

– TT5 –

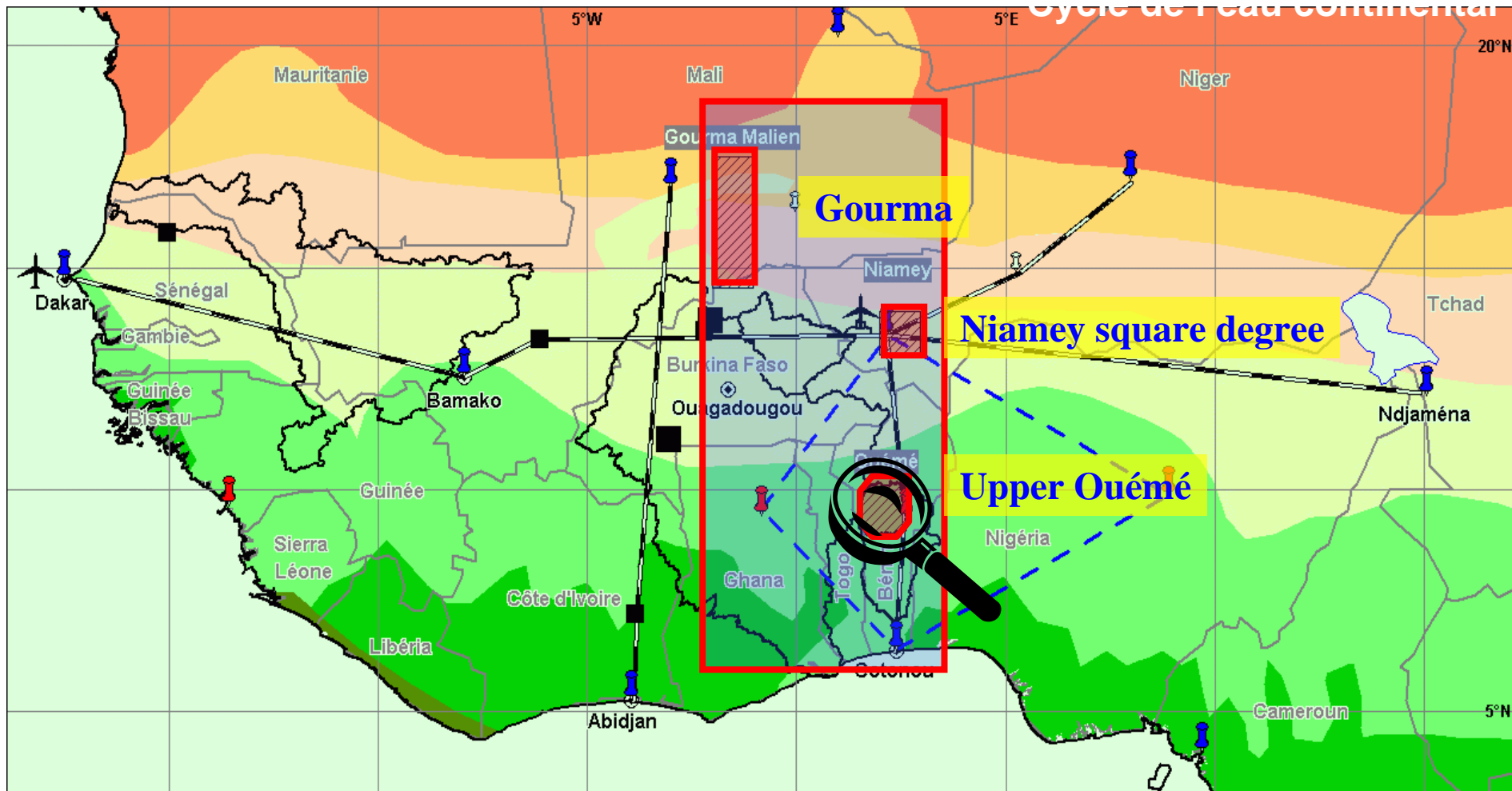
EOP integrative studies on the Ouémé meso-scale site

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The observing strategy has been conceived for the documentation of:

- ❑ climatic forcing and atmospheric parameters,
- ❑ the continental water cycle, from local to meso scale, and feed backs
- ❑ aerosol and atmospheric chemistry processes.

Mesoscale sites



Ouémé mesoscale site
1200 mm/year [march-october]

The observing strategy

- ❑ climatic forcing and atmospheric parameters,
- ❑ the continental water cycle, from local to meso scale, and feed backs
- ❑ aerosol and atmospheric chemistry processes.

Rainfall quantification

- 46 automatic raingauges (*CL.Rain_0* and *CL.Rain_Od*) operating since 1997 : quantification of rain inputs to the hydrologic and vegetation systems, and for aerosol deposition and surface emissions
- high resolution, 3D description of rainfall events, to contribute to a better estimations of rainfall fields : 2 radars (*Xport*, *Ronsard*)
- one disdrometer (*AE.Dsd_Or*), one optical spectro-pluviometer (*AE.OSP_Od*) and one bi-static receptor (*AE.BIST_RADAR*).



Main attachment is TT5

LOP

EOP

SOP

Characterizing the state of the atmospheric column

- Parakou radio-sounding (*AE.RS_Q1*)
- meteorological station (*AE.Met_Od*)
- VHF Profiler (*AE.VHF_O*)
- GPS (*AE.GPS_1*) *
- lidar-ceilometer (*AE.CT25K*)
- micro-wave temperature and humidity profiler (*AE.PROF_T*)
- micro-rain radar (*AE.RADK_T*)

* *part of a regional network*



GPS + Meteorological station

LOP EOP SOP

The observing strategy

- ❑ climatic forcing and atmospheric parameters,
- ❑ the continental water cycle, from local to meso scale, and feed backs
- ❑ aerosol and atmospheric chemistry processes.

Continental water cycle and feed backs

Based on a multi-scale (spatial and temporal) approach associating long-term (LOP) and enhanced (EOP) observation periods.

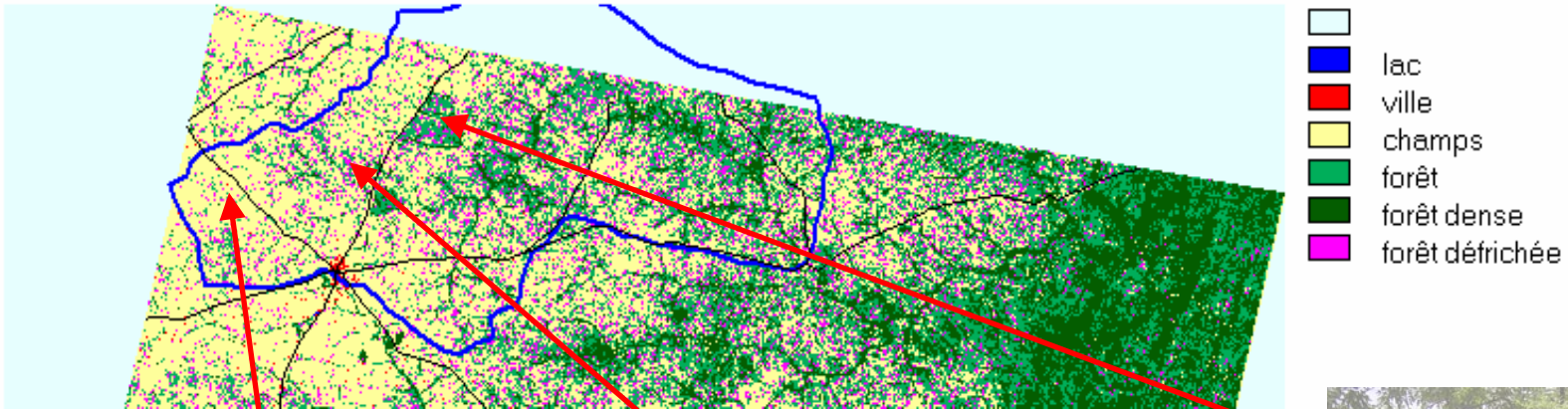
- **local sites (catena)**
document fluxes dynamics in relation with vegetation and hydric resources (CE.SW_Odc), (CE.GWat_Odc), (CE.Run_Odc), (CE.Veg_Odc) (AE.Flux_Odc) *, (CC.Geophy_Odc) (CE.WChem_Odc), (CC.Scintill_Od)
- **super-sites : Donga Watershed (700 km²)**
Characterize the water cycle compartments at seasonal and interseasonal time scale : (CL.Rain_Od), (CL.Run_Od), (CL.GWat_Od) (CL.Wchem_O)
- **meso-scale watershed : upper Ouémé basin (14 000 km²)**
Integrate contribution from various geological areas and spatial rainfall variability (CL.Rain_O), (CL.Run_O), (CL.GWat_O), (CE.WatChem_O)

* part of a regional network

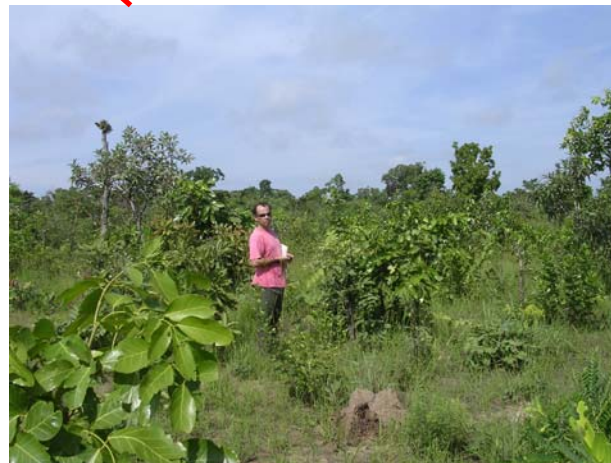
LOP EOP SOP

Donga vegetation cover

SPOT 4/11/00 classes de NDVI



Crop / Fallow



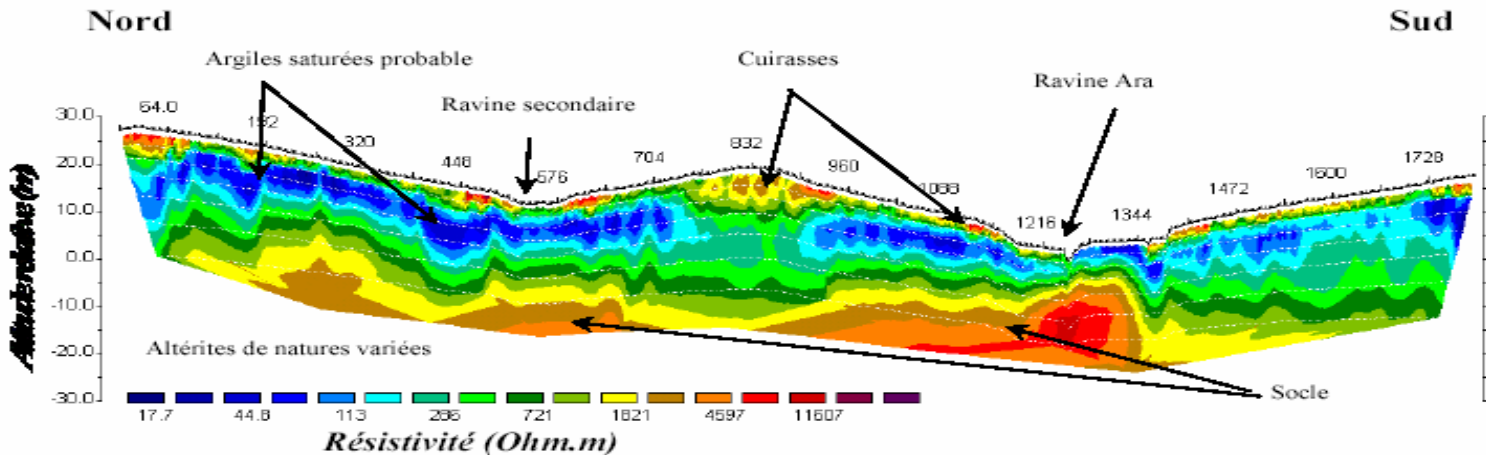
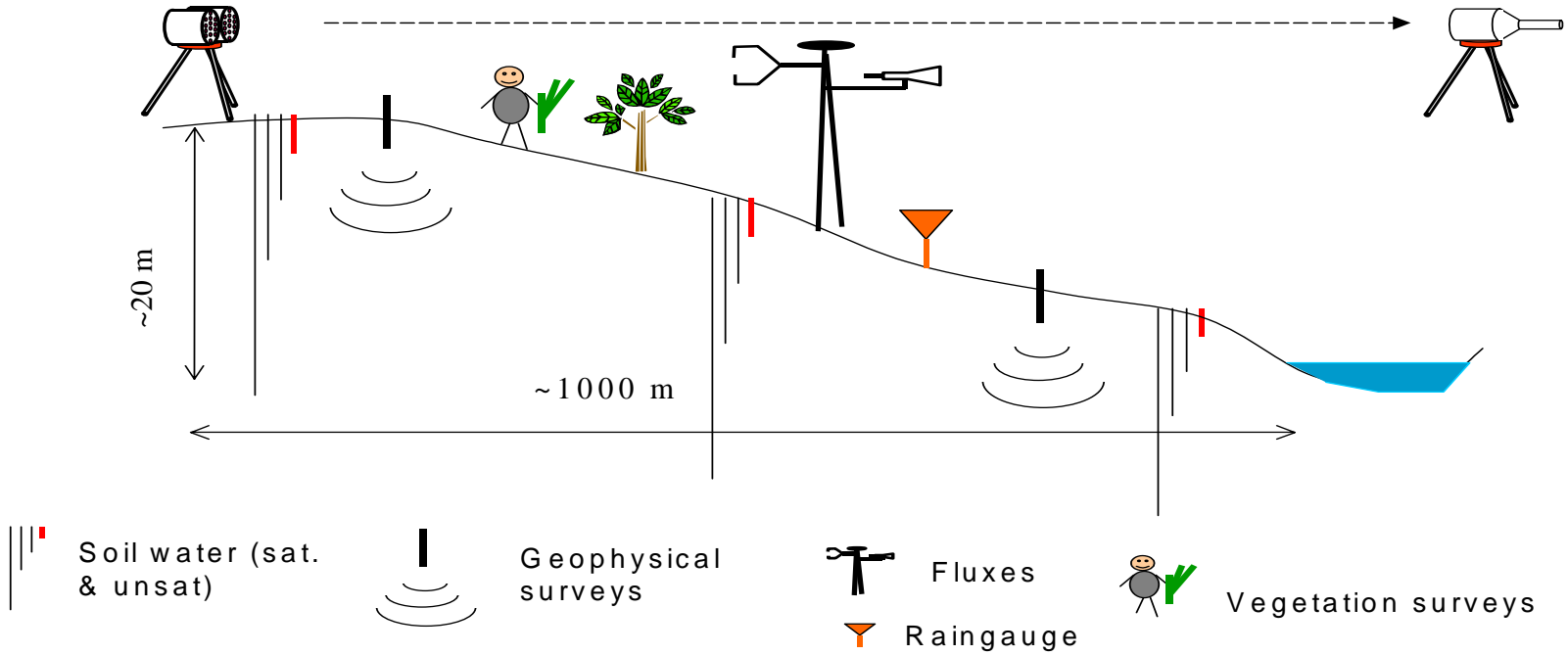
bush savannah



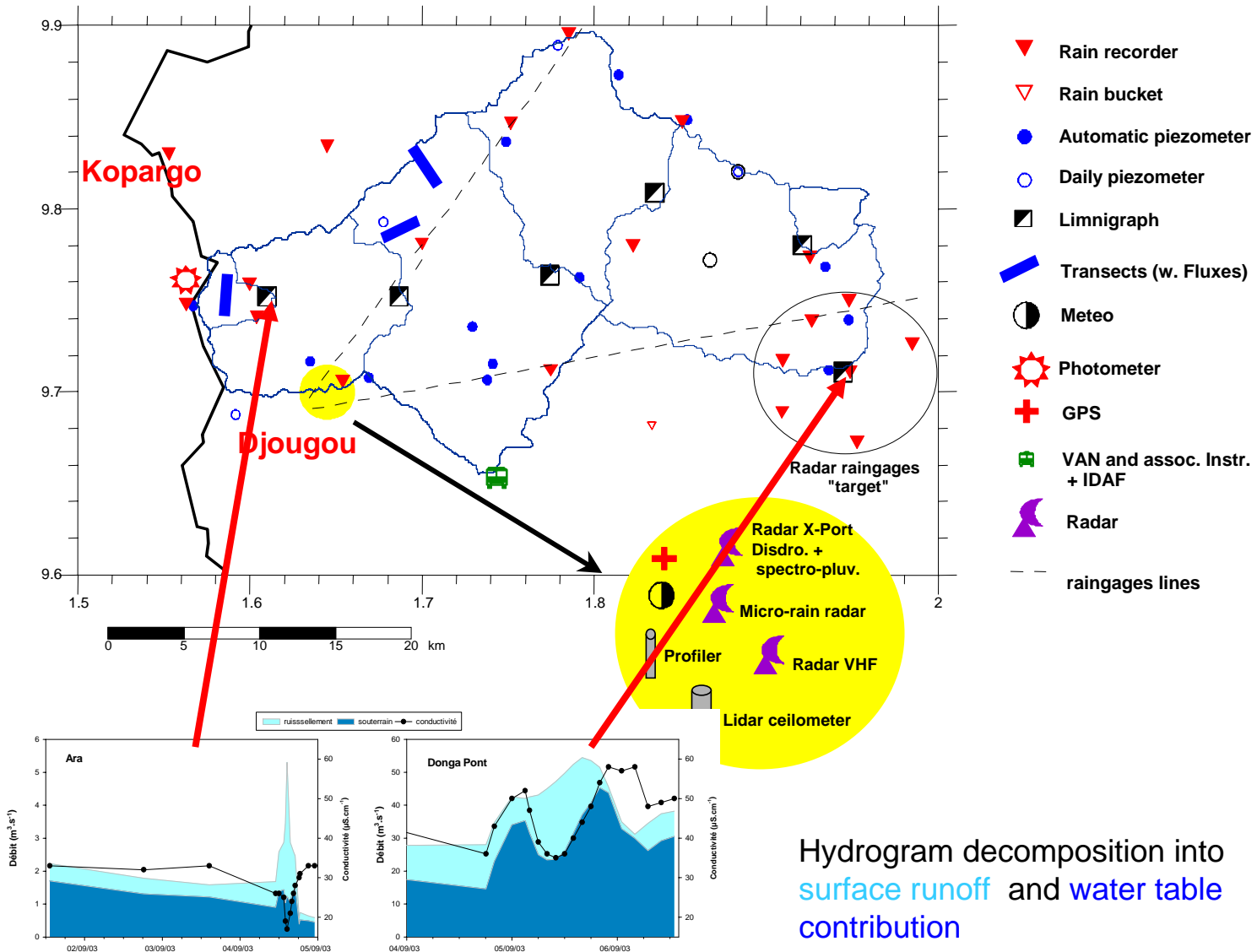
forest

A1.1 Local scale (transects) EOP equipment

Scintillometer (open savanah site)



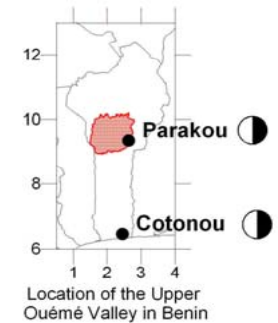
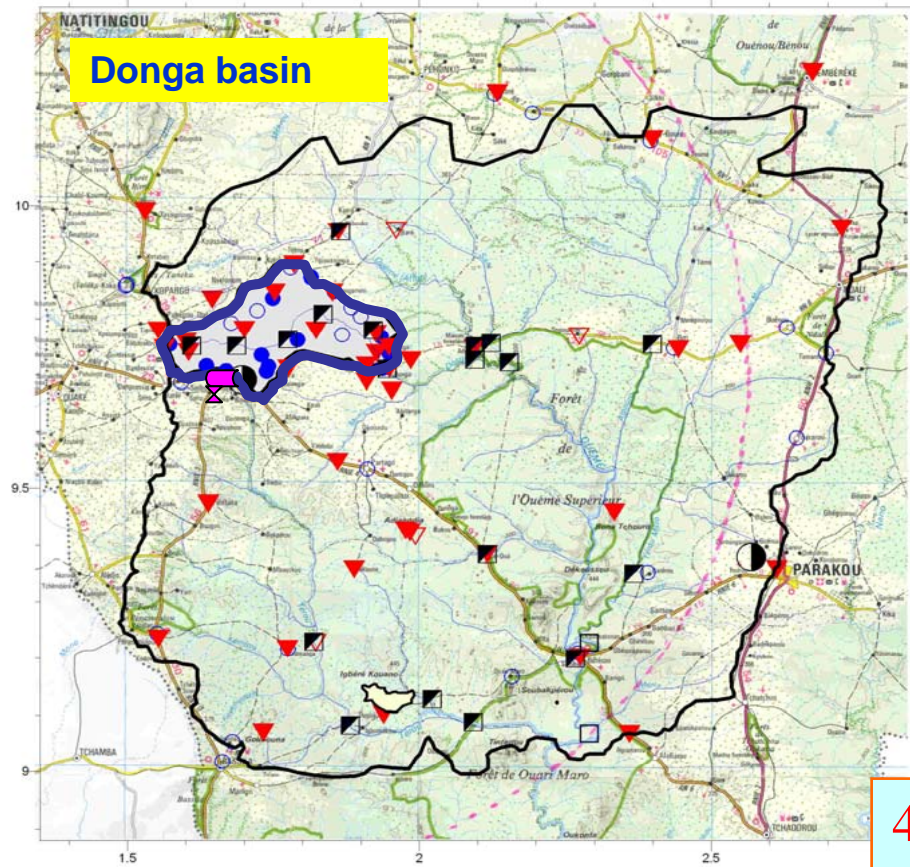
A1.2 Donga super-site LOP/EOP equipment



Continental water cycle survey



Donga basin



- Recording Raingage
- River flow station
- Recording and daily Piezometers
- Meteo
- Donga catchment (Super-Site)
- Aguiama (IMPETUS Project)



80 automatic devices

- national network
- AMMA
- IMPETUS

- 44 raingauges
- 19 limnimeters
- 15 piézographs
- 1 météorological station
- 1 radar

100 readers

The observing strategy

- ❑ climatic forcing and atmospheric parameters,
- ❑ the continental water cycle, from local to meso scale, and feed backs
- ❑ aerosol and atmospheric chemistry processes.

Aerosol and atmospheric chemistry processes

- to gather a precise documentation on biogenic emissions (processes and seasonal variability) and deposition of reactive trace gases (NO_x, COV, O₃) (**AE.VAN_Od**)
- document dry and wet deposition, as well as aerosol composition : IDAF station (**CL.Depot_RW**) *, dust impactors (**AS.Dust_Od**) * and sun photometer (**CL.Photometer**) * of the PHOTON-AERONET network

* *part of a regional network*

A all-in-one ground-based station; starting September 2005

Full met station



Energy budget + CO₂ fluxes



NO emissions from soils

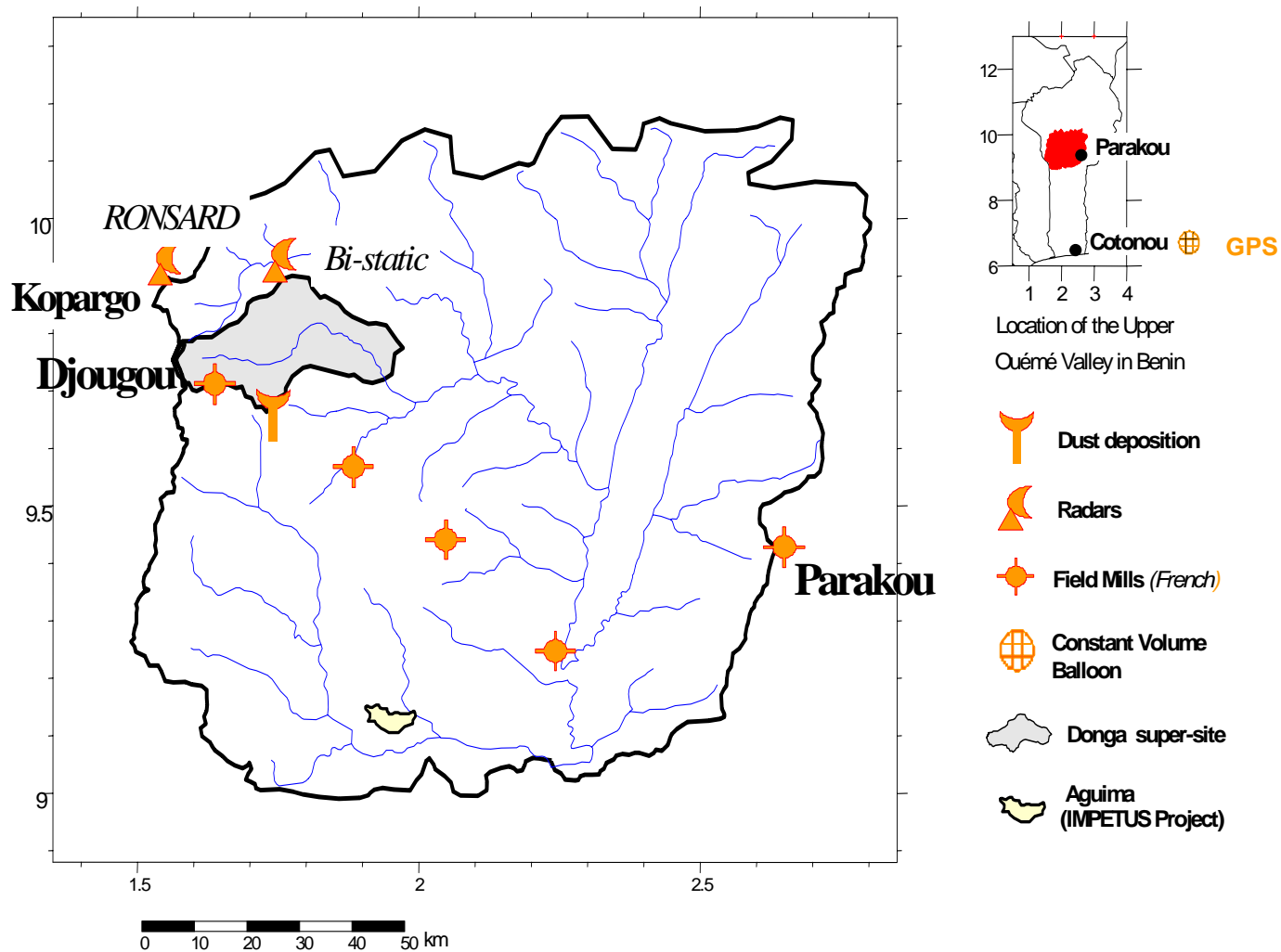


Aerosols and gaseous chemistry



+ others (SAOZ, spectro-granulometer...) + SOP deployment (cf. AE_Dust0d)

A1.4 Meso-scale Ouémé site SOP equipment



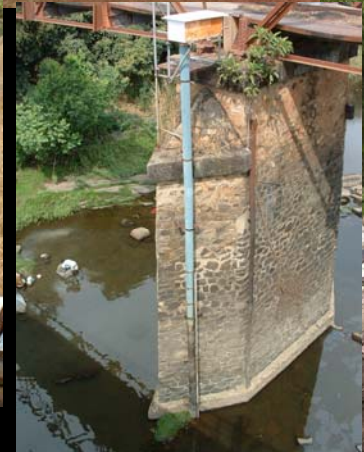
Burning issues

Scientific

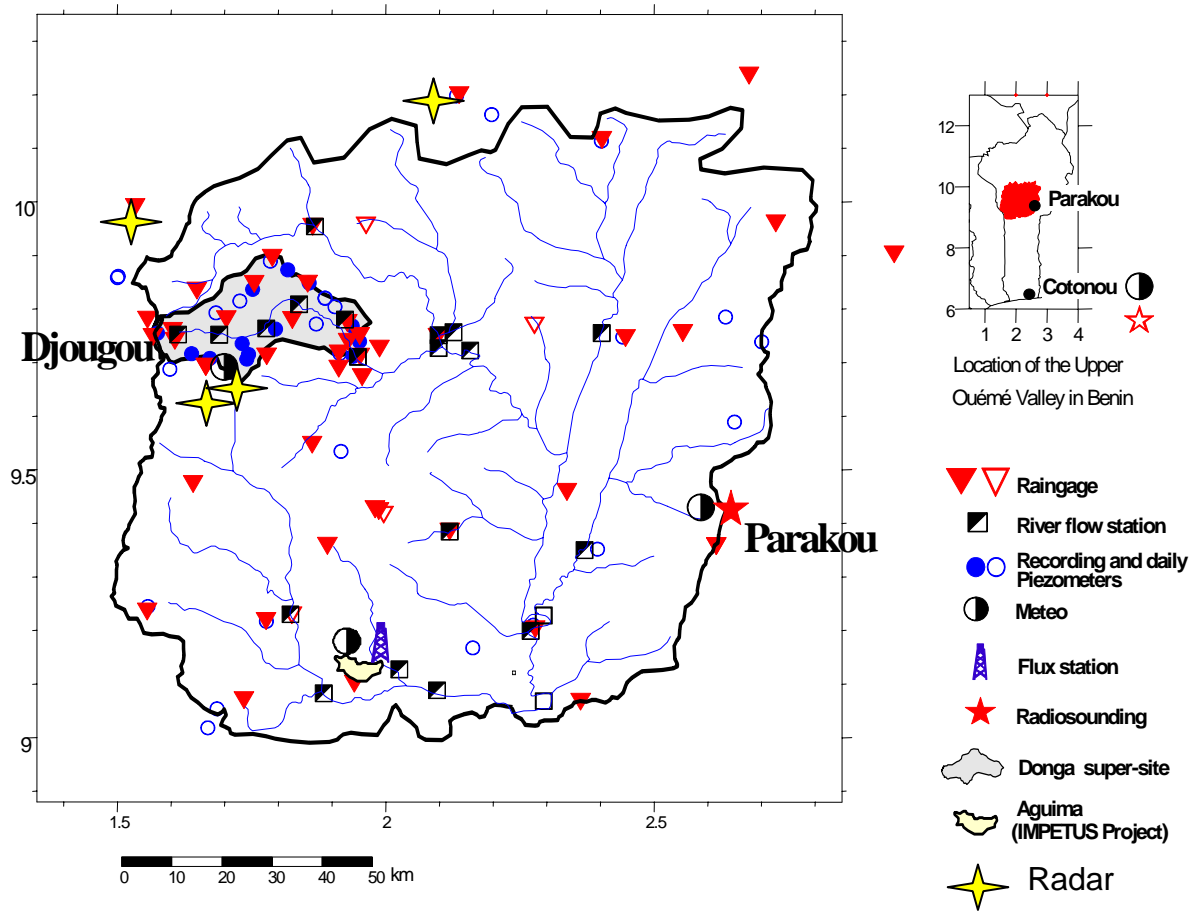
- Instrument related to different TTs
- Delay for flux installation : extend monitoring to 2008 ?
- Unknown status of some instruments
- Appearance of last minute instruments
 - add instrument sheets on implementation web site
- No funding for geophysical survey
- Scientific partnership with beninese teams

Logistics

- Secondary Benin AOC will begin mid october
 - systematic mission announcement one month ahead
- Car, office
- Determine communication needs (EOP and SOP) see AOC meeting
- Stand-alone instrument : an idealistic but not realistic concept
i.e. scintillometer, GPS, photometer
 - permanent technical support in Djougou needed



A1.3 Meso-scale Ouémé site LOP/EOP equipment



Logistical considerations

- Logistical team : 1 administratif coordinator (sept. 2005), 1 technical coordinator (IRD)
 - 2 available cars (IRD), 5 mandatory
 - No office for visitors (chair and internet connection)
 - No funding for transmission (numerous instrument PI are interested (XPort, Ronsard, VHF, VAN, GPS, etc.) / local technician
- Need for definition of secondary AOC

Communication / data transmission

This issue has to be coordinated with SOP TT and Operation Centre, for needs and funding : the final choice has to be made when the precise technical requirements will be established

- **Field sites**

- EOP**

- Djougou (Xport Radar, GPS, Lidar, micro rain radar, microwave profiler ?),
 - Nangantchori (atmospheric chemistry and aerosols, VHF, UHF ?),
 - Nalohou (scintillometer)
 - Flux sites (SAF Land?) (Nalohou, Béléfoungou, Bira-Bira)
 - Parakou RS station

- SOP**

- Djougou : Dust_Impactor ?
 - Kopargo : Radar Ronsard
 - Kolokondé : Bi-static receptor
 - 5 field mills between Parakou and Djougou
 - Lightning detection

- **Cotonou (ADSL available)**

- Ozone Radio-sounding
 - GPS station
 - Ballon Volume Constant Benin ?

Actual EOP deployment

- **22 installed instruments (27 planned)**
 - Geophysical instrument not funded
 - Flux measurement delayed (lack 2005 rainy season)
 - No information on lidar, microwave profiler micro-rain radar (Suzanne Crewell)
- **New/unknown instruments (for TT5)**
 - SAOZ
 - Lightning detection
 - Remote sensing validation (WP 4.3)
 - ??

Technical choices

type	Principal site	Secondary site	Investment cost	Yearly cost	drawback
Geolink full internet	Djougou	Radio link	61000 €	13000€	Investment cost, upward capacity
Inmarsat Full internet	Each site		1300 €	6€/Mo 48000€ (8 Go/year)	Cost for large amount of data
GSM Portable telephone	Each site				Only 10 km from Djougou Small data amount
ADSL Internet connection	Djougou	Radio link	?		Not yet working (end 2005 ?)

Modelling and satellite observations

- These instruments provide data for calibration, validation and data assimilation in models, as well as validation data for satellite products (vegetation cover , fluxes).
- A particular need concerns the estimation of large scale fluxes (evapotranspiration) from local tower and scintillometer measurements, and satellite images, using models.