is linked to the genesis and development of the geomorphology rather than to the weathering of the original parent material.

Oxisols are generally without clearly marked horizons. They are recognisable in the Morro Grande and part of the Sipaliwini landscape by remnants of the plinthite cuirass (developed originally under forest cover) as plinthite gravel or pisoliths at the soil surface. They do not have an argillic or spodic horizon because they are often truncated. In the Morro Grande landscape the haplorthox soils prevail.

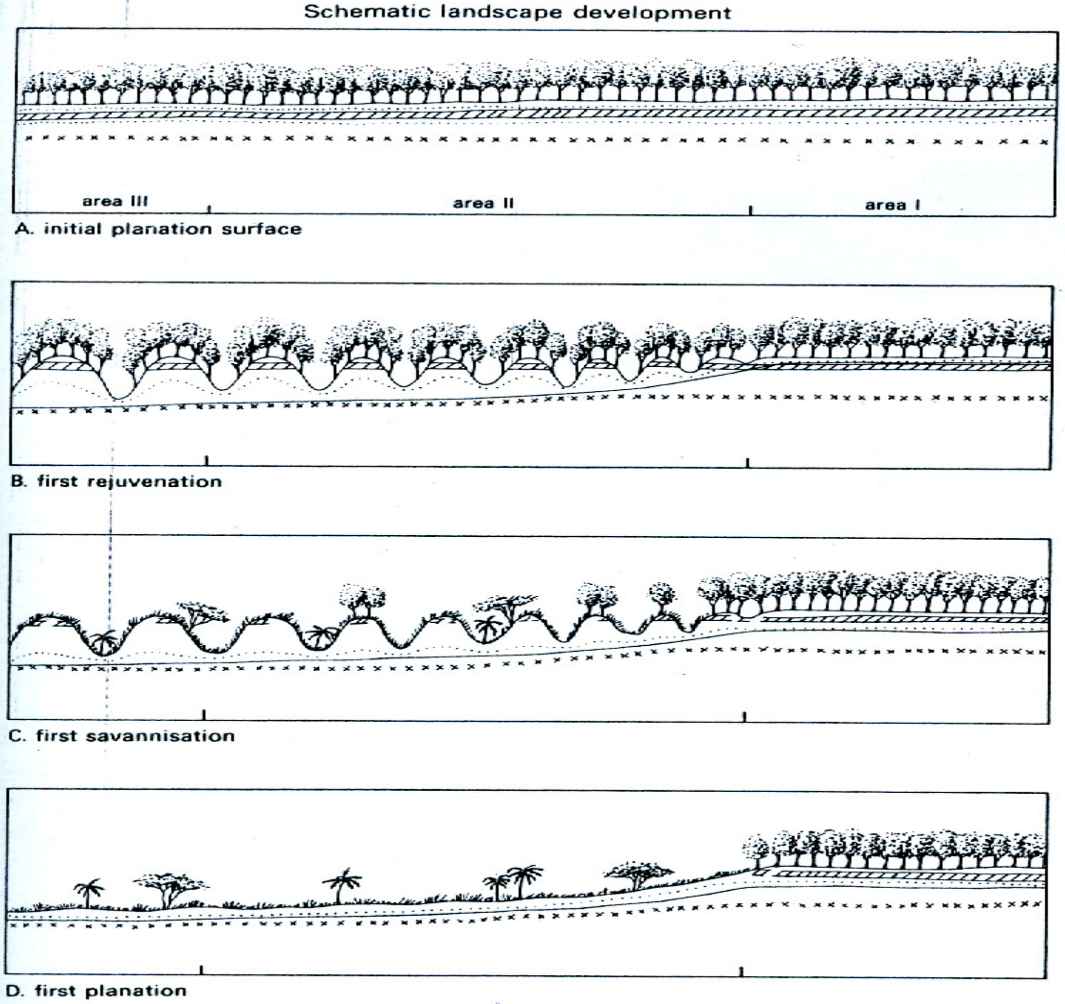
The Ultisoils of the Sipaliwini landscape are characterized by the presence of an argillic horizon, an indicator of illuviation. Paleudults are the main soil type.

In Inceptisols there is a cambic horizon but no sign of illuviation and clay transport. Inceptisols are restricted to post-Pleistocene surfaces, an indication that the present phase of savanisation is not more than 15,000 years old

Riezebos (1979) designed a model of landscape development including two savannisation and two planation phases as shown in Fig.6 and 7 (next pages). The recent savanna vegetation is reflected in the second planation phase.

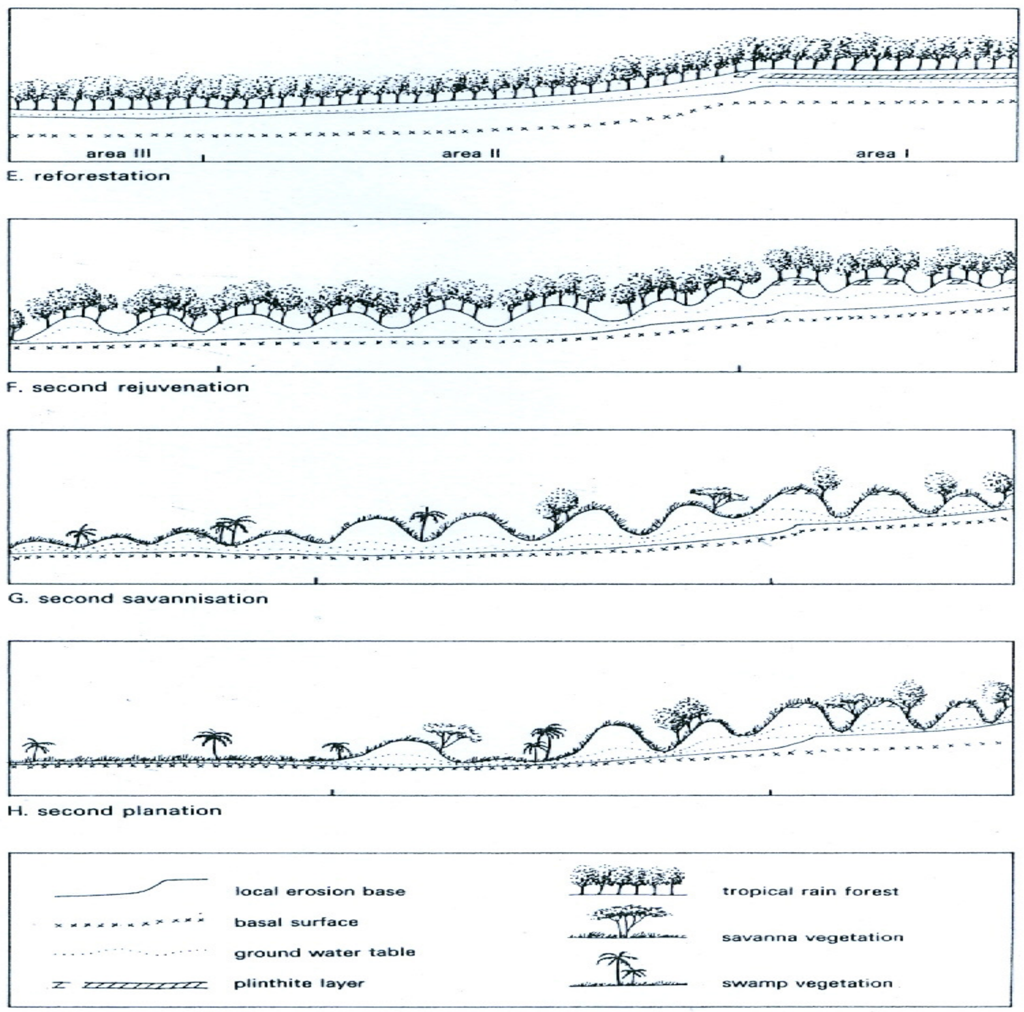
The spatial distrbution of the various vegetation types is represented in the second part of this section: TRANSECT Maps.

Schematic landscape development



A schematic model of landscape development for Sipaliwini Savanna

Fig.6.



(continued) A schematic model of landscape development for Sipaliwini Savanna

Fig.7.

ALL Figures of TRANSECTS part 1 are from Riezebos, PhD thesis, 1979