Survey of REDD projects in Central Africa
Etude des projets REDD en Afrique Centrale

(formulaire à renvoyer à cdewasseige@foraf.eu et philippe.mayaux@jrc.ec.europa.eu)

1) General description / Description générale

Project name / Nom du projet:

Monitoring forest structure/degradation in Central Africa and Brazil from canopy grain analysis

Domain of activity / Domaine d'activité

(n answers possible, if possible sorted by priority 1= highest priority
plusieurs réponses possibles, si possible par priorité 1= plus haute priorité)

Monitoring of forest cover (deforestation and degradation) Suivi du couvert forestier (déforestation et dégradation)	1
Assessment of carbon stocks Mesures des stocks de carbone	1
Forest dynamics Dynamique forestière	2
Modelling of forest dynamics (including reference scenario) Modélisation des dynamiques forestières (dont scénario de référence)	2
Political and institutional context Context Institutionnel et Politique	no
Capacity-building and technology transfer Renforcement des capacités nationales et transfert de technologie.	2
Promotion of participation of local communities Promotion de la participation des communautés locales	no
Field Project with REDD potential (project generating emission reduction from Deforestation and Degradation without an MRV component) Projet de terrain ayant un potentiel REDD (projet permettant la réduction des GES liées à la déforestation et la dégradation sans composante MRV)	no
REDD Pilot Project (project aiming to generate measurable and verifiable GHG emissions reduction from deforestation and forest degradation) Projet Pilote REDD (projet visant la reduction mesurable et vérifiable des émissions de GES liés à la déforestation et à la dégradation forestière)	no

General objective / Objectif général

Provide a validated remote-sensing methodology to help in the implementation of REDD.

Specific objectives / Objectifs spécifiques

Large scale validation approaches using metric resolution imagery and canopy texture analysis to quantify forest structure and degradation.

Region of interest / Région d'intérêt

Cameroun, Gabon, Central African Republic (CAR), Democratic Republic of Congo (DRC) and the Republic of Congo

Budget
(order of magnitude if confidential / ordre de grandeur si confidentiel)

~ 400 000 Eur (imagery, salary, field trips)

2) Partners / Partenaires

(Institution, contact person, email)

Project leader / Leader du projet

Pierre Couteron (IRD)

Technical and scientific partners / Partenaires techniques et scientifiques

Institut de Recherche pour le Développement (IRD)
Pierre Couteron – Project manager
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Nicolas Barbier
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Scientist to be hired by IRD in June 2010

FORET RESSOURCES MANAGEMENT (FRM)
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Instititional partners (COMIFAC countries) / Partenaires institutionnels (Pays COMIFAC)

Congo – Partners and Associated Researchers
SETRAF
setraf_ekma@yahoo.fr

IFO
Industrie Forestière d'Ouesso IFO
North Congo
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Gabon – Partners and Associated Researchers
Rougier Gabon
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CAR – Partners and Associated Researchers
SCD
valerio Bagarella
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Contacts have been established with orther logging societies

Financial partners / Partenaires financiers

IRD, UE (FP7- People), Spot image (Planet Action), FNRS, INRA, FRM and institutional partners

3) Earth Observation component / Composante d'Observation de la terre

This part aims at identifying the characteristics of the Earth observation component if there is one. Leave it blank if it not the case.
Cette partie veut identifier les caractéristiques de la composante d'observation de la terre, s'il y en a une. Ne remplissez pas cette partie si ce n'est pas le cas.

Data used / données utilisées

Dataset Données	Sensor / capteur Radar/optical/lidar…	Resolution	Coverage Couverture	Time & frequency Date et fréquence	Quality / qualité (good-medium-bad)	Accessibility (free access-with conditions – restricted)
Optiques métriques	Quickbird, Ikonos, Spot 5, GeoEye, Orbview, FORMOSAT, Komsat	Metric	Partial	Once	Good	Depending on sensor. Spot 5 to be made available for free in CA.

Methods / Méthodes

(short description on sampling, classification methods… / description de l'échantillonnage, des méthodes de classification…)

Archive imagery and new acquisition have been ordered for a systematic investigation in West Central Africa.

Reference sites have been selected by the partners involved in natural forest management and studies in the targeted countries, in association with local partners. For all selected sites, field data (tree enumeration and diameter measurement in field plots) from thorough forest sampling (consistent methodology) are available. (See point 4).

The method for canopy texture analysis as described in the published references (Barbier et al. 2010; Barbier et al. Accepted; Couteron et al. 2005; Proisy et al. 2007) will be applied to metric resolution panchromatic images in order to compute canopy texture indices derived from the Fourier spectra of the images. Good correlation between texture indices and some stand forest parameters (tree density, stand distribution of diameter values) are expected according to the preliminary studies from French Guiana. Conditions limiting the use of the method, such as particular ecological conditions and technical parameters of image acquisition will be identified. The standard error of prediction will be assessed for each main forest parameter, including standing above-ground biomass.

A modelling approach is also used for a systematic study of the effect of acquisition conditions (e.g. sun/scene/sensor angles), on the basis of radiative transfer models (e.g. DART (Gastellu-Etchegorry 2008)) applied on 3D forest templates.

Expected results / résultats attendus

(short description of products, parameters measured, frequency, expected accuracy..
Courte description des produits, paramètres mesurés, fréquence, précision attendue…))

- Large scale maps of canopy texture variation (see Barbier et al. 2010), with assessable errors
- Large scale ground validation with respect to classical variables used in forestry (distribution of diameters at breast height - dbh, stem density, allowing the prediction of biomass)
- Method sensitivity analysis wrt acquisition conditions and mitigation procedures for acquisition discrepancies in order to ensure consistency in space and time of the forest structure assessment

Validation

(short description of validation protocols, reference data… / courte description des protocols de validation et des données de référence)

Field inventories (see point 4) and radiative transfer models applied on realistic 3D forest templates.

4) Ground component / Composante sol

Parameters collected / paramètres collectés

(list of parameters with short description of collection method / liste des paramètres collectés avec une courte description des méthodes de collecte)

All stems above 10 cm (20 cm in some cases) are identified to scientific species level and measured for DBH.). Additional data on specific places regarding total height and crown measurements will be collected.

Destructive biomass sampling is also planned to help derive allometric equations.

Sampling strategy / Stratégie d'échantillonnage

Ground data are management oriented forest inventory (mainly DBH) systematically recorded within 200x25 m contiguous plots inventoried along transects. Study areas (covering around $14\ 10^6$ ha in total) are sampled at a ~1% rate

Statistical analysis / Analyse statistique

See point 5.

5) Integration Earth Observation - ground / Intégration Télédétection-sol

Integration methods / Méthodes d'intégration

(assimilation models, statistical models…)

Spatialized correlation analyses, cross-validation techniques based on geostatisitcs to match independent sampling designs, as well as spatial interpolation and map comparison methods.
Overall sampling scheme of acquired VHR metric images (see table) based on a stratified sampling of the regional gradients (climate, Geology, etc.)

Final products / Produits finaux

(estimation de biomasse, de flux de carbone, de flux financiers…)

Method sensitivity analysis. REDD-ready protocole suggestions for measuring spatio-temporal variations of carbon-stocks in high biomass closed canopy forests

Regional maps of biomass, forest structure and forest degradation.

In depth analysis of regional canopy structure variation and feed-back on topics such as forest ecology, biodiversity conservation and local livelihood improvement

Validation

(short description of validation protocols, reference data…)

See point 4.

6) Political component / Composante politique

Beneficiaries / Bénéficiaires

(REDD focal points, forest services, monitoring services, local communities… / points focaux REDD, services forestiers, services de suivi, communautés locales…)

Theme / thème

(Negotiation, reporting, monitoring, retrocession of payment… / négociation, reporting, suivi, distribution des bénéfices)

Type of action

(training, awareness-raising, field project, demonstration project, development of economic alternatives to deforestation and/or degradation, political study… / formation, sensibilisation, projet de terrain, projet de démonstration, développement d'alternatives à la deforestation et degradation, étude politique)

7) Capacity Building activities

Trainings delivered

(theme, beneficiaries, location, date, duration, frequency / thèmes, bénéficiaires, lieu, date, durée, fréquence)

To be considered within a broader framework of IRD and partners involvement in central Africa

Workshop organized

(theme, beneficiaries, location, date, duration, frequency / thèmes, bénéficiaires, lieu, date, durée, fréquence)

Support Provided for the organisation of local communities and/or local project management institutions

(Types of institutions created, structure and modus operandi, legal status, contractual arrangement and benefits sharing agreement / Types d'institutions créées structure et modes opérationnels, staut legal, accord contractules et accord sur le partage des benefices)

Potential support in training/capacity building activities organized by others

We are keen to share our expertise and experience in order to contribute to ongoing or planned initiatives for capacity building.

8) General Details (For REDD Pilot Projects Only /Pour projets pilotes REDD seulement)

Pays	
Surface	ha
Type de certification (MDP, VCS, ...)	
tURCE/VER générées	
Date de début du projet	
Méthodologie utilisée	
Période de comptabilisation	
Coûts d'investissement (hors composante carbone)	Si disponible
% fonds propre	Si disponible
% dette	Si disponible
Revenus carbone	Si disponible
Delta TIR	Si disponible
Promoteur	Si disponible
Financeur	Si disponible

9) Publications

List of publications or reports available in or relevant for the project – please send a digital copy of the public documents for publication on the OFAC web site
Liste des publications ou rapports disponibles dans le projet – envoyez une copie digitale des documents publics pour mise à disposition sur le site de OFAC)

Barbier N., Couteron P., Proisy C., Malhi Y. (2010). The variation of apparent crown size and canopy heterogeneity across lowland Amazonian forests. Global Ecol Biogeogr 19: 72-84
Barbier N., Proisy C., Couteron P., Véga C. (Accepted). Bidirectional texture function of LiDAR hillshade models of tropical forest canopy. Remote Sens Environ
Couteron P., Pelissier R., Nicolini E.A., Paget D. (2005). Predicting tropical forest stand structure parameters from Fourier transform of very high-resolution remotely sensed canopy images. J Appl Ecol 42: 1121-1128
Gastellu-Etchegorry J.P. (2008). 3D modeling of satellite spectral images, radiation budget and energy budget of urban landscapes. Meteorol Atmos Phys 102: 187-207
Proisy C., Couteron P., Fromard F. (2007). Predicting and mapping mangrove biomass from canopy grain analysis using Fourier-based textural ordination of IKONOS images. Remote Sens Environ 109: 379-392

10) Free comments / Commentaires libres

(including what you expect from this survey / incluant ce que vous attendez de cette enquête)

This project is part of a broader project (Programme Pilote de Recherche or PPR) borne by IRD and opened to a wide array of partnerships on "Biodiversity, Global Change and Health in Central Africa"