The simulation results shows that the majority of fallow-chickpea based farm households are vulnerable (68% in warmer climate and 42% in wet climate) to climate change if current production systems are used in the future. Vulnerability is not uniform across the Kurnool district and climate impacts vary across climate scenarios. Therefore, development and promotion of location specific adaptation strategies linking technologies, policies and infrastructure is need to improve the resilience and adaptive capacity of farm rainfed farm households to climate change.

***Title*: Impacts of 1.5 versus 2.0°C on West African cereal yields**

Presenter: Heidi Webber

Author: Faye, Babacar[1], Webber, Heidi[2], Naab, Jesse[3], MacCarthy, Dilys[4], Adam, Myriam[5,6,7], Ewert, Frank [1,2], Lamers, John[8], Schleussner, Carl-Friedrich[9,10], Ruane, Alex[11], Gessner,Ursula[12], Hoogenboom,Gerrit[13], Boote, Ken[13], Shelia, Vakhtang[13], Saeed, Fahad[9], Wisser, Dominik[14], Hadir, Sofia[1], Laux, Patrick[15], Gaiser, Thomas[1]

[1] University of Bonn, Germany
[2] ZALF, Germany
[3] WASCAL, Burkina Faso
[4] University of Ghana, Ghana
[5] CIRAD), France
[6] ICRISAT, Mali
[7] INERA, Burkina Faso
[8] ZEF, Germany
[9] Climate Analytics, Germany
[10] PIK, Germany
[11] NASA, USA
[12] DLR, Germany
[13] University of Florida, USA
[14] FAO, Italy
[15] KIT, Germany

Abstract: With the Paris Agreement, governments around the world agreed to limit global temperature rise to less than 2.0°C above pre-industrial levels, with the ambition to keep warming to 1.5°C. Designing appropriate mitigation responses requires weighing costs of mitigating versus associated damages for the two levels of warming, with particular consideration of the implications for regions already challenged by food insecurity. This study assessed impacts in the West African Sudan Savanna of 1.5°C versus 2.0°C on yields of maize, pearl millet and sorghum. Two crop models were used that were calibrated with common varieties from experiments in the region. To capture a range of realistic management, early, typical and late sowing was assessed. Further, simulations were conducted for both current fertilizer rates and for an intensification case which assumed fertility not limiting, in attempt to capture the extremes of possible economic development scenarios on current cropping systems. With current fertilizer use, results indicated 2% units higher losses for maize and sorghum with 2.0°C compared to 1.5°C warming, with no change in millet yields for either scenario. In the intensification case, yield losses due to climate change were larger than with current fertilizer levels. However, despite the larger losses, yields were always 2-3 times higher with

intensification, irrespective of the warming scenario. Though yield variability increased with intensification, there was no interaction with warming scenario. Risk and market analysis are needed to extend these results to understand implications for food security.

***Title*: Climate change impacts on current and future agricultural systems in the semi-arid regions of West Africa**

Presenter: Ibrahima Hathie

Author: Ibrahima Hathie[1], Dilys S. MacCarthy[2], Roberto Valdivia[3], John Antle[3], Myriam Adam[4], Samuel K. Adiku[5]

[1] Initiative Prospective Agricole et Rurale, Senegal

[2] Soil and Irrigation Research Centre, CBAS, University of Ghana, Accra, Ghana

[3] Oregon State University, USA

[4] Centre de Coop. Internationale pour la Recherche Agronomique pour le D´eveloppement (CIRAD), France

[5] Department of Soil Science, CBAS, University of Ghana, Accra, Ghana

Abstract: Agriculture in the semi-arid regions of West Africa is mainly rain-fed with a large number of smallholder farmers dependent on it for their livelihoods. Farming systems are dominated by cereals and legumes with livestock playing a significant role in the functioning of the systems. In this paper, we use the AgMIP Regional Integrated Assessment methods, which include a set of mid-century climate projections, biophysical (Decision Support Systems for Agro-technological Transfer; DSSAT and Agricultural Production Systems sIMulator; APSIM) and economic (trade-off analysis model: TOA-MD) models, representative agricultural pathways and global economic model projections to explore the impacts of climate change on the economic vulnerability of farm households in Nioro, Senegal. Our results indicate that most climate scenarios - except the hot-dry had positive impacts on peanuts which is one of the main crops in this production system. The effect of climate change on maize was negative and the impacts on millet were variable but changes are small. In tomorrow's production systems and socio-economic conditions, climate change would have positive impact on Nioro farmers livelihoods in almost all cases simulated. However, with low prices, climate change would have a negative impact of Nioro farmers' livelihoods in most cases. For Senegal, these results have significant policy implications, in particular on international trade and regional prices as peanut is one of the major export commodities.

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Session 2E: Modeling the Causes and Cascading Impacts of Food Shocks

***Title*: New crop modelling technique for improving model performance under climate change and stress simulations**

Presenter: Ioannis Droutsas

Author: Droutsas, Ioannis[1], Challinor, Andrew[1], Semenov, Mikhail[2]

[1] Institute for Climate and Atmospheric Science, School of Earth and Environment, University of Leeds, LS2 9JT Leeds, UK

[2] Rothamsted Research, Harpenden, Herts, AL5 2JQ, UK