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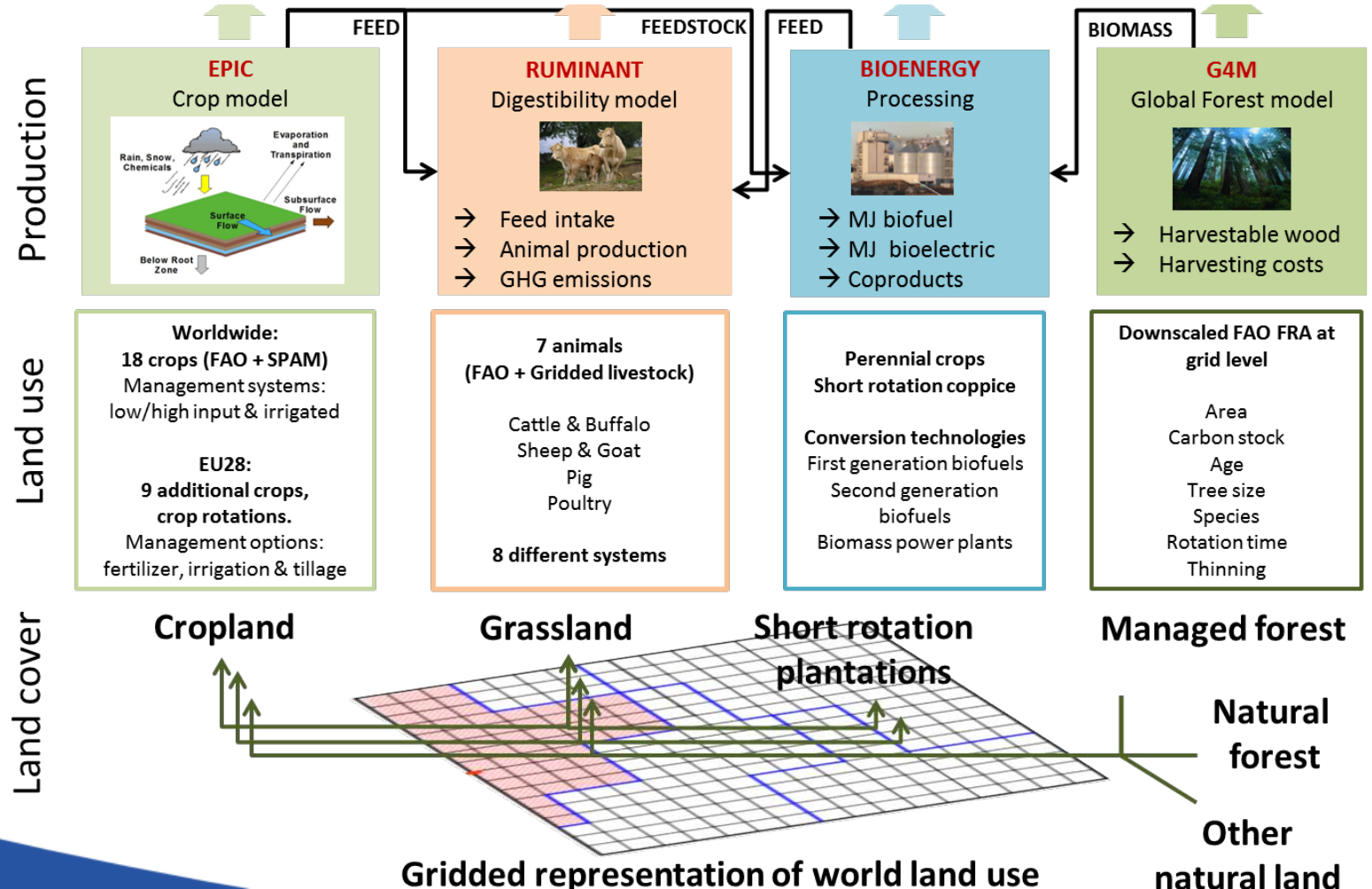
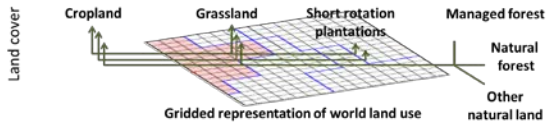
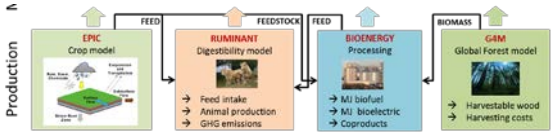
The GLOBIOM data folder

Explanations, helpful commands and adaptations

Everything that enters the model before the first calibration







Each of these items are dealt with in the data folder and how will here be explained in more detail

The 0_execute_batch file

```
$macro execute_abort(cmd_line) execute cmd_line; scalar err_lvl; err_lvl=errorlevel; if (err_lvl<>0,display "Command line",cmd_line,"Error leve
$setLocal env IDE=%gams.ide% logOption=%gams.lo% errorLog=%gams.errorlog% errMsg=1 pageWidth=130 cErr=5
$setLocal X %system.dirSep%

* FAO Population
execute_abort("gams 1_compile_pop.gms              %env%                          CDir=PopFAO");

* FAO Crop Data
execute_abort("gams 1_comp_faoPRODdata.gms         %env%                          CDir=CropsFAO");
execute_abort("gams 2_comp_faoSUAdata.gms          %env%                          CDir=CropsFAO");
execute_abort("gams 3_comp_faoPRICEdata.gms        %env%                          CDir=CropsFAO");
execute_abort("gams 5_comp_faoFBSdata.gms          %env%                -s t%X%a5 CDir=CropsFAO");
execute_abort("gams 5b_foodprojection.gms          %env% -r t%X%a5                CDir=CropsFAO");
execute_abort("gams 6_comp_faoLANDdata.gms         %env%                          CDir=CropsFAO");
execute_abort("gams X_calc_yieldgrowthrate.gms     %env%                          CDir=CropsFAO");

execute_abort("gams 1_loaddata.gms                 %env%                -s t%X%a1 CDir=CropsFAO_new");
execute_abort("gams 2_compile.gms                  %env% -r t%X%a1                CDir=CropsFAO_new");
execute_abort("gams 2_compile_osd.gms              %env% -r t%X%a1                CDir=CropsFAO_new");

* FAO Live Data
execute_abort("gams 1_loaddata.gms                 %env%                -s t%X%a1 CDir=LiveFAO");
execute_abort("gams 2_comp_liveFBSdata.gms         %env% -r t%X%a1      -s t%X%a2fbs CDir=LiveFAO");
execute_abort("gams 2_comp_liveSUAdata.gms         %env% -r t%X%a1      -s t%X%a2sua CDir=LiveFAO");
execute_abort("gams 3_comp_livePricedataSUA.gms    %env% -r t%X%a2sua   -s t%X%a3sua CDir=LiveFAO");
execute_abort("gams 3_comp_livePricedataSUAFBS.gms %env% -r t%X%a2sua   -s t%X%a3 CDir=LiveFAO");
execute_abort("gams 1_loaddataAnimals.gms          %env%                -s t%X%a1_anim CDir=LiveFAO");
execute_abort("gams 4_comp_liveSTOCKdata.gms       %env% -r t%X%a1_anim -s t%X%a4 CDir=LiveFAO");

execute_abort("gams 1_loaddata.gms                 %env%                -s t%X%a1 CDir=LiveFAO_new");
execute_abort("gams 2_compile.gms                  %env% -r t%X%a1                CDir=LiveFAO_new");
execute_abort("gams 2_compile_y.gms                %env% -r t%X%a1                CDir=LiveFAO_new");

* Live ILRI
execute_abort("gams 1_loadliveSimU.gms             %env%                          CDir=LiveILRIsimU");
execute_abort("gams 0_executebatch.gms             %env%                          CDir=LiveILRI //name=default");

* Forest FAO
execute_abort("gams 1_compile.gms                  %env%                          CDir=ForestFAO");
execute_abort("gams 1_compile_2010.gms             %env%                          CDir=ForestFAO");

* Elasticities USDA
execute_abort("gams 1_comp_ElaUSDA.gms             %env%                          CDir=Elasticities%X%USDA");
execute_abort("gams 1_comp_ElaUSDA_2005.gms        %env%                          CDir=Elasticities%X%USDA");

* FAO FBS new data for demand - HV 16.02.2012
execute_abort("gams 1_comp_FAO_FBSdata_hv.gms      %env%                -s t%X%sav CDir=FBS_FAO");
*execute_abort("gams 2_comp_FAO_hist_regress.gms    %env% -r t%X%sav               CDir=FBS_FAO");

* Income elasticities projections - HV 16.02.2012
*execute_abort("gams 1_compile_inc_elast.gms        %env%                          CDir=Demand_2100 //opt=FAO");

* Water
execute_abort("gams 1_comp_klumdata.gms            %env%                          CDir=Water");
execute_abort("gams 1_comp_irriland.gms            %env%                          CDir=irri_land_FAO");
* Emissions
execute_abort("gams 1_load_emissiondata.gms        %env%                -s t%X%a1 CDir=Emissions");
execute_abort("gams 2_calc_emissions.gms           %env% -r t%X%a1                CDir=Emissions");
```

Compilation of external data in GLOBIOM-compatible parameters

Processing of the data to ensure a spatially-explicit year-2000 consistent picture

```
* Final compilation part 1
execute_abort("gams 1_compiledata.gms              %env%                -s t%X%a1");
execute_abort("gams 1_extractdata.gms              %env% -r t%X%a1              ");
execute_abort("gams 2_comp_cropdata.gms            %env% -r t%X%a1      -s t%X%a2");
execute_abort("gams 2_cons_croplnd.gms             %env% -r t%X%a2      -s t%X%a3");
execute_abort("gams 2_extract_cropdata.gms         %env% -r t%X%a3              ");

* Grass productivity
execute_abort("gams 1_loaddata.gms                 %env%                                CDir=Grass_SimU");

* Final compilation part 2
execute_abort("gams 3_comp_feeddata.gms            %env%                -s t%X%a4");
execute_abort("gams 3_cons_grslnd.gms              %env% -r t%X%a4              ");
execute_abort("gams 3_comp_livedata.gms            %env% -r t%X%a4              ");
execute_abort("gams 4_comp_fordata.gms             %env% -r t%X%a1      -s t%X%a5");
execute_abort("gams 4_mai4myk.gms                  %env% -r t%X%a5      -s t%X%a6");
execute_abort("gams 4_cons_forest.gms              %env% -r t%X%a6      -s t%X%a7");
execute_abort("gams 5_cons_othercropland.gms       %env% -r t%X%a7              ");
execute_abort("gams 6_comp_srpdata.gms             %env% -r t%X%a1      -s t%X%a8");
execute_abort("gams 7_comp_gibbsdata.gms           %env% -r t%X%a1      -s t%X%a9");
execute_abort("gams 8_comp_trade.gms               %env% -r t%X%a1              ");
```

Exogenous drivers

Population, GDP, consumer preferences

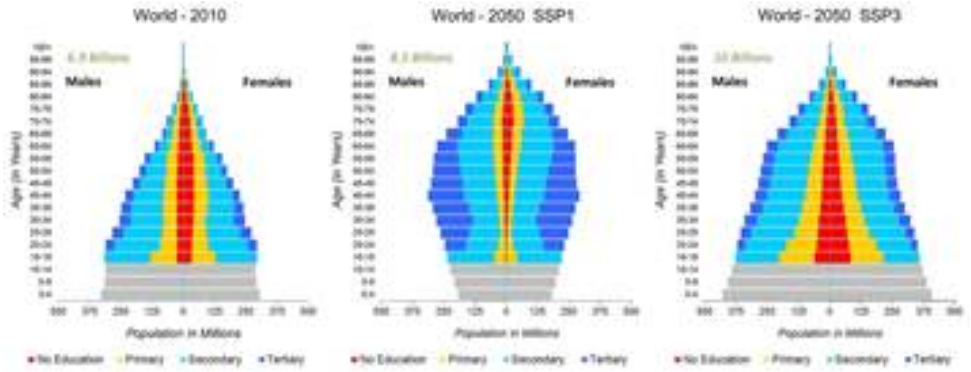
```
* FAO Population
execute_abort("gams 1_compile_pop.gms
```

Compilation of external data in GLOBIOM-compatible parameters

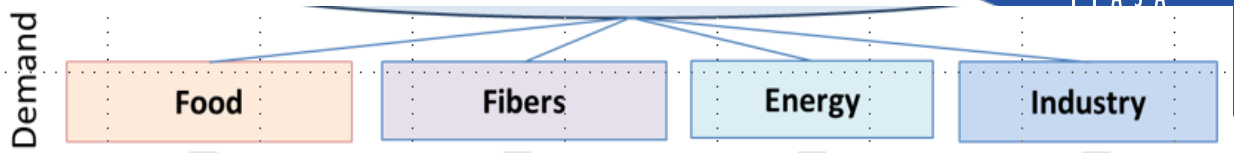
Relevant parameters:

- `POPTOT_DATA(ANYREGION)` Population in 1000 persons

Other exogenous parameters: GDP and consumer preferences



Demand, prices and trade




```
execute_abort("gams 2_comp_faoSUAdata.gms
execute_abort("gams 3_comp_faoPRICEdata.gms
execute_abort("gams 5_comp_faoFBSdata.gms
execute_abort("gams 5b_foodprojection.gms
```

Production balance by country, product and year

Producer price (US $/tonne) from FAO

Calorie consumption and production (kcal per capita per day)

FAO food balance sheets

Parameter name	Parameter explanation
SUADATA_CY	Production balance by country, product and year
SUADATA_AVG	Average production balance
PRICEDATA_CROPS	Producer price (US $/tonne) from FAO
PRICEDATA_C	Producer price (US $/tonne) from FAO, averaged over the years
FoodConsForecastdet_RelChng	relative change in per capita calorie consumption

```
* Elasticities USDA
execute_abort("gams 1_comp_ElaUSDA.gms
execute_abort("gams 1_comp_ElaUSDA_2005.gms
```

price elasticity of demand obtained from USDA by product and by region

Parameter name	Parameter explanation
DemandPriceEla_USDA	Price elasticity of demand
DemandIncomeEla_USDA	Income elasticity of demand

Crops

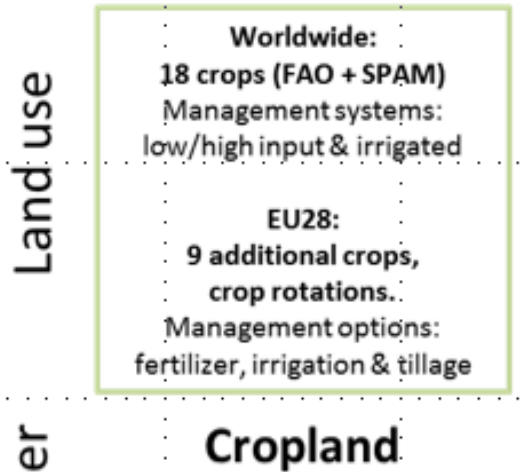
```
* FAO Crop Data
execute_abort("gams 1_comp_faoPRODdata.gms
execute_abort("gams X_calc_yieldgrowthrate.gms
```

Production data for crops from FAO (t)

Average production data for crops from FAO (t)

Relative change of yields compared to 2000 calculated based on linear regression 1980-2006 → To compute the factor of technological change

Parameter name	Parameter explanation
PRODDATA_CY	Production data for crops from FAO (t)
PRODDATA_C	Average production data for crops from FAO (t)
HistYieldChng_Data	Relative change of yields compared to 2000 calculated based on linear regression 1980-2006

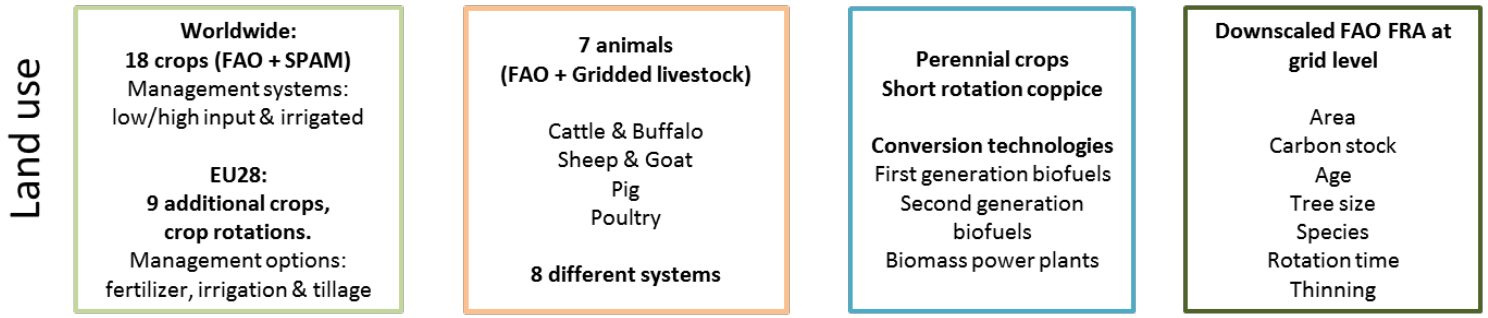


Landcover

```
execute_abort("gams 6_comp_faoLANDdata.gms
```

Land by land cover from FaoStat

Parameter name	Parameter explanation
LandFAO_Data	Arable land, temporary and permanent grassland, forest area, other land



Livestock data

Load in specific livestock data and processed products
Load in specific sets and maps for all types of livestock

RUMINANT
Digestibility model

→ Feed intake
→ Animal production
→ GHG emissions

7 animals
(FAO + Gridded livestock)

Cattle & Buffalo
Sheep & Goat
Pig
Poultry

8 different systems

FAOSTAT

```
* FAO Live Data
execute_abort("gams 1_loaddata.gms
execute_abort("gams 2_comp_liveFBSdata.gms
execute_abort("gams 2_comp_liveSUAdata.gms
execute_abort("gams 3_comp_livePricedataSUA.gms
execute_abort("gams 3_comp_livePricedataSUAFBS.gms

execute_abort("gams 1_loaddataAnimals.gms
execute_abort("gams 4_comp_liveSTOCKdata.gms

execute_abort("gams 1_loaddata.gms
execute_abort("gams 2_compile.gms
execute_abort("gams 2_compile_y.gms
```

Load-in all FaoStat data for livestock

SUA data for animal production

FBSNUT_DATA_DET	Calorie consumption per live product
PRICEDATASUA_A	Price data for crops
PRICEDATA_A	Price data for crops
SUALIVEANIMALS_DATA	SUA data for livestock STOCKs and Producing Animals
LIVENUMBER_FAO	Data for livestock STOCKs and Producing Animals
LIVENUMBER_FAO	Data for livestock STOCKs and Producing Animals

ILRI

```
* Live ILRI
execute_abort("gams 1_loadliveSimU.gms
execute_abort("gams 0_executebatch.gms
```

PIGS	Pigs
BOVD	Bovine - dairy
BOVO	Bovine - other
BOVF	Bovine - Followers
SGTD	Sheep and goats - dairy
SGTO	Sheep and goats - other
SGTF	Sheep and goats - followers
PTRB	poultry broilers
PTRH	poultry laying hens
PTRX	poultry mixed

Livestock ILRI	
LIVENUMBER_SIMU	Full spatial resolution - livestock numbers
LIVENUMBER_LUID	200x200 km grid - livestock numbers

Forest data

```
* Forest FAO
execute_abort("gams l_compile.gms
execute_abort("gams l_compile_2010.gms
```

Load foreststat data from FAO on production, consumption, import and export.

Load data from ForesSTAT_DATA with products

Allocate woody biomass to biomass for pulp and paper and biomass for sawnwood

Calculate trade of forest products by minimizing the difference with domestic consumption.

Produces the table ForesSTAT_DATA

ForesSTAT_DATA	Forestry data from FAO (2000)
IW_Biomass	Sawlogs and Pulplogs in 1000 m3
SW_Biomass	Sawlogs in 1000 m3
PW_Biomass	Pulplogs in 1000 m3
OW_Biomass	Other Indust Roundwood in 1000 m3
FW_Biomass	Wood Fuel in 1000 m3
SawnWood	SawnWood in 1000 m3
PlyWood	Plywood+Veneer in 1000 m3
Fiberboard	Particleboard+Fiberboard in 1000 m3
ChemPulp	Chemical Pulp+Semi Chemical pulp in 1000 t
MechPulp	Mechanical Pulp in 1000 t
Woodchips	Chips_and_particles+Wood_residues in 1000 m3
Woodpellets	Woodpellets in 1000 t (2012)

Other

```
* Water
execute_abort("gams 1_comp_klumdata.gms
execute_abort("gams 1_comp_irriland.gms

* Emissions
execute_abort("gams 1_load_emissiondata.gms
execute_abort("gams 2_calc_emissions.gms
```

Calculate water demand and yields under irrigation

Report emission factors

Parameter name	Parameter explanation
YIELD_WATER	Yields depending on irrigation
YIELD_WATERCOEF	Yield coef depending on irrigation
DEMAND_WATER	Water requirements by countries
IRRIG_COST	Irrigation cost
IrriLand_FAO_Y	irrigated area in 1000 ha
IrriLand_FAO	average irrigated area over 1998-2002
Animal_Data_EPA	Total Non-Carbon Emissions in Million Metric CO2-Equivalent
CROP_DATA_GHG	Crop Carbon Dioxide Emissions in tons CO2 per hectare

Obtained data for all major items at national or regional level

... But not spatially explicit

... No potentials taken into account

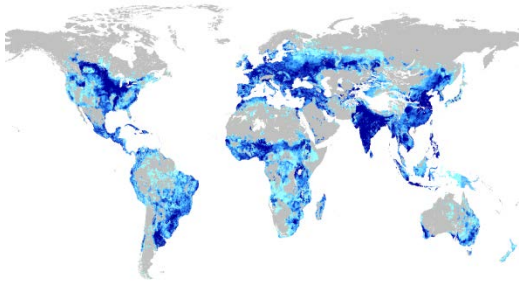
```
* Final compilation part 1
execute_abort("gams 1_compiledata.gms
execute_abort("gams 1_extractdata.gms
execute_abort("gams 2_comp_cropdata.gms
execute_abort("gams 2_cons_croplnd.gms
execute_abort("gams 2_extract_cropdata.gms

* Grass productivity
execute_abort("gams 1_loaddata.gms

* Final compilation part 2
execute_abort("gams 3_comp_feeddata.gms
execute_abort("gams 3_cons_grslnd.gms
execute_abort("gams 3_comp_livedata.gms
execute_abort("gams 4_comp_fordata.gms
execute_abort("gams 4_mai4myk.gms
execute_abort("gams 4_cons_forest.gms
execute_abort("gams 5_cons_othercropland.gms
execute_abort("gams 6_comp_srpdata.gms
execute_abort("gams 7_comp_gibbsdata.gms
execute_abort("gams 8_comp_trade.gms
```

38 regions

Sets
`Anyregion`
`Allcountry`

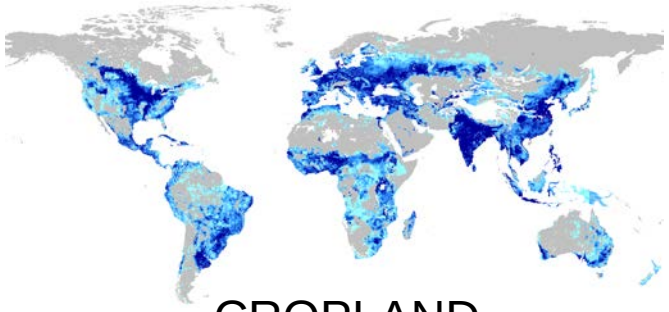


Spatially explicit

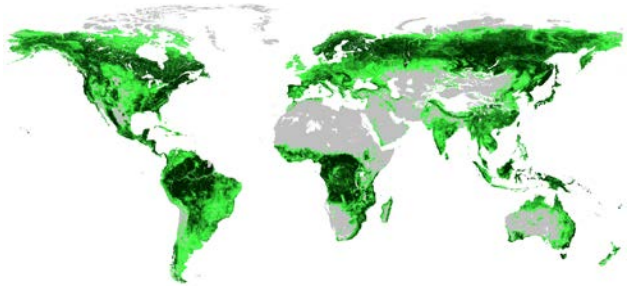
Sets
`(Allcolrow,`
`AEZClass,`
`Alticlass,`
`Slpclass,`
`Soilclass)`

Spatially-explicit land cover

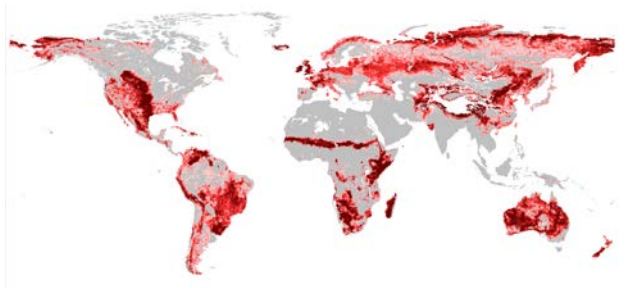
Initial land cover (GLC 2000)



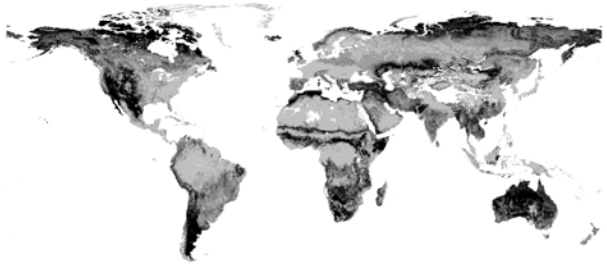
CROPLAND



FORESTS



GRASSLAND



OTHER NATURAL LAND

Landcover loaded in in the file:

```
execute_abort("gams 2_comp_cropdata.gms
```

Consists of the following main landcovers

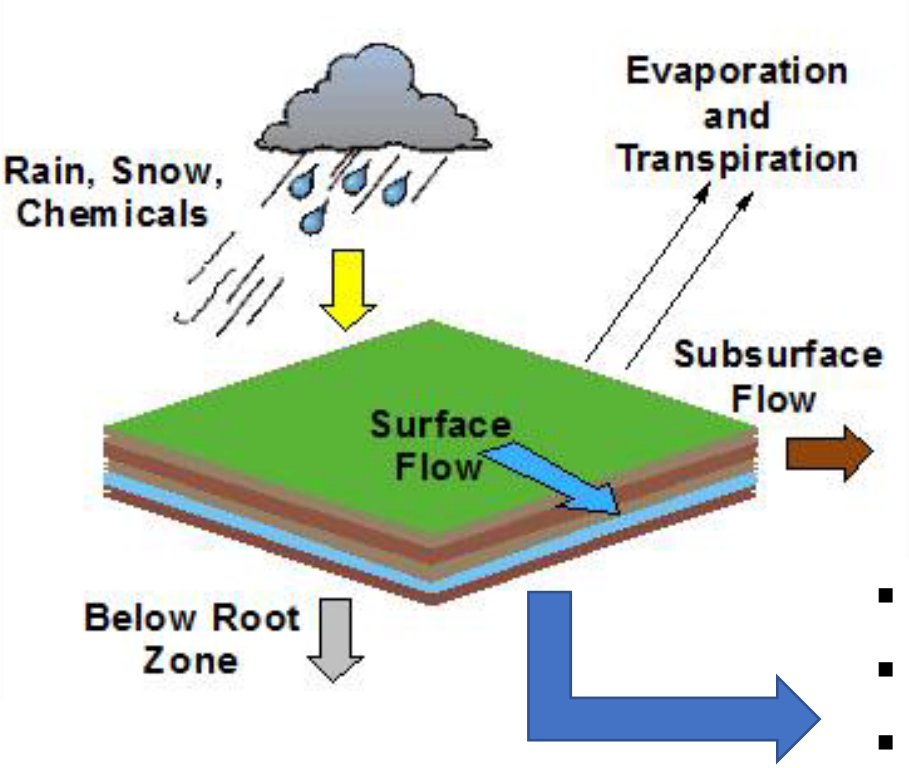
LC_TYPES	LC_TYPES_EPIC
CrpLnd	CrpLnd
WetLnd	WetLnd
NotRel	NotRel
OagLnd	OthAgri
OagLnd	OthCrpLnd
GrsLnd	Grass
NatLnd	OthNatLnd

And the following main parameters

Parameter name	Parameter explanation
LANDCOVER_INIT	Initial land cover (1000 ha)
LANDCOVER_INIT_CRPADJ	Initial land cover adjusted for consistency with FAO crop areas
LANDCOVER_INIT_SIMU	Initial land cover

Spatially-explicit crop data

EPIC model




```
execute_abort("gams 2_comp_cropdata.gms
```

Parameter `crop_data`

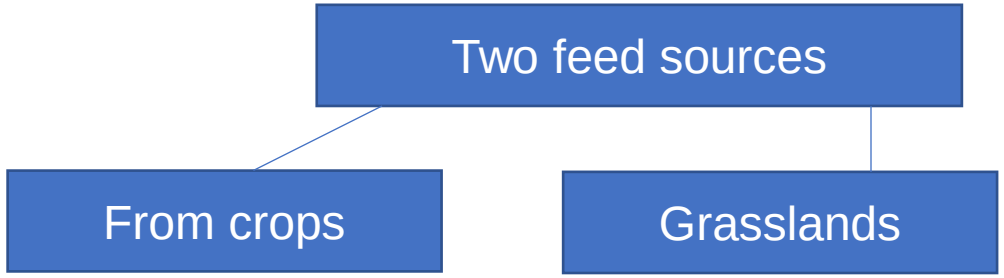
Parameter name	Parameter explanation
Basearea	SPAM data from IFPRI
CROPS	EPIC modelled crops
WATER	Water requirements from different irrigation systems from EPIC
COST	Based on nitrogen and phosphorus use from EPIC

- Crop yield (tonne/ha)
- Input use (kg/ha)
- Water use
- Nitrogen emissions

Spatially-explicit feed

```
execute_abort("gams 3_comp_feeddata.gms
execute_abort("gams 3_cons_grslnd.gms
execute_abort("gams 3_comp_livedata.gms
```

Declaring of the ILRI data for livestock numbers, livestock data and biomass values



Barl	0.89
BeaD	0.9
Cass	0.21
ChkP	0.9
Corn	0.85
Cott	0.91
Gnut	0.94
Mill	0.89
Pota	0.2
Rape	0.91
Rice	0.85
Soya	0.9
Srgh	0.89
SugC	0.25
Sunf	0.94
SwPo	0.2
Whea	0.85

← Crops that can be used as feed stuff in their dry-matter ratio

If the feed quantity from the SUA data

<

LIVENUMBER X LIVEDIET

→ Grainreserve

Mapping grass yields to regional levels based on inputs from EPIC and Rich data

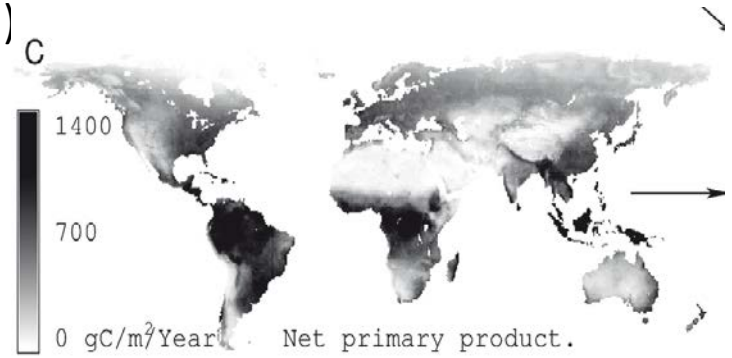
Parameter name	Parameter explanation
GRAS_DATA	Grassland productivity, grassland reserve and area
STOVER_DATA	Reserve Difference between the supply and demand for stover to make base year feasible
STOVER_LU_DATA	Difference between the supply and demand for stover to make base year feasible
GRAINRESERVE_DATA	Difference between the supply and demand for concentrate aggregates
LIVENUMBER	Livestock numbers from ILRI in 1000 TLU

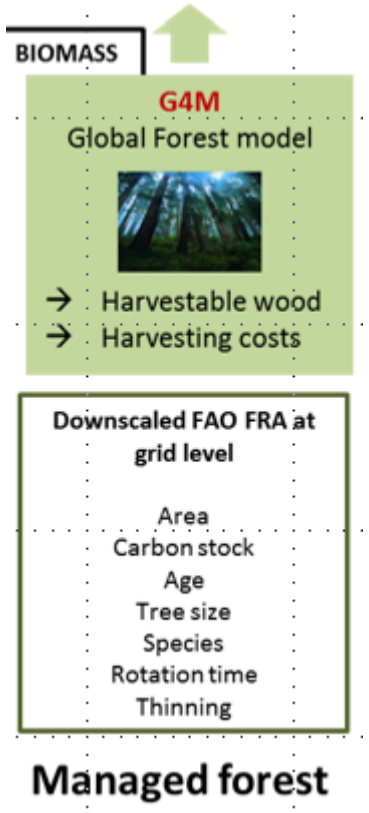
Parameter name	Parameter explanation
LIVE_DATA	Products, feed requirements, GHG, Manure and N_Excretion in tonnes/year
LIVE_DATA_woRESERVE	Feed requirements in tonnes/year
LIVEDEMAGGS_DATA	Share of individual animal products in the FBS aggregates

Spatially-explicit forestry data

FORESTS

- Sawn wood (m3/ha)
- Fuel wood (m3/ha)
- Pulp wood (m3/ha)






```
execute_abort("gams 4_comp_fordata.gms
execute_abort("gams 4_mai4myk.gms
execute_abort("gams 4_cons_forest.gms
```

```
$include data_g4mMNG_SIMU_cor.gms
```

```
TABLE DATAG4M_MNG_SIMU_COR(ALLCOUNTRY,AllColRow,SlpClass,ForMngt_TypeAll,ForMngt_ItemAll) Management data from G4M (in tC)
* RotationTime          Rotation Time [Years]
* Increment             Annual increment [tC per ha per Year]
* HarvLoss              Harvest losses (Not usable annual increment) [tC per ha per Year]
* HarvWood              Total annual usable wood = increment - harvLoos  [tC per ha per Year]
* SawnWood              Annual havestable Sawnwood [tC per ha per Year]
* HarvCost              Harvesting costs [$ per tC]
* ForestWood            Average aboveground Wood biomass at this rotation time [tC per ha]
* Cbelow                Forest Below ground biomass at current sitation [tC per ha]
* Cdead                 Foret Dead biomass at current sitation [tC per ha]
* Clitter               Forest Litter biomass at current sitation [tC per ha]
* Csoil                 Forest Soil Carbon at current sitation [tC per ha]
```

PARAMETER FOREST_DATA
Basearea allocated based on a share in forests
Harvest wood and sawnwood converted to m3, costs converted to USD/m3
Biomass converted to tCO2eq per ha

Land cover harmonization

```
execute_abort("gams 5_cons_othercropland.gms
```

However, the landcover data and productivity data need to be harmonized to ensure a consistent picture at the country level.

For cropland

Sum of cropland in the SPAM data doesn't necessarily match the cropland area in the GLCShare2000. Therefore:

- Scaling of basearea and yields of cropdata parameter based on FAOstat
- Adjustments of new cropland area to other landcovers; i.e. more cropland than in initial landcover, take from other land covers

For grassland

- What if Grassland > available grassland? → Take away from OthAgri and OthNatLnd → Leads to parameter `LANDCOVER_INIT_CrpGrsADJ`

For forest productivity

- What if the basearea x forest yields > available forests? → To the extent possible, away from OthNatLnd → `LANDCOVER_INIT_CrpGrsADJ`
- Other agricultural land adjusted with natural land

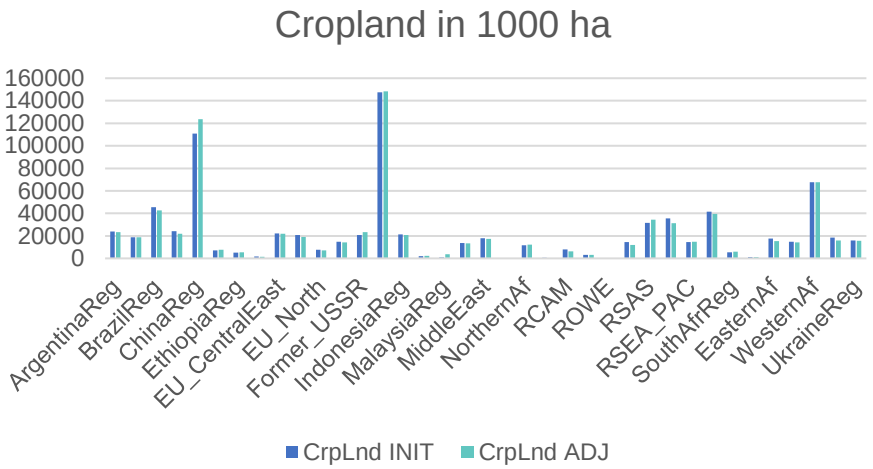
Leads to the parameter that gets exported to the final data:

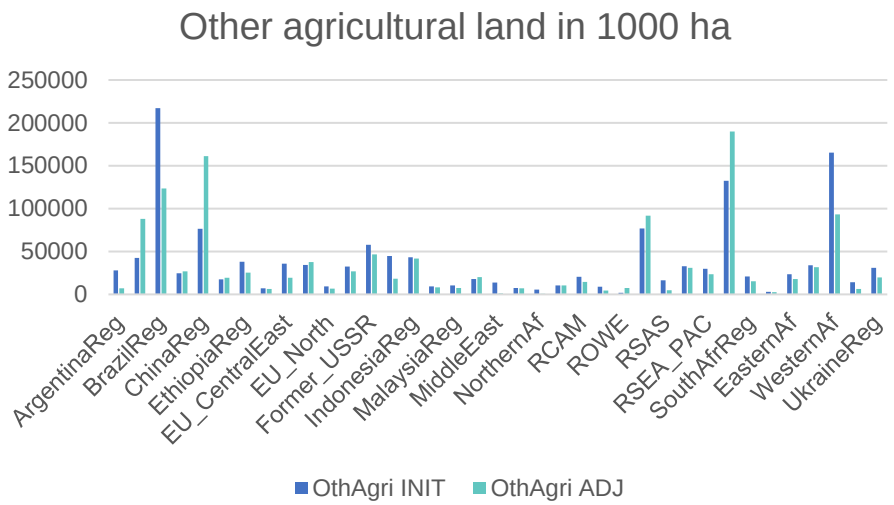
`LANDCOVER_INIT_CrpGrsForOagADJ(ALLCOUNTRY,ALLCOLROW,AltiClass,SlpClass,SoilClass,AezClass,LC_TYPES_EPIC) (1000 ha)`

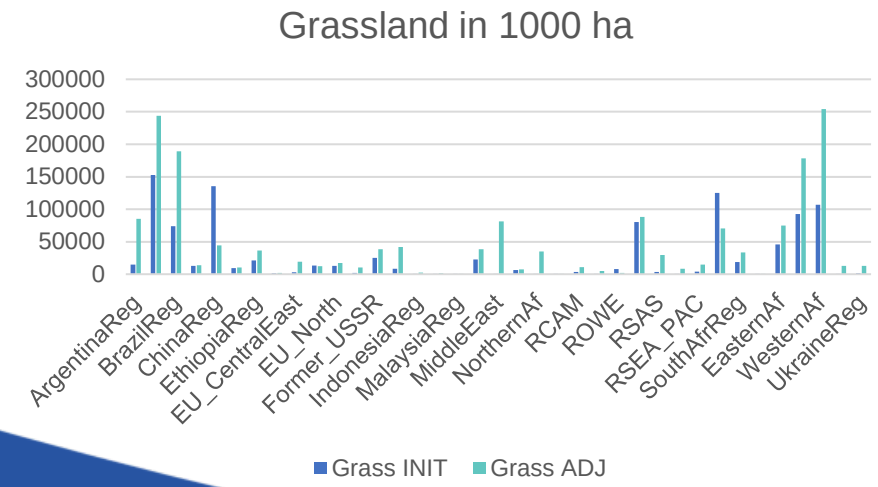
Land cover harmonization

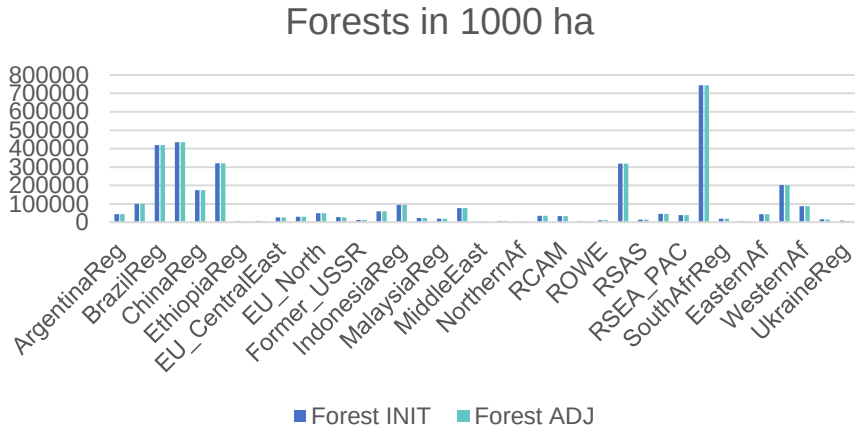
GLC2000 land cover classes	GLOBIOM land cover classes	GLOBIOM land use classes	Harmonization with other sources
Cultivated and managed area, Mosaic cropland/tree/other natural vegetation,	Cropland	Cropland	IFPRI 18 GLOBIOM-modeled crops distribution maps FAO harvested area by region (average 1998-2002)
Mosaic cropland/shrub/grassland		Other agricultural land	*Difference between GLC cropland area and 18 GLOBIOM modeled crops area*
Herbaceous cover	Grassland	Grazed pastures	Livestock distribution maps from FAO-ILRI
Shrub cover, sparse herbaceous or sparse shrub cover	Other natural land	Short rotation tree plantations Other natural land	*Difference between GLC grassland plus other natural land minus grazing requirements area and minus short rotation tree plantation area*
All forests except tree cover flooded	Forests	Managed forests Natural forests	FAO managed forest area by region (average 1998-2002) *Difference between GLC Forests and Managed forests area*

Land cover harmonization









To what extent did we affect the land cover data in the harmonization procedure?

Spatially-explicit short rotation plantations

PLANTATIONS

Wood for pulp m3/ha

Fuel wood m3/ha

Obtained from G4M with the potential area that can be cultivated on natural land, agricultural land, grassland, wetland and forestry and the current area

Parameter name	Parameter explanation
SRP_DATA	Mean annual increment in m3/ha
	Costs in USD/m3
	GHG sequestration in tCO2/ha

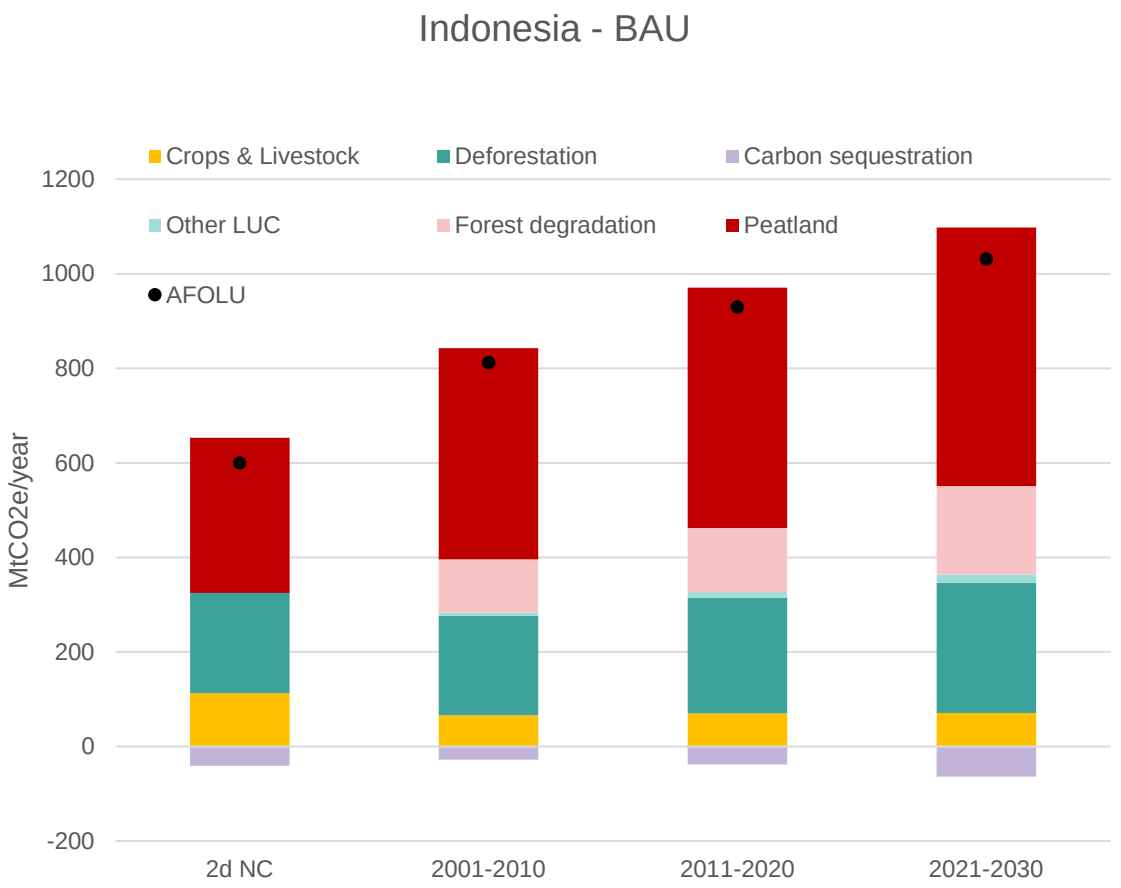
GHG calculation

```
execute_abort("gams 7_comp_gibbsdata.gms
```

GHG emissions from:

- Use of cropland from EPIC
- Livestock keeping from ILRI data
- Below and above ground biomass of forestry products from G4M
- Above and below ground living biomass related to land cover from Reusch & Gibbs

Parameter: `CarbonRueschGibbs`



Trade

```
execute_abort("gams 8_comp_trade.gms
```

Load-in trade-data, tariff-data and price data

Correct trade-data with the tradeable volume from division between production and consumption

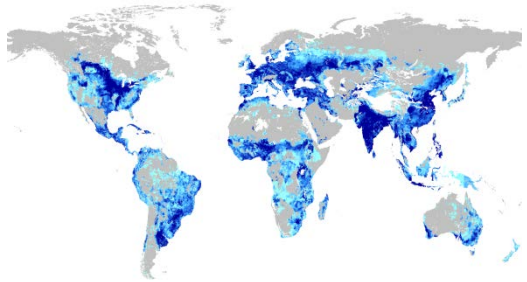
Trade takes place at the regional level

`Trade` With trade flows between regions

Main inputs and outputs from GLOBIOM

SCALE

38 regions



Spatially explicit

INPUTS

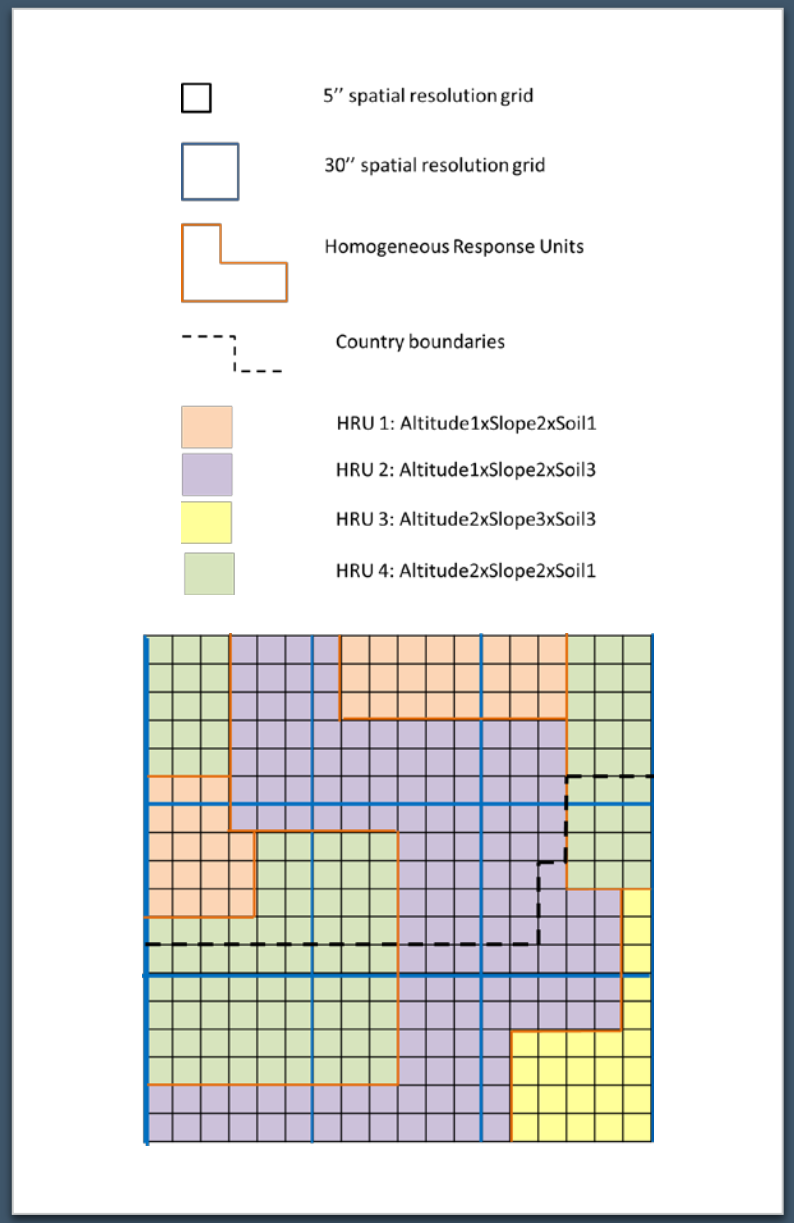
Population growth and GDP p.c.
Bioenergy use
Calorie intake p.c.
Demand price elasticity
Processing costs and coefficients
International trade costs

Crop parameters
Grassland yield
Livestock parameters
Forest parameters
Carbon stock
(Internal transportation costs)

OUTPUTS

Prices
Demand quantity
Processed quantity
Bilateral trade flows

Land use
Crop production
Livestock production
Intensification
Wood production
GHG emissions
(CO_2, CH_4, N_2O)



Exercise 1: change the countries' spatial resolution

MODEL Folder

decl_Rset → Select your region as a SIMU_COUNTRY/HRUN_COUNTRY instead of an LUID_COUNTRY

Choose the regions resolution by defining these sets:
HRUN_Country → At Homogenous response unit level

SIMU_country → At 50x50 km grid (*colrow*) + AEZ level

LUID_country → At 200x200 km level

DATA Folder

All spatial explicit data that we have covered previously

- **Data**/2_comp_cropdata
- **Data**/3_comp_feeddata

Search for these files by selecting HRUN.

MODEL Folder

Recalc_resolution: Based on the changes you made all parameters are now on the level of a different grid.

Exercise 2: Introduce a new country as a separate region

How would we want to refer to the new group of regions that includes your region?

→ Here I say REGION38

In decl_regionset.gms

REGION38(ANYREGION)	REGION37(ANYREGION)	EthiopiaReg
REGION38_COUNTRY_MAP(ANYREGION,ALLCOUNTRY)	REGION37_COUNTRY_MAP(ANYREGION,ALLCOUNTRY)	EthiopiaReg .Ethiopia
GGI_REGION38_MAP(ANYREGION,ANYREGION)	GGI_REGION37_MAP(ANYREGION,ANYREGION)	SubSaharanAfrica .EthiopiaReg
POLESMACROREG_MAP(ALLPOLESREG,ANYREGION)		SSAFp . (CongoBasin, SouthAfrReg, SubSaharanAfr, EthiopiaReg)
POLESREG_MAP(ALLPOLESREG,ANYREGION)		SSAFp . (CongoBasin, SouthAfrReg, SubSaharanAfr, EasternAf, SouthernAf, WesternAf, EthiopiaReg)
NATGRS_ALLOWED(ANYREGION)		EthiopiaReg

Decl_regionset_newfao.gms adapted in the same way

Exercise 2: Introduce a new country as a separate region

Create new mappings where Region37 is adapted to Region38 search

Sets_region_ag.gms	REGION_AG_MAP(REGION_AG,ANYREGION)	SSA . (SouthAfrReg, CongoBasin, EasternAf, SouthernAf, WesternAf, EthiopiaReg)	SSA . (SouthAfrReg, CongoBasin, EasternAf, SouthernAf, WesternAf, EthiopiaReg)
		WLD . (SET.REGION37)	WLD . (SET.REGION38)
Sets_region_agmip.gms	REGION_AG_MAP(REGION_AG,ANYREGION)	AME .(CongoBasin, EasternAf, SouthernAf, WesternAf, SouthAfrReg, NorthernAf, MiddleEast, TurkeyReg)	AME .(CongoBasin, EasternAf, SouthernAf, WesternAf, SouthAfrReg, NorthernAf, MiddleEast, TurkeyReg, EthiopiaReg)
		WLD . (SET.REGION37)	WLD .(SET.REGION38)
Sets_region_pnas.gms	REGION_AG_MAP(REGION_AG,ANYREGION)	SubSaharanAfr .(SouthAfrReg, CongoBasin, EasternAf, SouthernAf, WesternAf)	SubSaharanAfr .(SouthAfrReg, CongoBasin, EasternAf, SouthernAf, WesternAf, EthiopiaReg)
		"World" . (SET.REGION37)	"World" . (SET.REGION38)
Sets_region_wb.gms	REGION_AG_MAP(REGION_AG,ANYREGION)	AFR .(SouthAfrReg, CongoBasin, Easternaf, Southernaf, WesternAf)	AFR .(SouthAfrReg, CongoBasin, Easternaf, Southernaf, WesternAf, EthiopiaReg)
		WLD . (SET.REGION37)	WLD . (SET.REGION38)
Data_IRRI_DEMAND_SUPPLY.gms	Demand_water_region(AnyRegion,IR_items)		EthiopiaReg .FAO_adjust

File: Sets_region_ag.gms

Exercise 2: Introduce a new country as a separate region

Then all you have to do →

Decl_Rsets.gms
$setglobal
REGION
REGION38

Some decisions to make

Is your region a NODEFOR_REGION(ANYREGION)?

Is your region a NOSUCKLER_REGION(ANYREGION)?

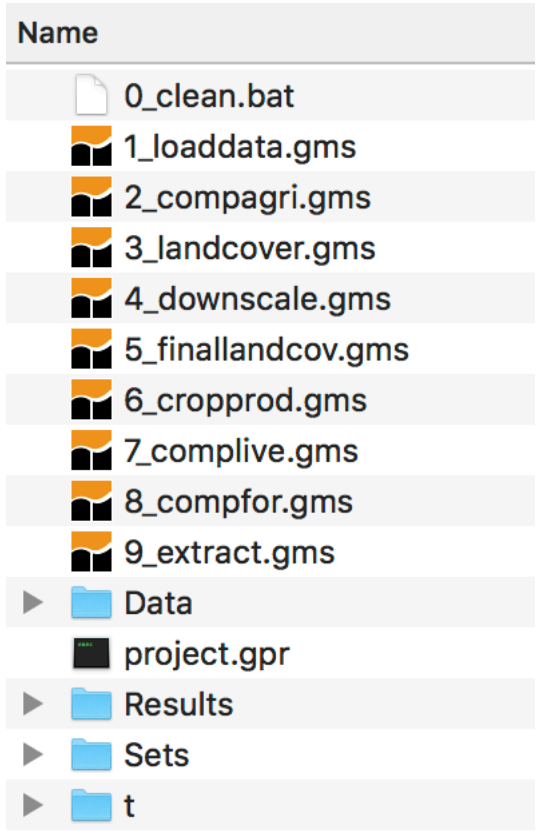
Is your region a TROPICAL_REGION(ANYREGION)?

Maybe you are missing some country-specific data.

For example:

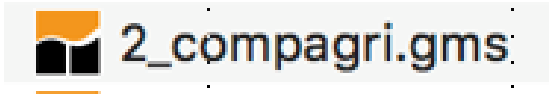
- Adjustments for the water yield for Ethiopia
- Adjustments for the forestry sector for Ethiopia

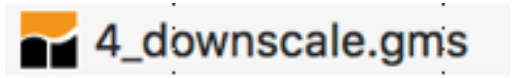
Exercise 3: Introduce a new crop and new landcover
Overview of the Agristats_proc folder



- Potentially include national agricultural statistics at sub-national level (2)_
- Potentially include alternative land cover map (3_)
- Harmonize crop statistics and cropland area given by the land cover map at simulation unit level (4_ and 5_)
- Add by-default compilation files in the Data folder which use as input the harmonized land cover map: 2_comp_cropdata (6_); 3_compfeeddata, 3 comp_livedata and 3_consgrslnd are merged into one comp_livestock file (7_); 4_compfordata, 4_consforest and 4_mai4myk are merged into one comp_forestry file (8_).
- Extract the final database (for crops, livestock and forestry parameters) for the country/region of interest into one gdx

Exercise 3: Introduce a new crop and new landcover
Overview of the Agristats_proc folder





Include crop yield, area and production

Introduce new land cover, map land cover to GLOBIOM classes

Allocate basearea and productivity by crop for the year 2000 to cropland area of the new landcover map

CrpLnd	RubAgrofor
	OtherAgrofor
	RubMono
	OtherMono
	CROPLAND
NotRel	WATER
	NoData
	SETTLEMENT
	CLOUD
PltFor	TeakPlant
	PulpPlant
	OtherTimbPlant
PltOpa	OpalMono
MngFor	LoggedFor
	LoggedSwaFor
	LoggedMang
PriFor	UndisFor
	UndisSwaFor
	UndisMang
NatLnd	Grass
	SHRUB
	OthCleared

Various approaches available using various softwares:

- Cross entropy / minimization of variation approach
- Available in R and GAMS

Basic idea is to allocate crop data by crop in such a way that the sum of the areas and production of the crops still matches with the sub-national statistics.