Kick-off meeting, 24-25 March 2011, VITO (Mol, Belgium)

1 Partners and their representatives:

- European Commission (DG-INFSO, EU): Thierry Devars
- SDLO (Alterra, NL): Allard de Wit and Raymond van der Wijngaart
- University of Milan (UMI, IT): Roberto Confalonieri
- European Commission (JRC, EU): Mohamed El Aydam
- INRA (Morocco, MO): Riad Balaghi
- Chinese Academy of Agricultural Sciences (CAAS, CN): Zhongxin Chen
- Anhui Institute for Economical Research (AIFER, CN): Zhongmo MA and Yang Qing
- Jiangsu Academy of Agricultural Sciences (JAAS, CN): Qiu Lin
- Ministry of Environment and Mineral resources (DRSRS, KE): Charles Situma
- VITO (BE): Qinghan Dong, Lieven Bydekerke, Herman Eerens, Anne Gobbin

2 Introduction and overview of the project and its partners:

- Welcome and introduction of nine partners including duties and expertise of each organization. The presentations are available on: https://sites.vito.be/sites/eagri.
- Thierry Devars, the project officer: Introduction of DG INFSO and expectations for E-AGRI implementation from the viewpoint of the European Commission:
- E-AGRI project overview (Qinghan Dong)
- E-AGRI management and its share point server (MOSS) (Lieven Bydekerke)

3 Workgroup discussing and activity planning:

3.1 Workgroup CGMS (Work package 2)

The partner institutions of the workgroup include Alterra (leader) INRA and AIFER. Collaboration with the work group 3 will be substantial. 39 man/month (WP21 till WP25) will be dedicated to the activities of the workgroup.

3.1.1 Data to be collected or estimated at grid level in the test site Anhui and Morocco

- Precipitation (daily total)
- Temperature (daily maximum, daily minimum)
- Global radiation (daily total) or a proxy (sunshine duration, cloud cover)
- Vapour pressure
- Wind speed (daily average)
- Reference evapo-transpiration (derived from the above)
    - Potential evaporation of water surface
    - Potential evaporation of wet bare soil
    - Potential evapo-transpiration of a crop canopy

3.1.2 Establishing gridded weather data

Morocco:

- Weather data: Alterra checks if station observations for Morocco (as currently used in the MARS database) are available for E-AGRI. INRA checks if other station data are available. When: **1 month**
- Soil data: use 1:50.000 soil map of Morocco (for Agricultural part). INRA will check and provide derived product from soil map. When: **6 months**. Alterra will use fixed procedure to derive single layer parameter values.
- Statistics: a detailed database can be provided by INRA to Alterra containing data for +/- 40 provinces. When: **1 months**.
- Crop experimental data: Alterra will provide INRA with list of parameters needed by WOFOST and list of data that can be used for calibration. Even better, Alterra & UMI make joined list of required (for BioMa and CMGS) parameters and send this to INRA. When: **2 weeks**. INRA will check if local experiment are suitable to provide directly parameter values or data suitable for calibration. If not, INRA can do some very limited experiments to measure some key parameter values. When: **6 months**.
- Crop masks: Current mask in MARSOP is not covering all areas. For the purpose of this project a specific crop mask can be created using remote sensing for Wheat (and Barley) by INRA / VITO in WP4. When: **3 months**.
- Crop calendars: not available. Sowing data is most important. Calculable based on temperature. When: **6 months**.

Anhui:

- Weather data: ERA-interim already available at Alterra will be used during the setup. Alterra will send station metadata, while AIFER will do the interpolation and return grid weather during setup based on downscaled 10-daily observed data. When: **6 months**. Compare 10-daily observed results with ERA data.
- Soil: 1:5.000.000 FAO already available at Alterra. When: **ready**.
- Statistics: available on district level. AIFER will provide the data to Alterra. When: **3 month.**
- Crop experimental data: Alterra will provide list of data needed for calibration. When: **1 month**. Only few local experiments are available for Huaibei. AIFER will check if nearby experiments could be used. Probably these are not representative. For calibration it is best to have 6 to 10 year time series data of well distributed locations. AIFER will return available data and send it to Alterra. When: **3 months**.
- Crop mask: AIFER will provide 1x1 km weighted mask to Alterra. When: **3 months**.
- Crop calendars: detailed mask is available and delivered by AIRFER to Alterra. When: **3 months**.

3.1.3 Adaptation model Morocco / China

- Identify main drivers of yield level and variability,
- identify missing elements and improvements.

Two actions are proposed:

- Questionnaire for identifying limiting factor. Integrate with some rules for irrigation and diseases. Designed as joined effort by Alterra and UMI and send to INRA and AIFER to be filled in by experts (returning +/- 10 each).

- Adapt interpolation according to method by Météo France for Morocco? Adapt resolution to 10x10 km for Morocco? Analyze relation between climate and diseases for Morocco?

3.2 Workgroup BioMA

The workgroup BioMA, composed by UMI, JRC, INRA and JAAS, will essentially deal with the work-package 3, from data collection, adaptation or parameterization, to the piloting phase. 52,5 man/month (WP31 – WP35) will be dedicated to the activities of this workgroup. The rice in Jiangsu and the wheat in morocco are targeted or simulated crops. Thanks to the modular structure, six modelling solutions will be developed and evaluated within E-AGRI:

- Rice in China: multi-model simulations with and without forcing the models with RS data
  - WARM (Confalonieri et al., 2010)
  - WOFOST (Van Keulen and Wolf, 1986)
  - CropSyst (Stöckle et al., 2003)
- Wheat in Morocco: multi-model simulations
  - WOFOST
  - CropSyst

Each modelling solution will include models for:

- Crop growth and development (CropML and CropML_WL)
- Soil water dynamics (SoilRE and SoilW)
- Diseases (DiseasesProgress, ImpactsOnPlant, BlastDiseases)
- Abiotic damages (AbioticDamage)
- Forcing models state variables with exogenous data (i.e., NDVI or NDVI-derived leaf area index) (used only for rice in China) (Forcing)
- Micrometeorology (TRIS)

Each modelling solution performs simulation for different production levels, keeping separated the outputs of the levels themselves.

3.2.1 Data Collection

UMI will send an Email **within 1 month** for the specification of the data to be collected**:**

- Specification for the identification and grouping of cultivars.
- Specification on the field experiments and measurements to be carried out.
- Metadata for field /agricultural management including the period of sowing, frequency of fertilization or insecticide application

The identification of cultivars will be ended **after 6 months**. The collection of the available data and the field experiments for the collection need to be ended **at the end of this year**.

If needed, the further collection of data will be repeated in the year of 2012.

3.2.2 Sensitivity analysis for identification of most important parameters

This task will started immediately and continue for the rest of the year 2011

3.3 Workgroup RS-Yield (work-package 4)

The workgroup is composed by VITO (leader), INRA and AIFER and will work on the both test sites (Anhui and Morocco). 18 man/month (WP41-44) will be dedicated to the activities of this Workgroup.

3.3.1 Data collection

The following data are required for assimilation of wheat year using remote sensing:

- Long-term crop yield statistics per administrative unit (county, district and province) ;
- time series NDVI series (SPOT-VGT, optionally MODIS for Morocco) etc.);
- Accurate crop mask (GLC2000, CLC, GlobCover, etc.);
- local expertise and knowledge on cropping pattern;
- RS and statistic expertise (ΣNDVI, Median NDVI, Slope of NDVI, etc.).

The actions to be taken for Anhui and Morocco:

- AIFER and INRA will provide the vector files for the administrative unit within the two test sites (**1 month**).
- VITO provides the NDVI time series derived from SPOT-VGT from 1998 to 2010 for both test site and the database for Regional Unmixed Mean (RUM), this **within 2 months**.
- Optionally, the similar databases based on the indices fAPAR or DMP will be built up, **within 4 months**.
- Crop mask to be provided at resolution of 250 M or 1KM by AIFER (for Anhui) and VITO (for Morocco), **within 3 months**
- Crop yield statistics at county, district or province level to be provided by AIFER and INRA **within 4 months**
- Climatic data, 10 daily means for rainfalls temperature at the administrative unit level, will be collected **within 6 months** by AIFER and INRA.

The actions to be discussed regarding Kenya:

- VITO and DRSRS will have to agree and the area to be monitored **from 2012**.

3.3.2 Simulations of the yield

The activities can already be started in 6 months after the collection of data are achieved. To facilitate the collaboration AIFER will send a researcher to VITO in the second halve of the year or in the beginning of 2012.

The DRSRS would like to develop the expertise in this domain (yield prediction using remote sensing), considering that the Kenya experts have a relatively strong expertise in the crop area estimation but the estimation on the crop yield is rather weak. They requested subsequently the strengthen their expertise by spending the man power foreseen in the work-package 56 (crop acreage estimation) in the activities developed within this workgroup.

Discussion is under way over sending a Kenya scientist to VITO during the second (2012) and the third year of implementation.

3.4 Workgroup RS-area (work-package 5)

The workgroup is composed by CAAS (leader), INRA, VITO and AIFER. The objective improve the methodology of crop area estimation in a cost-efficient way. The study areas will be the HUAIBEI plain in Anhui province and at least a few representative (agriculturally and climatologically speaking) provinces. 44 man/month will be dedicated to the activities of this workgroup.

The general idea emerged from the meeting is that a piloting study has to be first carried out in the first year and more extended study will be carried out in second and third years. Therefore, the first priority is to define the pilot area in the first year in China and Morocco.

3.4.1 Data collection

Background data for the both test sites

- The background GIS maps, best including land use, administrative, road, soil, vegetation, contour, crop, geology, geomorphology and hydrology (**6 months or before 30 September). The database on crop acreage for each administrative units will be**
- Crop calendar and phenology ((**6 months or before 30 September)**
- Optionally climate data in the study areas
- Optionally social economical data of last 10 years if available

Ground data

Ground segment sampling will be carried out in the test sites Anhui and Morocco. The pilot tests will be set up for the first year at the smaller scale, although the objective of the ground sampling remains unchanged, meaning to generate crop area estimates on a statistically sound base.

In the study area of Morocco, since the growth season is ending, only a track survey in two climatologically different provinces will be carried out.

For the test site in Anhui, in 2011 a trial with 20-25 samples of 500x500m, concentrated on a smaller area (1 county for example) will be carried out.

For Kenya, the DRSRS will decide if they will carry out the activities of the WP5 (area estimation) or exclusively the activities they prefer (WP4). The advantage of DRSRS on area estimation is the availability of aerial data. A proposition for activities in 2012 and 2013 will be made by **DRSRS within 3 months**.

Remote sensing data

- Low resolution image: SPOT-VGT and MODIS are the basic low resolution data. Optionally AVHRR can be used.
- High resolution data: TM, ALOS and AWiFS are the basic data type. Optionally, HJ-1 can be used
- Very High Resolution: QB or IKONOS
- The first set of data will be collected **within 3 months**, and RS data collection will be continued, and collected progressively. The inventory of the available RS data will be made within 3 months.

3.4.2 Methodology

CAAS provided the flow chart of spatial sampling procedure. The approach need to be described for an implementation in Morocco and /or in Kenya. It would include:

- Selection of sampling frame
  - spatial vs. non-spatial
- Sampling methods:
  - Random
  - Systematic
  - Stratification
- Remote sensing sampling
- Extrapolation (scaling-up)
  - Relevant to sampling method
  - Regression with remote sensed info

Vito will provide a description of track survey and image classification, for an implementation in Morocco.

Both descriptions need to be made available **in 6 months**

3.4.1 Summary of action in 2011

No	Task	Description	Institutes	Time	Deadline
1	Definition of pilot region	Define the pilot study area for 2011 in China/Morocco/ Optionally, the study area in Kenya needs to be fixed**.	AIFER/CAAS/ INRA/VITO	1M	April 30, 2011
2	Background data collection	Socio- economic statistical data for 2001-10; Climate data for 2001-10; GIS maps (land use, administrative, road, soil, contour, crop, geology, geomorphology, hydrology); Crop calendar and phenology	AIFER/CAAS/ INRA	3M	June 30, 2011
3*	Ground Sampling for winter wheat in China*	20 - 30segments @ 500m x 500m for winter wheat*	AIFER/CAAS	2M*	May 30, 2011
4*	Ground Sampling for maize in China	20-30 segments @ 500m x 500m for maize *	AIFER/CAAS	6M	Sept. 30, 2011
5	Track survey in Morocco	2 climatologically different provinces	INRA	3 M	30 JUNE
6	Sampling for fall crops in Kenya	Using aerial photography 1,5km x 1,5 km	DRSRS	3M	30 JUNE
7	LR images - VGT	SPOT-VGT @ 1km for all bands and NDVI, DMP for 2001-2011 for research regions in China, Morocco and Kenya **	VITO	3M	June 30, 2011
8	LR images - MODIS	EOS-MODIS data @ 250m, 500m and	CAAS/AIFER/	3 M	June 30,

		1km for all bands, NDVI, Ts, LAI for whole test sites in China, Morocco and Kenya (2001-2011)	INRA/VITO		2011
9	HR images -China	TM, CBERS, ALOS, HJ-1 and AWiFS data for the test site in North Anhui for 2011	CAAS/AIFER	6 M	Sept. 30, 2011
10	HR images - Morocco	TM, ALOS or AWiFS data for the 2 targeted provinces for 2011	INRA	6 M	Sept. 30, 2011
11	HR images Kenya**	TM, CBERS, ALOS data for the study area in Kenya for the entire implementation period **.	DRSRS	6 M **	Sept. 30, 2011**
12	Sampling model for crop area	Test the sampling methods in pilot study region in North Anhui	CAAS/AIFER/VITO	8 M	Nov. 30, 2011
13	Test classification methods	Test crop classification methods focus on the various HR image and with different registration periods	CAAS/AIFER/ INRA/ VITO	9 M	Dec. 30, 2011

*__Suggestions from VITO: It will be much better to concentrate to one season (wheat or maize) and sample 50 segments in the 2011__.

** A study area for Kenya can be defined optionally if DRSRS wished to elaborate the capacity building activities in this domain (see 3.5)

3.5 Kenya activities

Kenya partner has expressed a clear preference to strengthen their activities in the area of yield forecasting. The subject is crucial in the mission of early warning against famine.

Towards this request, VITO is favorable to integrate the DRSRS in the activities of yield forecasting using remote sensing. This could be scheduled in the activities of WP4 for 2012.

Concerning the crop area estimation, the Kenya partner has already acquired much experience in the domain of aerial survey. However for cost efficiency purposes, a combination of use of satellite data and aerial photography should be proposed. A pilot study could be carried out in one defined region. The field survey can be replaced by the aerial survey using aerial photography.

Tasks ***in 2011***

- Define the regions which will be monitored from 2012 in terms of crop yield.
- Define the region (provinces or districts) which will be monitored in terms of crop acreage using satellite imagery
- Collection of the needed data (see below)
- An introductory session on field sampling is suggested.

Data to be collected ***in 2011****:*

- The crop yield statistics for the principal agricultural region at level of district for the last 10 years.

- The meteorological data (last 10 years if possible) for the regions to be monitored.
- The aerial photographic images taken in 2011
- The satellite imagery provided by the sensors TM, LISS3, SPOT or ALOS-AVNIR-2

3.6 Tentative schedule for E-AGRI events (Progress Meetings, E-AGRI Workshops and (on-site) training sessions)

<table>
<tr><th>event</th><th>2011</th><th colspan="2">2012</th><th colspan="2">2013</th><th>2014</th></tr>
<tr><td>Progress meetings
Who:
members of consortium plus the European Commission
What:
Project implementation progress
Admin/consortium issues</td><td>Limited consortium meeting:
Review of the project progress in 4 workgroups or
reinforce the communication aspects: dissemination of E-AGRI results in Africa. May be held together with other food security projects.
Autumn 2011, Brussels (EC)?</td><td colspan="2">First Progress meeting
Preferably jointed with CGMS expert meeting (JRC)
When: March 2012
Where: Morocco (?)
Organizer: INRA</td><td colspan="2">Second Progress Meeting
When: March 2012
Where: The Netherlands
Organizer: Alterra</td><td>Final meeting
When: Feb. 2014
Where: Ispra
Organizer: JRC</td></tr>
<tr><td>E-AGRI workshops
target: Policy makers from ministries of agriculture, attachés of agriculture of EU, DG’s INFSO, RTD,AGRI
Aim: promotion and dissemination of European crop monitoring technology</td><td></td><td colspan="2">When: JUNE 2012
Where: Beijing, China
Organizer: CAAS
Technical promotion: Agro-meteorological modelling</td><td colspan="2">October 2013
Where: Kenya
Organizer: DRSRS
Technical promotion: RS applications</td><td></td></tr>
<tr><td rowspan="6">Training sessions in Aggro-meteorological modelling</td><td rowspan="6">CGMS set up
Nov. 2011, China
Organizer: Alterra</td><td colspan="2">BioMA Setup</td><td colspan="2">BioMA Piloting</td><td rowspan="6"></td></tr>
<tr><td>January</td><td>Milan</td><td>?</td><td>Morocco</td></tr>
<tr><td>July</td><td>China</td><td>?</td><td>China</td></tr>
<tr><td colspan="2">CGMS set up</td><td colspan="2">CGMS Piloting</td></tr>
<tr><td rowspan="2">September</td><td rowspan="2">Morocco</td><td>?</td><td>Morocco</td></tr>
<tr><td>?</td><td>China</td></tr>
</table>

Training In RS Applications	**Training at INRA** **October?, 2011 (?)** In Rabat, Morocco	Training at VITO February-June September-November	To be determined	
Capacity building in Kenya	Introduction of field sampling December 2011 (?) Organizer: CAAS	Introduction of crop growth monitoring using agro-meteorological modelling	Training on crop acreage estimation combining aerial and Satellite data	