



GLOBAL
RESEARCH
ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

CROPLANDS RESEARCH GROUP:

Country/Network Update: China/LMAS network

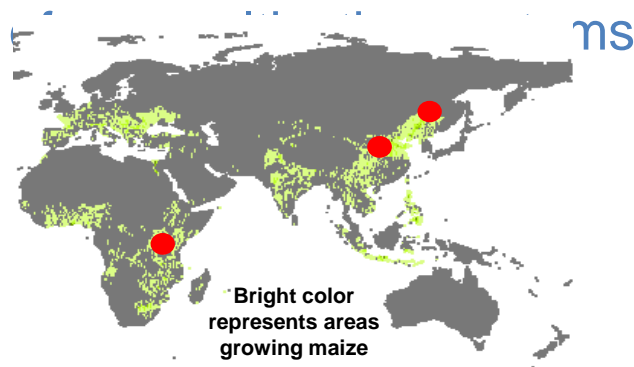


**CRG representatives:
Xunhua Zheng**

Aug. 11, 2018, Rio, Brazil

Activities/Accomplishment since last meeting

- Implement GHG_{fom} -- a NSFC-UNEP project under N Flagship
 - N_2O measurements in Kenya to be started in the coming September;
 - Field excursions to select experimental site in northeast China;
 - Modelling study to identify the BMPs for rotations of three crops (cotton and wheat–maize) using the criterion: least negative impact potential (NIP) but without significant yield loss.
 - Published a methodological framework for quantifying GHG footprints



A price-based proxy $\text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O}_{\text{GAG}}$ O₃-layer depletion matter N leaching

$$\text{NIP} = k_1 \text{NEGE} + k_2 \text{NH}_3 + k_3 \text{NO} + k_4 \text{N}_2\text{O}_{\text{ODM}} + k_5 \text{NL}$$

Protocol-based parameters

k_1	7.00	\$ $\text{Mg}^{-1} \text{CO}_2$ eq	Referred to market price of carbon trade
k_2	5.02	\$ $\text{kg}^{-1} \text{N}$	Birch et al. 2010
k_3	25.78	\$ $\text{kg}^{-1} \text{N}$	Birch et al. 2010, Compton et al. 2011
k_4	1.33	\$ $\text{kg}^{-1} \text{N}$	Compton et al. 2011
k_5	1.92	\$ $\text{kg}^{-1} \text{N}$	van Grinsven et al. 2010; Dodds et al. 2009; Compton et al. 2011

Zhang et al., 2018, Sci. Total Environ. (under review);
Zheng and Han, 2018, Atmos. Ocean. Sci. Let.

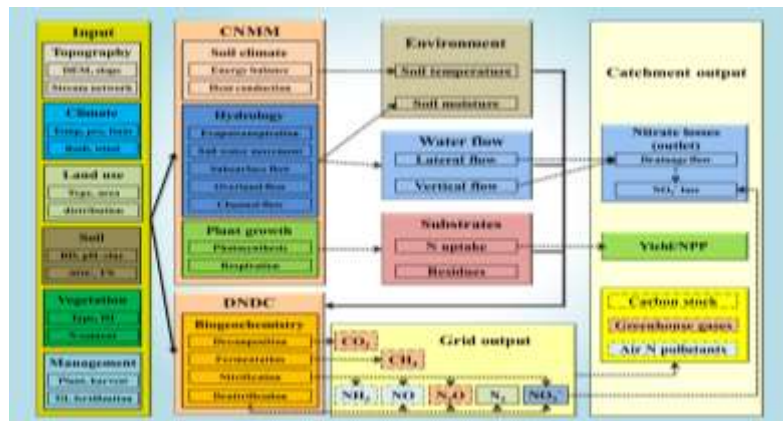
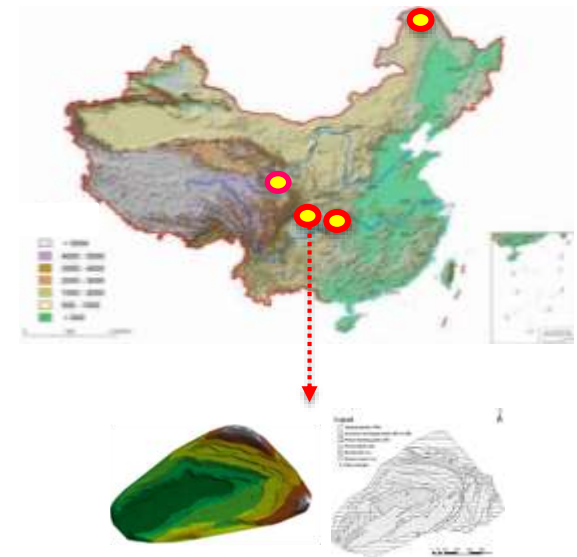
Activities/Accomplishment since last meeting

- **Implement the plans of a GRA research network -- Landscape Management of Agriculture System (LMAS)**
 - Developing and testing the CNMM-DNDC -- a hydro-biogeochemical model as the core of a decision-supporting system for identifying the best landscape management strategies;
 - Revising/validating/applying the base DNDC – one of process-oriented biogeochemical models involved in the GRA modelling platform;
 - Building a modelling research team for the LMAS in IAP-CAS;
 - Making effort to establish two catchment-based demos of researches and applications of landscape management.

Activities/Accomplishment since last meeting

- **Develop the CNMM-DNDC**

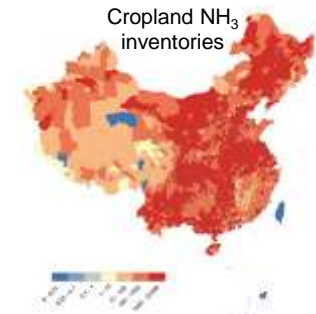
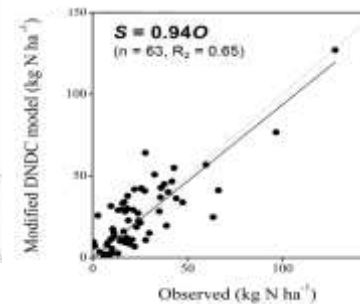
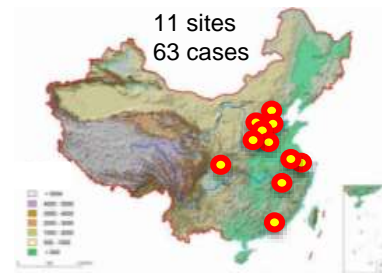
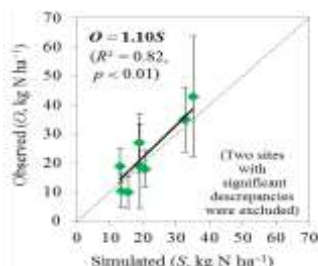
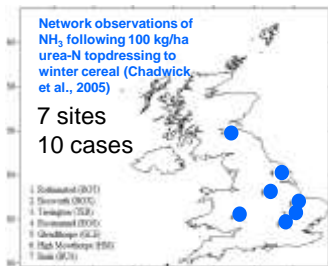
- Testing and applying the model to simulate nitrogen and GHG balances in a typical subtropical catchment in southwest Chia;
- Testing the model simulation in tea plantation;
- Revising the model to adapt it to seasonal freezing and permafrost regions.



Land uses	Area (ha)	Per hectare averages (Mg CO ₂ eq/kg N ha ⁻¹ yr ⁻¹)						Entire catchment (Mg CO ₂ eq/kg N yr ⁻¹)					
		NO ₃ ⁻	N ₂ O	NH ₃	NO	N ₂	GHG	NO ₃ ⁻	N ₂ O	NH ₃	NO	N ₂	GHG
WF-R	1.8	20	0.3	21	0.1	6.8	36.0	0.6	39	0.1	12	65	
W/R-R	2.5	35	2.8	46	0.7	6.1	10.3	7.0	115	1.8	15	26	
M-W	16.1	32	3.4	68	1.4	0.5	-2.1	54	1088	22	8	-34	
Forest	11	9	1.1	4	0.1	0	-17.2	12	43	1.6	0.1	-189	
Res.	3.7	20	0	0	0	0	0	0	0	0	0	0	
Total	35.1							408	74	1284	26	36	-133

Activities/Accomplishment since last meeting

- **Revise/validate/apply the base DNDC**
 - Revising NH_3 -related processes of the model;
 - Validating the revised model using
 - + UK defra network fluxes (wind-tunnel) for urea amendment, and
 - + China fluxes (wind-tunnel/micrometeorological techniques);
 - Establishing China database as the drivers for DNDC computation of national cropland emission inventories of NH_3 , NO , N_2O , CH_4 , or CO_2 ;
 - Calculating national cropland NH_3 inventories of China.



- **Building a modelling research team for the LMAS**
 - Fulltime fixed-position senior scientist: X. Zheng.
 - Part-time fixed-position senior scientist: Klaus Butterbach-Bahl (2 months per year in IAP-CAS since 2018; IAP-CAS allocated 1.2M CNY for the first 3 years).
 - Two 6-year postdocs of IAP-CAS as modellers:
 - + Dr. Wei Zhang (since Jul., 2015)
 - + Ms. Siqi Li (since Jan., 2019, now Ph. D student of UCAS).
 - IAP-CAS will receive a fulltime senior modeller in 2020 for this team.
 - This team is calling for substantial cooperative researches under the GRA umbrella, e.g., under the LMAS and Nitrogen Flagship.

Opportunities and plans

- **Opportunities:** fund possibilities for, e.g., N Flagship/networks
 - **NSFC-NUEP project:**
 - Grant: 3 M CNY for 5 years of each project fully granted by NSFC;
 - Fields: climate change, ecosystem management & livelihood nexus;
 - Proposal: receive in mid-March, release result in September.
 - **Bilateral joint projects between NSFC and other foundations:**
 - For each 4-year research project, NSFC grants 2 M CYN for Chinese PIs and the other foundation provides comparable or more grant for the PIs from the other side;
 - Fields: usually focused by joint calls;
 - Proposal: usually receive in mid-March, release result in September.
 - **MOST international cooperation project:**
 - Grant: 2–5 M CNY for 5 years of each project fully granted by MOST;
 - Fields: focused by specific calls or decided by applicants.

Opportunities and plans

■ Opportunities: meeting possibilities

- Periodic **International N₂O Conference (INOC)** for the Nitrogen Flagship: to be held every 4 years;
- Support from China: it is possible to find support for organizing the conference to be held in the country.

■ Capability Building

- 3-year full CAS-TWAS scholarship: Ph. D students of University of Chinese Academy of Sciences (receiving applications every year; see details at <http://englishucas.ac.cn/index.php/admission>);
- CAS or CSC postdoc fellowships (receiving applications every year; see details at <http://englishucas.ac.cn/index.php/admission>).