Crop Monitoring as an E-agricultural tool in Developing Countries

MINUTES OF THE PROJECT MEETINGS

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1.0	28/01/2014		This document is a compilation of three project meetings.	Qinghan Dong,

1. First Project Meeting

The first project meeting took place on 23rd November 2011, at JRC, Ispra, Italy.

1.1. Agenda of the first project meeting

Progress meeting – 23rd November 2011
JRC –Ispra (Italy)

Programme

9.00 – 9.15	Welcome address O. Léo (MARS Head of Unit) and/or S. Niemeyer (AGRI4CAST Action Leader)
9.15 – 9.45	Presentation of E-AGRI partners and E-AGRI project Q. Dong (VITO/ project coordinator) –
9.45 – 10.00	WP1 presentation / VITO
	Coffee break
10.30 – 10.45	WP 2 presentation / Alterra
10.45 – 11.00	WP3 presentation / UNI/JAAS/JRC
11.00 - 11.15	WP4 presentation / VITO/INRA
11.15 – 11.30	WP5 presentation / CAAS/VITO
11.30-12.30	Questions/Discussion (Moderator: Q. Dong)
12.30 – 13.45 lunch (JRC / piccola mensa)	
Meeting restricted to E-AGRI partners	
13.45 - - 15.30	Discussion on interim report and deliverable (15 min / WP) Moderator: Q. Dong
	Coffee break
15.00 –	Discussion Near term actions (action list) and next events/meetings
17.00 End of meeting	

1.2. Participants of the first project meeting

- European Commission (DG-INFSO, EU): Ardiel Cabrera
- SDLO (Alterra, NL): Allard de Wit
- 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): **not present (excused)**
- Jiangsu Academy of Agricultural Sciences (JAAS, CN): **not present (excused)**
- Ministry of Environment and Mineral resources (DRSRS, KE): **not present (excused)**
- VITO (BE) & coordination: Qinghan Dong

François Kayitakire, René Gommes, Javier Gallego, Amit Srivastatva and Stefan Niemeyer (from JRC), Simone Bregaglio (UNIMI), Sliman El Hani (INRA, MO).

1.3. Welcome addresses

- Welcome and information by **Stefan Niemeyer**
  - M. El Aydam will leave the action and the management of E-AGRI project from JRC side will be taken by Manola Bettio (this has to be confirmed)
  - S. Niemeyer mentioned that, while CGMS and BioMA are the property of the European Commission, JRC appreciates that the technology transfer of these tools is supported and executed in E-AGRI by the project partners Alterra, Vito, or Univ. Milano that are knowledgeable of the systems due to their long-standing scientific relationship with the MARS unit.
    As for the technology transfer, the property rights of the European Commission must always be respected. No software, data, or related tools must be distributed by the project partners or third party without prior informing the Commission and having received its approval.
- **Q. Dong** introduced the new project officer from DG INFSO. Mr Cabrera informed the the consortium partners about his work at DG INFSO since July 2011 and the coming FP7 call (probably in January) which is in direct link with the current project, focusing on low cost technology transfer and use of ICT, Africa being particularly targeted.
  Mr Cabrera was already informed and briefed by Q. Dong about the E-AGRI project in Brussels before the meeting in Ispra.
- **Q. Dong** as coordinator of the projected gave a presentation to highlight the objectives of the project (focusing on the following dimensions: demonstration, dissemination, added-value for EU (increase of know-how) and collaborations), the three study areas (China, Morocco, Kenya) and the research angles of the project (yield and crop estimation). Mr. Dong presented also all work packages highlighting the partners involved, the related methodologies and the main deliverables.
- WPs are :

- WP1 - management (VITO).
- WP2 – CGMS,
- WP3 – BioMA,
- WP4 – yield using Remote sensing,
- WP5 – crop area estimation.
- WP6 – capacity building in Kenya and it will particularly be built up at the later stage of the project. Il will be carried out in close collaboration with AGRICAP, another FP7 project led by VITO.

1.4. Workgroup presentations and discussion:

1.4.1. WP1 – Management

Q. Dong presented the status of the deliverables. Most of the deliverables due for the month 6 were available prior to this progress meeting except two deliverables (WP2). The status was notified to / agreed by the project official. Alterra will do the necessary to send them soon. The rule of deadlines for the interim reports were reminded: the consortium has each time 60 days after the year 1 and 2 of implementation to submit the report.
For the first implementation year ended on the 1st February 2012the report has to be delivered before 31st March 2012.
About the past E-AGRI events, all actions were conducted successfully:

- KO meeting in Mol
- workshop in Rabat on crop yield forecasting using remote sensing (WP4)
- workshop in Hefei (China, WP2).

About the Consortium Agreement (CA), a new version is now reviewed by the Legal Service of VITO after amendment requested by JRC.

M. El Aydam insisted also on the notion of the 'background' knowledge in viewpoint of JRC. Before receiving the final version of the CA to be signed, all partners should pay attention to the data use policy stated by JRC. Only interpolated meteorological data are made available from MARS database to be used within this project (that means the availability will be re-considered after the end of the project). The condition on the use of CGMS and BioMA tools are also revised by JRC.

1.4.2. WP2 – CGMS

De Wit presented the status of advancement. The missing deliverables mentioned above will be sent as quickly as possible.

As the complete set-up for the Moroccan version of CGMS, named "CGMS_MA" is due for the end of the project: an alternative was proposed by De Wit to allow INRA to forecast crop yields in Morocco from 2012 growth season by using all existing infrastructure in CGMS (Europe), especially the CGMS statistical tool box. The

forecasting will be, after the end of the project, taken over by the CGMS_MA using Moroccan meteorological data, locally calibrated WOFOST model and the statistics from DSS.

1.4.3. WP3 – BioMA

As the leader for this WP, R. Confalonieri (UMI) presented the status of advancement for wheat (Morocco) and rice (China) growth monitoring using BioMA approach. All deliverables scheduled in first 9 months were available (confirmed by Q. Dong) for this WP.

Mr Confalonieri explained also in detail his sensitive analysis. His study aimed to identify the most relevant parameters of WOFOST and CropSyst as first steps of calibration. The methodology is well-established: the sensitivity analysis is first performed under the potential conditions with no water limitation. The conditions of water limitation were added in a second stage as in all environmental modelling processes. The modelling approach was acknowledged by Alterra and JRC. INRA stressed the impact of rainfall , thus water-limitation conditions on crop yields (the rainfall could explain till 80% of the variability on yield). It is also important to calibrate the WOFOST model using the local weather stations data to integrate as much as possible the climatic specificities of the region. Allard (Alterra) confirmed that the inter-annual variability on yield can be "explained" by the calibrated parameters. Kayitakire also emphasized on the importance of including water limitation conditions in the modelling processes.

Concerning the ground data collection (experimental field observations) in the studied areas of China and Morocco, JAAS has done an excellent job in delivering detailed observation data beyond the initial planning. Four groups of varieties for rice have been identified in Jianghuai Plain and the management practices such as direct sowing or transplanting have been recorded.

Four wheat varieties have been identified for the study region of Morocco. Other wheat related data are from JRC agro-pheno structure database. Balaghi (INRA) commented on the importance of agro-ecological zoning in Morocco on crop varieties and yields.

Confalonieri (UMI)commented on the possibility to use the available data at INRA related to the impact of diseases on wheat. These data could be used to calibrate parameters of models.

A visit of UNIMI to INRA could be relevant for field data collection.

1.4.4. WP4 – Yield estimation with remote sensing

R. Balaghi (INAR) presented the results obtained for Morocco (soft and durum wheat, barley) and China. Balaghi explained that for this type of research, Huaibei Plain with its 6 districts are rather too small. He suggested for this WP to extend the region of the

interest to the neighbouring regions or even neighbouring provinces. Furthermore the statistical data at county level will be useful as well (to be added to the action list).

Balaghi also suggested to use in this WP the facility of the CGMS Statistical Toolbox which should allow the inclusion of remote sensing indicators as predictors (to be added to the action list).

Allard (Alterra) commented on the possibility of correlation between the predictors issued of remote sensing.

Balaghi suggested also for statistical analysis to re-group the historical years into: good/average/ bad production years. The year 2010 is a good production year due to the abundance of rainfall. The remote sensing indicators showed saturation and the forecasting had to rely on the agro-meteorological modelling such as CGMS.

Question on the acceptable accuracy on yield forecasting (Dong): the answer by Balaghi is that the accuracy should stay above 90% to be credible. For Huaibei Plain, an accuracy of 90% can be achieved if the specific crop mask is available. Chen (CAAS) commented that the trials of CGMS application in China carried out within other projects show a forecasting accuracy around 90%.

Another specificity for forecasting using remote sensing on Huaibei Plain (remark from Balaghi), is the dekads selected for the regression analysis thus forecasting, varied from one district to another. It should further investigate this issue and to better fix the dekads used for prediction (*question: what are the data needed to fix the dekads? To be added to the action list*).

1.4.5. WP5 – Area estimation with remote sensing

Z. Chen (CAAS) presented the results achieved in the study region in China. Most related to the WP5. The field data collected in the study region in Morocco were sent after the meeting. No presentation on this part of work was available.
Many data on this study area have been collected. This includes the official statistical data on yield and acreage: at district level within Anhui province and at county level within Bozhou districts Il would be interesting for the execution of WP4 to collect the statistics on the neighbouring districts, even within the neighbouring province such as Henan and Shandong (Balaghi's suggestion to the action list).
The phonological data have been assembled as well for the use of WP2. However Alterra would expect to collect the historical phonological data (last 5-10 years) from some experimental sites in the neighbourhood. CAAS promised to look for it (action list).
Concerning the WP5, the presentation was focused on the sampling method and sampling design. Five sampling schemes have been tested in the county of Mengcheng (which has 6000 km^2). For the winter wheat season, 12 frames have been surveyed. For the maize season 31 frames have been visited some of them twice.

The stratified systematic sampling delivered most efficient sampling results. An increasing number of strata led to a decrease of variance within each stratum
Comments were added by J. Gallego about the variance computing in case of systematic sampling. Furthermore when the same ground data are used for stratification and sampling, the efficiency of the systematic sampling (against random sampling) is often overstretched.
J. Gallego is now involved with DSS (Morocco) for area estimation. A first visit to DSS (Min. of Agriculture of Morocco) is planned mid-January 2012.Javier suggested some references to Chen:

GALLEGO, F.J. and DELINCÉ, J., 2010, The European Land Use and Cover Area-frame statistical Survey (LUCAS). In *Agricultural Survey Methods*, R. Benedetti, M. Bee, G. Espa, F. Piersimoni. (Ed.),pp. 151-168 (New York: John Wiley & sons).

Remote sensing and land cover area estimation - INT. J. REMOTE SENSING, 10 AUGUST, 2004,VOL. 25, NO. 15, 3019–3047
F. J. GALLEGO

1.5. Summary of action in 2012

This action list is a follow-up of the action lists agreed at the Rabat and Hefei workshops

No of deliverables	Task	Description	Partner Institutes	Action / Implementation	Deadline (Month)
D21.1	**Experimental databases**	**Field experimental / observation data related to the phenology and the field management practice**	**Alterra INRA AIFER**	**Alterra will send a question list to the local partners (in Morocco? and) on Huaibei Plain in China. CAAS will help Alterra and AIFER to collect historical phenological records in the agronomical experimental sites in the region. Alterra will look at the availability and the usability of phenological data in Morocco collected between 2001 and 2005.**	
D21.3	Regional statistic database	Databases have been collected	INRA AIFER	Report to be submitted in month 12 (January 2012)	12
D22.1 and 22.2	**Usability report and strategy report on CGMS adaptation for morocco**		**Alterra INRA**	**Status: partially delayed To be submitted as soon as possible *Scheduled in February?***	12
D23.1 and 23.2	**Usability report and strategy report on CGMS adaptation for morocco**		**Alterra AIFER**	**Status: partially delayed To be submitted as soon as possible *Planned in February?***	12
D31.2	Ground info	Experimental observation data for	UMI /	The observation will last two years. The	**MS1 =**

	database	different varieties of wheat in Morocco and rice on Jianghuai Plain in China. The targeted observation includes phenological parameters and the field management practice.	INRA / JAAS	calibration will be fine-tuned during these years. JRC agro-pheno structure database can also be used as reference. *INRA will plan some new observation to fill the project database on will rely only on JRC agro-pheno database?*	**month 24**
32.1	Sensibility analysis report	Application of BioMA on rice growth on Jianghuai Plain, China	UMI/JRC		12
32.2	Databases for parameterisation		UNM/JRC	Databases need to be yearly updated	30
D41.1	**Databases on winter wheat yield for two study region**		**INRA AIFER CAAS**	**The yield data have been collected as planned. The empirical model can be established based on the collected data. However, there is always room for improvement. INRA asked AIFER and CAAS to help collected more yield statistical data on Huaibei Plain (in the neighbouring districts, province) if feasible.**	
D43.2	**Empirical models for yield forecasting**		**INRA AIFER**	**Investigate the dekads of biophysical variables used for regression on Huaibei Plain**	
51.1 and 51.2	Segment sampling DB and accuracy assessment report	Raster Database	CAAS INRA	Final version is due for the month 30. But it will be started in the year 1 and gradually updated.	30
61.1 62.2	**CGMS tool box**	**application of statistical analysis for use of yield forecasting**	**Alterra**	**Normally it is due for the Month 30 and 36. Now it will be available at month 14. Thus more updates and improvement possible. Integration of remote sensing indicators should be possible (possibility of testing multiple (combinations of) dekads??).**	

1.6. Updated schedule for E-AGRI events (Progress Meetings, E-AGRI Workshops and (on-site) training sessions)

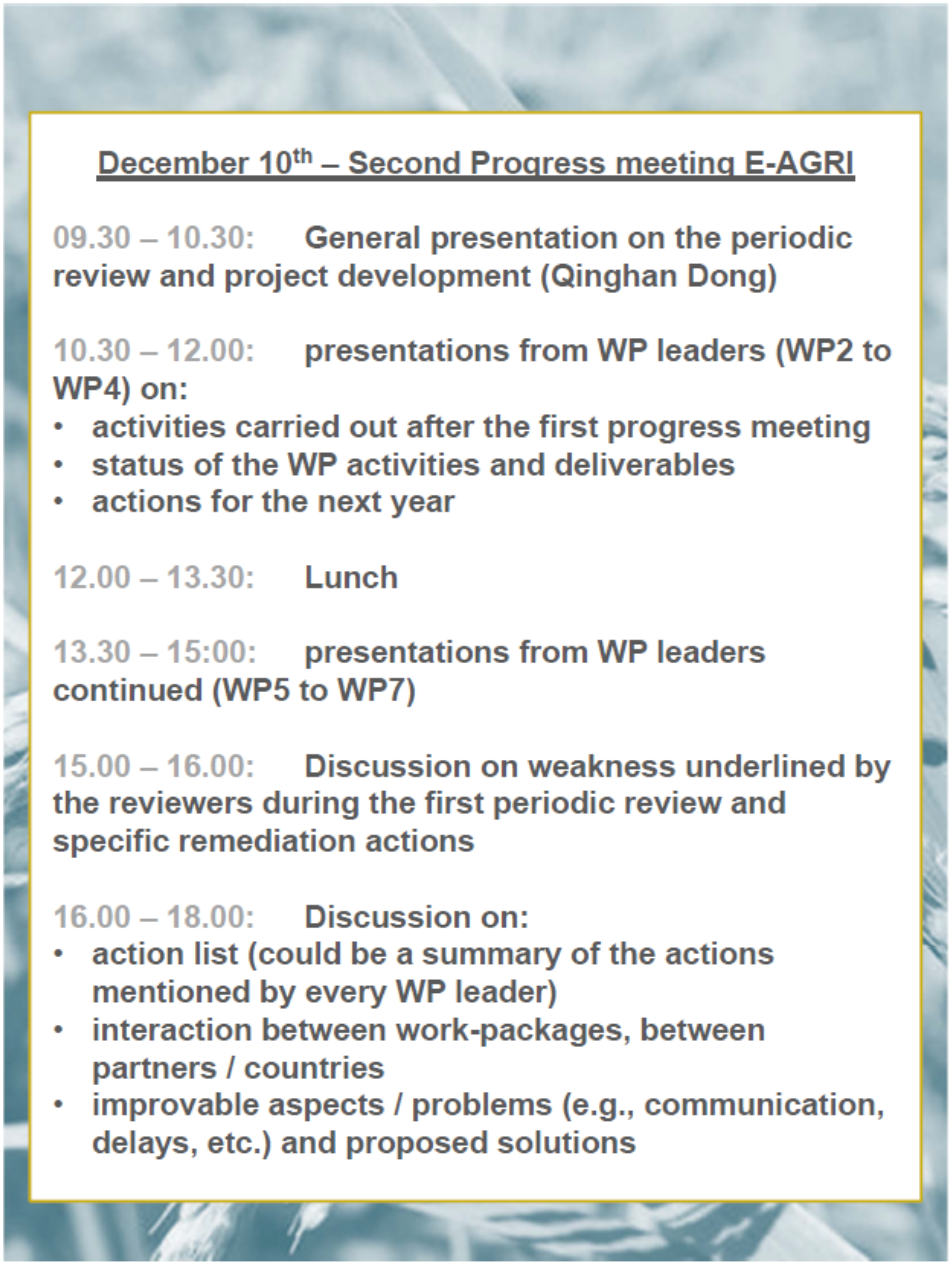
Event	2011	2012	2013	2014
Progress meetings Who: **members of consortium plus the European Commission** What: **Project implementation progress** **Admin/consortium issues**	*Limited consortium meeting: Review of the project progress in 4 workgroups or reinforce the communication aspects: dissemination of E-AGRI results in Africa. May be held together with other food security projects.* Autumn 2011, Brussels (EC)? **First meeting 23rd Nov**	2nd Progress meeting When: October /November 2012 Where: *Nanjing* *Organizer: JAAS* *To be combined with BioMA workshop*	2nd Progress Meeting When: September 2013 *Where: The Netherlands* *Organizer: Alterra*	Final meeting When: Feb. 2014 *Where: Ispra* *Organizer: JRC* *Or: Rabat* *Organizer: INRA*
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**		*When: 2012? 2013? 2014?* *Where: Beijing, China* *Organizer: CAAS*	2013 Where: Kenya Organizer: DRSRS to be hold together with other projects such as AGRICAB	
		BioMA Setup	BioMA Piloting	

Training sessions in Aggro-meteorological modelling	CGMS set up Nov. 2011, Hefei, China Organizer: Alterra	??	JRC (Marchello?)	?	Morocco
		October	China	?	China
		CGMS set up		CGMS Piloting	
		September	Morocco	?	Morocco
				?	China
Training In RS Applications	Training at INRA October, 2011 In Rabat, Morocco	Training at INRA-DSS and VITO Spring 2012 Introduction of field sampling 2012 Organizer: CAAS To be confirmed		To be determined	
Capacity building in Kenya		Introduction of crop growth monitoring using agro-meteorological modelling		Training on crop acreage estimation combining aerial and Satellite data	

2. Second Project Meeting:

The second project meeting was held on December 10, 2012, at JAAS, Nanjing, China.

2.1. Agenda of the second meeting



2.2. Participants of the second project meeting

Name	Organization	e-mail
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Allard de Wit	Alterra, Wageningen (SDLO) – UR, The Netherlands	Allard.dewit@wur.nl
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2.3. Work-package presentations and discussion

The second progress meeting was warmly welcomed by Prof ***Sun Ling***, director of Institute of Agricultural Economics and Information, Jiangsu Academy of Agricultural Sciences (JAAS).
The following sections summarized the presentations from each work package.

2.3.1. WP1 – First Periodic Review and Management

In first presentation Dr Dong (VITO) showed the summary of the first Periodic Review held in Brussels on 16th May 2012. The speech focused on the recommendations and the corrective actions proposed by EC. Specific remediation are mostly full-finished and new actions are proposed for the aftermath (see Section 4).
In particular, the reviewers stressed on low promotional activities, e.g. dissemination by general press publications in Internet. Prof Chen (CAAS) suggested that CAAS partners can publish on their institute journal. Moreover, he proposed to ask for special issue supplement in a popular scientific journal. Dr Confalonieri (UMI) pointed out that the breeder is not the target of our project, implying that the popular publications are not the most suitable divulgation vehicles for our project. He also proposed to publish the results on Jiangsu study area on International Rice Research Institute Notes, which is a generic but scientific journal focused on development of improved technology for rice-based cropping systems. Lastly he highlighted, in agreement with Dr Dong, that workshops can be effective tools to fulfil the dissemination task. In this context, with the aim to further develop the dissemination activities, Dr Dong invited partners to send proceedings of conferences or institute meetings where the project is acknowledged.
Dr Dong recommended the partners to submit the abstracts (half or one pages) for the remaining deliverables before the next Periodic Review (i.e., 09***, April 2013***). Dr Confalonieri replayed that, since each year the same work procedure will be adopted using different field experimental data, it will be possible to submit the whole report early and gradually update it with new parameters, new results and so on. Dr Dong agreed.
About the management part, Dr De Wit (SDLO) pointed out that the use of resources (UOR) is now under the financial issue and no longer under the management one.

Lastly, two dates are proposed for the BioMA training combined with a short progress meeting, hosted by INRA in Rabat:

- 26th – 29th of March
- 1st – 5th of April

The final decision will be determined after a further survey with the partners not participant to this meeting[1].
In the second presentation, Dr Dong summarized the achievements and *state of art* of all E-AGRI activities, further detailed in the following presentations.

2.3.2. WP2 – CGMS

Dr De Wit presented the first results achieved by CGMS adaptations to Morocco winter wheat, the issues encountered and the actions carried out to ride out them.
Dr Confalonieri confirmed the availability to support WP2 with the results that will be achieved by WP3 calibration of WOFOST using Moroccan field data. INRA stressed the necessity to use a rule for sowing day (e.g., based on rainfall), since the variability of Moroccan winter wheat sowing date spans about one month (November) and so far the spatially distributed simulations ran using a single date (1st of December). UMI replied that is possible to model this rule and give its availability to support INRA during the development of it.
In the second part, Dr De Wit described the data collection useful to estimate wheat variability in Anhui province. AIER confirmed the availability of the first results about questionnaire survey.
Lastly, Dr De Wit presented a possible choice for the E-AGRI viewer, i.e., the based Luigi framework, similar to MARS viewers. INRA proposed to use Luigi framework with the aim to increase the dissemination work (e.g., end-users could visualize the E-AGRI data).

2.3.3. WP3 – BioMA

Dr Confalonieri presented the status of calibration and validation work for the three models applied in Jiangsu paddy rice fields.
JAAS 2011 field observations showed an unexpected large value for aboveground biomass close to maturity phase, registered in each dataset. UMI and INRA agreed on the possibility to ignore this issue in the light of the yield forecast, without undermine the quality of the prevision. However UMI ask JAAS to examine more in depth the possible cause for it. About meteorological station data, an anomaly was found in global solar radiation datasets. Dr De Wit suggested the possibility that the radiation is indirectly derived on the basis of field observations.
At the end of the presentation Dr Confalonieri move for an additional progress meeting – the last – to be hold 1 or 2 month before the end of the project. December 2013 was the date proposed for it.

[1] due to the requirement of EURONEWS reportage, the training/ workshop/ field visit/ TV filming are scheduled in the week of March 11.

2.3.4. WP4 – Yield estimation with remote sensing

Two presentations reported the status of WP4. The first one by AIER (Dr B. Zhang) and the second one by INRA (Dr Balaghi).
Dr B. Zhang presented the results of prediction of wheat yields using multiple linear regression models in the Huaibei Plain of China and the suggestions for further develop this study. The high light of this presentation is the incorporation of use of chemical fertiliser as a co-variable in the simulation.
Dr Balaghi presented some statistics about Moroccan wheat yield prediction and he showed the first crop forecasting bulletin for the season 2011-2012 obtained within the E-AGRI project in collaboration with SDLO and VITO.
Dr Balaghi also presented the 2011 field data collected for the BioMA calibration (WP3). Dr De Wit and Dr Confalonieri debates about the experimental data shown by Dr Balaghi, stressing that the aboveground biomass values collected are surprisingly high compared to the leaf area index values. Dr Balaghi replied that Moroccan wheat varieties are particularly adapted to drought stress conditions, e. g. limiting the water transpiration from the canopy layers.

2.3.5. WP5 – Area estimation with remote sensing

Prof Chen illustrated the activities of the ground sampling and data collection (WP51) and the crop area estimation (WP52) in the Huaibei Plain of China during 2012. The methodology and the results were presented with a high level of detail. At the end of his speech a specific action list for 2013 was pointed out (see section 4).

2.3.6. WP6 – Statistical toolbox

A dedicated presentation on the statistical toolbox software was planned in the third day of E-AGRI meeting, at the end of BioMA training session. In the present phase only some brief considerations were pointed out as suggestions to improve the statistical toolbox.
Dr Confalonieri, with a view to possible future developments, noted that it would be useful to include in the tool the ability to perform the similarity analysis based on multiple decades choice (instead of single one), as it is in the statistical Control Board (CoBo) developed by Joint Research Council (JRC). Dr Balaghi, according to his own experience, agreed with Dr Confalonieri that the knowledge of the history of more decades will make the forecasting system more accurate. Dr De Wit agreed with these remarks.

2.4. SUMMARY OF ACTIONS IN 2013

The final part of the meeting focused on the discussion for the planning of the specific actions relative to the third year of the E-AGRI project. Partners were first grouped according to work packages, and specific ‘action lists’ were compiled based on the actual work package status. WPs partners were later combined where crossed cooperation can be useful to fulfill specific achievements.
The table below describes the list of action agreed in the group discussion.

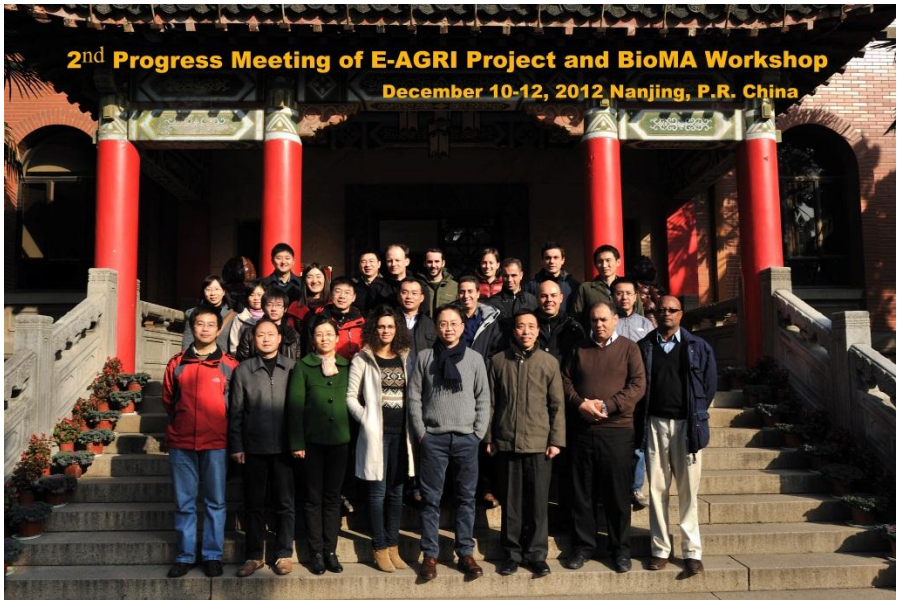
Work Package	Task	Partner Institutes	Action/Implementation
All	Bring forward the content of the deliverables and provide dissemination information to VITO (***February 2013).*** The aim is to inform the reviewers of the Second Periodic Review	All	Send to VITO: 1. 1 or 2 pages of abstract for each remaining deliverable to be delivered on the 30th (or 36th)month 2. The list of conferences and symposiums attended and title of presentations or the first page of proceedings 3. The list of the specialized organizations visited and mission summaries 4. The list of publications (scientific and journalistic)
WP1	Management	VITO	1. FP7 Reporting Knowledge (Period review) 2. Biannual Reporting
WP1	Promotional Work	all partners	1. Liaise with Government bodies (Local ministries, DG-AGRI) 2. List of conferences and symposiums attended and title of presentations or the first page of proceedings 3. Attending more specialized symposiums (e.g., Dragon symposium, USDA conference) 4. Exchange with other teams in the field and provide for mission summaries (e.g., visited: Anhui agricultural University on March 2012, China Agriculture University on June 2012, Moroccan centre of remote sensing CRTS; planned: Zhejiang University) 5. Publications: scientific and journalistic
WP2	CGMS Adaptation – piloting Morocco	INRA, SDLO	1. Set up the real-time processing for CGMS-Morocco. Allard will ask Tarik if he needs support in setting this up. 2. Set up the CGMS level2 processing: • Use crop parameters from study in D23.2 • Update with crop parameters from UMI if reasonable and available in time • Soil data still not available: ○ Send email with problems found to Samira ○ if needed Samira sends the raw point data of soil profiles ○ otherwise fall back on European soil map 3. Setup the spatial aggregation of results: • use the SQL scripts available from CGMS

			• grid to province: use crop mask • province -> agrozone -> Morocco use yield statistics (AGGREGATION_AREAS) 4. Develop and set up the e-Agri viewers for Morocco: • Ask demo data from Tarik 5. Setup CST for Morocco: • Updating of CST schema in ORACLE database • Include indicator sum of rainfall since 1th October • Functionality to export CST data to Access DB must be made to be downloaded by others that want to use CST. Note: processing and delivery of satellite indicators for viewer/CST is outside the scope of WP2 in E-AGRI. Dr Balaghi will take action to get this done.
WP2	CGMS Adaptation/piloting - Anhui, China	AIFER, SDLO	1. Setup the real-time processing for Anhui: Allard will send Bell Zhang a script for updating the database with meteorological data from GTS (NOAA Global Summary of the day). 2. Setup CGMS for running the level 2 data: the CROP_CALENDAR table has been set by Bell Zhang 3. Calibration WOFOST for wheat in Anhui. a preliminary calibration was done for Anhui for running CGMS for wheat. Bell Zhang wants to extend this with 3 cultivars for Anhui 4. Set up E-AGRI viewers for Anhui 5. Bell Zhang will check with CAAS and other institutes for crop experimental for Anhui for deliverable D21.1/D21.2 6. Allard will investigate performance problems with CGMS and MySQL
WP3	Ground data collection for BioMA & Adaptation of BioMA for multi-model wheat monitoring in Morocco	INRA	1. Support UMI with the 2011 and 2012 (first part, since the wheat cycle will be complete in the first months of 2013) field observations; 2. INRA is available to discuss model results and in case refine calibration during the next progress meeting hosted by INRA.
WP3	Ground data collection for BioMA & Adaptation of BioMA for	JAAS	1. Investigate reasons for anomalous 2011 field observations close to maturity (i.e., notably large values for AGB); 2. Support UMI with county sowing dates

	multi-model rice monitoring in Jianghuai Area		and crop mask for rice in Jiangsu; 3. Support UMI with 2012 field observations; 4. JAAS is available to meet with UMIL to discuss model results and in case refine the calibration of the three models. (on spring 2013?)
WP3	Adaptation of BioMA for multi-model rice monitoring in Jianghuai Area & BioMA piloting for multi-model rice monitoring and yield forecasting in JIANGHUAI Plain Adaptation of BioMA for multi-model wheat monitoring in Morocco & BioMA piloting for multi-model wheat monitoring and yield forecasting in Morocco	UMI	In synch with JAAS: 1. Implement a new approach to simulate rice transplanting effect; 2. Perform the second calibration and validation of the three models based on JAAS 2012 field observations; 3. Perform spatially distributed simulations in Jiangsu province with parameter sets retrieved from 2012 calibration; 4. Produce the first version of D33.2 deliverable (Assessment report on multi-model approach for rice monitoring) within the second review meeting. The deliverable will be gradually updated until the 36th month. 5. UMI is available to meet with JAAS to discuss and refine the calibration /validation of the three models. In synch with INRA: 1. Perform a first calibration and validation of the two models based on INRA 2011 and 2012 (first part) field observations 2. UMI is available to discuss model results and refine model calibration during the next progress meeting hosted by INRA; 3. UMI is available to support INRA for the implementation of automatic management rules to be used in BioMA (e.g., rainfall based sowing)
WP5	Ground sampling and data collection (Huaibei Plain, China) & Crop area estimation (Huaibei Plain, China)	CAAS	1. Continue collecting and updating the statistical data and the remote sensed images in the study area 2. Field campaign in 2013 for winter wheat and maize 3. Based on the remote sensed crop distribution map, improve the crop area frame sampling scheme in the study area 4. Continue testing the accuracy and efficiency of different methods/ algorithms using new remotely sensed images in 2013 5. Apply remote sensing classification for Maize as well as wheat 6. Work with Kenya is planned in

			collaboration with AGRICAB project 7. Publication and final report
WP5	Ground sampling and data collection (Morocco) & Crop Area estimation (Morocco)	INRA	Area frame sampling in collaboration with DSS of the Ministry of Agriculture. Classification of remote sensing data
WP7	Deliverables on the thematic workshops	UMI Alterra Vito	1. Submit the D71.2, D71.3, D71.3 before the delivery date (may be before next Periodic Review)

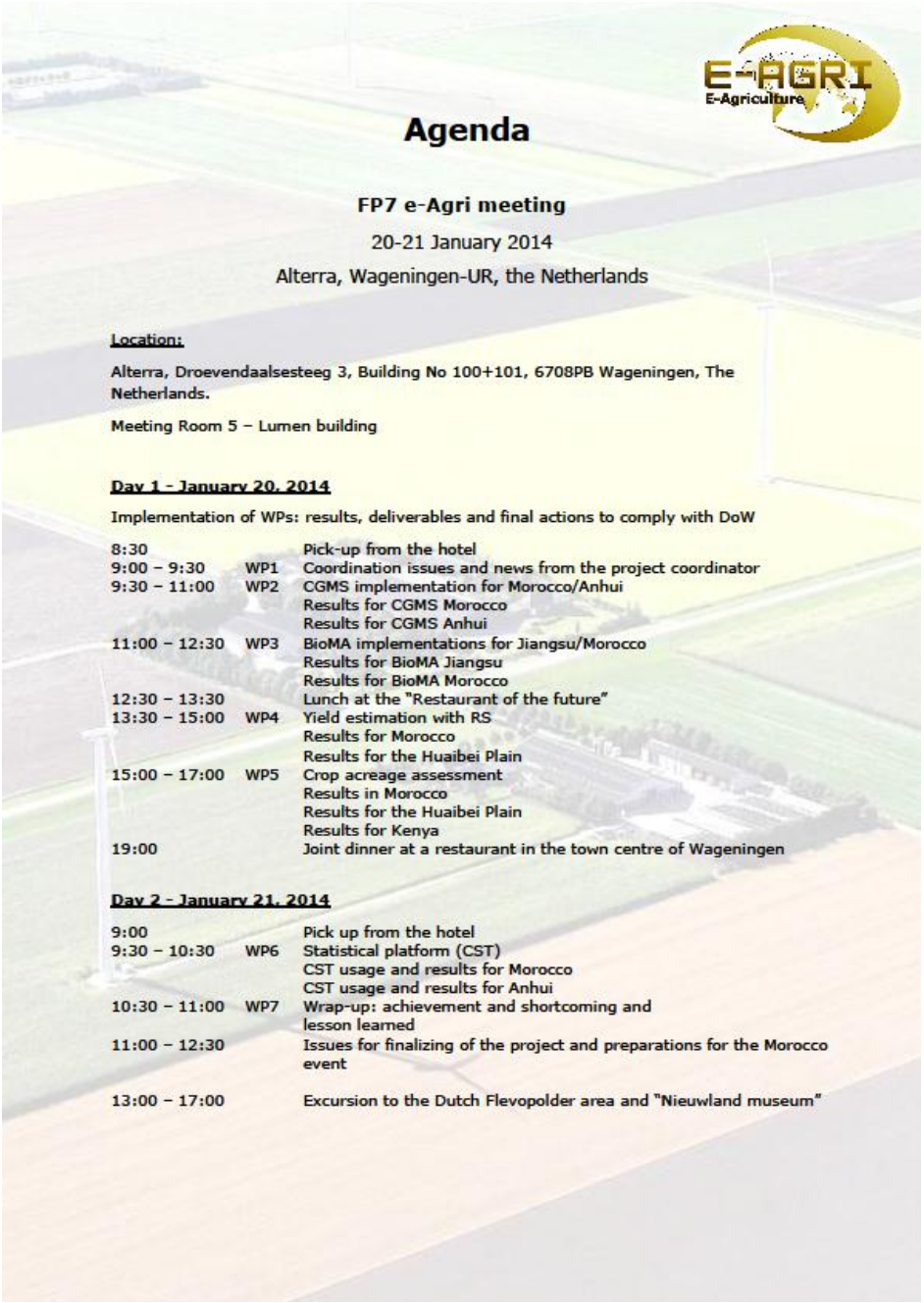
2.5. Meeting's photos



3. Final Project Meeting

The final meeting was organized on 20 and 21 January 2014, at Alterra (SDLO), Wageningen, the Nethelands.

3.1. Agenda of the final meeting



Agenda

FP7 e-Agri meeting

20-21 January 2014

Alterra, Wageningen-UR, the Netherlands

Location:

Alterra, Droevendaalsesteeg 3, Building No 100+101, 6708PB Wageningen, The Netherlands.

Meeting Room 5 – Lumen building

Day 1 - January 20, 2014

Implementation of WPs: results, deliverables and final actions to comply with DoW

8:30		Pick-up from the hotel
9:00 – 9:30	WP1	Coordination issues and news from the project coordinator
9:30 – 11:00	WP2	CGMS implementation for Morocco/Anhui
		Results for CGMS Morocco
		Results for CGMS Anhui
11:00 – 12:30	WP3	BioMA implementations for Jiangsu/Morocco
		Results for BioMA Jiangsu
		Results for BioMA Morocco
12:30 – 13:30		Lunch at the "Restaurant of the future"
13:30 – 15:00	WP4	Yield estimation with RS
		Results for Morocco
		Results for the Huaibei Plain
15:00 – 17:00	WP5	Crop acreage assessment
		Results in Morocco
		Results for the Huaibei Plain
		Results for Kenya
19:00		Joint dinner at a restaurant in the town centre of Wageningen

Day 2 - January 21, 2014

9:00		Pick up from the hotel
9:30 – 10:30	WP6	Statistical platform (CST)
		CST usage and results for Morocco
		CST usage and results for Anhui
10:30 – 11:00	WP7	Wrap-up: achievement and shortcoming and lesson learned
11:00 – 12:30		Issues for finalizing of the project and preparations for the Morocco event
13:00 – 17:00		Excursion to the Dutch Flevopolder area and "Nieuwland museum"

3.2. Participants of the final meeting

Name	Institute	Country	Email
Zhongxin Chen	CAAS	China	zxchen@mail.caas.net.cn
Abdelkader Dahhou	INRA	Morocco	dahhouab@gmail.com
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Qiu Lin	JAAS	China	wangzm69@126.com
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Allard de Wit	Alterra	NL	allard.dewit@wur.nl
Li Jia	Alterra	NL	li.jia@wur.nl

3.3. Summary of Presentations and Discussion

Day 1 - 20 January

WP1 Management (Dong)

- For finalizing the project two reports will need to be written: the final report and the report for the 3rd reporting period.
- INRA asks for an official letter to extend the project period which he needs for his administration. They have a problem with the administration as the administration expects that all finances will be received before the end of the project, while the EU will only pay the final amount when all deliverables have been accepted by the commission. It is not possible to transfer finances to INRA in advance of this decision.
- The project website has been updated by VITO, this could be extend by links on youtube to the CGMS-Maroc (https://www.youtube.com/watch?v=mwU2rxuiYlM) A video on the BioMA application (ask Robert for link)
- The deadlines for the reporting for e-Agri are:
    -
    - February 28: all deliverables and justification letters
    - March 15: input for the final report

WP2 - Morocco (Riad)

- Moroccan CGMS is now fully operation. Tarik has just ran the first CGMS simulation for the 2014 season, they are already available on the CGMS-Maroc viewer.
- The CGMS-Maroc website is now linked to from the website of the Moroccan ministry of Agriculture demonstrate the system has been accepted as an operational information system for the Moroccan government. Moreover, also the Morroccan statistical bureau (statagri) is interesting in accessing the data.
- The CGMS-Morocco works through a two-step procedure
-
    1. Processing weather data and running crop simulation at DMN (Tarik).
    2. Results from the processing chain at DMN are send to INRA which includes them in the web viewer. Moreover, they are combined with satellite products (NDVI, etc) from VITO.
- For improving the results of the CGMS-Morocco in the future, DMN will put an additional 100 rainfall stations in areas with too coverage. Currently the results for some areas are poor because of too low data coverage.
- At the start of the project, the AURELHY method for rainfall interpolation was discussed. This has not been implemented but it first needs to be demonstrated how AURELHY performs with daily rainfall data as it is originally designed for monthly values.
- a new crop mask has been available for Morocco based on 5m resolution SPOT-5 data. It distinguishes between irrigated and non-irrigated crop lands and is considerable better then the crop mask which is now in CGMS. Riad will ask Tarik to implement this crop mask.
- For the future, Riad wants to explore the possibilities of using weather forecasts and the seasonal forecasts. Allard notes that the CGMS is already prepared for this and can also use weather ensembles for calculating probabilities.

<u>WP2 - Anhui - Calibration (Li Jia)</u>

- Li Jia presents the work done by alterra to set up the CGMS-Anhui using the new data provided by AIFER.
- calibration has been carried out in two stages
-
    1. A detailed local calibration on data from the Fenqiu agro-experimental station
    2. A general regional calibration using only phenology has been done using phenological observations from 11 stations in and around Anhui for a time-series of 10-15 years.
- Finally the implementation of CGMS-Anhui was built by deriving the sowing dates from the phenological stations. The entire area was split into three zones with gradually later sowing dates towards the south.
- the whole CGMS setup was transferred to the AIFER during the support visit that Li Jia made in November 2013.

WP2 - Anhui - Operations (Bell Zhang)

- All level for the CGMS-Anhui are now implemented and running operational after the support visit of Li Jia in November 2013:
  -
  - Level1: archive data for 1990-2012 has been implemented, moreover the level1 is now operating on real-time using meteorological data from the NOAA Global Summary of the Day (GSOD). Interpolation of the daily weather data to the 25 km grid is done with the CGMS executable.
  - Level2: the crop simulations can now be done operational. Simulation of crop growth and aggregation of results is done through the CGMS executable. Finally aggregated simulation results are copied to the tables of the CGMS Statistical Toolbox for analysis with the CST for yield forecasting.
  - Level3: the CST database and CST have been set up for Anhui province. This included an update for the administrative boundaries as it was found that the administrative division had changed during the course of the project
- The analysis with the CST shows that the CGMS results so far do not provide good predictive power for yield forecasting in Anhui. This was already a bit anticipated given the analysis of yield variability in Anhui which revealed that some of the factors driving yield variability are not included in the CGMS.
- Nevertheless, the WP goals of setting up an operational system for Anhui has been reached.

WP3 - BioMA - (Roberto)

- Roberto shows some results for experimenting with the use of RS data in BioMA for Jiangsu and Morocco.
- The time-series of NDVI were used to adjust the emergence and heading dates for different crop models in BioMa. The results generally tend to improve although there is some variability in the results for different crop models.
- WP3 results were considered very satisfactory for rice in Jiangsu, especially for the multi-model approach and the assimilation of information from remote sensing. For wheat in Morocco results were satisfying, although to some extent not good as those presented for rice in Jiangsu. A discussion followed, focusing on the higher complexity of the wheat cropping systems in Morocco, because of the need to accurately reproduce soil water dynamics. However, some good performances were achieved in the regions where the current Moroccan wheat forecasting system (based on remote sensing and agrometeorological indicators such as cumulated rainfall) provides poor results

WP4 - Yield forecasting with RS -Morocco - (Riad)

- Yield forecasting in Morocco is now done operationally using RS information

- Forecasting is currently mainly done at national level because this is required by policy makers. The following data is used:
  -
  - Rainfall and temperature
  - NDVI and other satellite variables
  - CGMS/WOFOST output at national level
- The CGMS Statistical Toolbox is used for forecasting, but also other home-made tools using MS Excel or similar.

WP4 - Yield forecasting with RS - Anhui (Bell Zhang)

- The use of RS data for yield forecasting in Anhui was tested by Bell Zhang at the district level.
- He got some very nice results using multiple linear regression for the 6 districts in Anhui province.
- An important factor for yield of wheat in Anhui is the amount of rainfall during flowering. This could be taken into account by combining the satellite data with meteo data from the CGMS database.
- Riad suggests that a better understanding is needed for which periods the NDVI is a relevant yield indicator if you want to apply this operationally.

WP5 - crop area estimates in Morocco (Hamid Mahyou)

INRA presented their work on the domain of crop area asessemnt. A lot of effort has been spent to carry out the field survey and field sampling. They showed that if they can combine the data from the stratification batain by the field survey and remote sensing image analysis, the results are satisfactory and it is very cost efficient.

WP5 -crop area estimates in Huaibey - China - (Zhongxin Chen)
CAAS presented thet different approaches used for crop area estimation, from different field sampling approach and the different image analysis techniques. They showed at regional level (prefecture level) the combination use of field survey plus remote sensing analysis (regression estimator approach) is most accurate and costs effiecient.

WP5 - crop area estimates in Kenya - (Charles Situma presented by Zhongxin Chen)
As MEMR from Kenya is not technically ready to conduct the national crop mapping task, CAAS took over the activity and use unsupervised image classification approach, using LANDSAT 8 OIL data to generate the National crop map.

Day 2/21 January

WP6 statistical toolbox

- Statistical toolbox has been implemented in Anhui and Morocco.
- Moroccan setup uses the latest version of the CST and all ORACLE scripts have been sent to Tarik to build the CST database in ORACLE.
- Data from the ORACLE database will be exported to an MS Access database that can be easily distributed through an FTP server to different institutes. Local installations of the CST at different institutes can use the Access database for analyzing the current season and making yield forecasts.
- In Anhui, the CST database was directly coupled to the CGMS setup that was implemented by Li Jia. The results from CGMS are written into the CST database through the CGMS Executable and everything can be done locally through an access database. In a later stage, additional variables coming from the satellite data processing can be added to the database.

Deliverable status

Deliverables to be submitted by Alterra:

- D21.1 was submitted by Alterra. Will be resubmitted to Dong
- D21.4 "Statistical Report" needs to be submitted. Allard will ask for updated statistics from Bell (AIFER) and submit the report.
- D61.1 "CGMS Statistical Toolbox" -> write the tool
- D24.1 "piloting report Morocco" -> Allard will send template to Riad and Tarik to provide input
- D25.1 "piloting report Anhui" -> Allard will send template to Bell and Yang to provide input
- D72.1 Can be based on report from Hicham who attended the workshop in Hefei

Dissemination event in Morocco

Key messages from project:

- Availability of tools for crop monitoring and yield forecasting are useful for developing countries for food security and market intelligence.
- Develop flyers with key messages, try to get them available before 15 February.
- Not only for Morocco but also for Anhui, china.
- Benefits of cooperation between Morocco, China, Kenya not yet so clear

Socio-economic impact:

- for Morocco this is clear, because a processing chain is fully operational covering the entire chain from raw date -> processed data -> simulation results -> analysis -> input into policy making.

- For Anhui something could be written as CGMS will be used in a new project for AIFER related to crop insurance
- For Jiangsu the socio-economic benefits still need to be investigated.

Finally there were some ideas on combining CGMS results with socio-economic models in order to optimize on getting the best market price instead of the lowest forecast error.

3.4. Meeting's Photos