
Research activities in 2016: global food, agriculture and land use

Tomoko Hasegawa

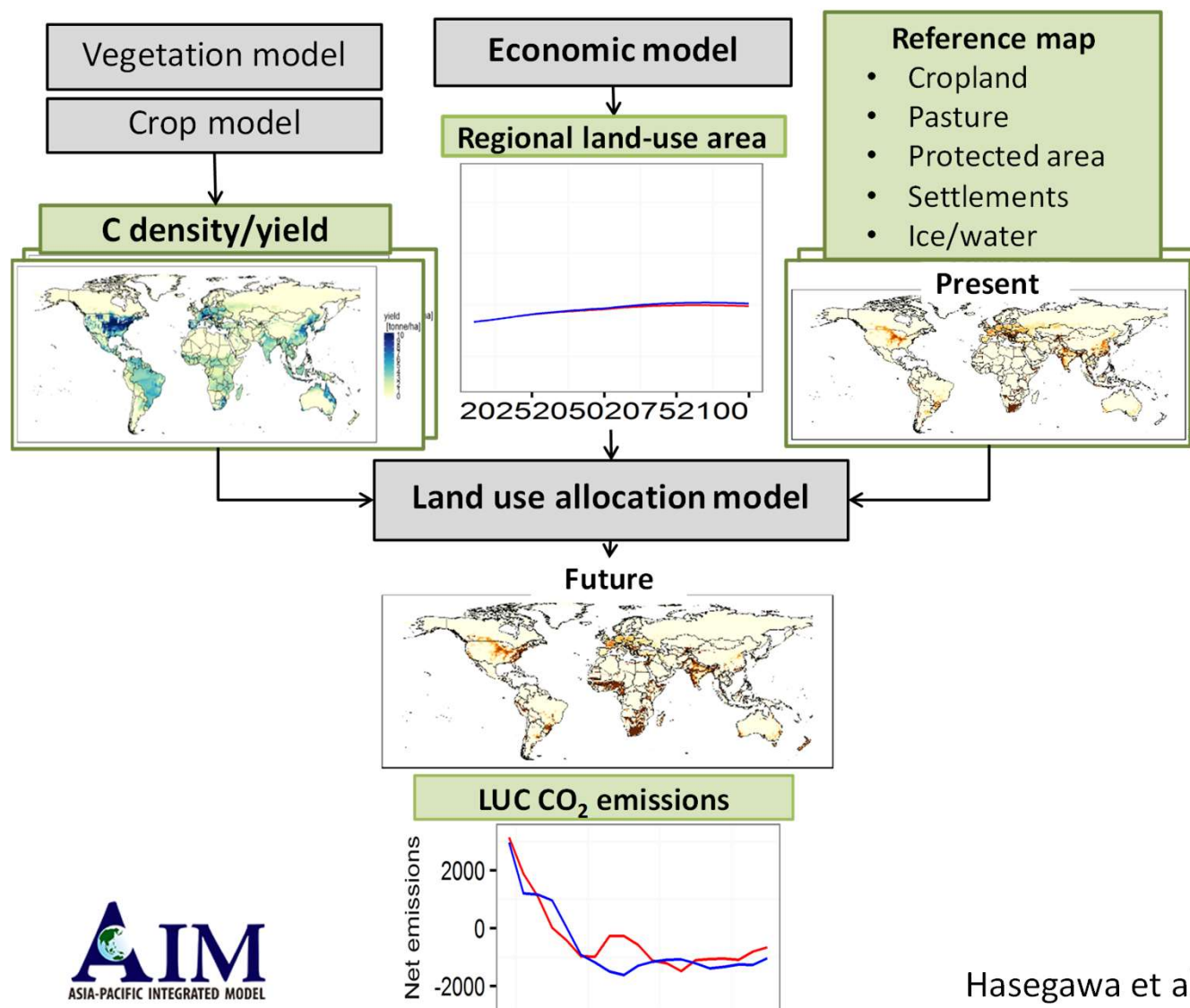
The 22nd AIM international workshop,
November 9-11th, Tsukuba, Japan

Activity in 2016

- AIM/PLUM (Land-use allocation model)
- Food security assessment under climate volatility
- On-going projects (AgMIP, LUH2)

AIM/PLUM (integration Platform for Land-Use and environmental Modeling)

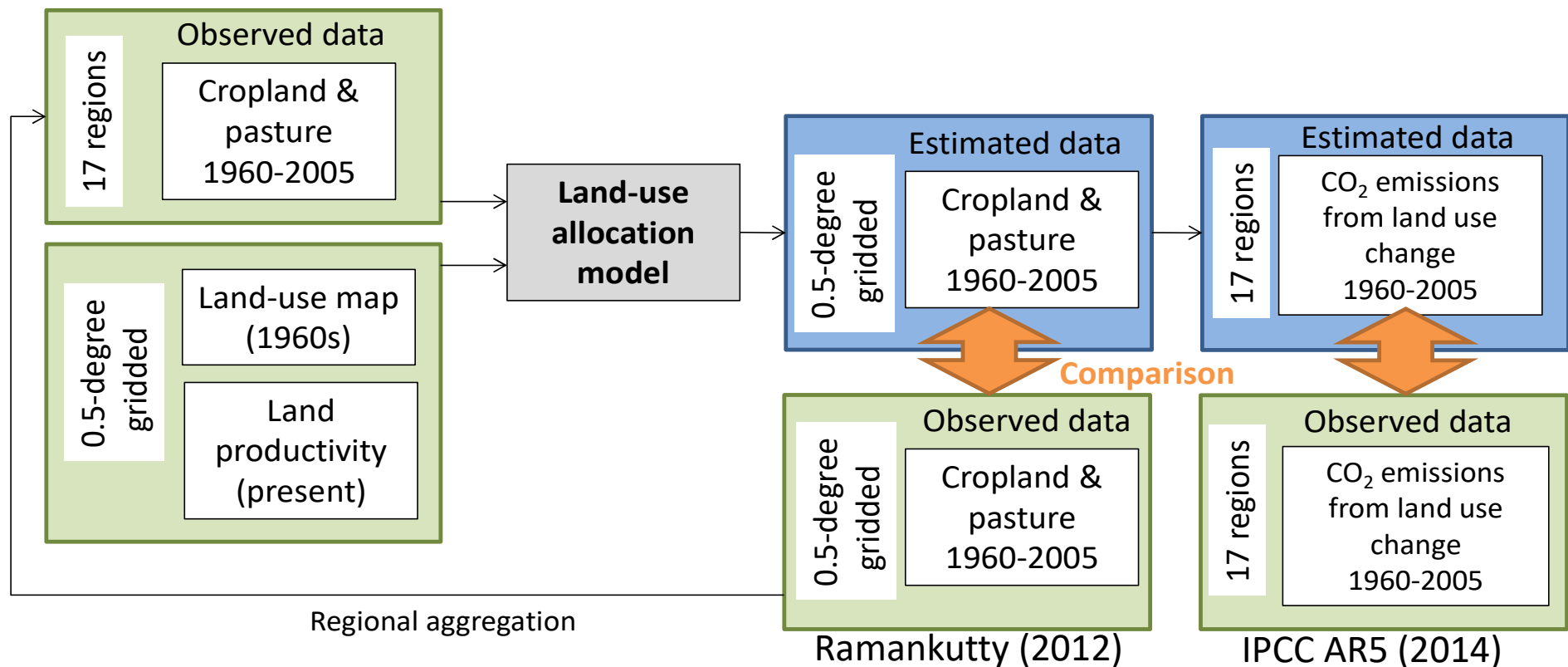
- Develop a land-use allocation model that works with an economic model (AIM/CGE).



- Profit maximization of land owner
- Linked to IAM
- $0.5^\circ \times 0.5^\circ$ spatial resolution
- Land area is described as fraction to a grid cell.

Verification for estimated land-use allocation

- Model verification using a historical period to determine uncertainty of estimated land-use patterns.

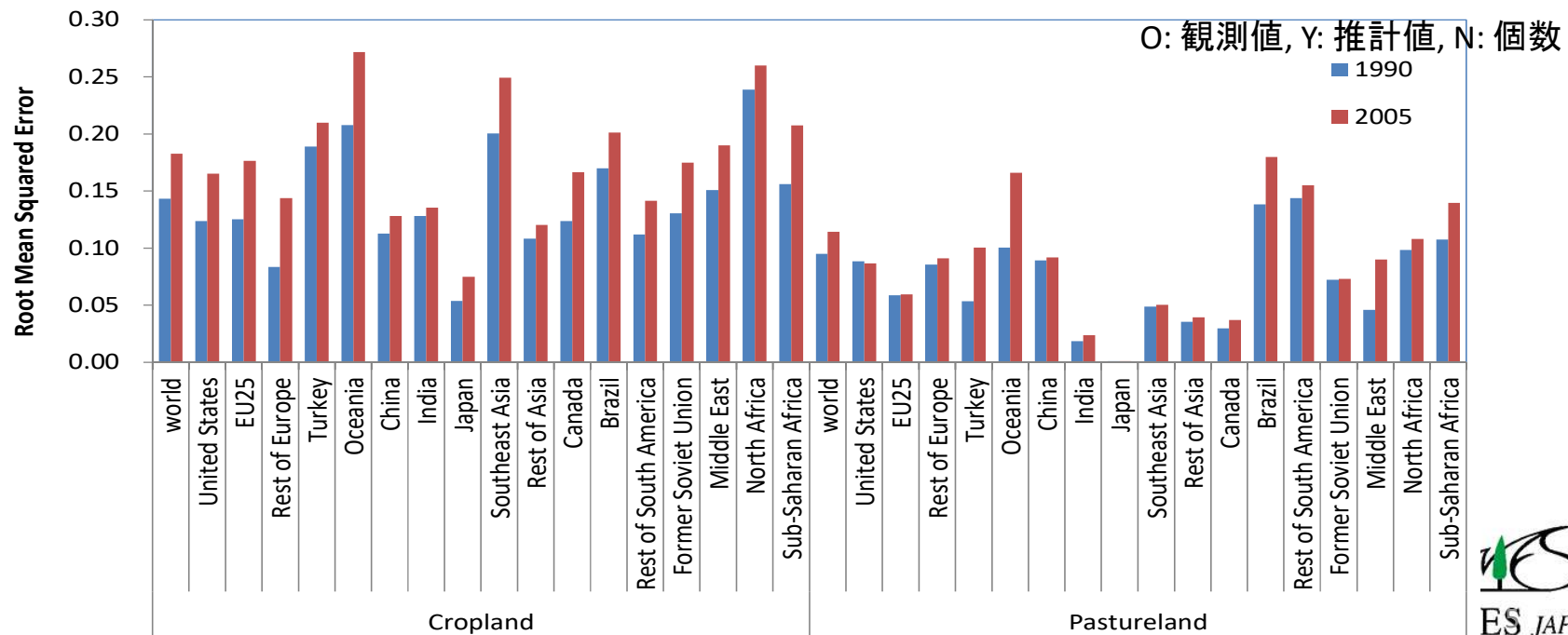


Model varification: difference between observation and estimation

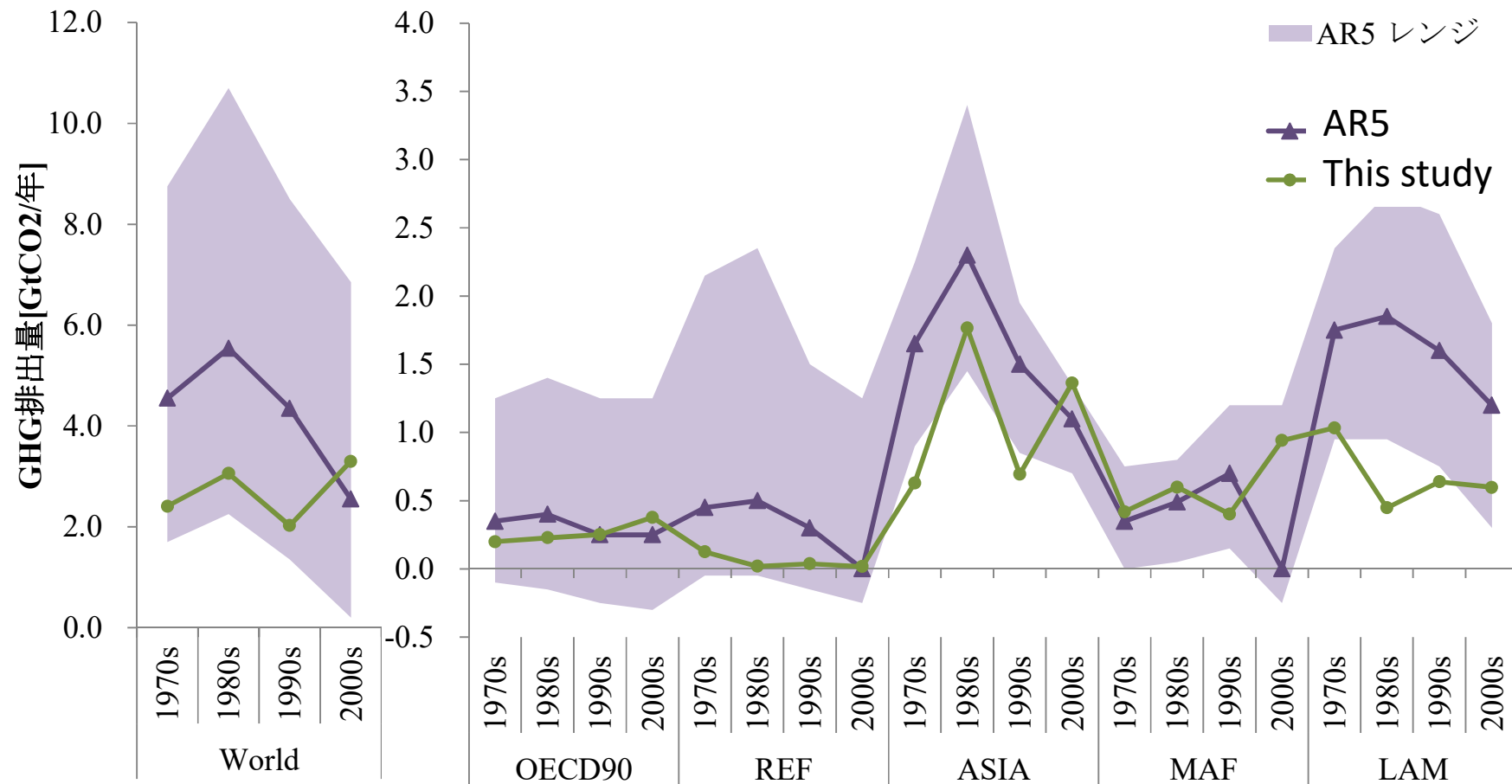
RMSE was 0.18/grid for cropland and 0.11/grid for pasture land in global in 2005.

1. Difference was relatively large in cropland compared to pasture land
2. Differences increased over time
3. Differences were large in regions, particularly in aggregated regions, with a large historical change in cropland area

$$RMSE_l = \sqrt{\frac{1}{N} \sum_{g \in GR} (Y_{l,g} - \overline{O_{l,g}})^2}$$

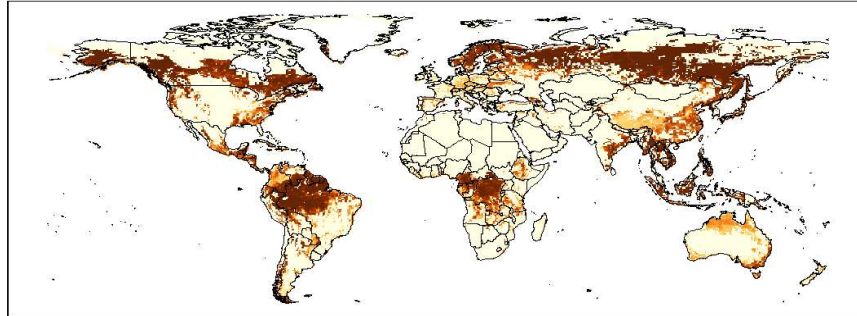


Comparison of CO2 emission from LUC with AR5

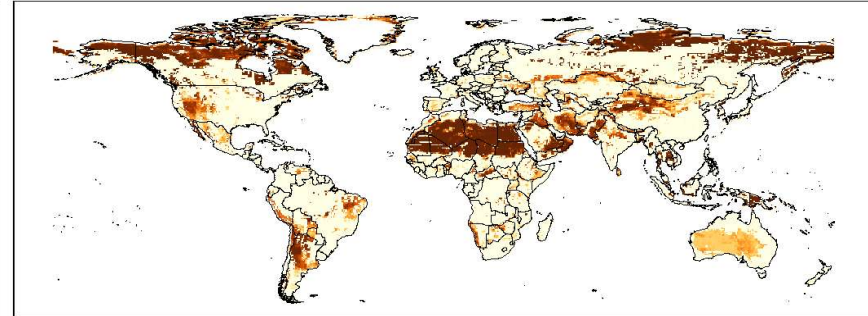


Downscale future aggregated scenario: Mitigation scenario (SSP2-RCP2.6: 2100)

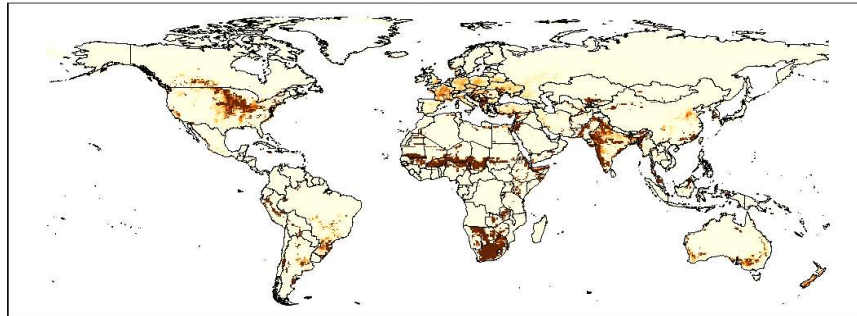
forest



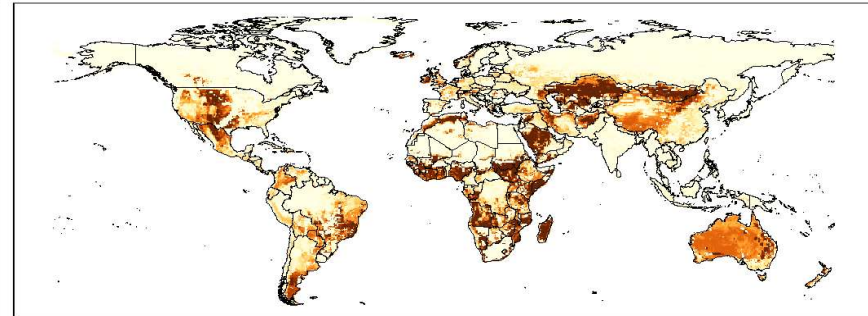
other natural vegetation



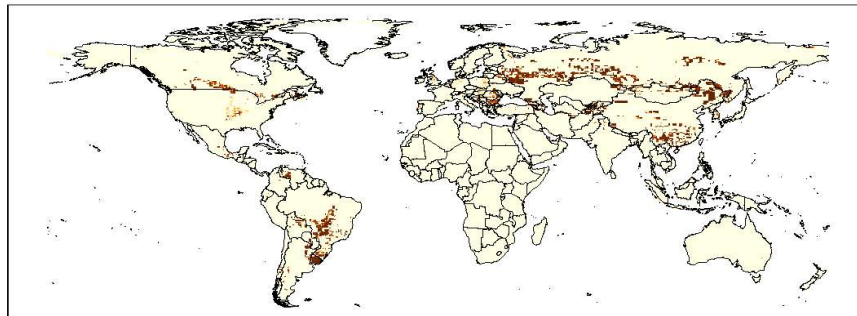
cropland



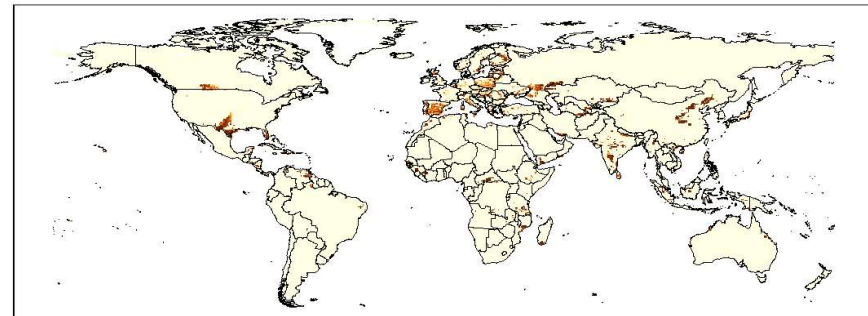
pasture



afforestation

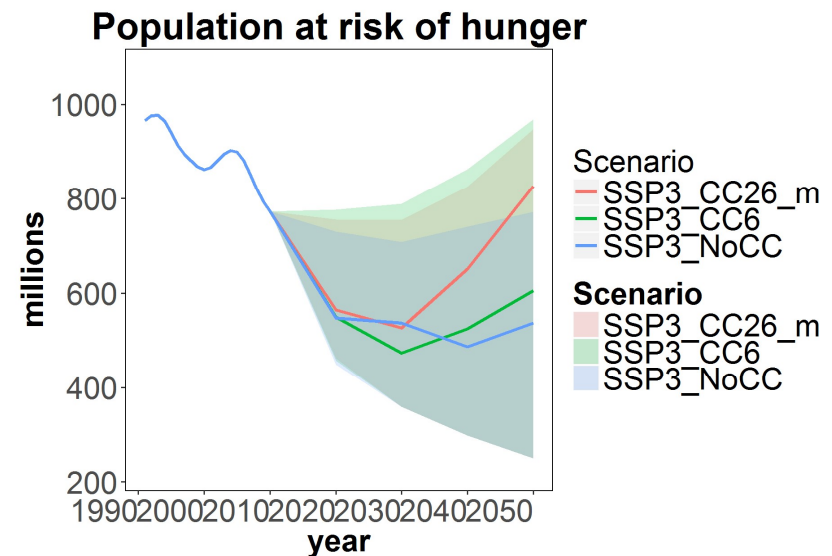


bio crops



Global food insecurity under climate volatility

- Period: Phase 2- 2014 to ? (Phase 1- 2011 to 2013)
- Funding: IFPRI (jointly working with JRC project)
- Main focus: Global agricultural market and food security impact caused by climate change mitigation and yield change
- Method: Model inter-comparison
 - SSP/RCP framework
 - IFPRI, IIASA, JRC, NIES, PBL, PIK, PNNL, Purdue, USDA, Wageningen
 - Coordinating with crop modeling and regional assessment groups
 - Timeframe; 2010-2050
- Expected outcomes:
 - Several papers before 1.5 degree SR
 - 1.5 °C impact on food security
 - Regional assessment
 - More outcomes for land and food SR
 - Livestock
 - Trade
 - Health



Thank you for your attentions!