Corona System Overview

Training Center

U.S. Geological Survey
Center for Earth Resources
Observation and Science (EROS)
Sioux Falls, South Dakota, USA

Applications of Coarse to High Resolution Satellite Imagery for Land Productivity Assessment & Management

Corona System Overview

Gray Tappan – SAIC / USGS EROS

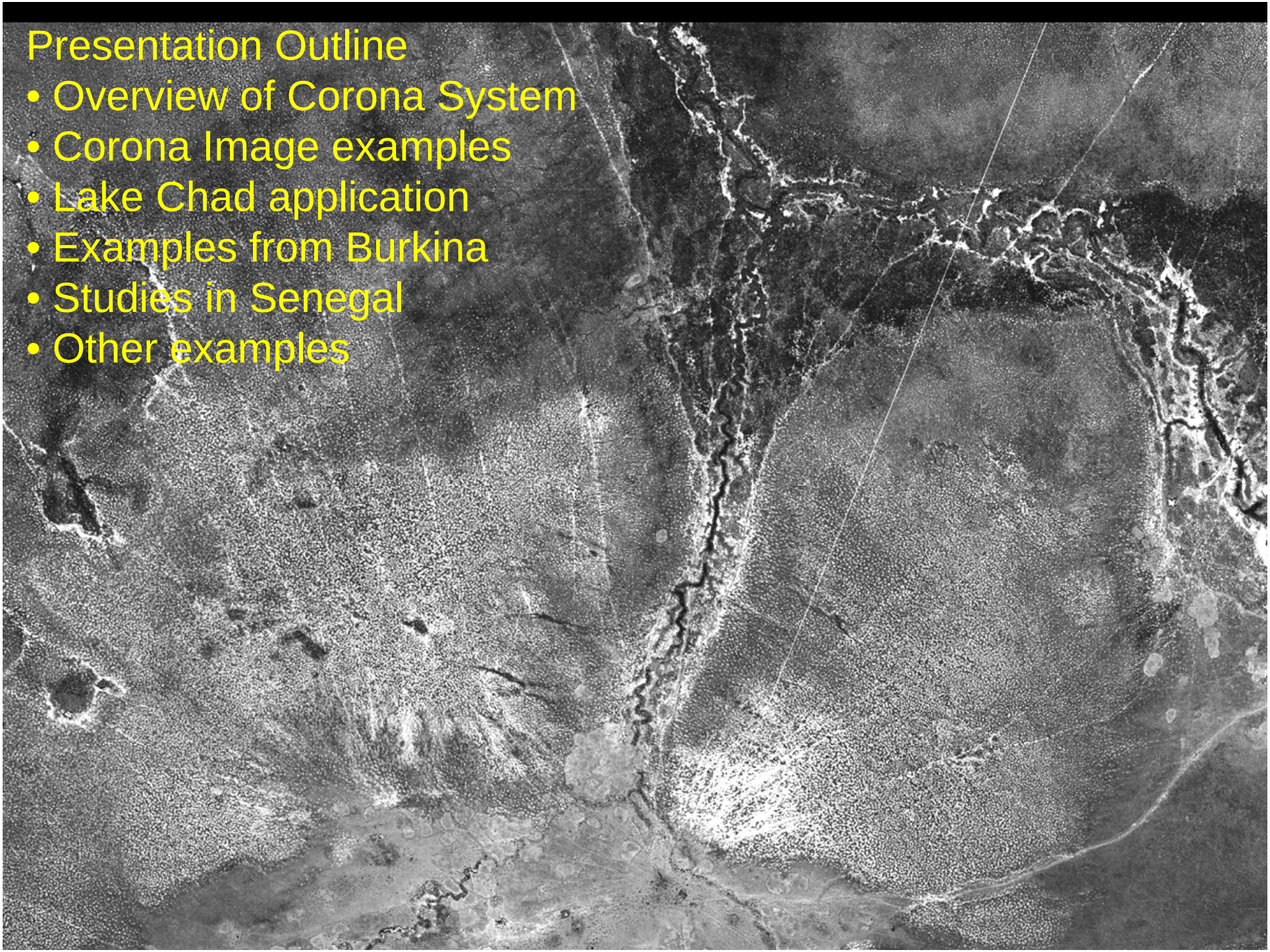
Bamako , Mali

6 - 17 February, 2006

Corona System Overview

Gray Tappan
U.S. Geological Survey / EROS
Sioux Falls, South Dakota USA
Tappan@usgs.gov

Nouakchott 1965



Presentation Outline

- Overview of Corona System
- Corona Image examples
- Lake Chad application
- Examples from Burkina
- Studies in Senegal
- Other examples

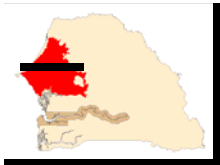
Corona – Imagerie spatiale classée

Niveau du satellite :

Imagerie historique des programmes Corona et Argon

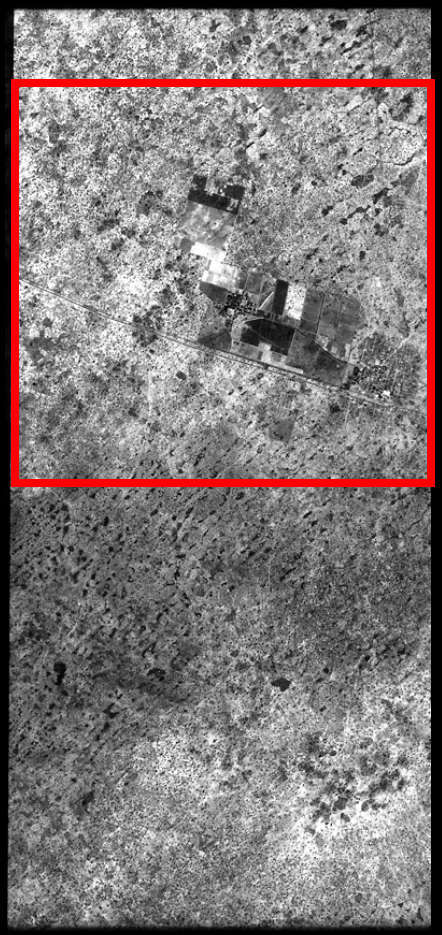
Récapitulatif pour le système Corona :

Période d'opération :	1959-1972
Nombre de missions :	95 réussies ; 121 totales
Orbite :	presque polaire
Altitude :	150 à 203 km
Type de senseur :	appareil photographique, longueur focale de 24'' (61 cm)
Type de film :	film Kodak panchromatic
Echelle nominale de la photographie :	1:305.000^{e}
Région spectrale :	Visible
Angle de balayage :	70 degrés
Couverture au sol :	19,6 par 266 km
Résolution au sol :	1,5 à 8 mètres

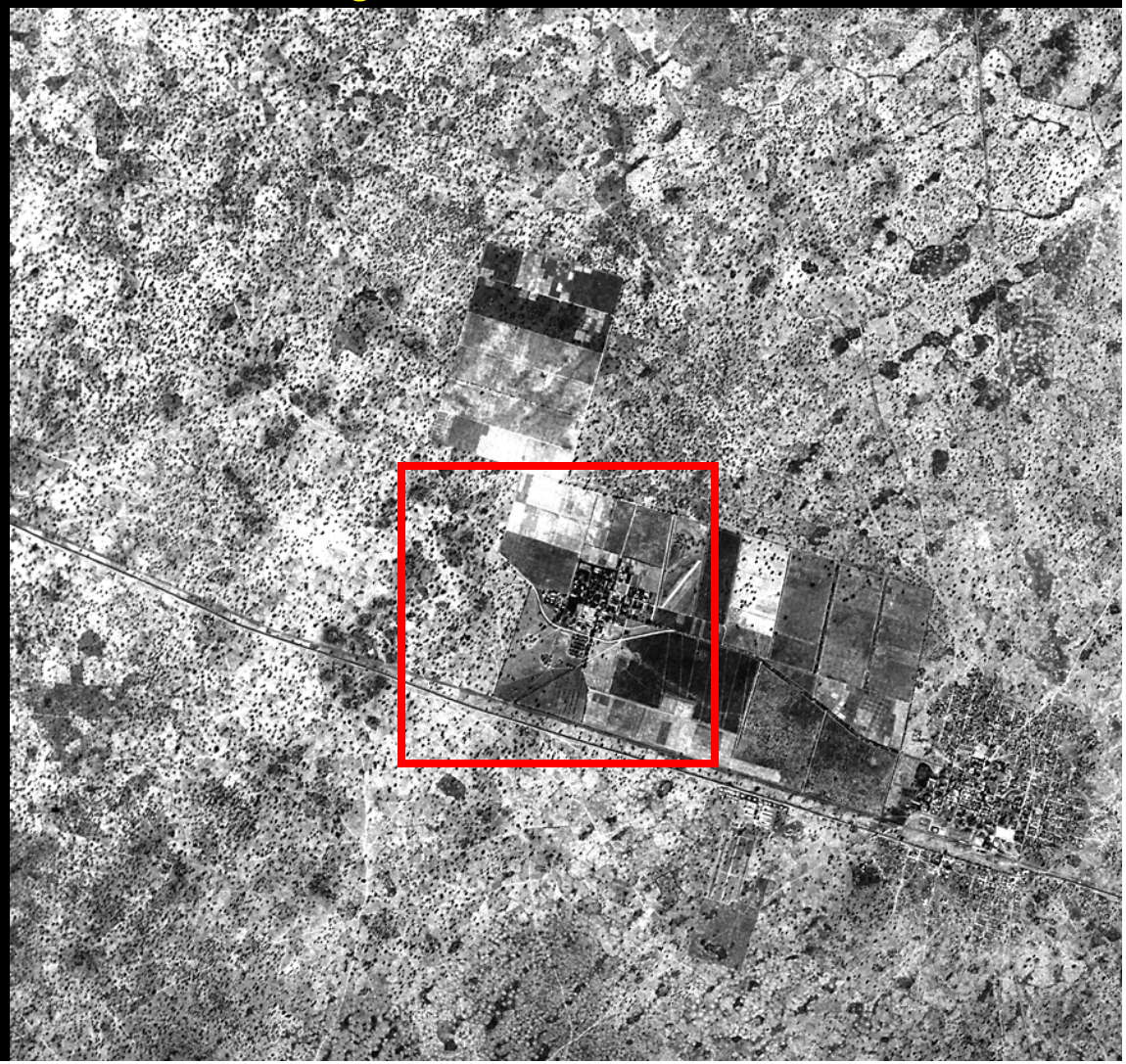


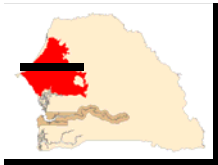
Photographie Corona: janvier 1968

Cliché entière: 20 X 266 km



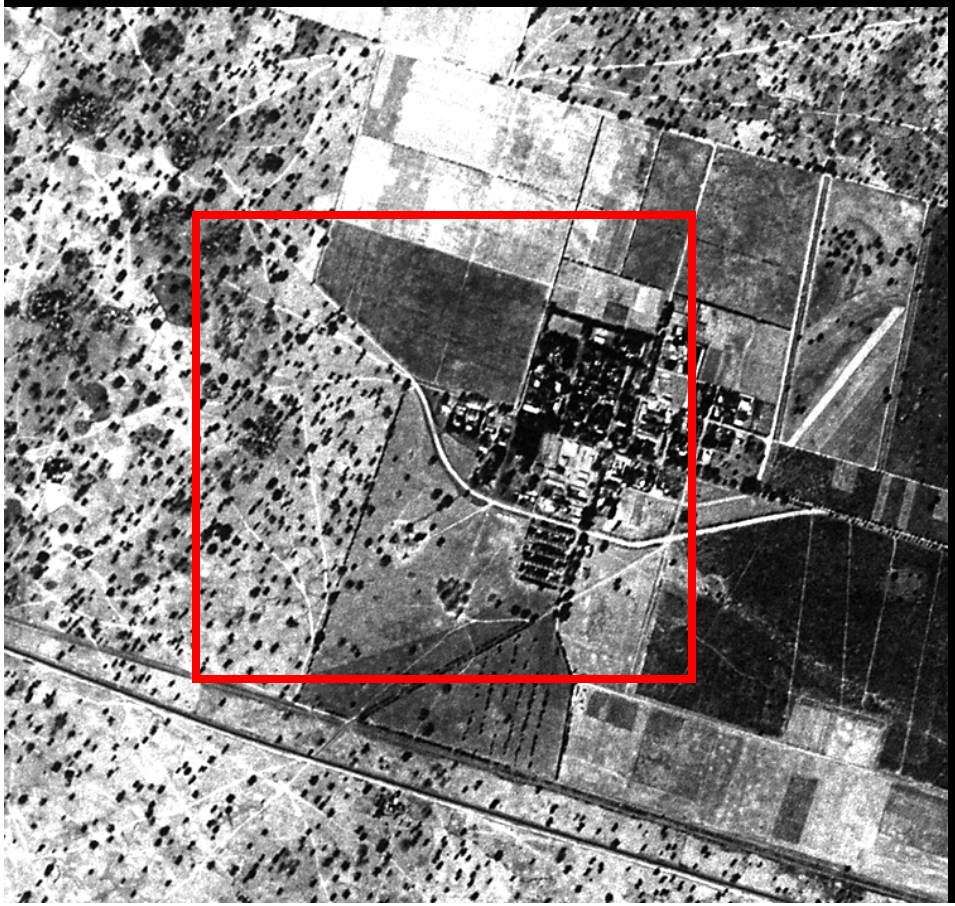
Agrandissement: 8 X 8 km





Photographie Corona: janvier 1968

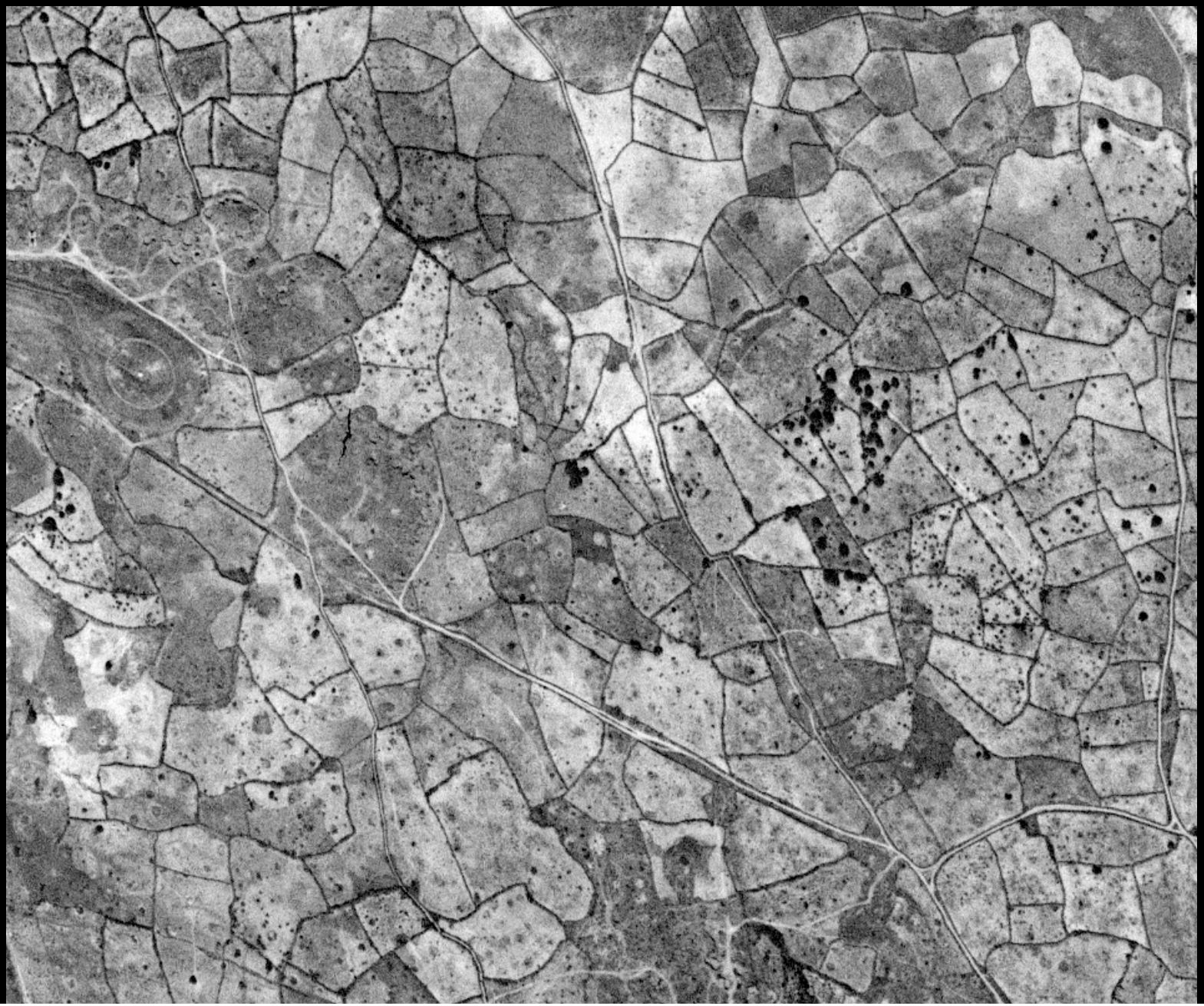
Agrandissement: 2.4 X 2.4 km



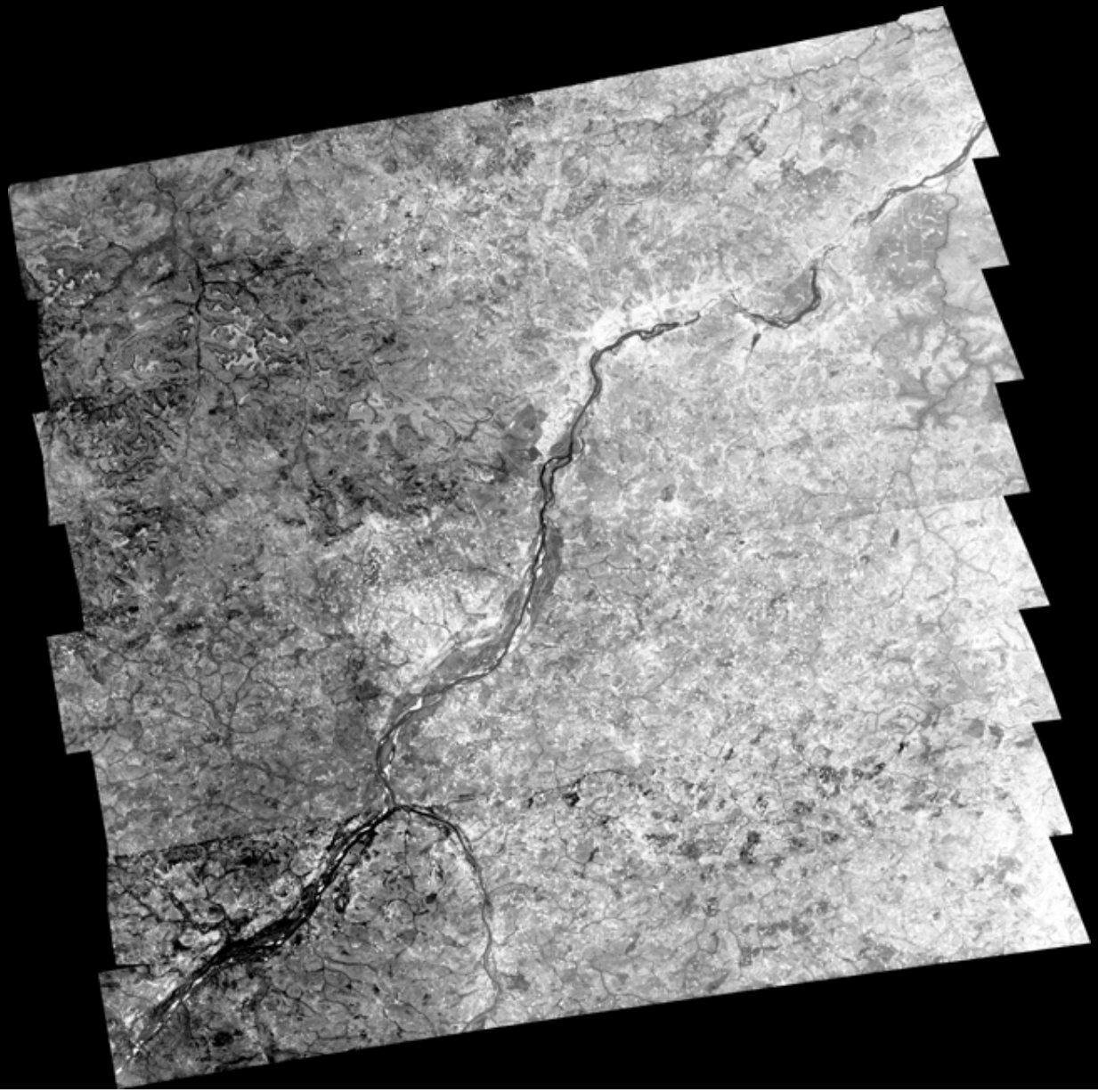
Agrandissement: 1.2 X 1.2 km

Corona: Université de Dakar, 19 février 1966

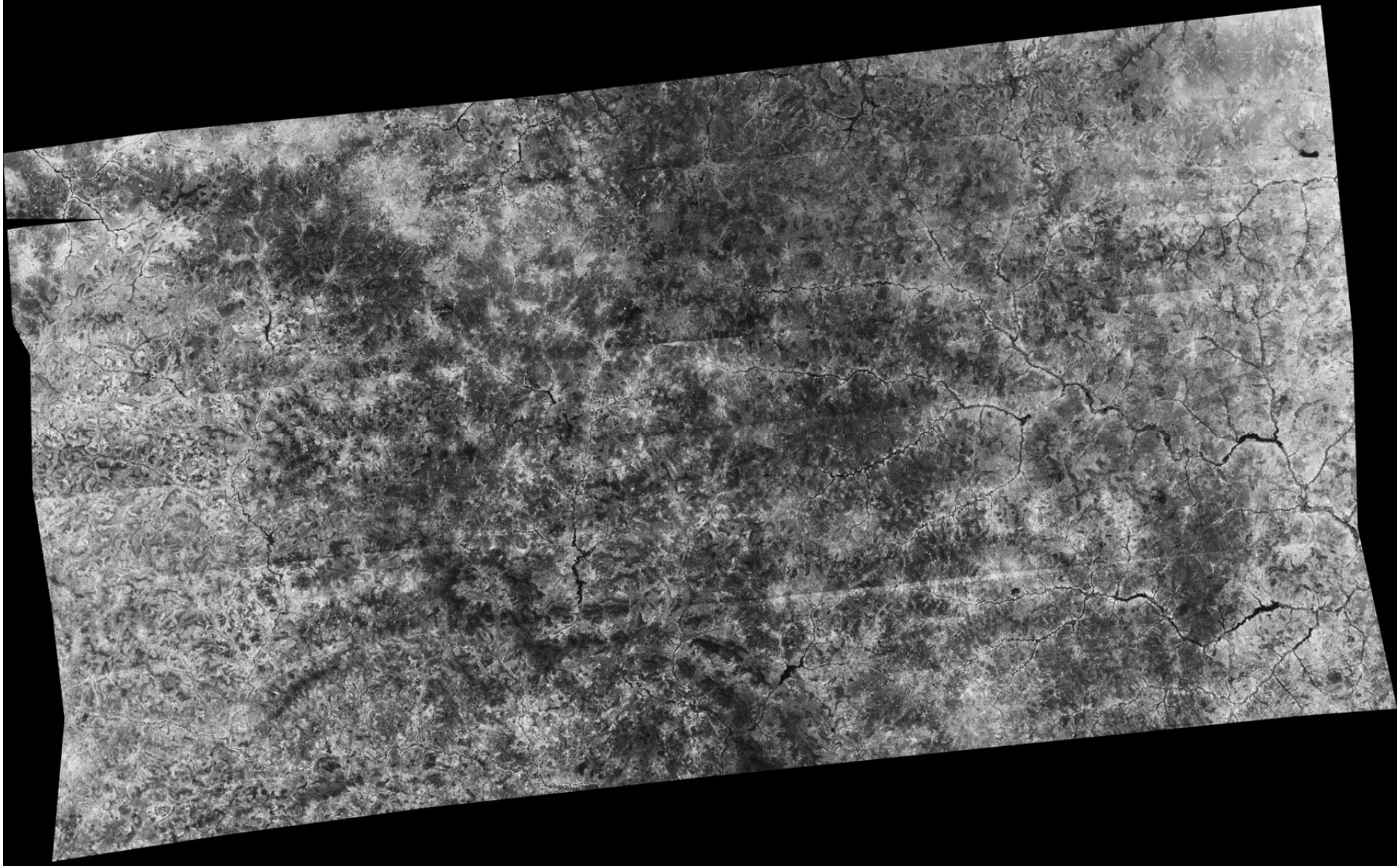
Corona: Cultures près de Dakar, 19 février 1966



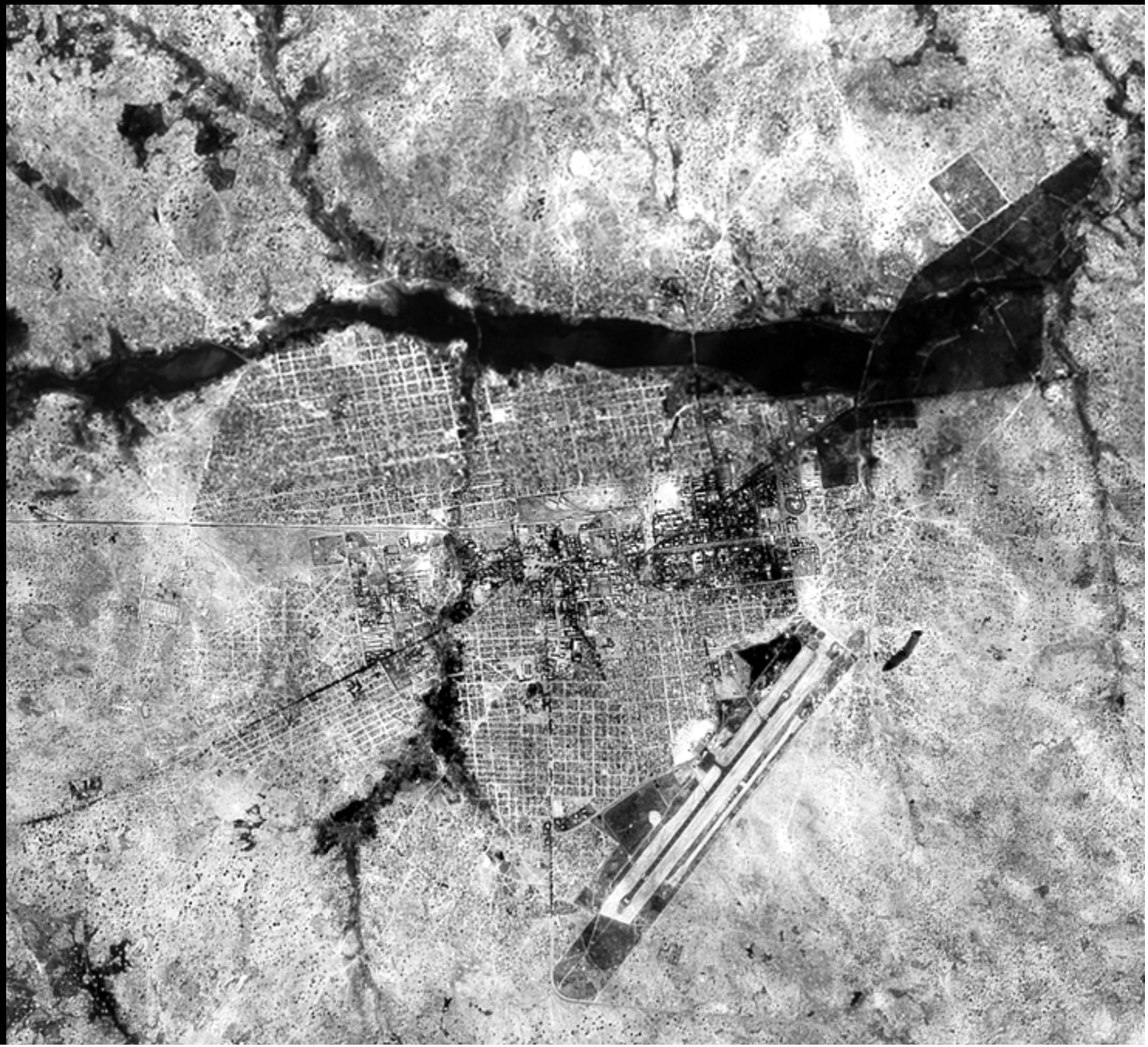
Corona Photo Mosaic -- Digitally Geo-Registered
Southern Mali – December 1965



Corona Photo Mosaic -- Digitally Geo-Registered
North-central Burkina – December 1965



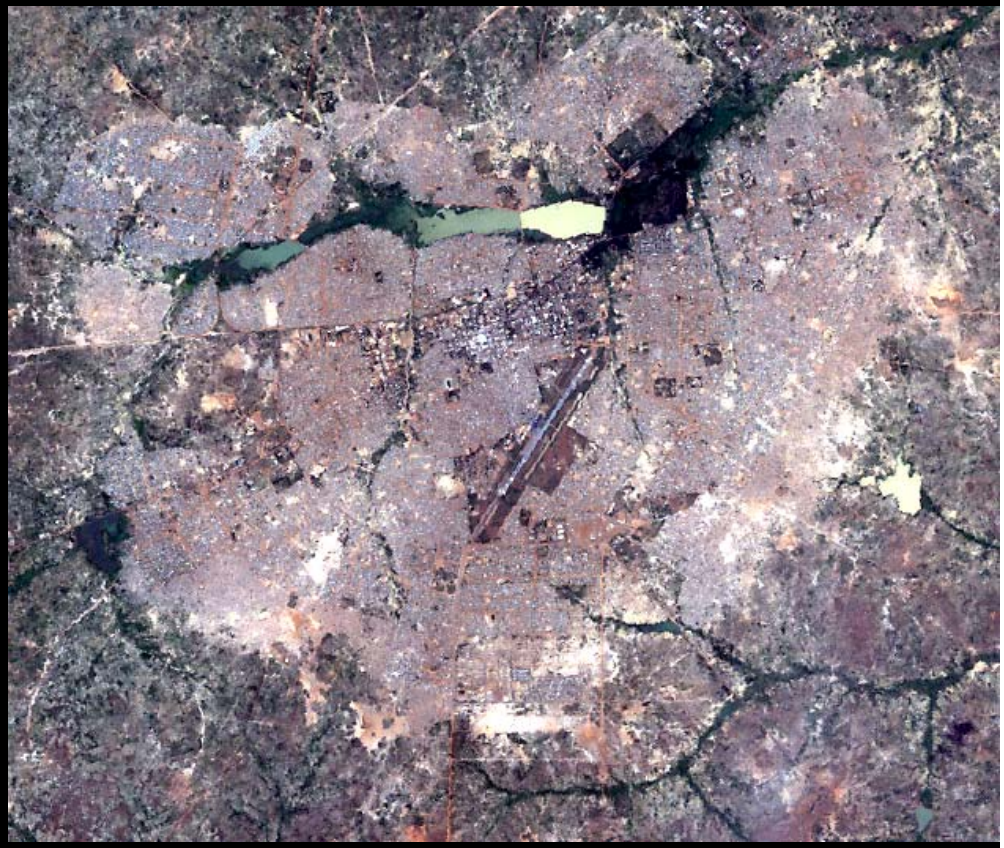
Ouagadougou
Janvier 1968
(Corona)

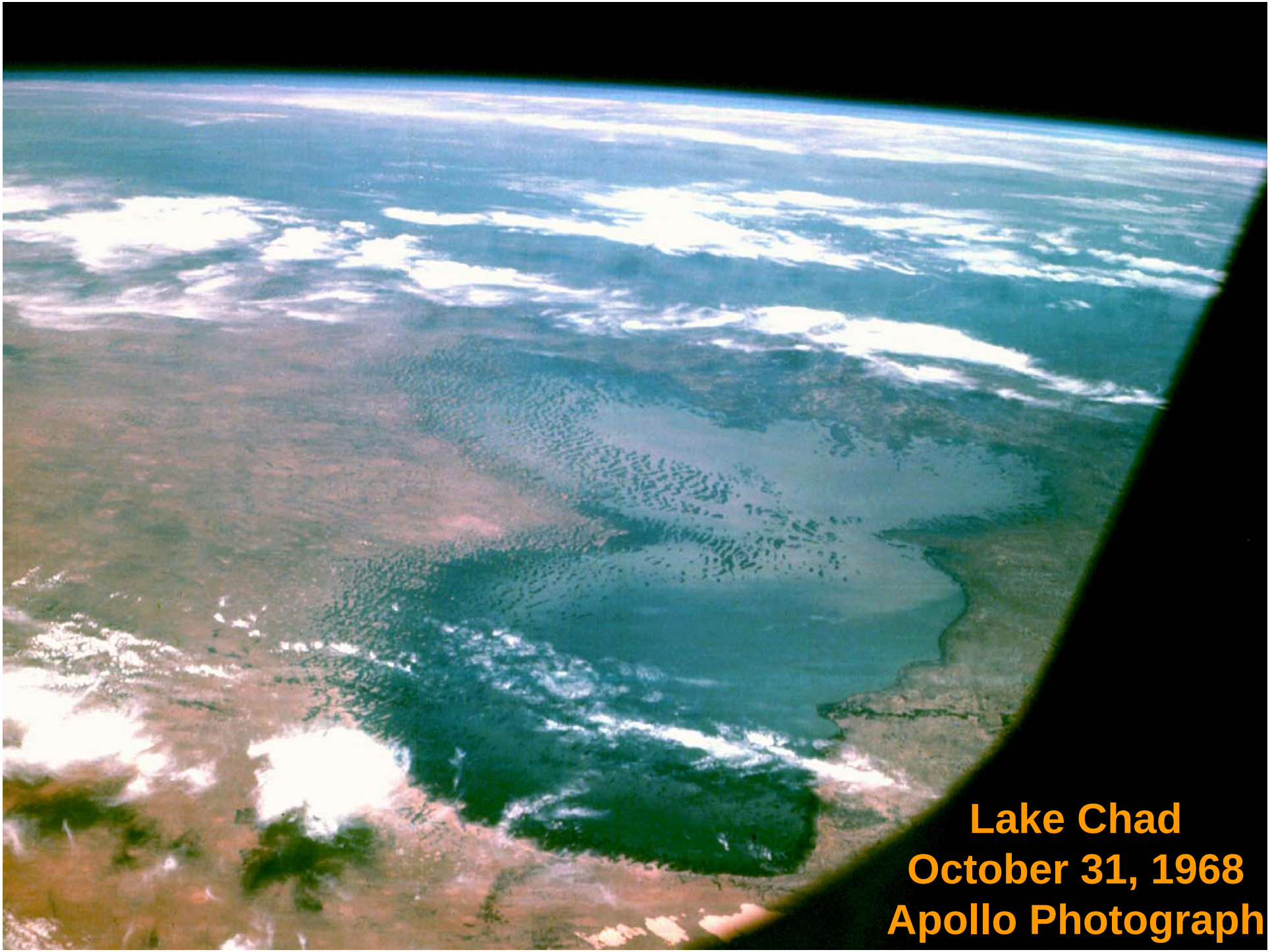


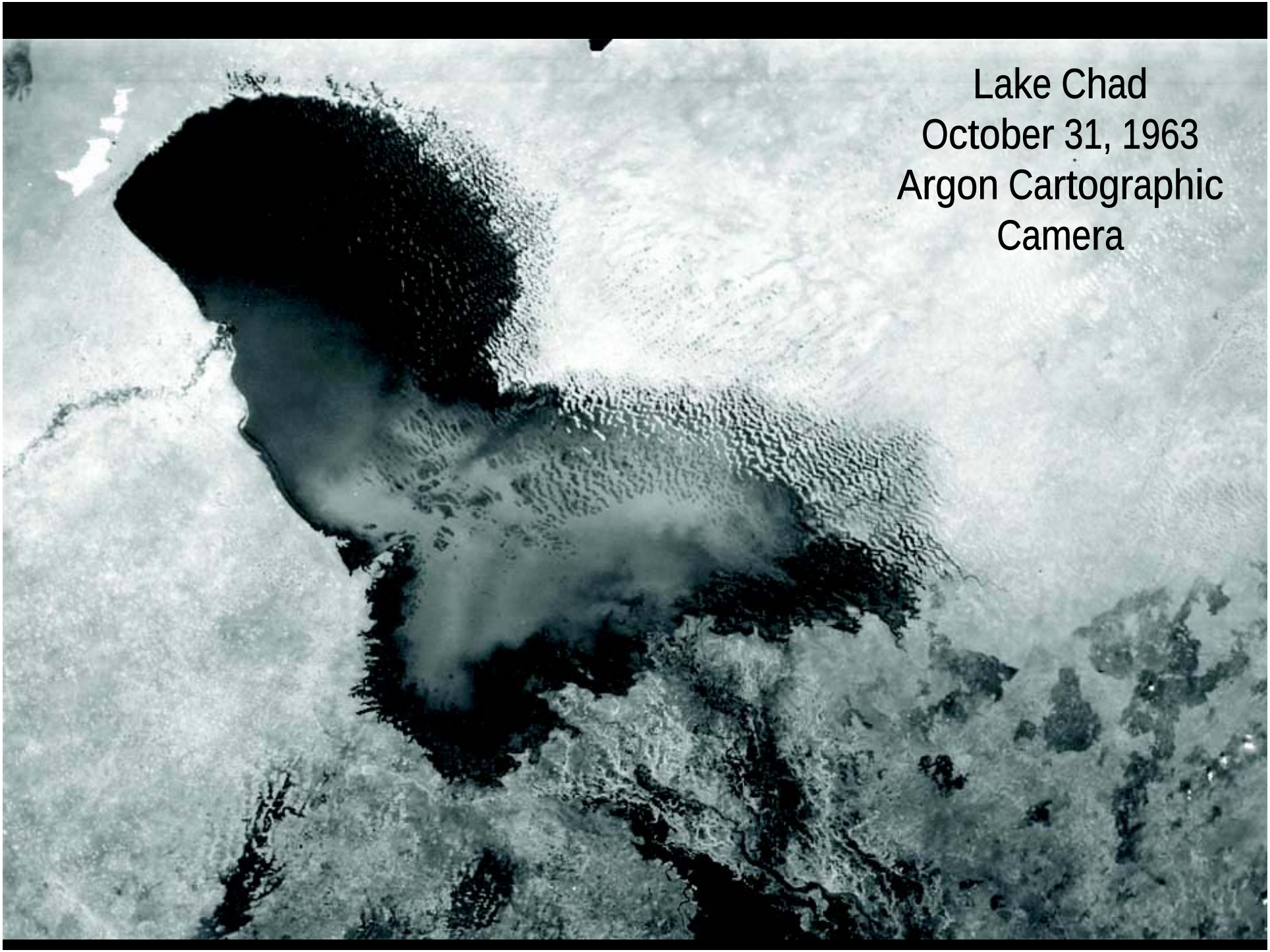
Ouagadougou, Burkina Faso

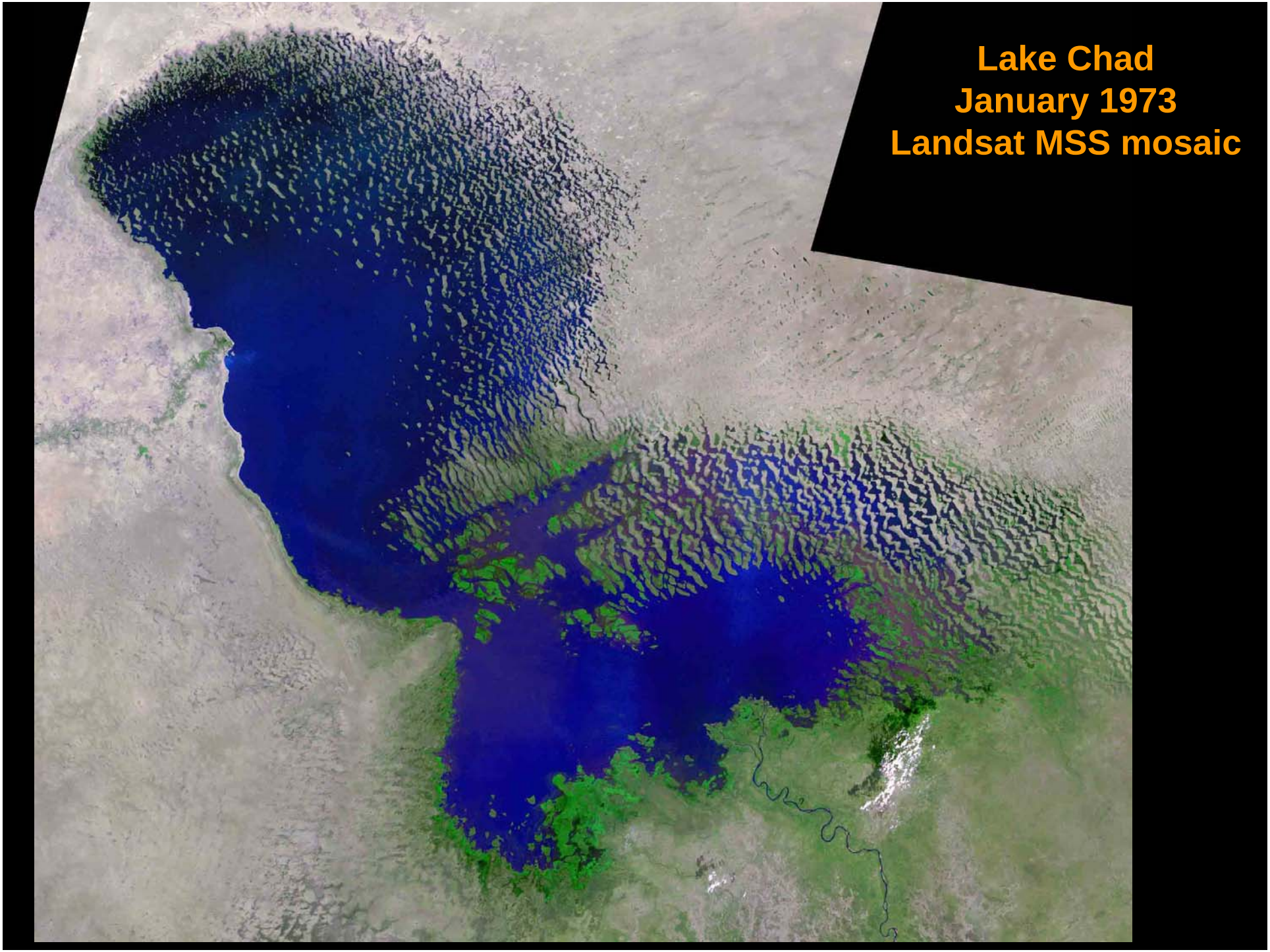
January 1968 (Corona)
Population: 101,000 estimated

October 1999 (Landsat ETM+)
Population: 925,000 estimated

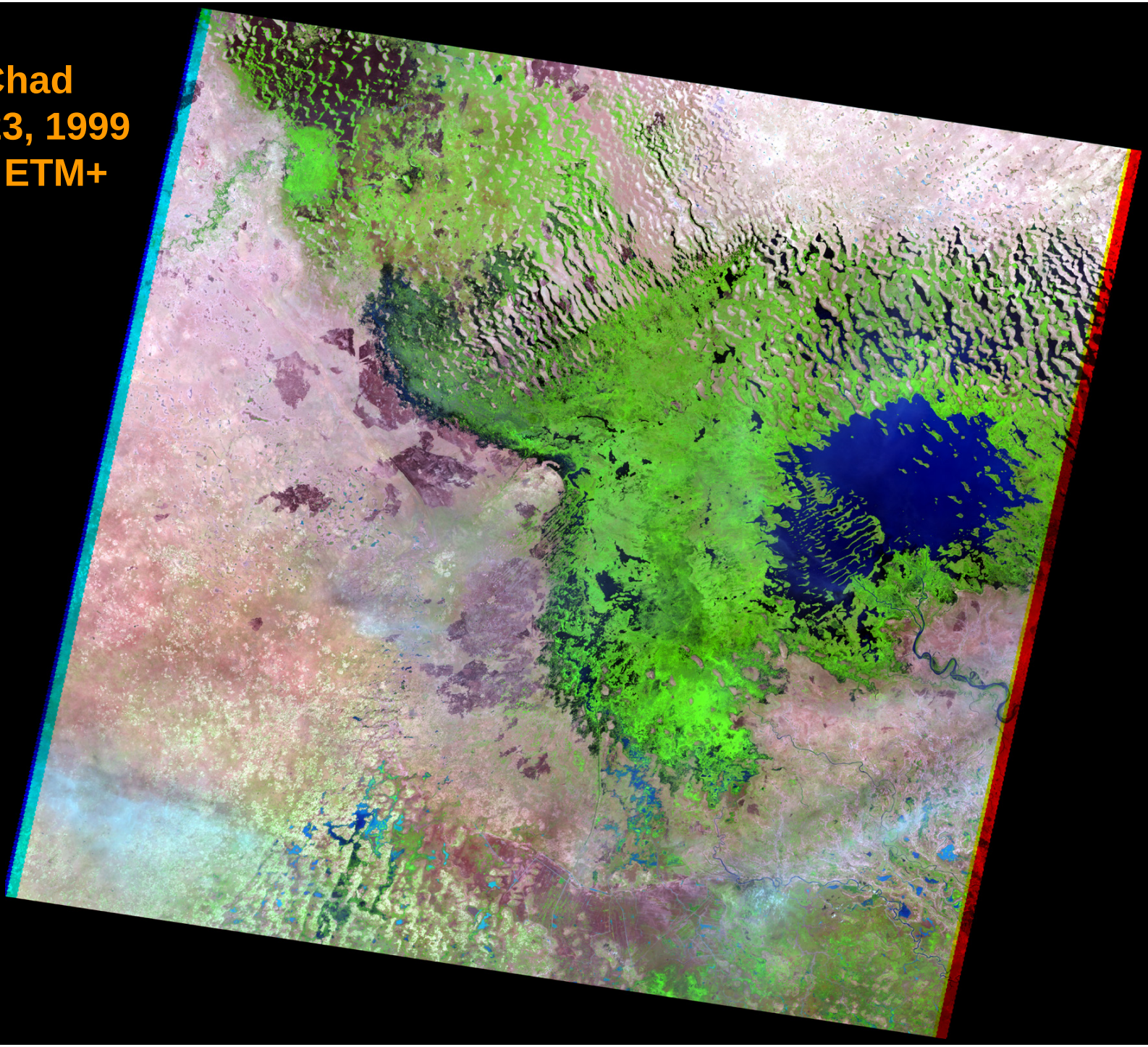



Lake Chad
October 31, 1968
Apollo Photograph


Lake Chad
October 31, 1963
Argon Cartographic
Camera


Lake Chad
January 1973
Landsat MSS mosaic

Lake Chad
October 23, 1999
Landsat ETM+



Lake Chad lake levels at Bol, 1954 – 1978 (Coe and Foley, 2001)

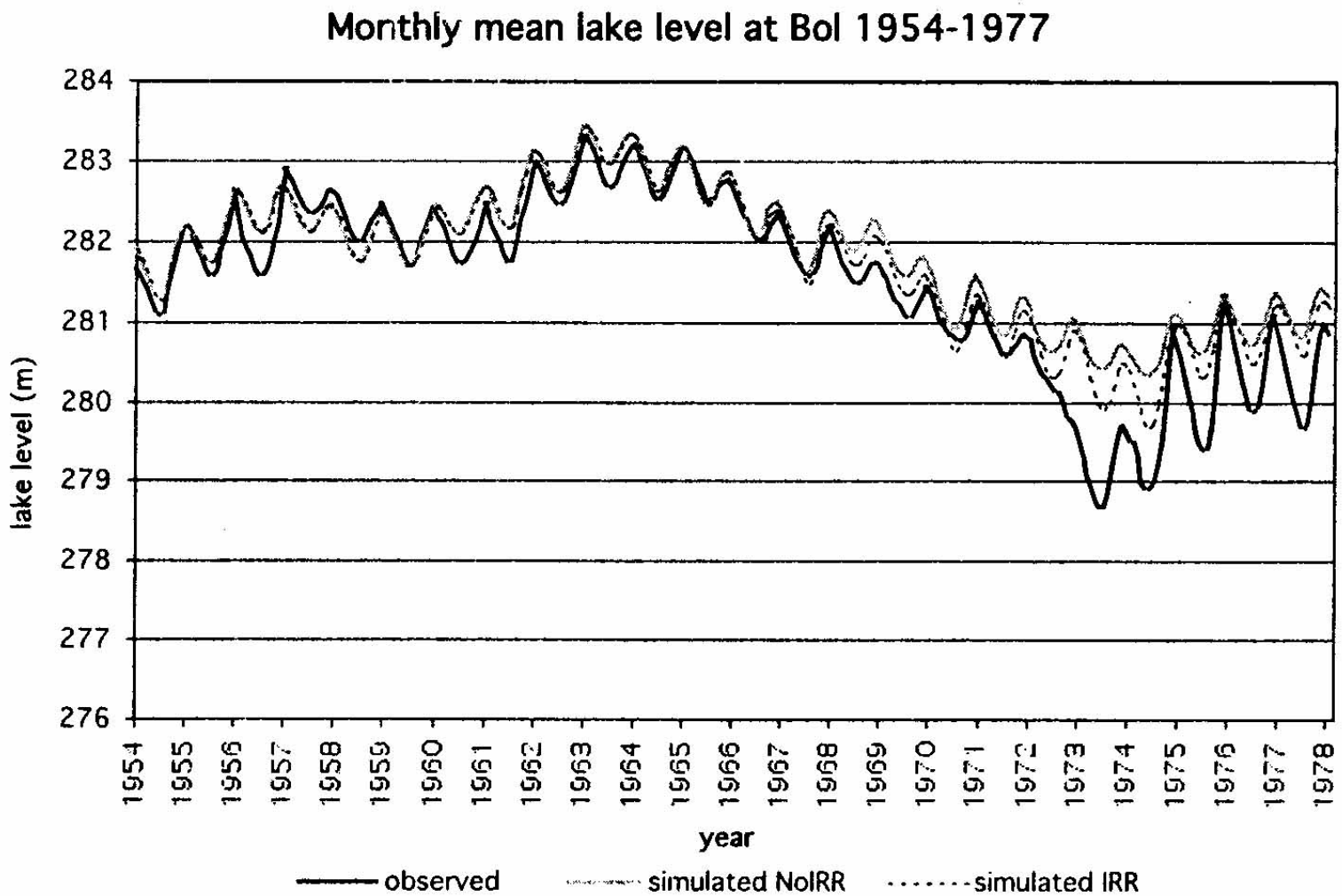
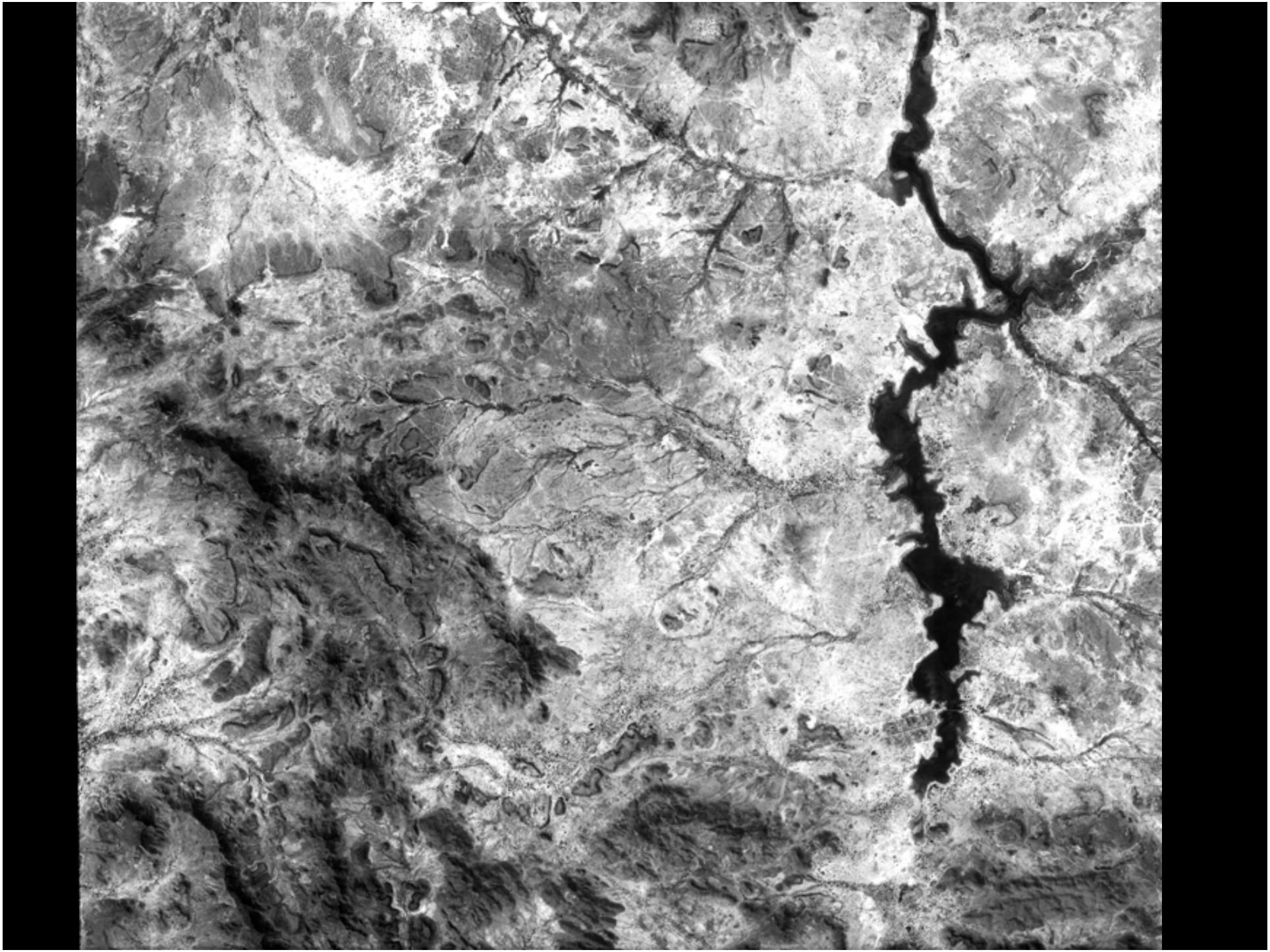
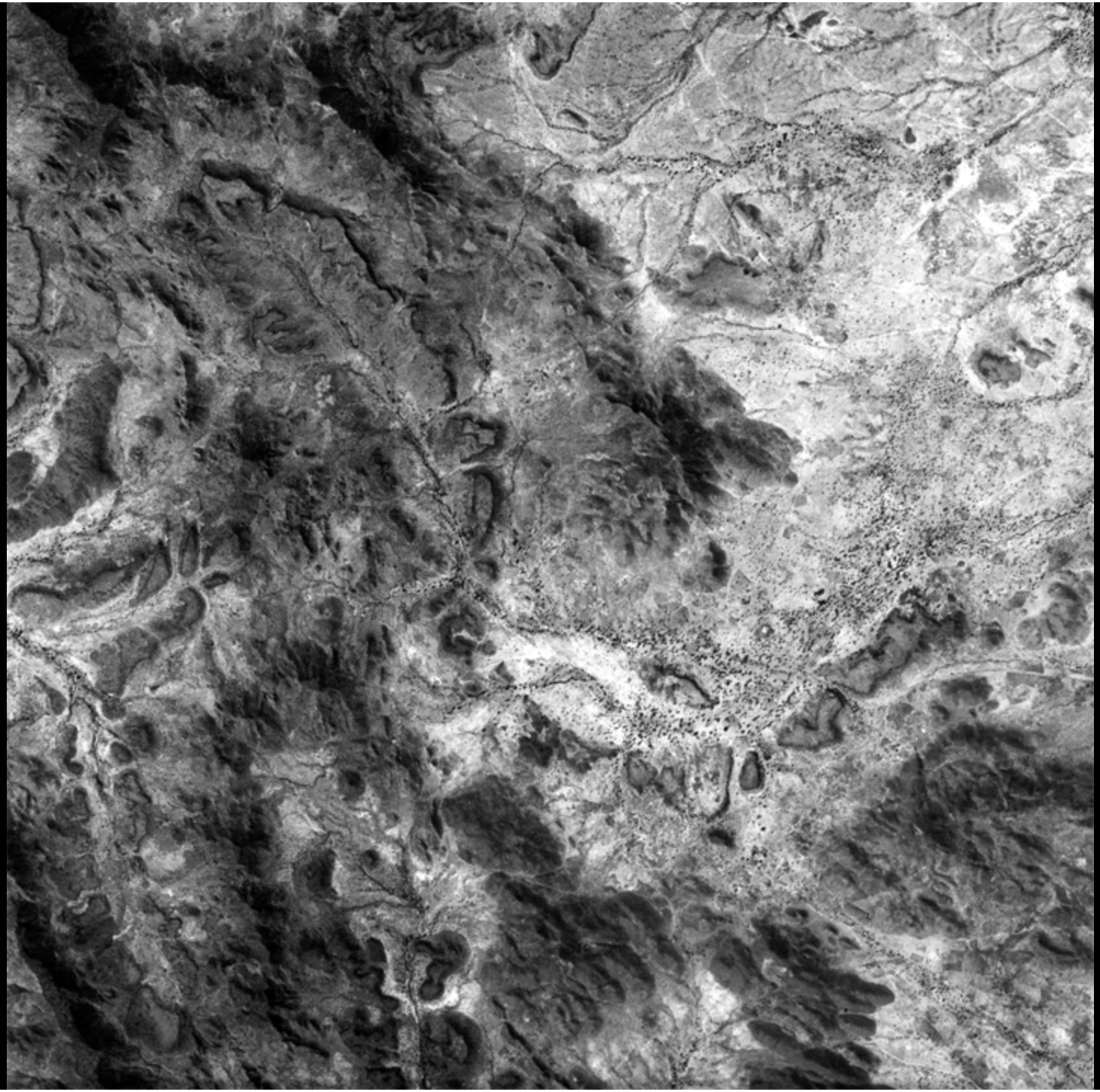
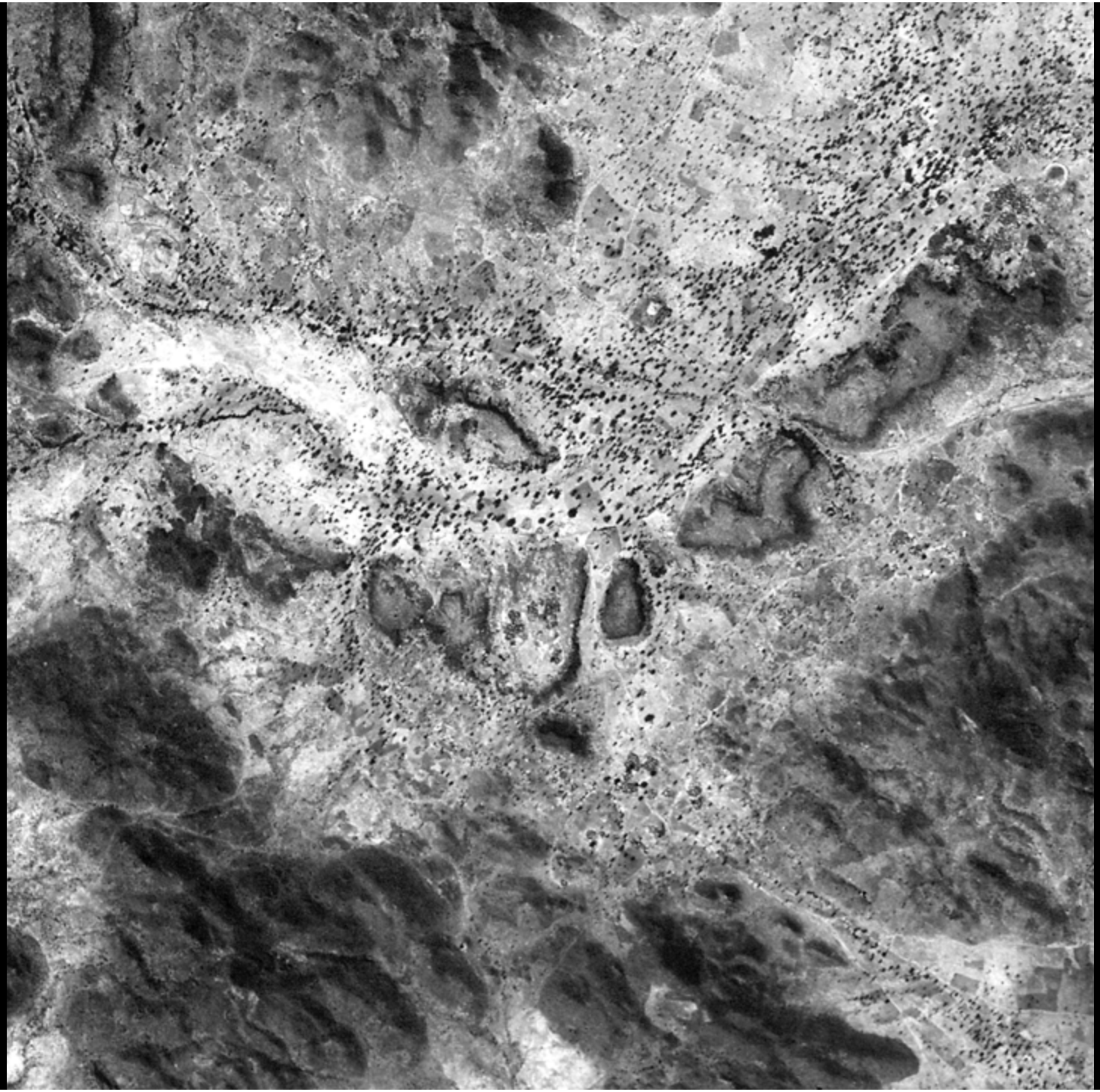
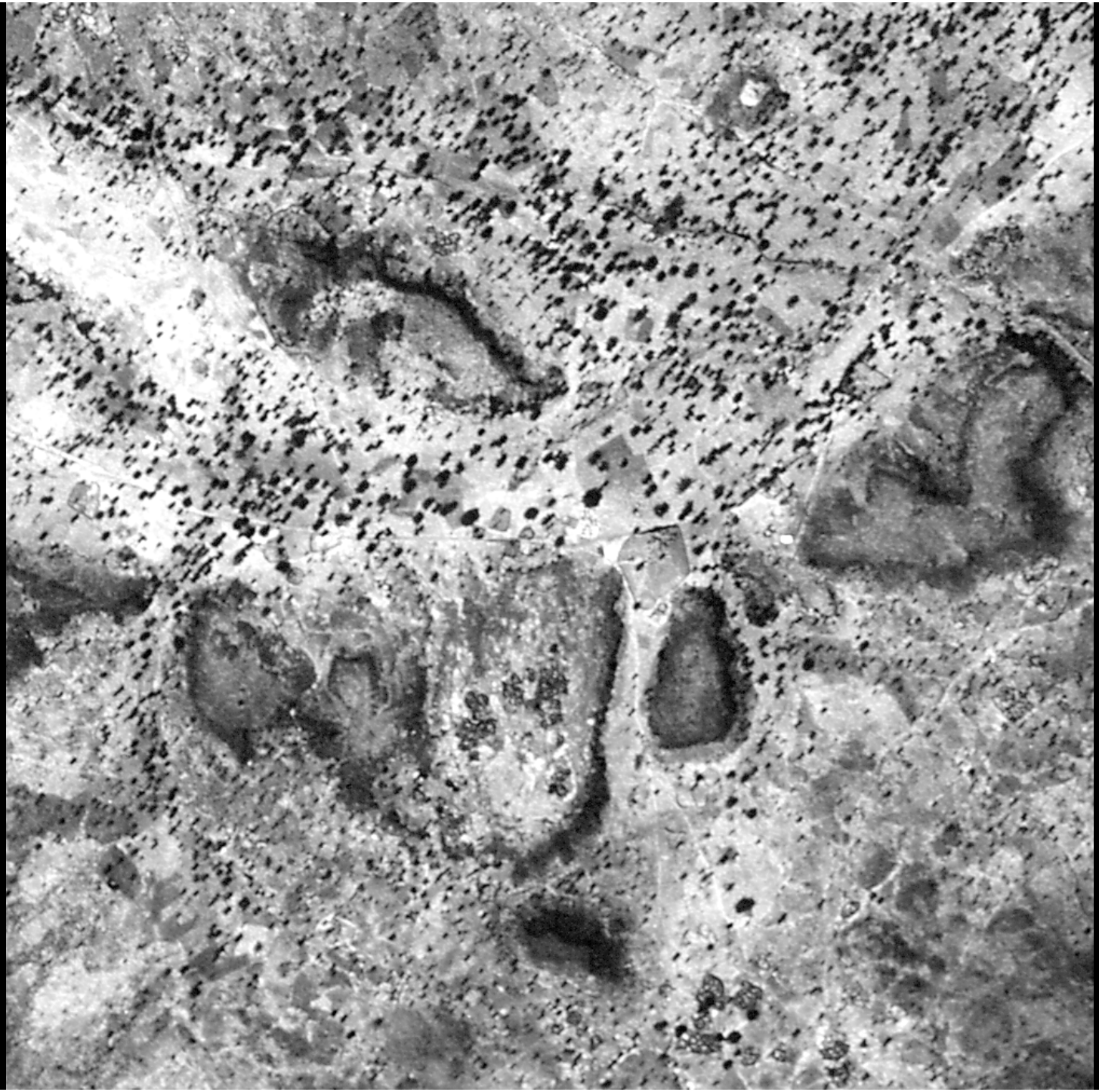


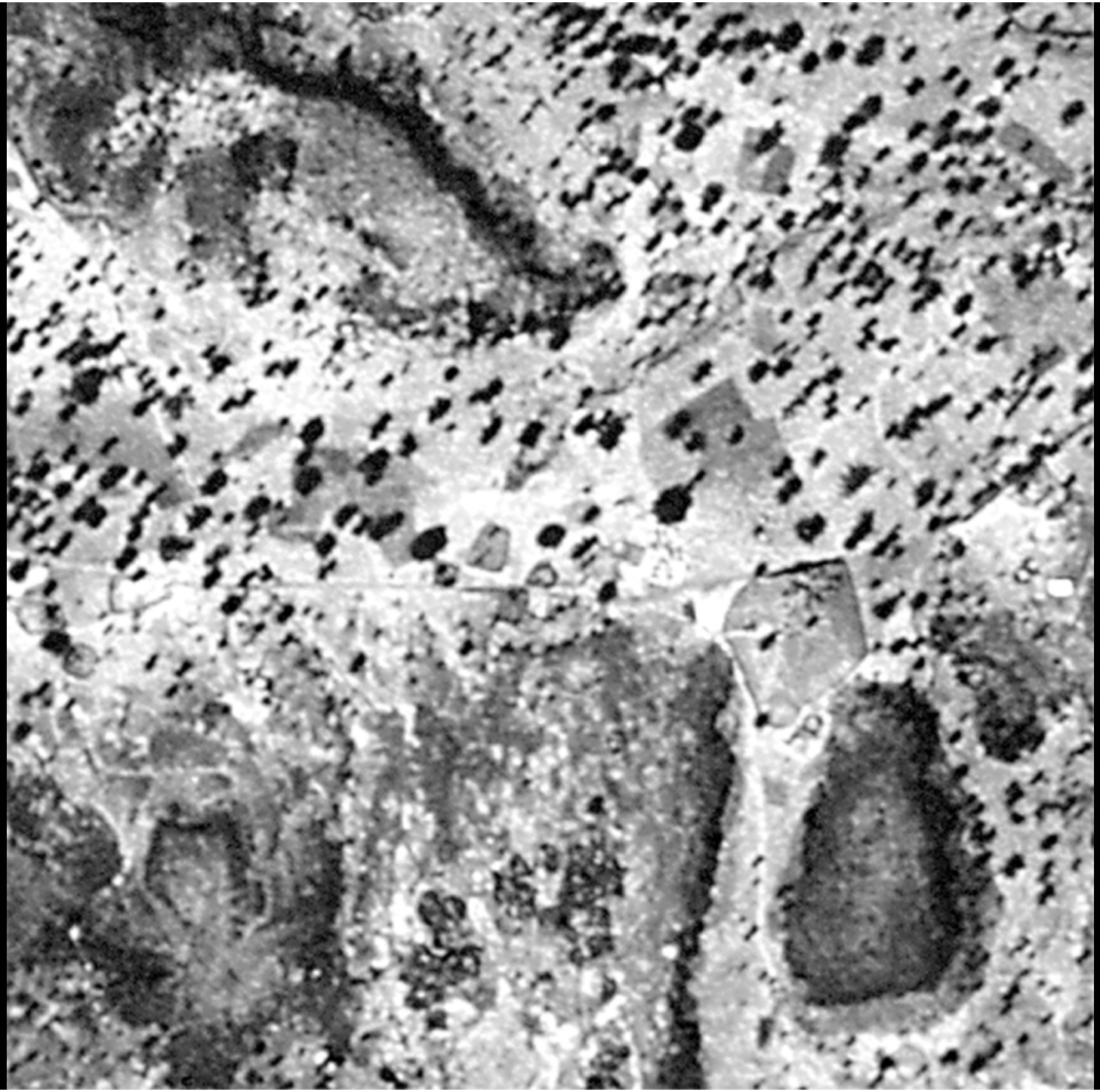
Figure 3. Monthly mean lake level at Bol, Chad (13.5° N; 14.7°E) from 1954 to 1978 for observations (black, [*Olivry et al.*, 1996]), the IBIS/HYDRA simulation without irrigation (NoIRR, grey), and the IBIS/HYDRA simulation with irrigation (IRR, dashed).



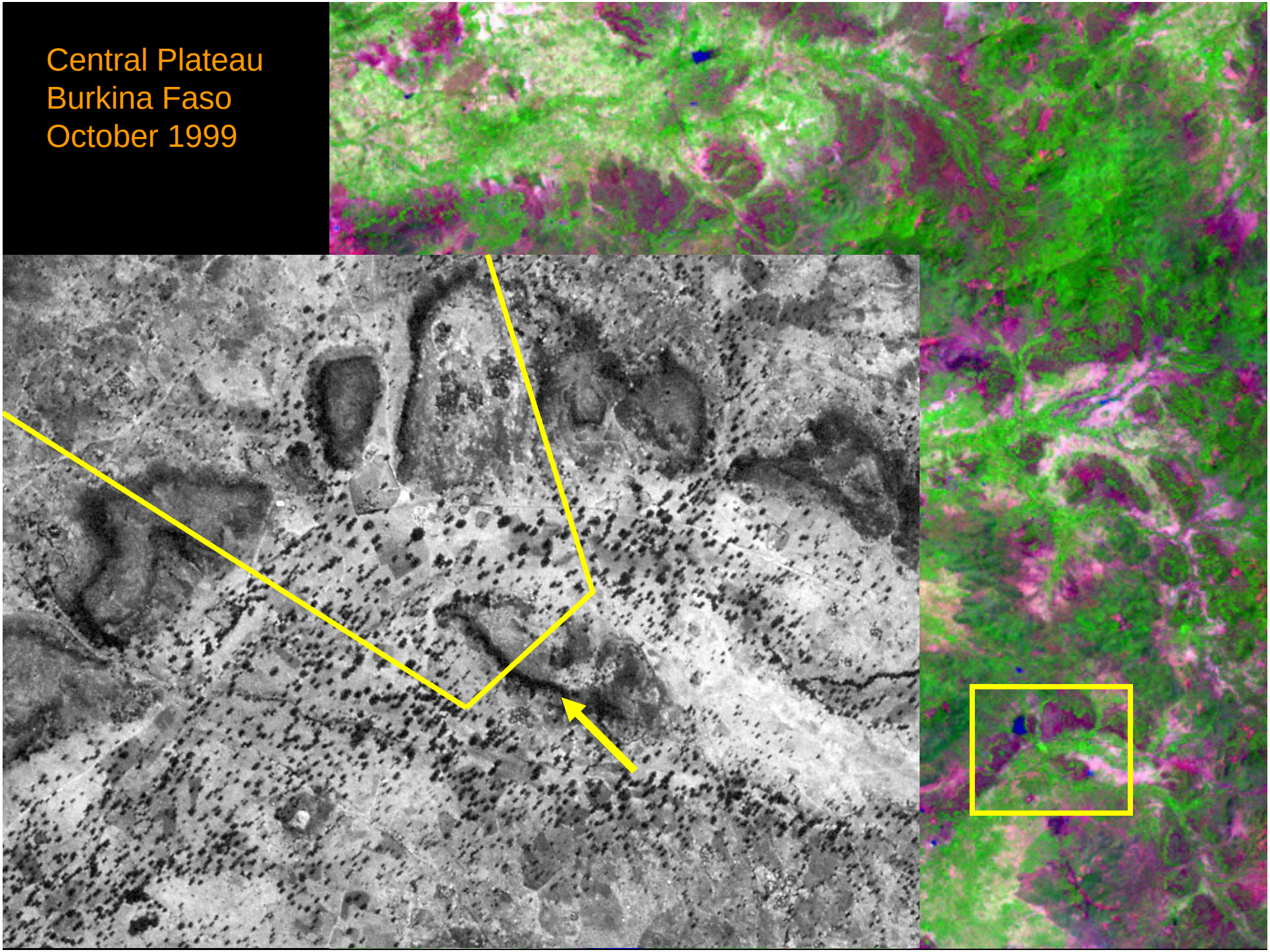








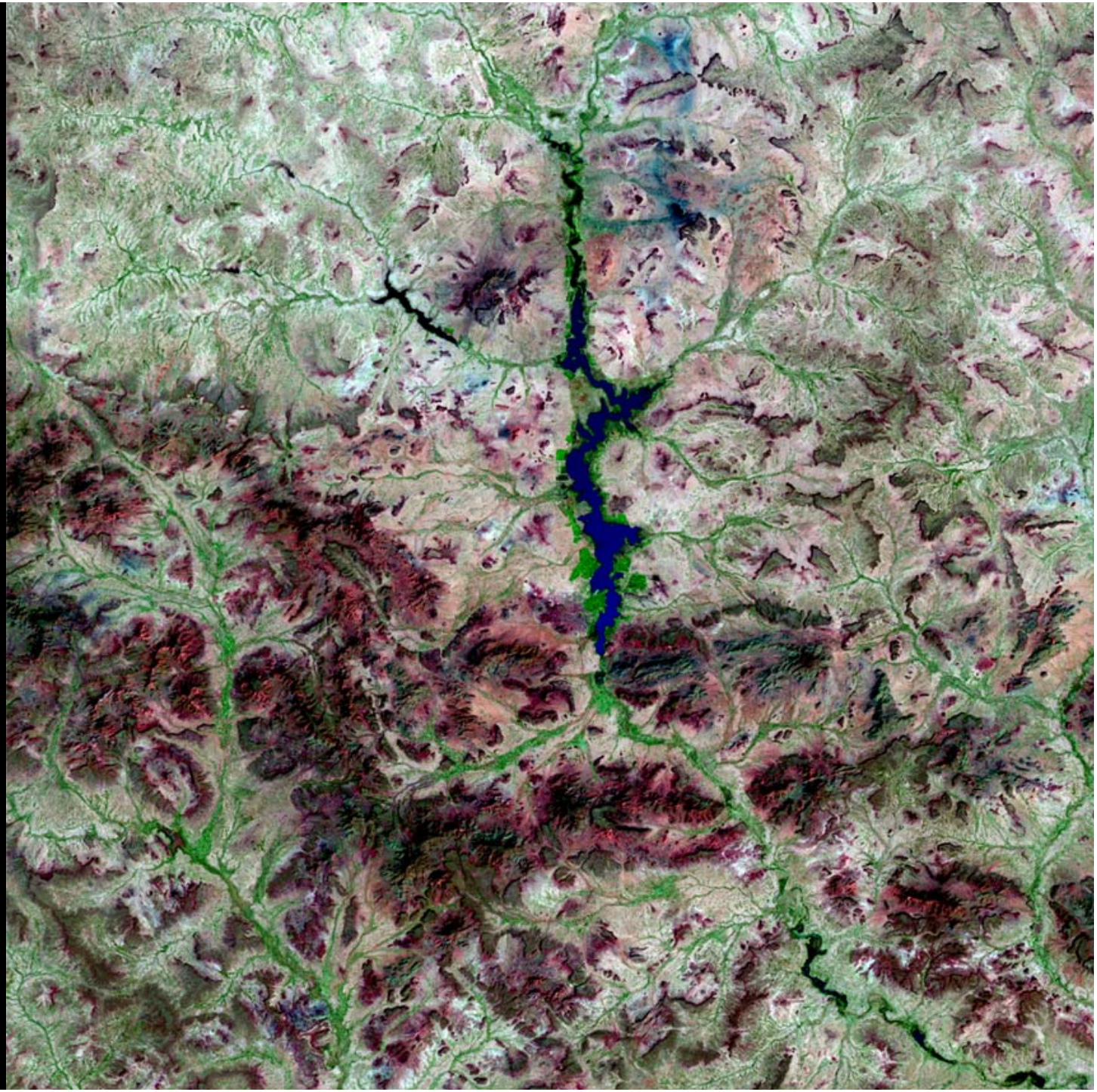
Central Plateau
Burkina Faso
October 1999



Rissiam, Central Plateau, Burkina Faso

Zone de Kongoussi

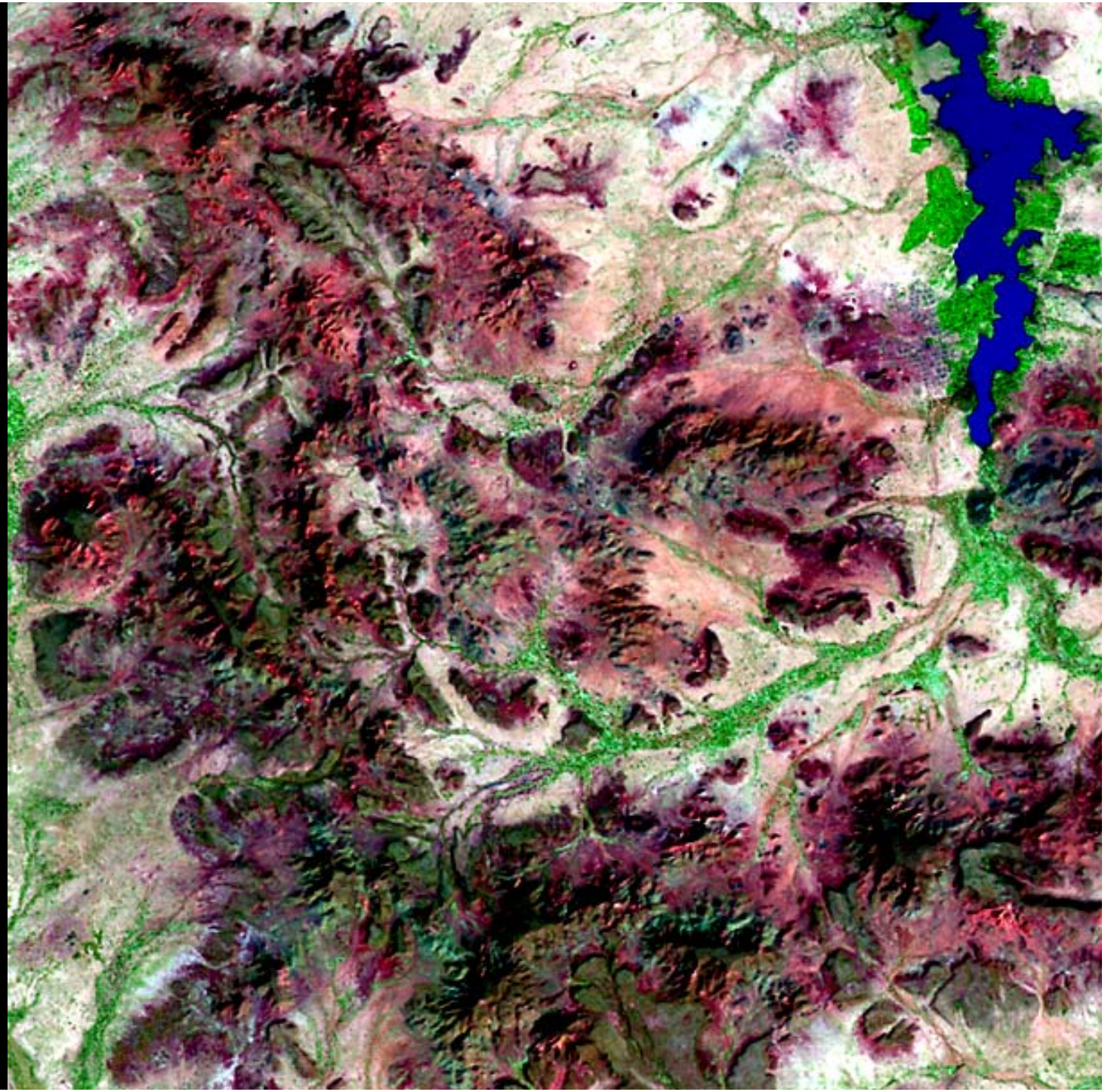
Landsat TM
Janvier 1986



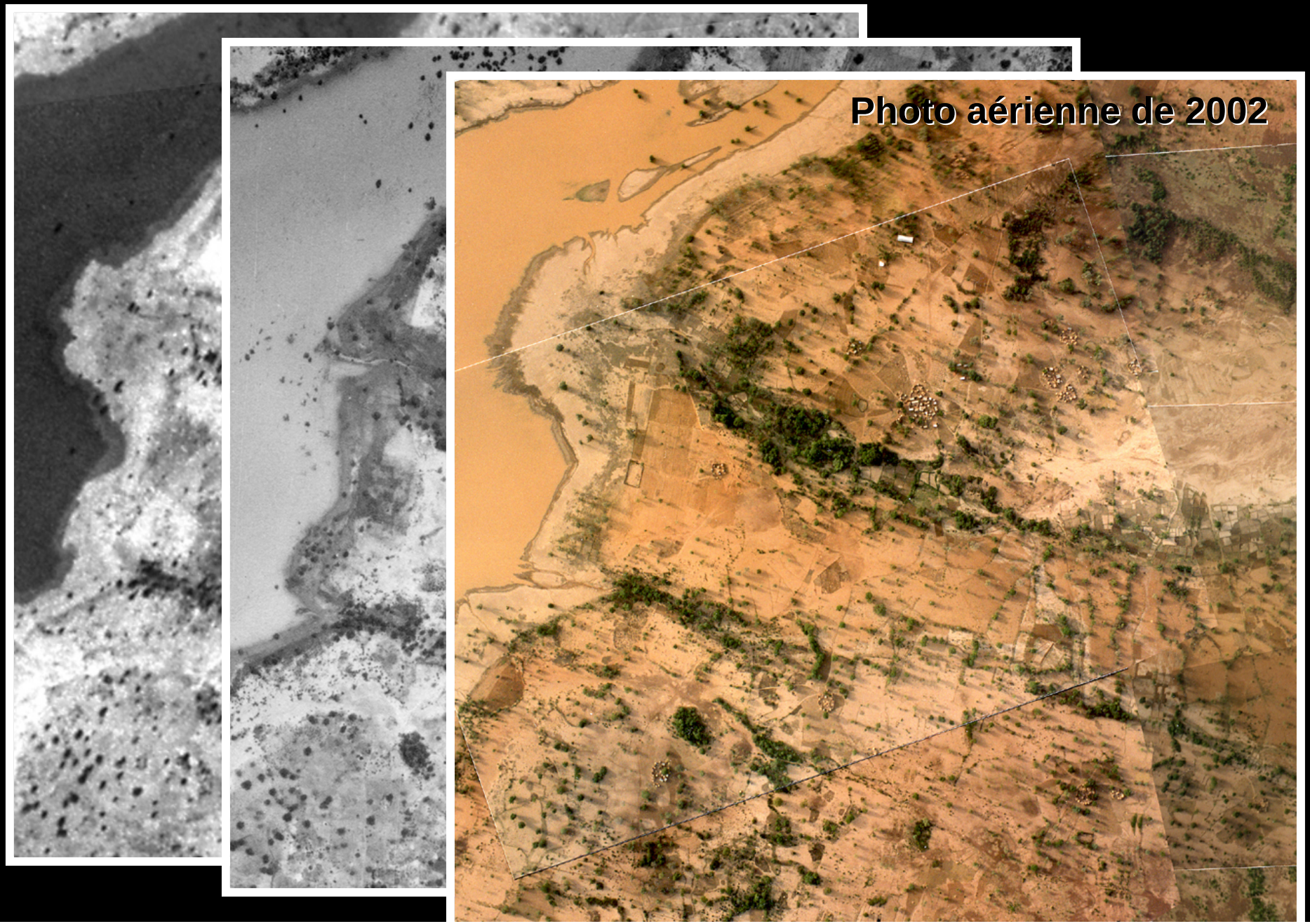
Rissiam et ses alentours

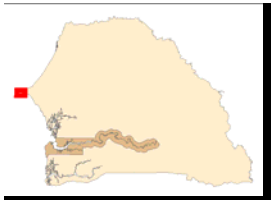
Landsat TM

Janvier 1986



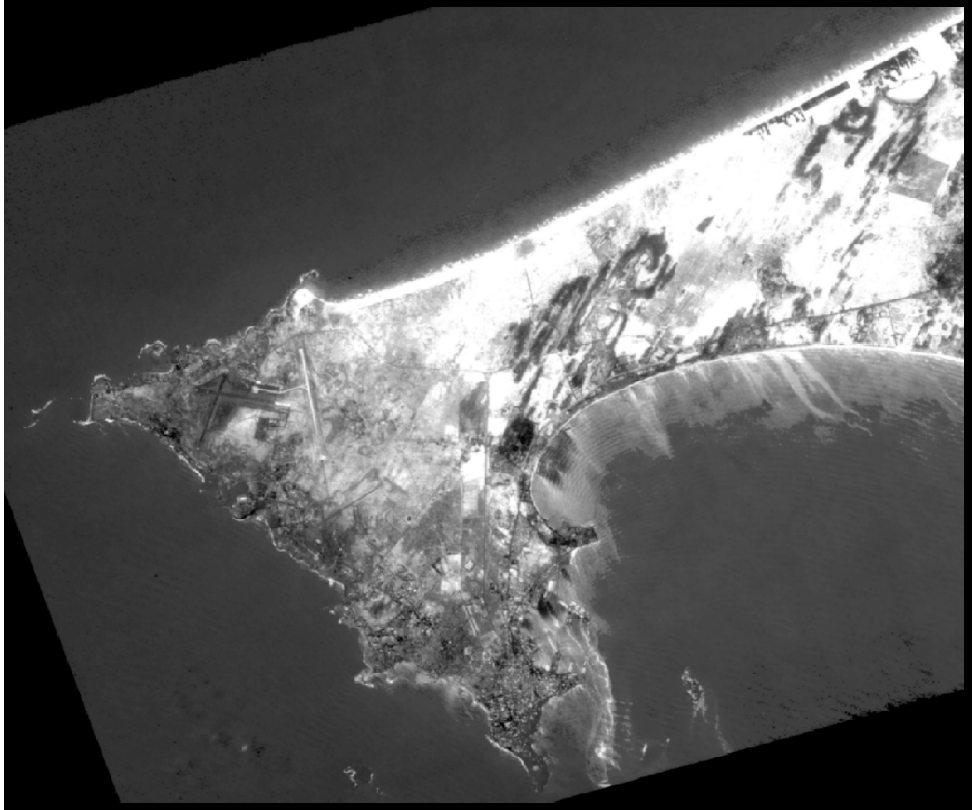
Use of remote sensing to monitor changes in natural resources and the spread of SWC practices: Kaartenga case study





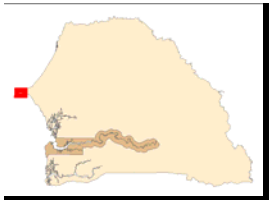
Population Explosion: Example of Dakar

Corona 1966



Landsat 1997

0 Kilometers 10



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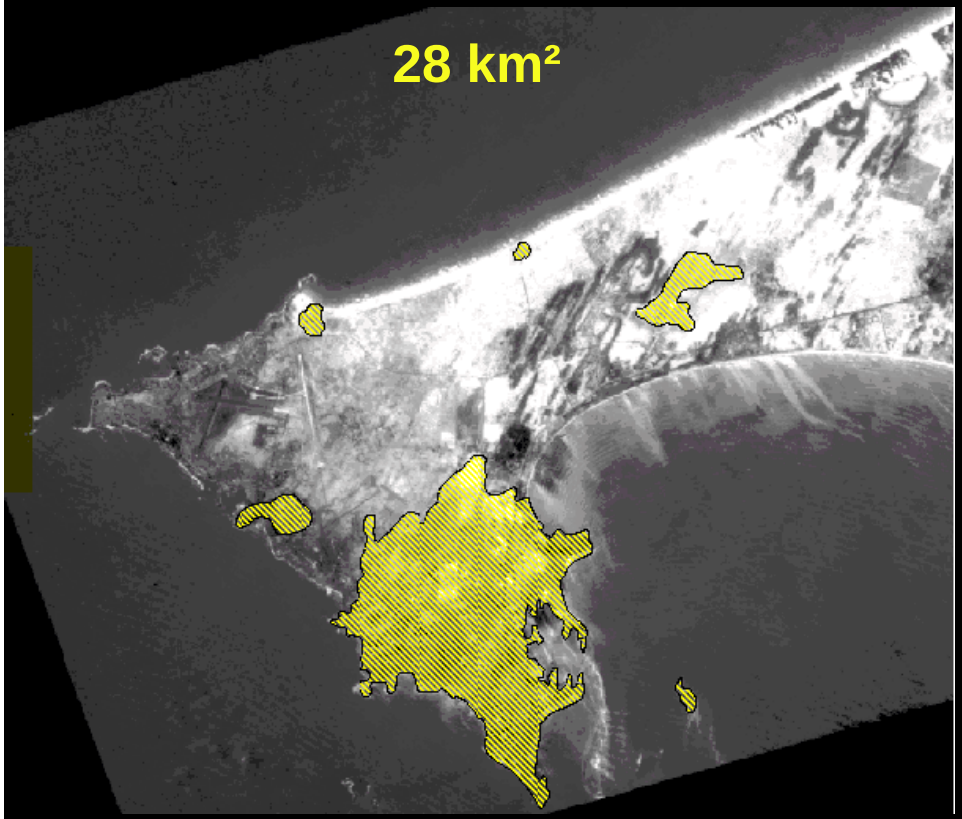
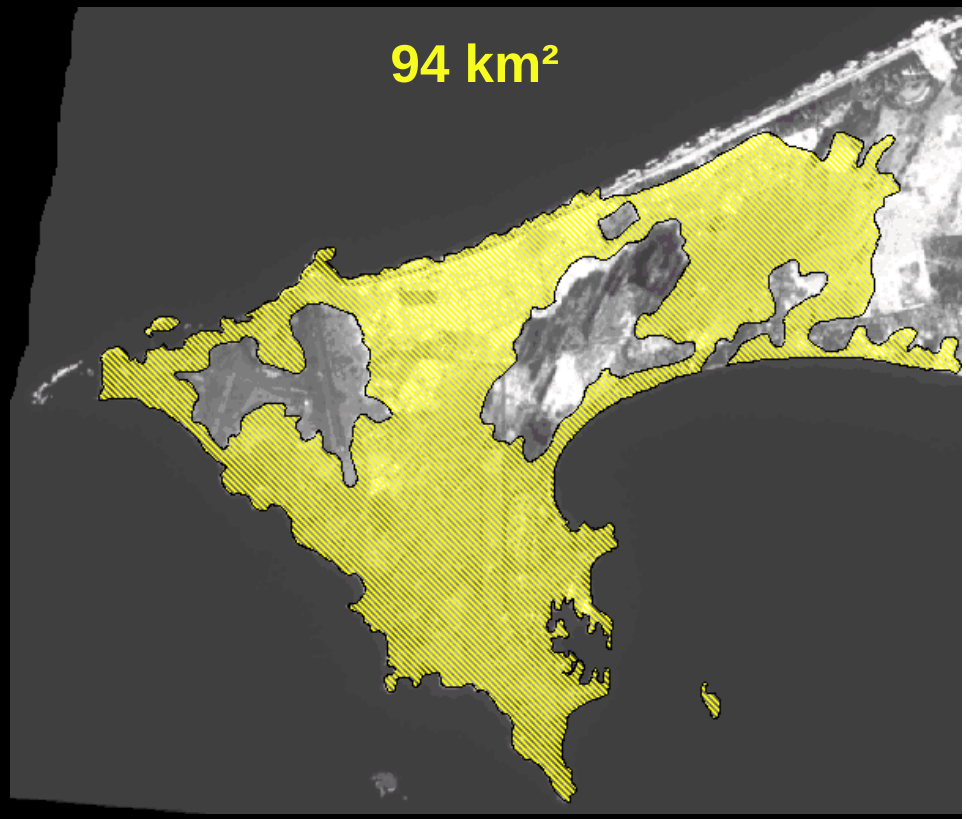
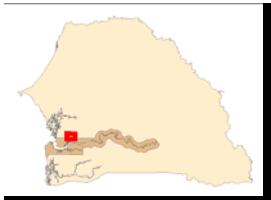


Landsat 1997

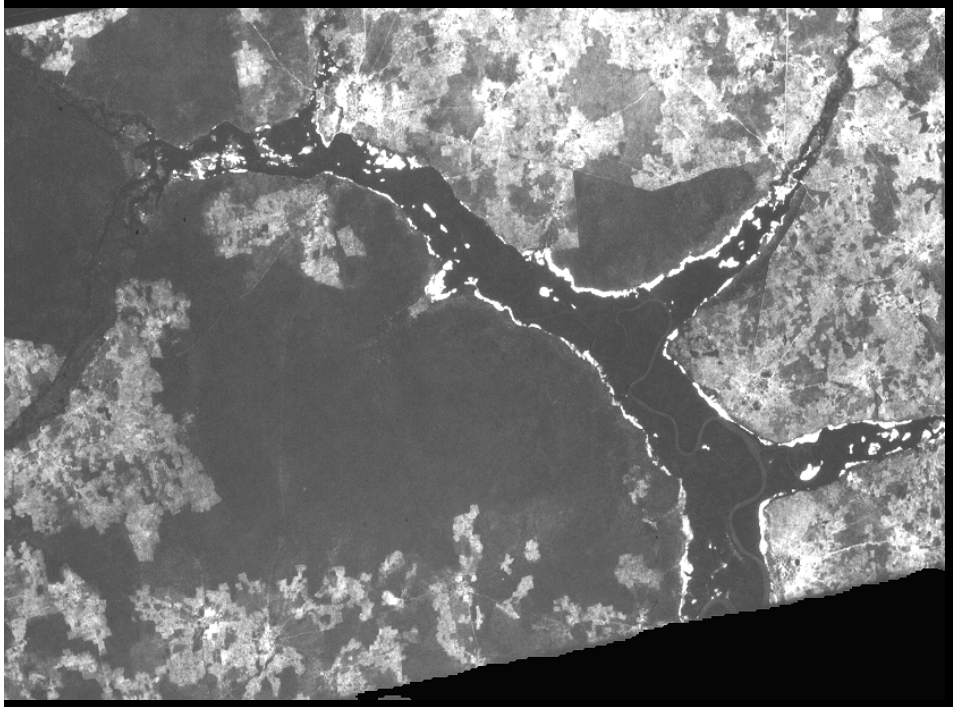


0 Kilometers 10

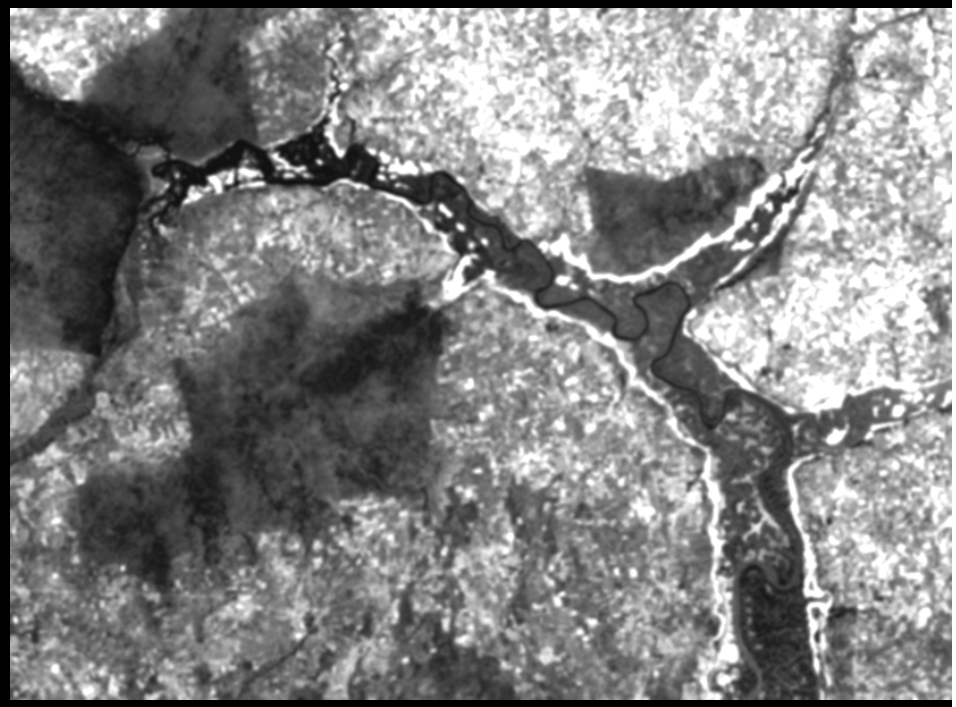


Cropland Expansion in Southern Senegal

Corona 1968



Landsat 1992



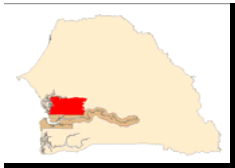
0 10

Kilometers

Example of Cropland Expansion and Decline In Use of Traditional Fallow

1983

1994

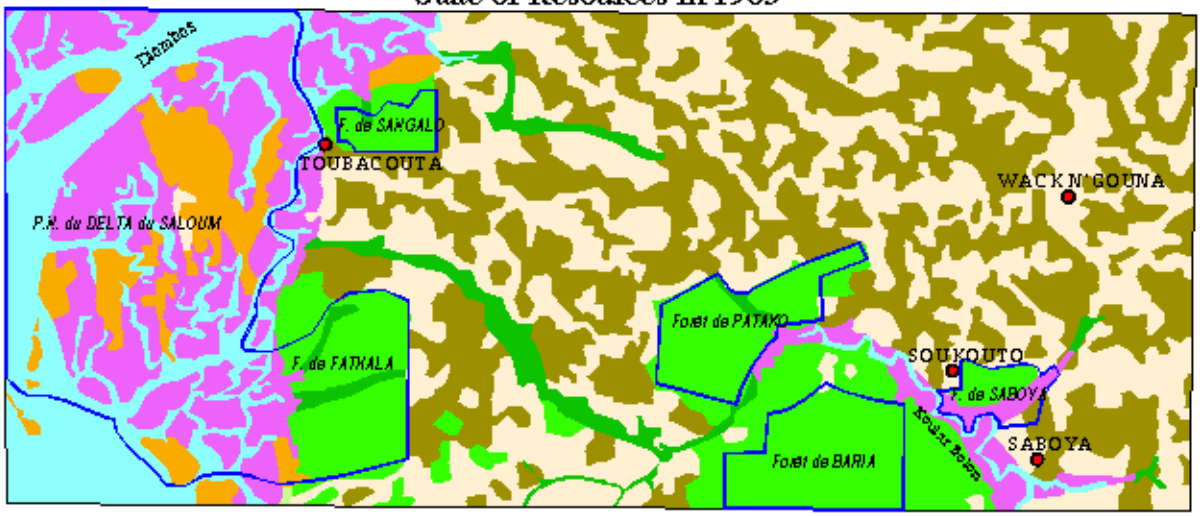


Tracking Cropland Expansion in Southern Senegal using Argon and Landsat TM

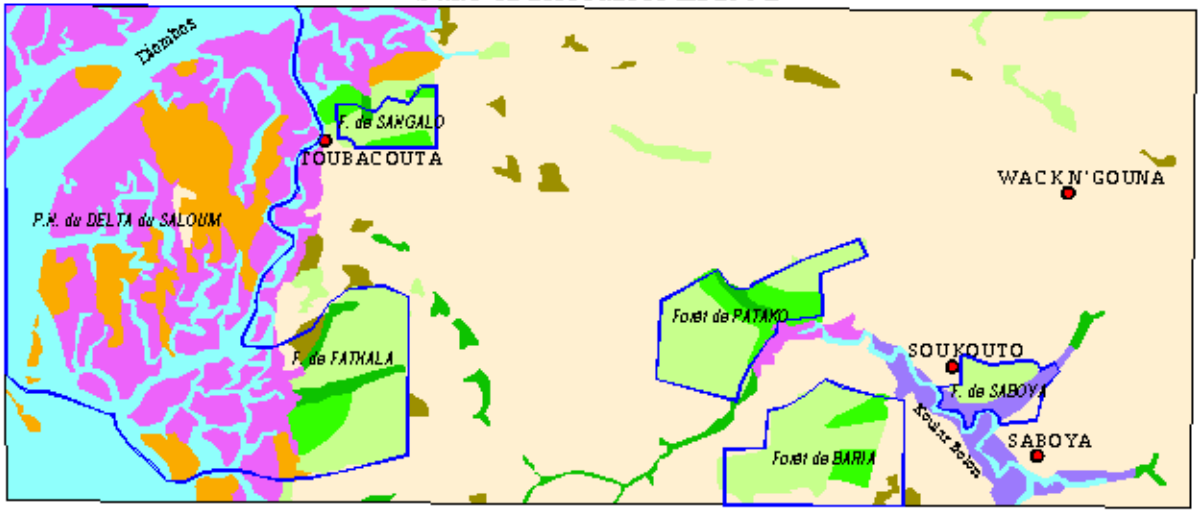
Land Use / Land Cover

Southern Peanut Basin, Senegal

State of Resources in 1963



State of Resources in 1992

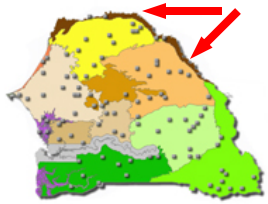


Legend...

- Intensive rainfed agriculture, limited fallow
- Bushland, old fields
- Savanna Woodlands
- Woodlands
- Woodlands in valleys, Gallery Forests
- Tree Savannas
- Mangroves
- Mud Flats
- Water
- Major Towns
- Protected Areas

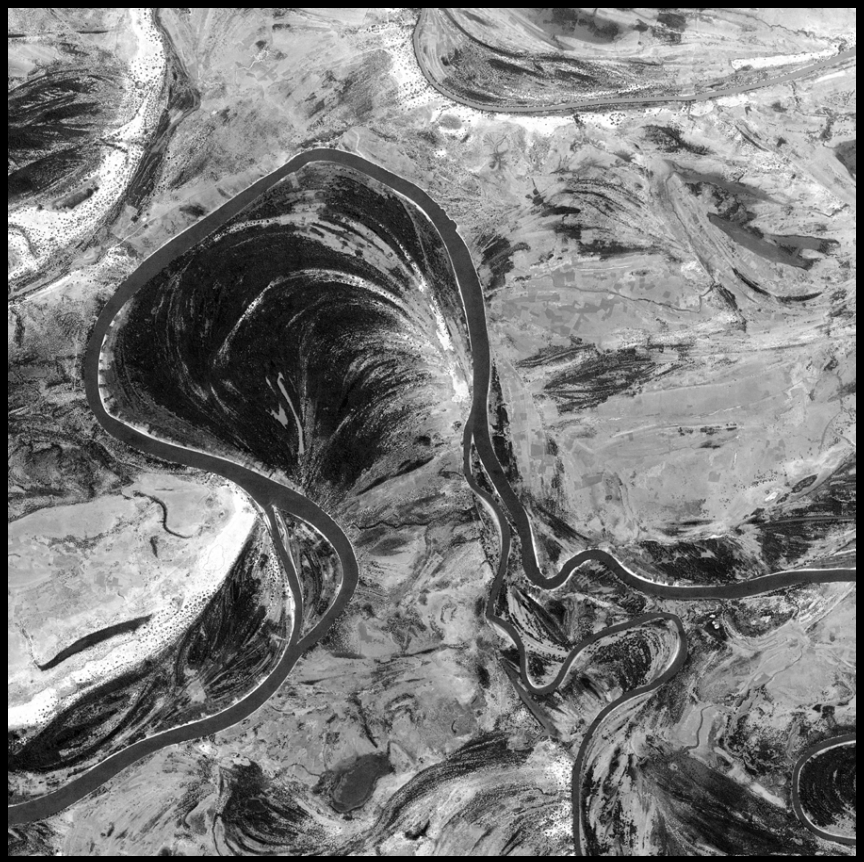
5 0 5 10
Kilometers

Prepared by the U.S. Geological Survey, EROS Data Center, with funding from USAID/ Senegal and the U.S. Geological Survey

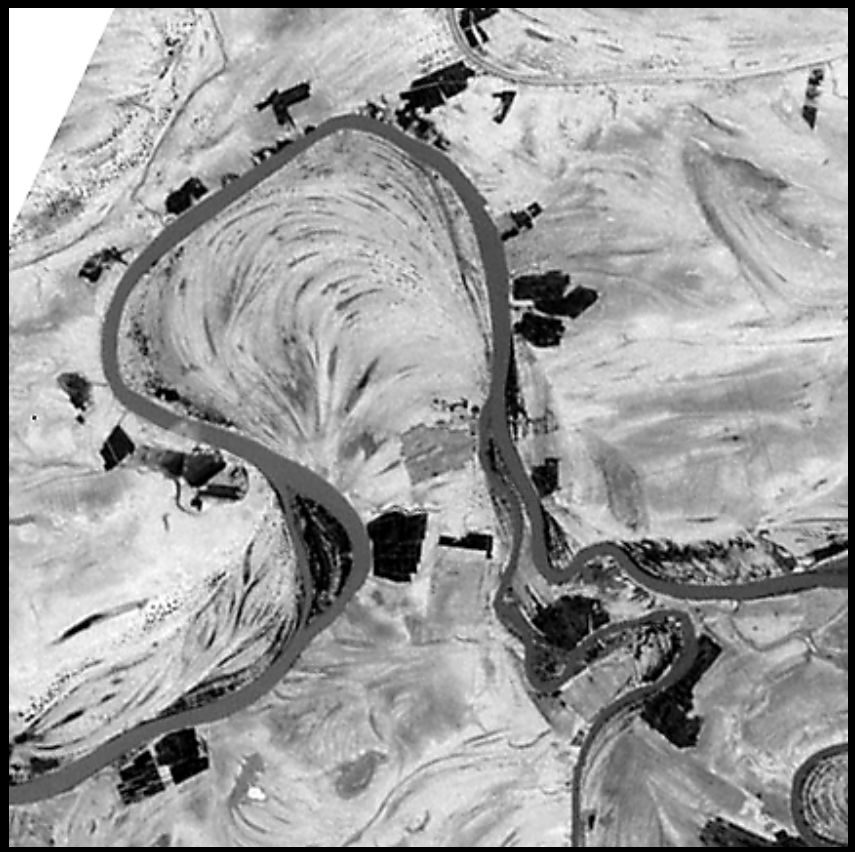


Gonakié Woodlands: Middle Senegal River

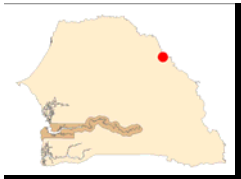
Corona 1965



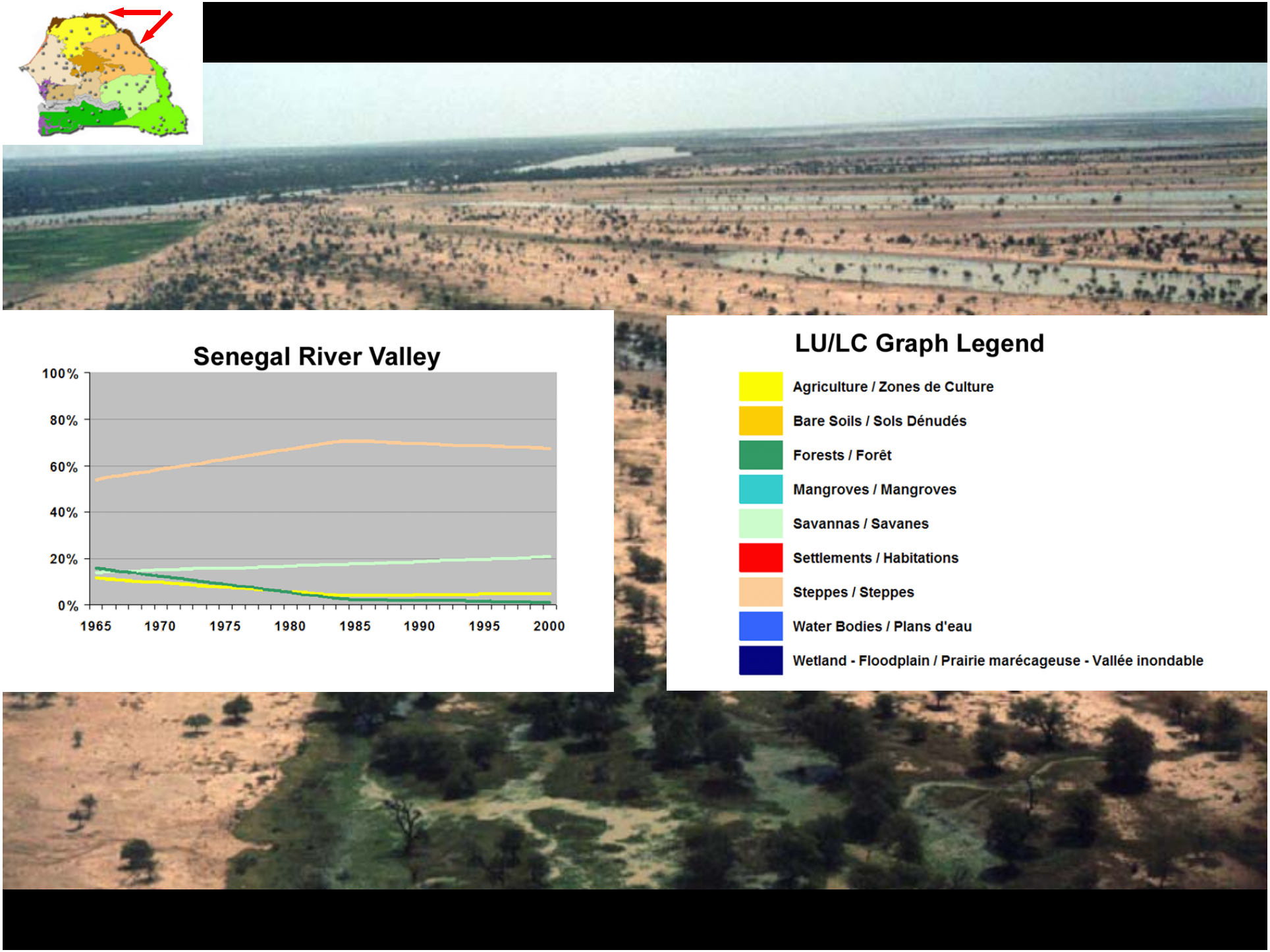
Landsat 1992



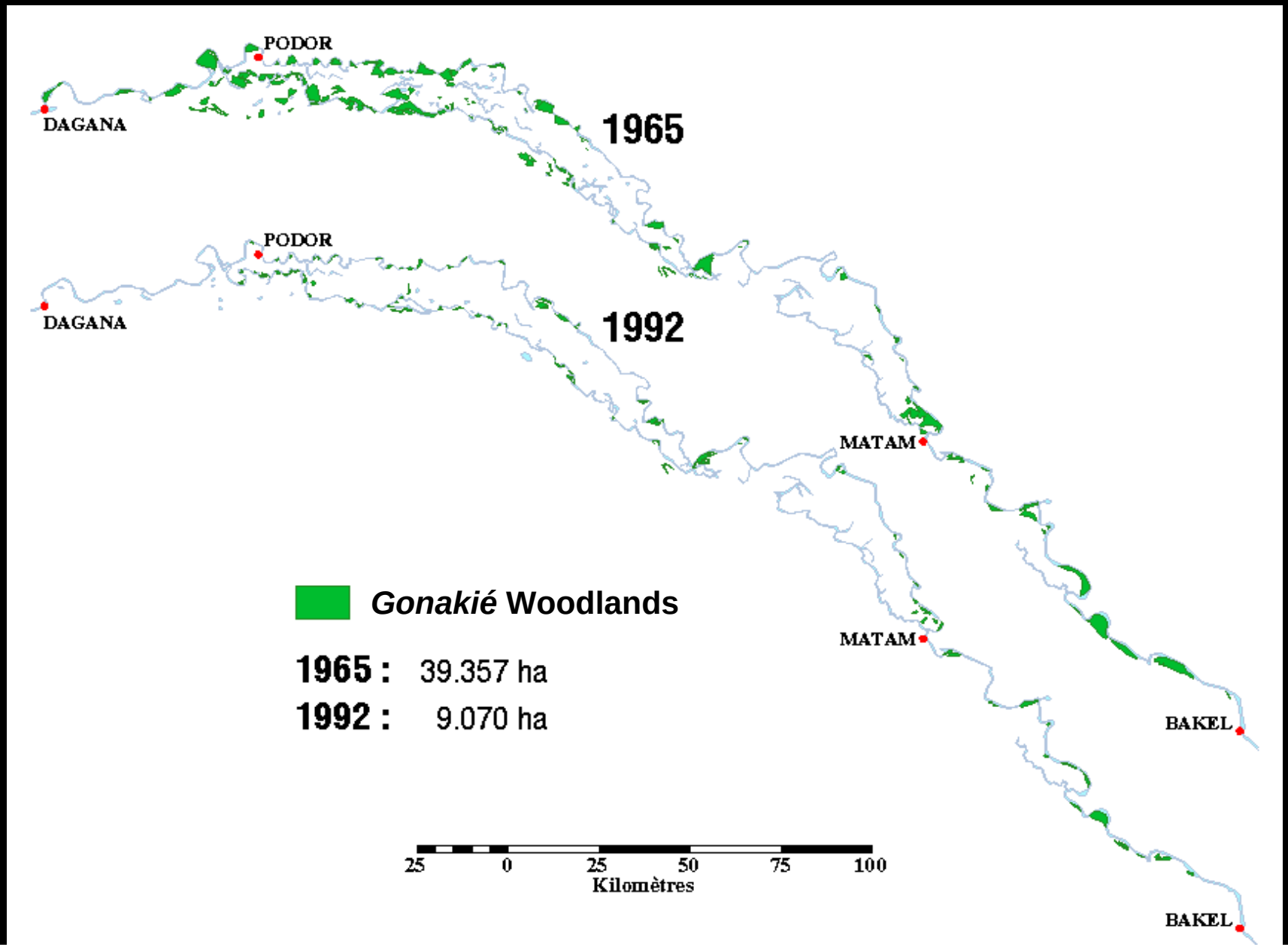
Riverine Woodlands of the Senegal River Valley

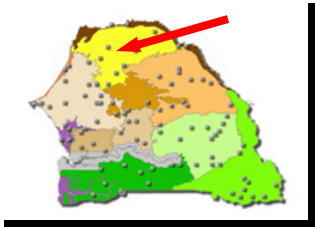


Woodlands of the Senegal River Valley


Senegal River Valley
100%
80%
60%
40%
20%
0%
1965
1970
1975
1980
1985
1990
1995
2000
LU/LC Graph Legend
Agriculture / Zones de Culture
Bare Soils / Sols Dénudés
Forests / Forêt
Mangroves / Mangroves
Savannas / Savanes
Settlements / Habitations
Steppes / Steppes
Water Bodies / Plans d'eau
Wetland - Floodplain / Prairie marécageuse - Vallée inondable

Rapid Decline of the Riverine Woodlands

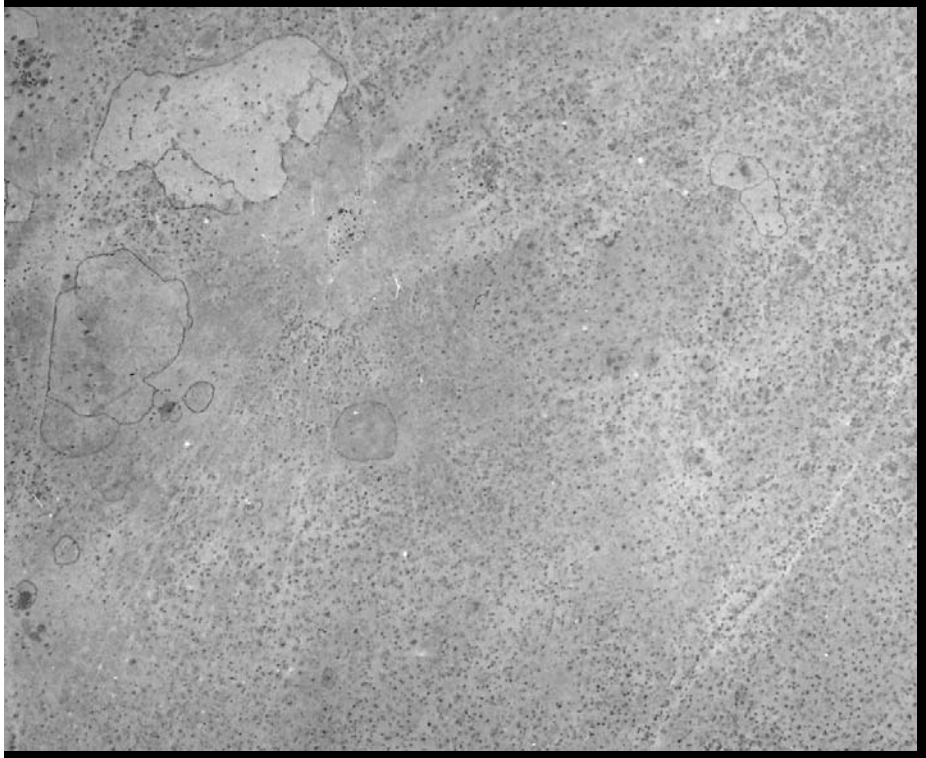




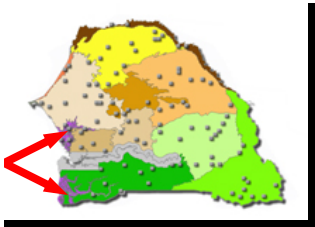
Northern Pastoral Sandy Region

Percent Woody Cover
1942, 1965: 10 – 15 %
1994: 2 – 5 %

Northwest Senegal, 4 April 1942

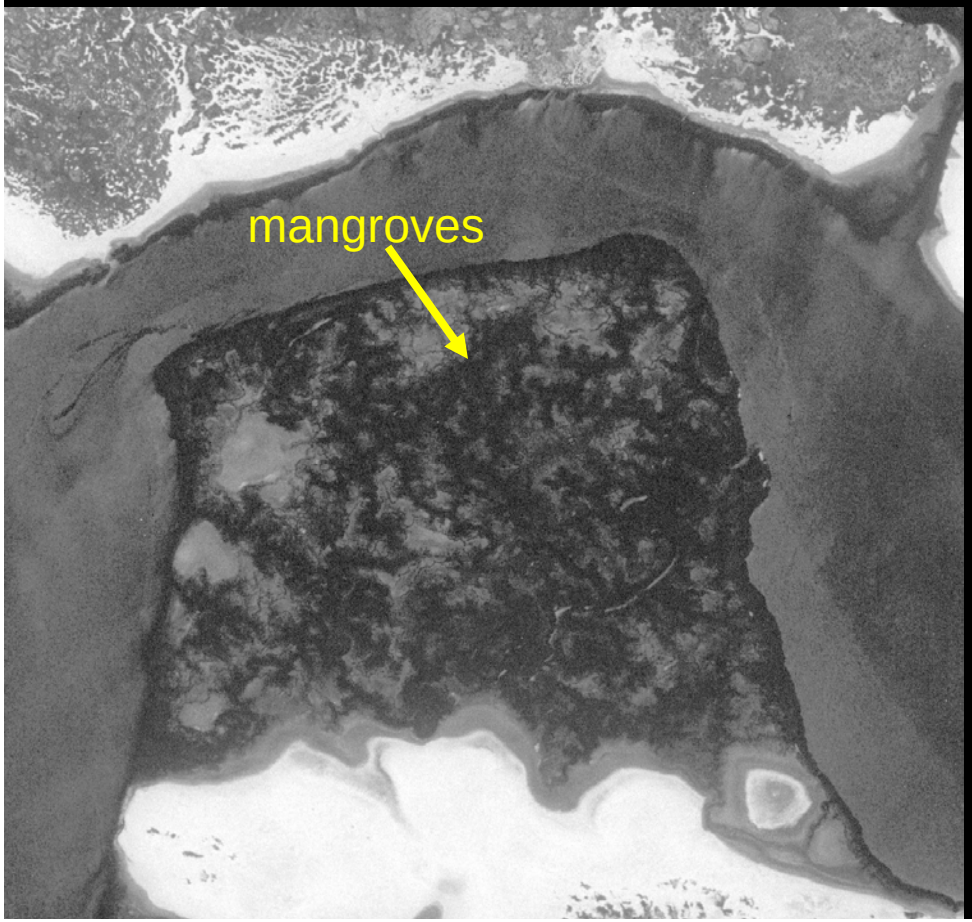


North-central Senegal, December 1965



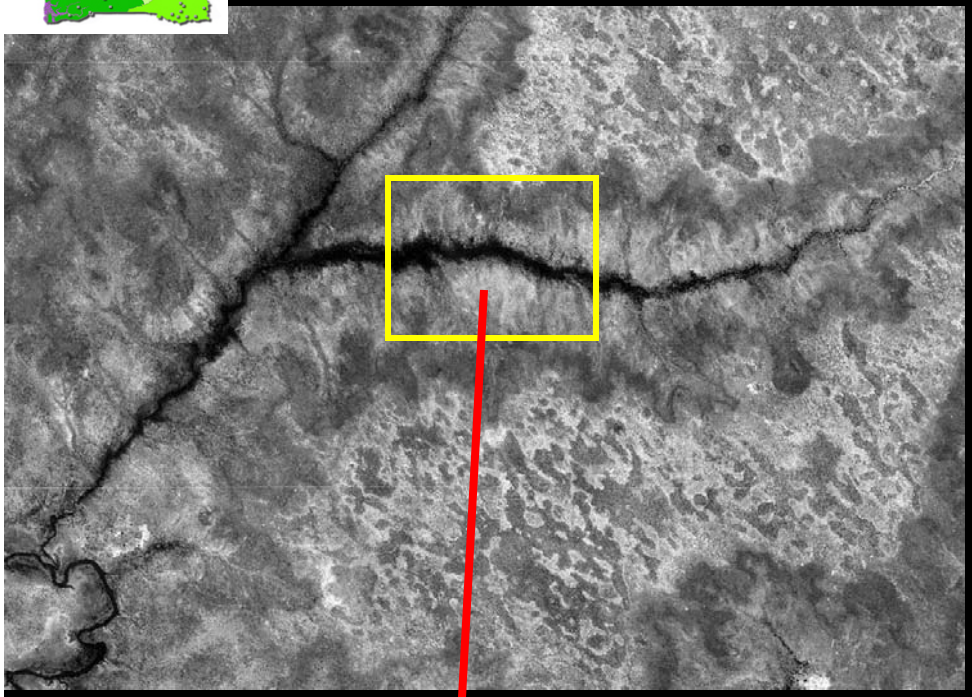
Estuaries Region

1968: vertical view of Saloum River



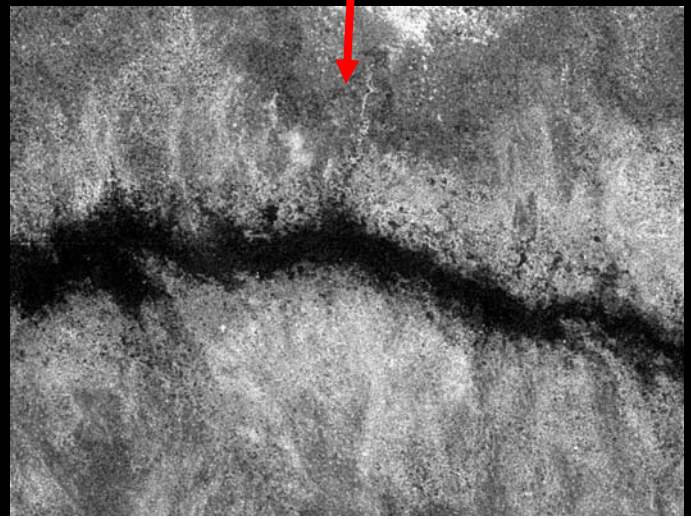
1997: oblique view of Saloum River

Eastern Transition Region



1965

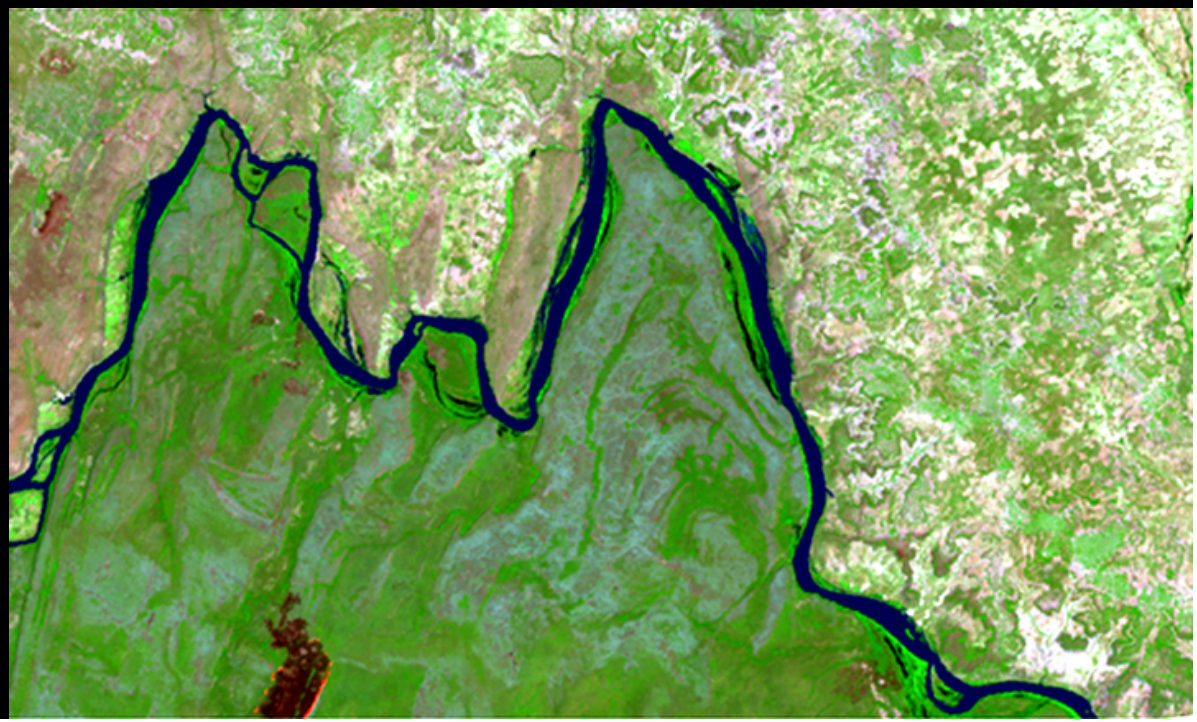
1999



Agricultural Expansion in Valleys and loss of Gallery Forest

West African Landscapes: National Park in Southern Niger

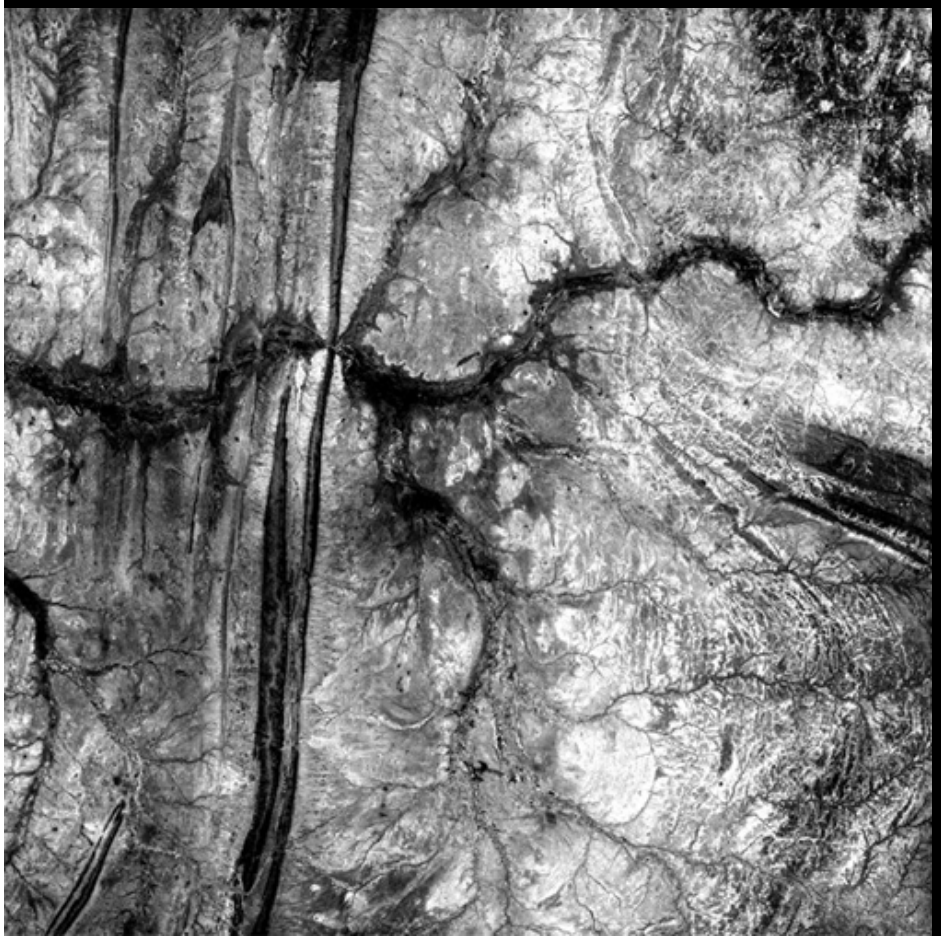
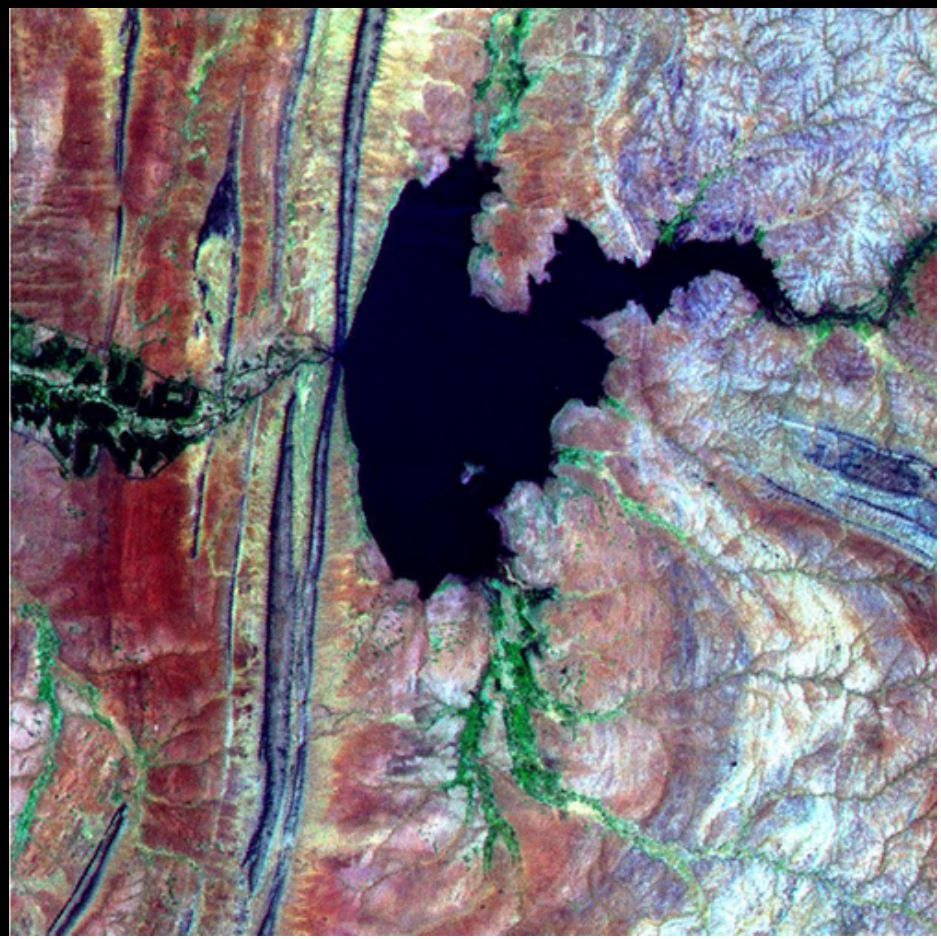
Corona 1965



Landsat 1999

West African Landscapes: The Gorgol, Mauritania

Corona 1966



Landsat 1999