

Toward a time-series of global livestock data over 2000-2015

Daniele Da Re

Christoffer Axelsson

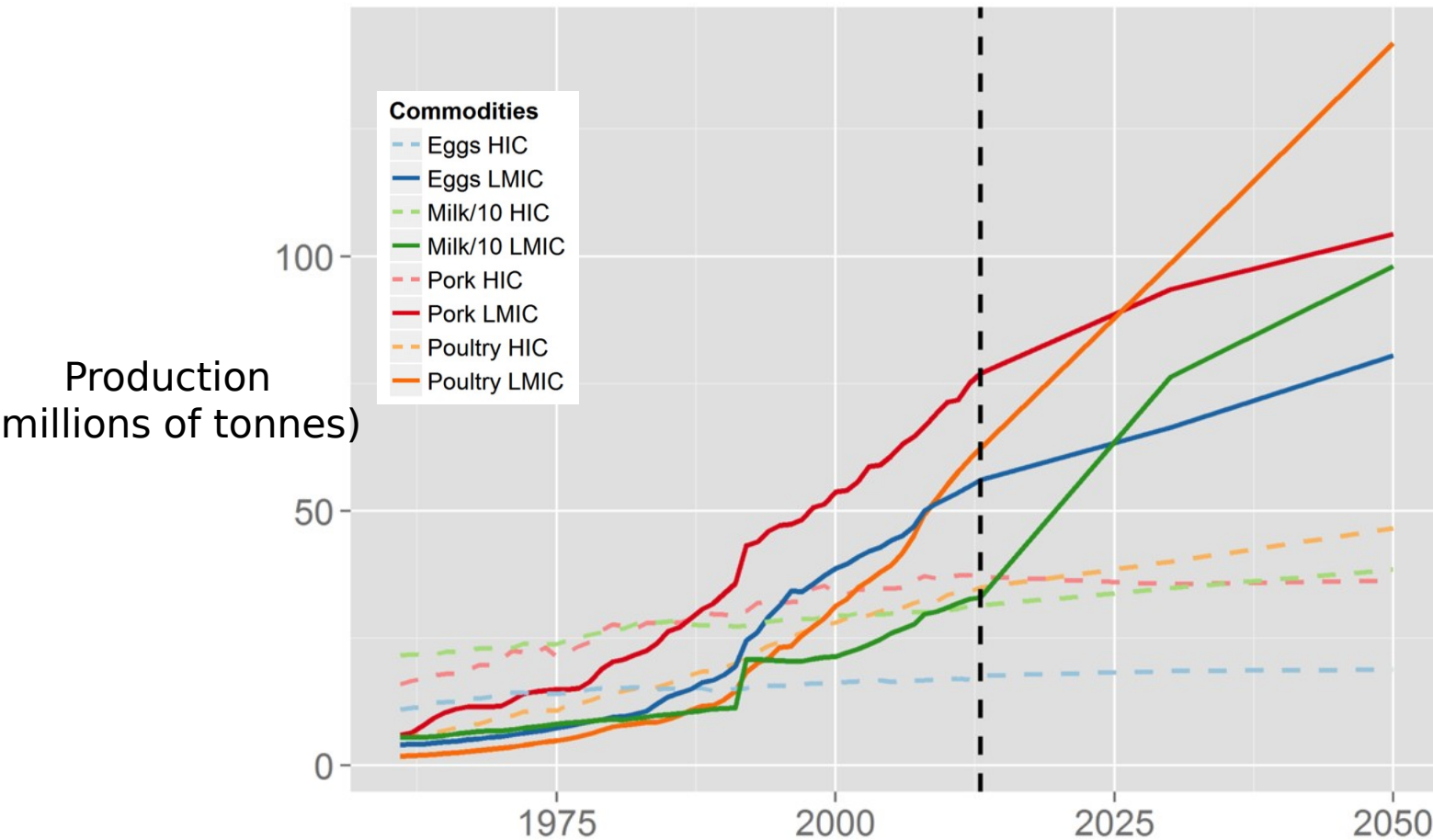
Giuseppina Cinardi

Timothy P. Robinson

Sophie Vanwambeke

Marius Gilbert

Global changes in livestock production



WorldBank 2010, FAOSTAT, Alexandratos and Bruinsma 2012

Why do we need livestock models?



Science of The Total Environment

Volume 666, 20 May 2019, Pages 1089-1105



Predicting biochemical oxygen demand in European freshwater bodies

Olga Vigiak^{a, b}  , Bruna Grizzetti^a, Angel Udias-Moinelo^a, Michela Zanni^a, Chiara Dorati^a, Fayçal Bouraoui^a, Alberto Pistocchi^a

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Why do we need livestock models?



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Volume 666, 20 May 2019, Pages 1089-1105



Predicting biochemical oxygen demand in European freshwater bodies

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ORIGINAL ARTICLE |  [Full Access](#) |

Spatial distribution and spread potential of sixteen *Leptospira* serovars in a subtropical region of Brazil

Manuel Jara, Luis E. Escobar, Rogério O. Rodrigues, Alba Frias-De-Diego, Juan Sanhueza, Gustavo Machado 

First published: 25 July 2019 | <https://doi.org/10.1111/tbed.13306>

Why do we need livestock models?

Trophic rewilding presents regionally specific opportunities for mitigating climate change



+ Tools

Sandom, Christopher J, Middleton, Owen, Lundgren, Erick, Rowan, John, Schowanek, Simon D, Svenning, Jens-Christian and Faurby, Søren (2019) *Trophic rewilding presents regionally specific opportunities for mitigating climate change*. Philosophical Transactions B: Biological Science. ISSN 0962-8436 (Accepted)

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Transboundary and Emerging Diseases



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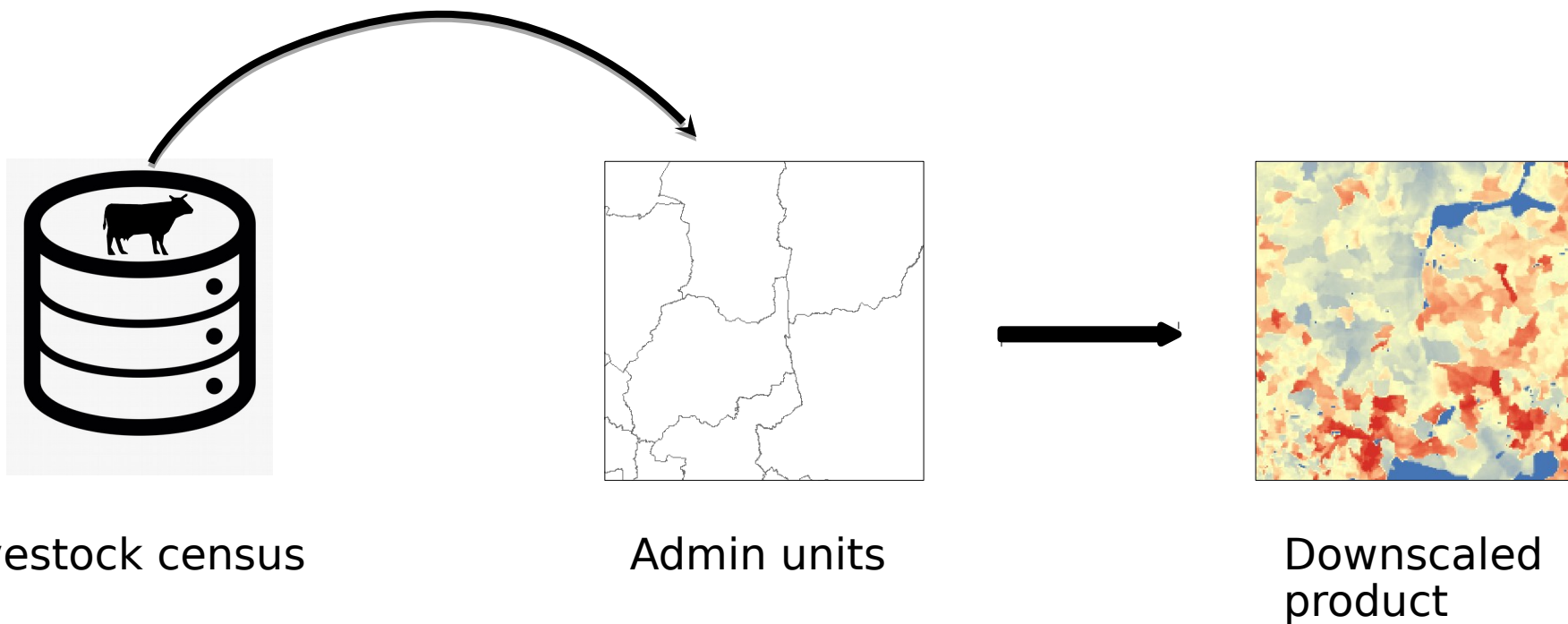
Spatial distribution and spread potential of sixteen *Leptospira* serovars in a subtropical region of Brazil

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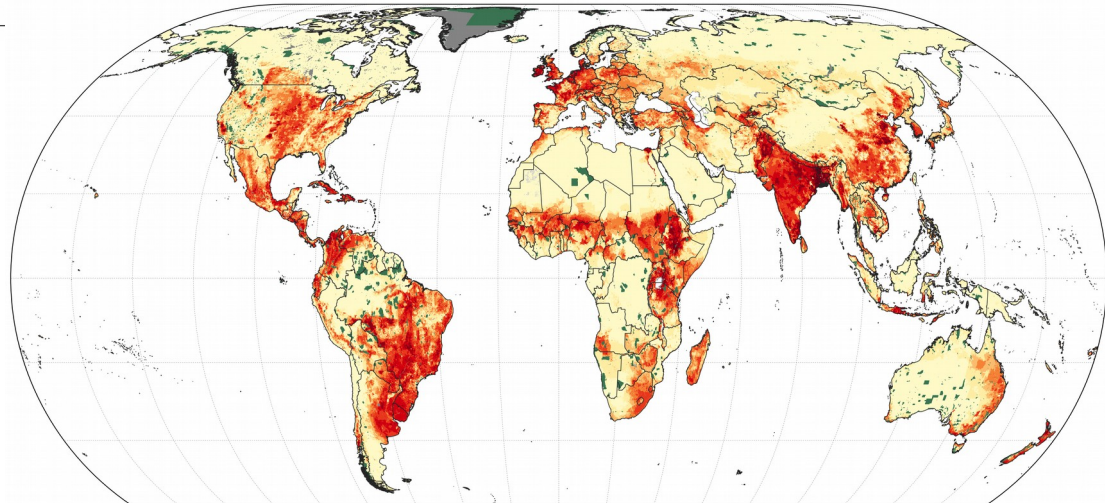
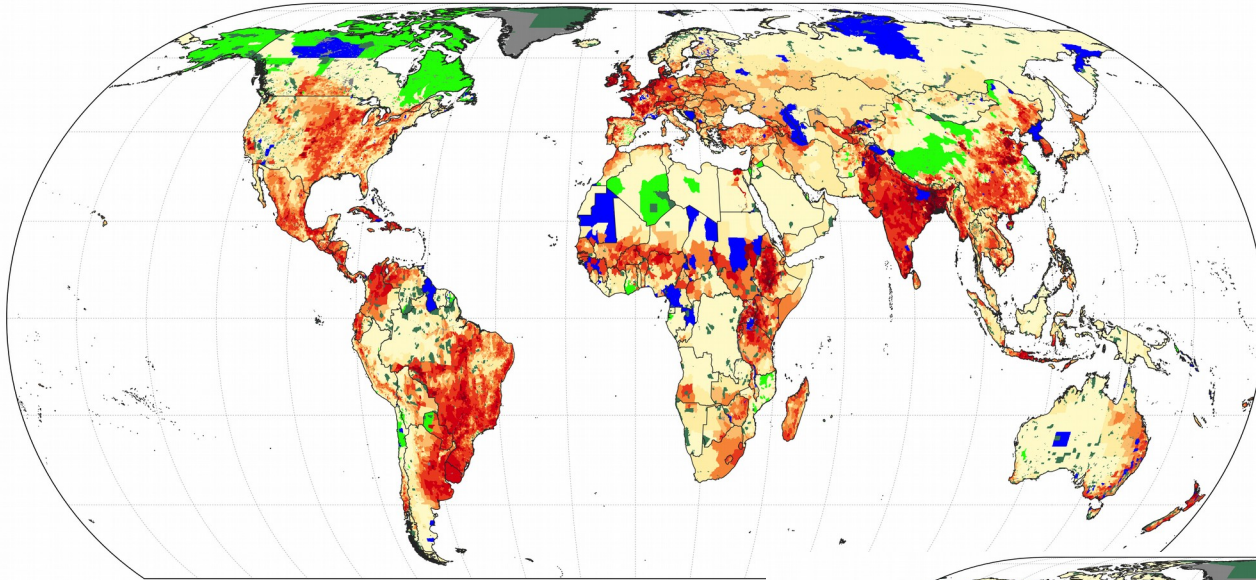
Gridded Livestock World (GLW)

Rationale

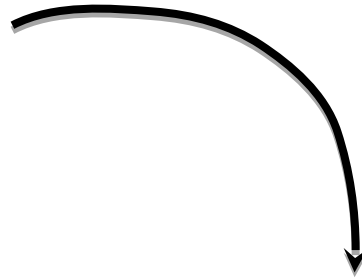
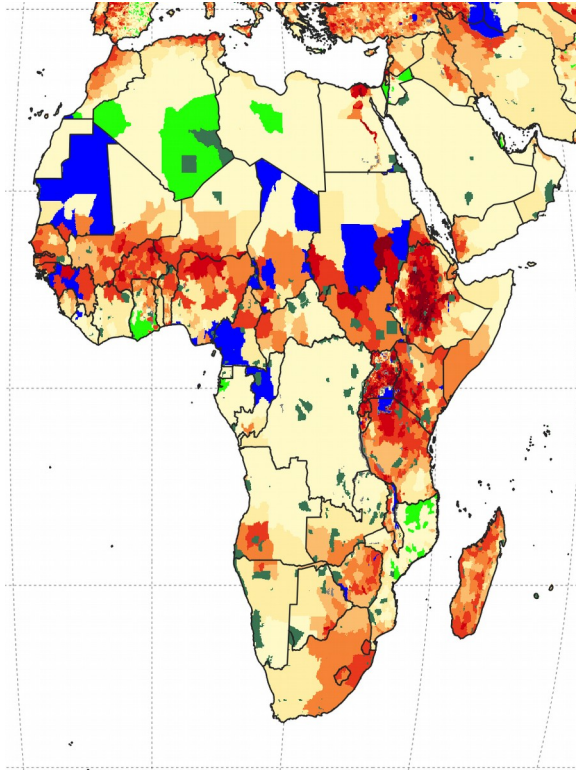


GLW3

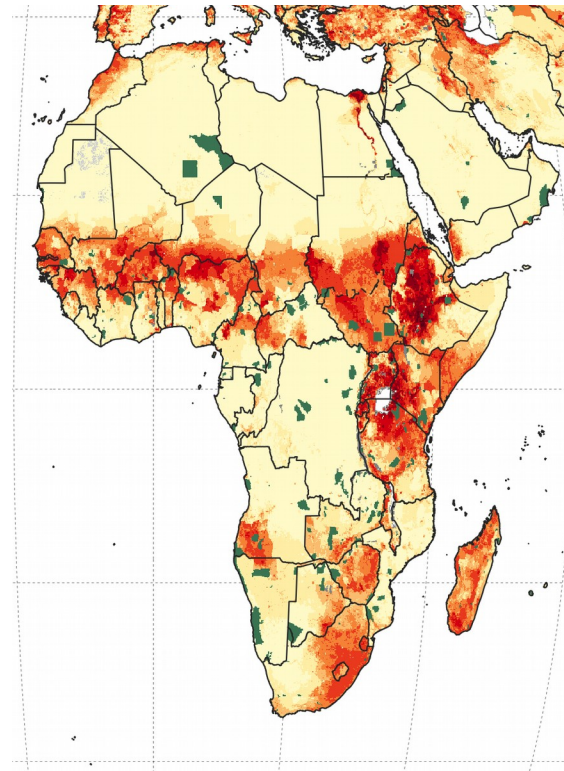
Downscale census data at the pixel level of 10k



Training polygons



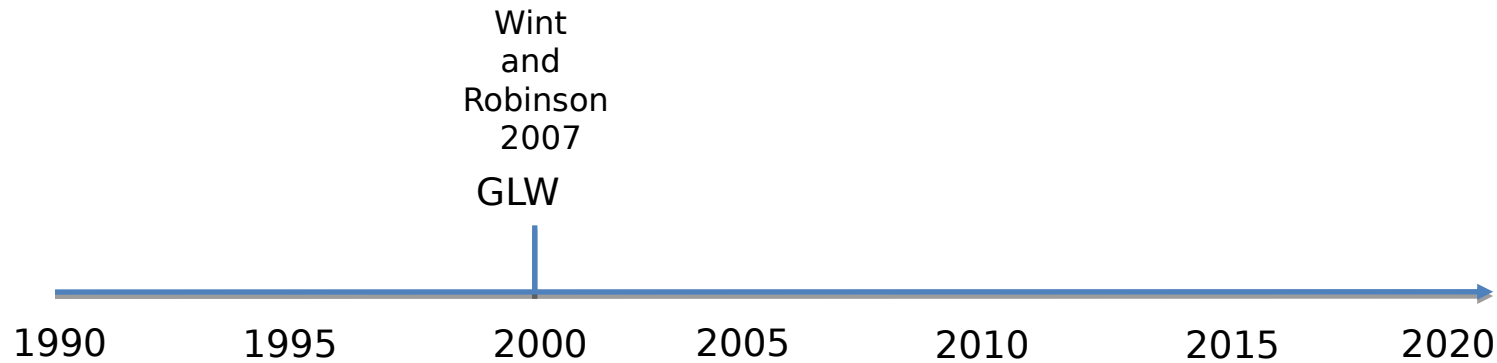
Downscaled raster product



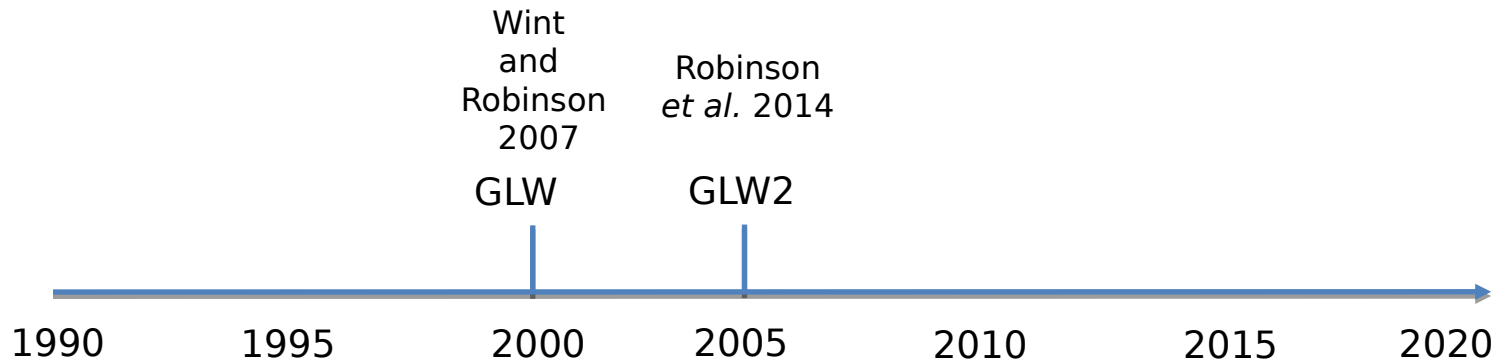
Several GLW version
but without temporal continuity



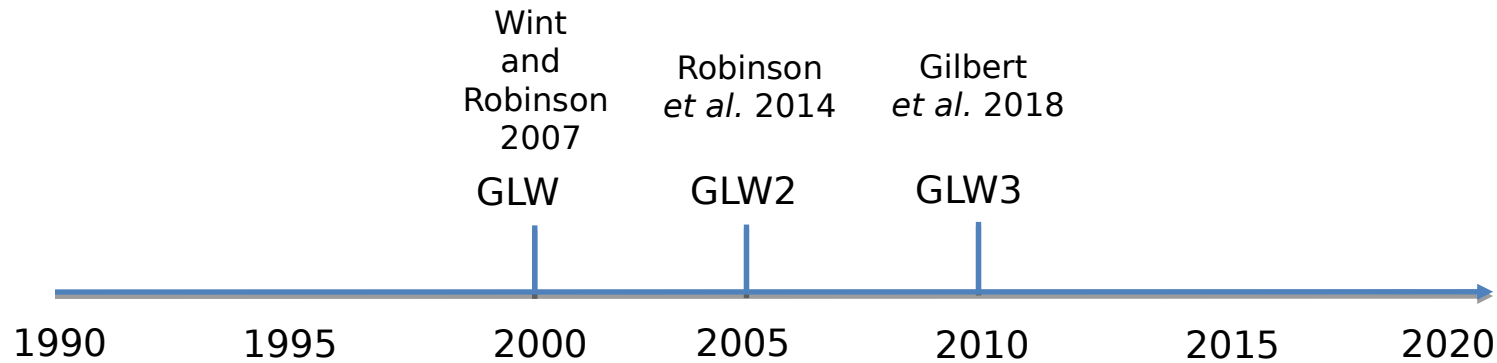
Several GLW version but without temporal continuity



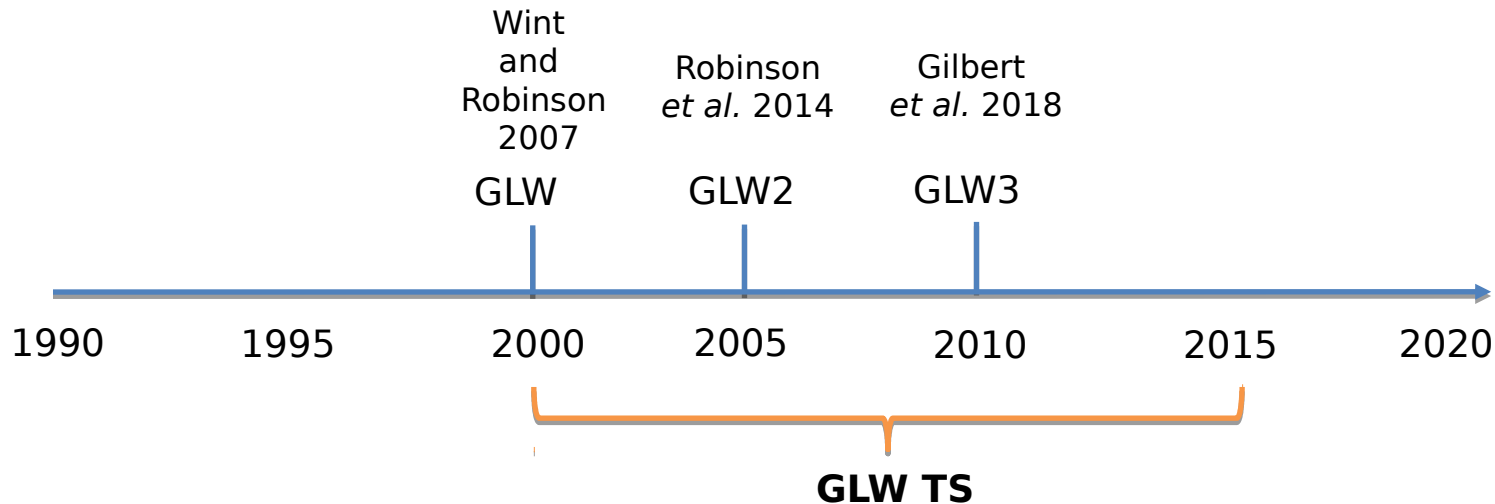
Several GLW version but without temporal continuity



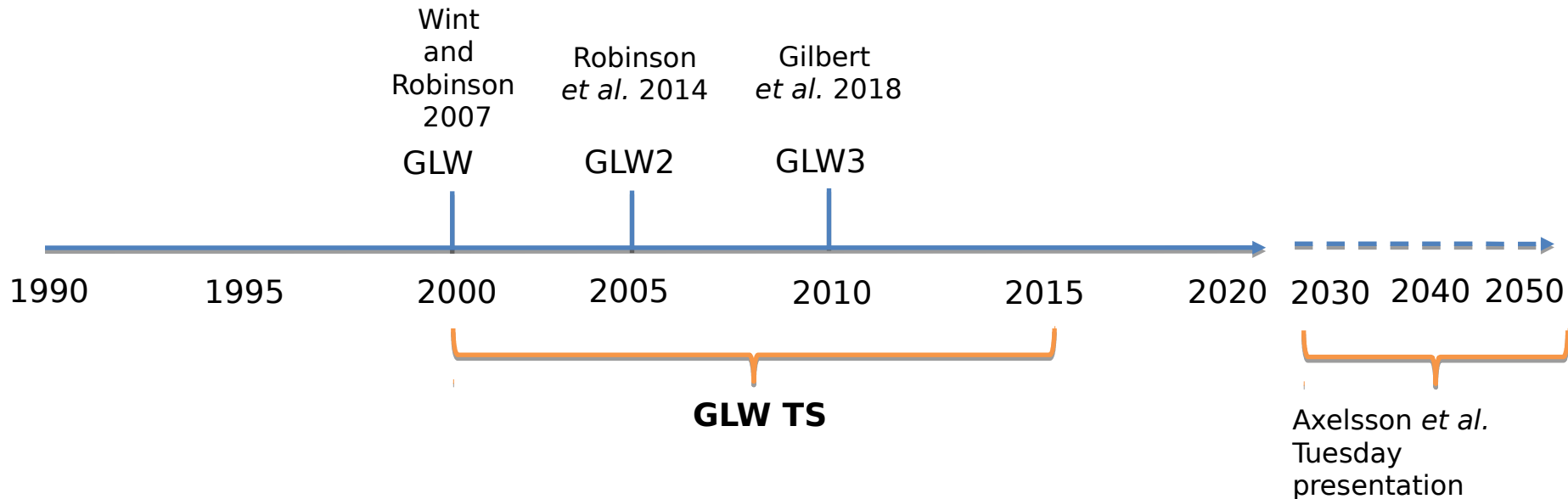
Several GLW version but without temporal continuity



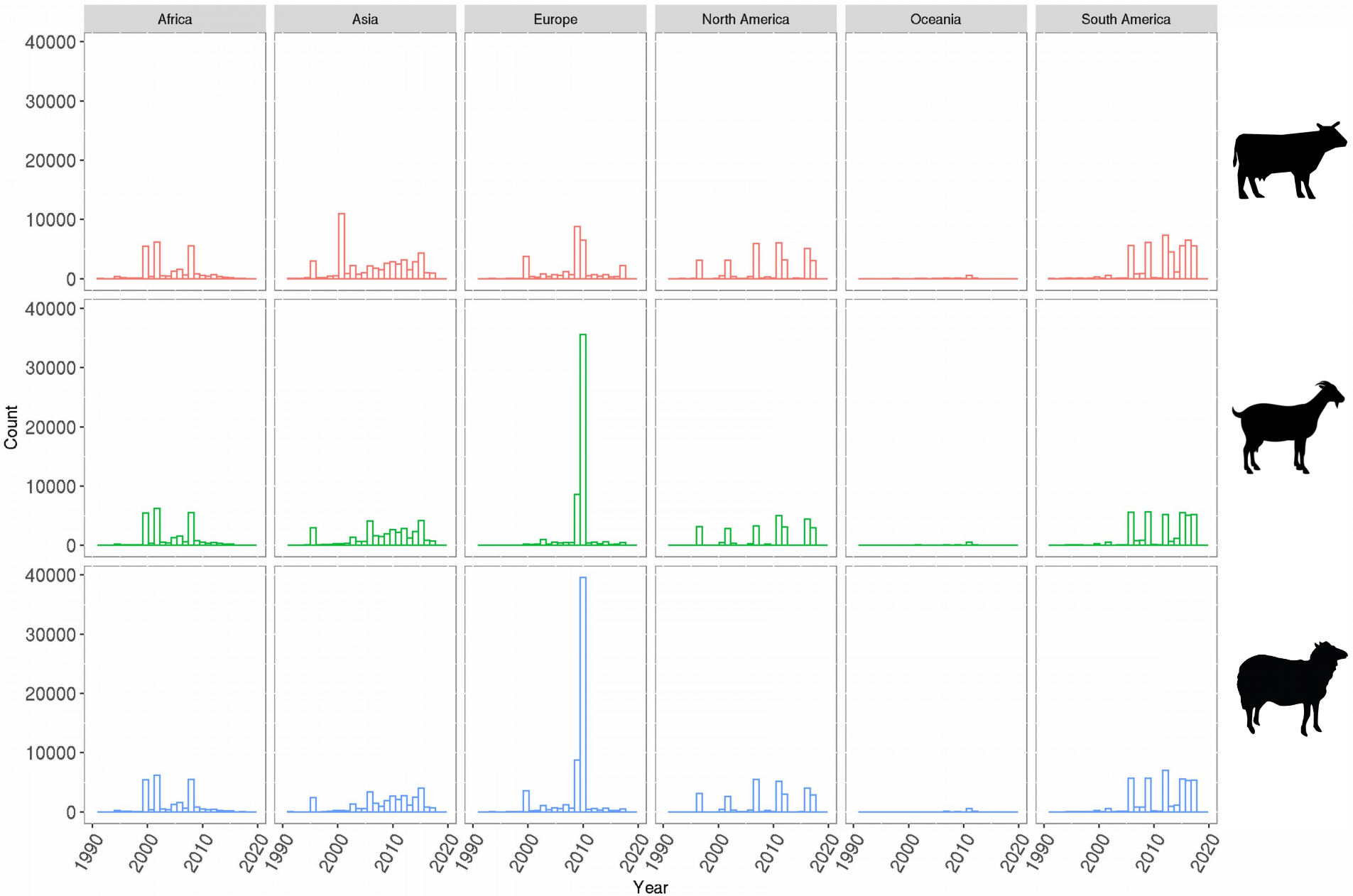
Several GLW version but without temporal continuity



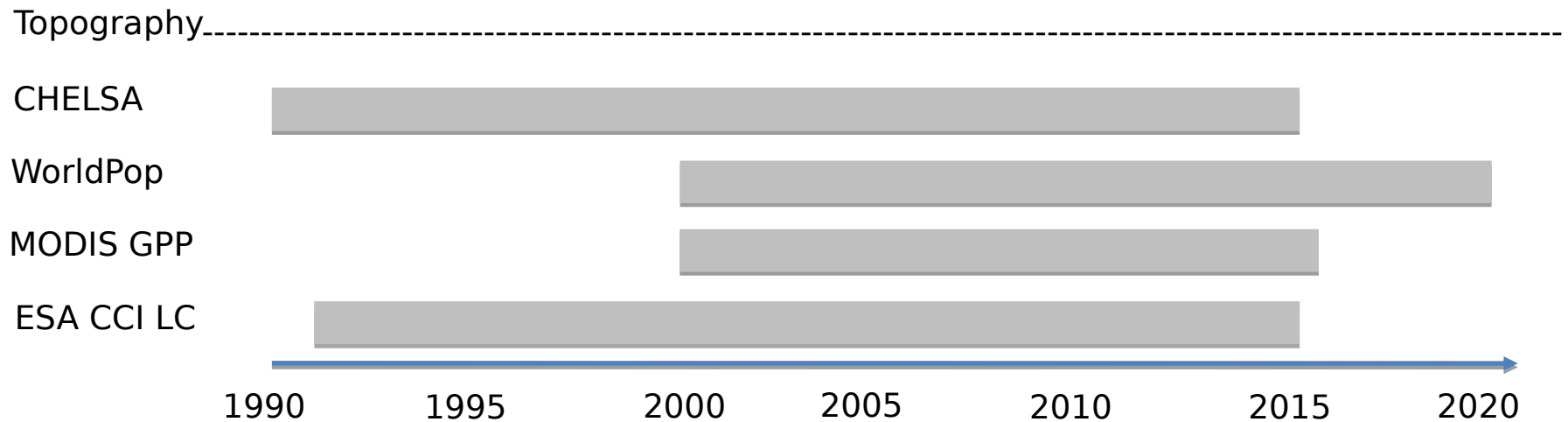
Several GLW version but without temporal continuity



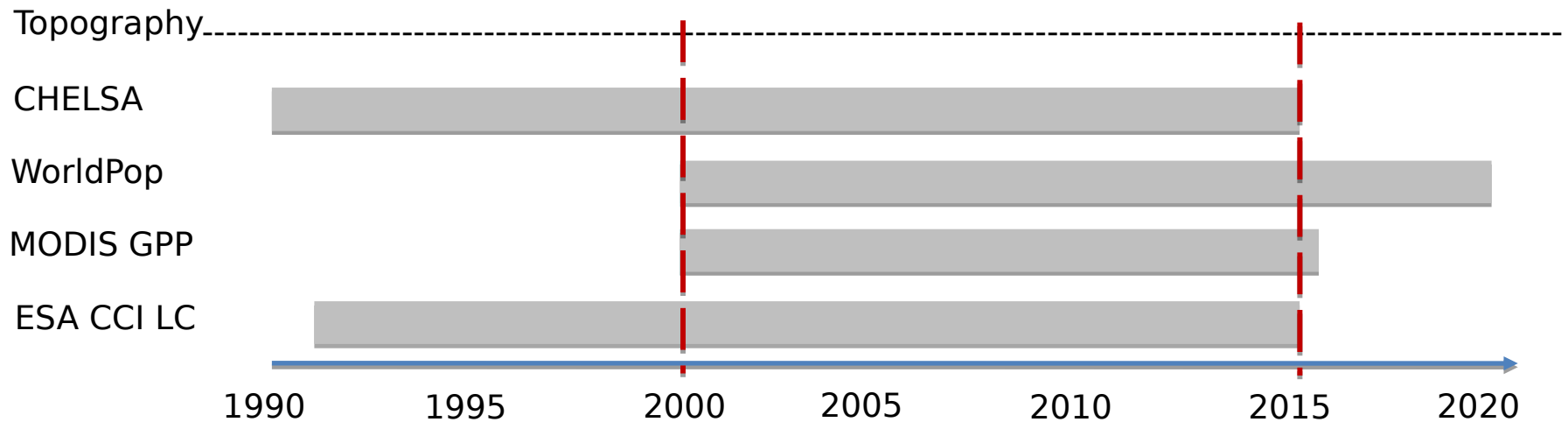
Livestock census abundance increases from 2000



Nowadays several spatio-temporal environmental variables are available



Nowadays several spatio-temporal environmental variables are available



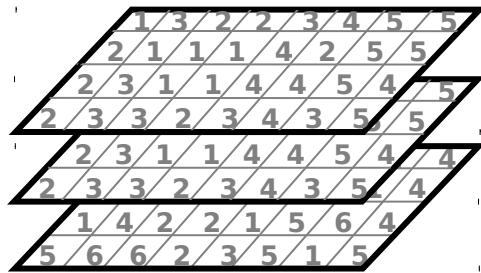
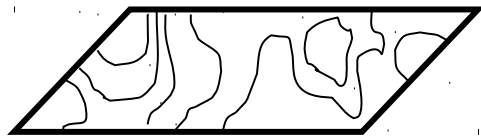
Spatio-temporal Random Forest model



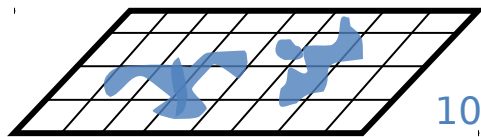
2000 $\Longrightarrow$ **2015**



DOWNSCALING METHOD

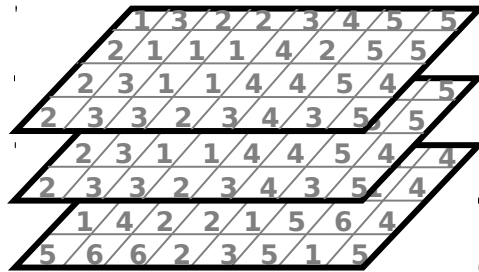
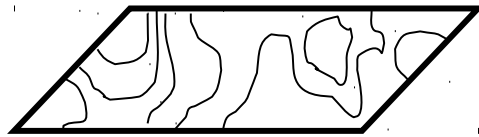


Random
forest

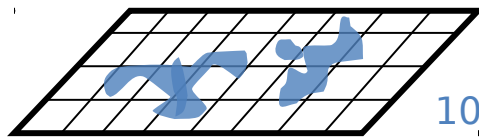


10km pixel

DOWNSCALING METHOD



Random
forest

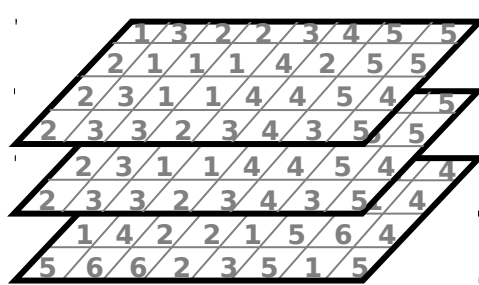
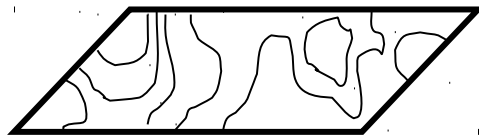


10km pixel

Number of animals
per administrative unit
for each year



DOWNSCALING METHOD



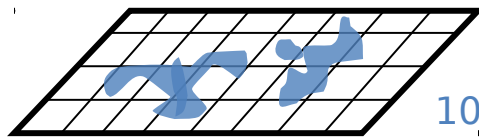
Spatial predictors

Human population,
topography,
Land cover,
Climate,
GPP

Number of animals
per administrative unit
for each year

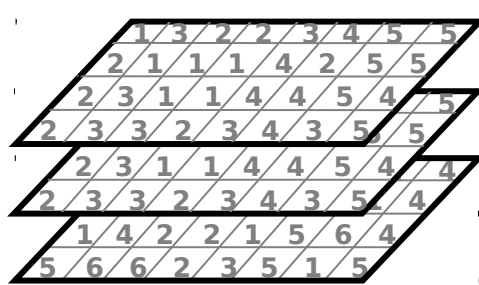
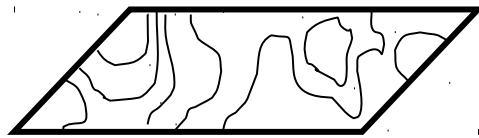


Random
forest



10km pixel

DOWNSCALING METHOD



Spatial predictors

Human population,
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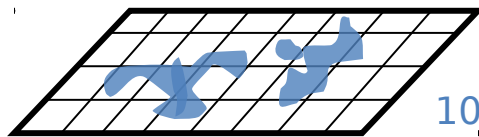
Number of animals
per administrative unit
for each year



for each year

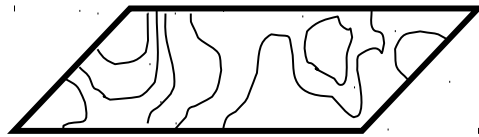


Random
forest

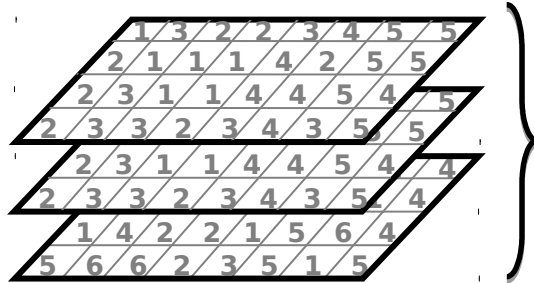


10km pixel

DOWNSCALING METHOD



Number of animals
per administrative unit
for each year



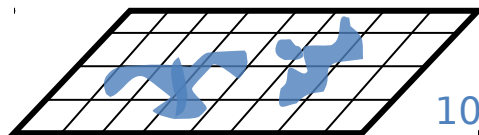
Spatial predictors

Human population,
topography,
Land cover,
Climate,
GPP

for each year



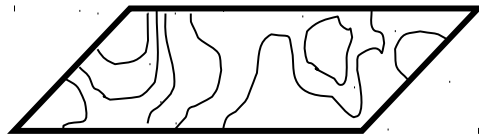
Random
forest



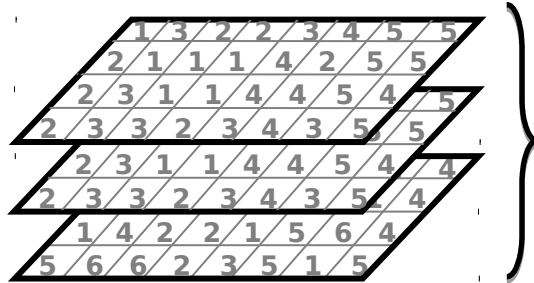
10km pixel

Number of animals
pixel

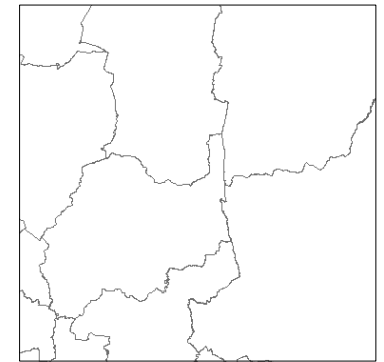
DOWNSCALING METHOD



Number of animals
per administrative unit
for each year

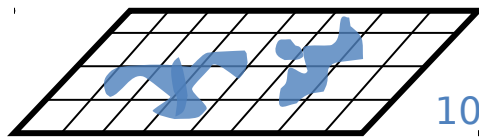


Spatial predictors Human population,
topography,
Land cover,
Climate,
GPP



for each year

Random
forest

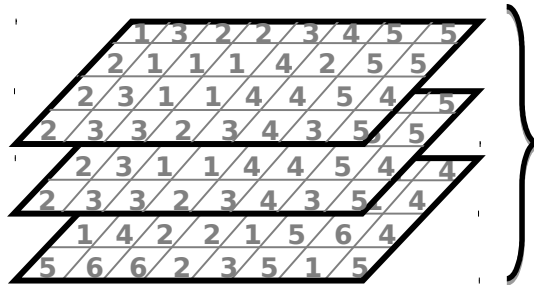
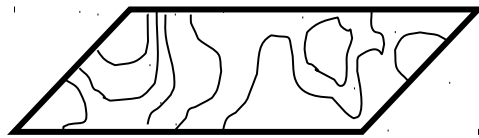


10km pixel

Number of animals
pixel

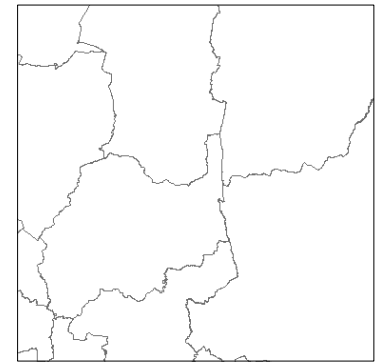
Correction of the
predictions based on
FAOSTAT

DOWNSCALING METHOD



Spatial predictors

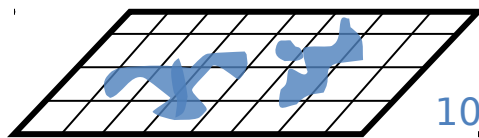
Human population,
topography,
Land cover,
Climate,
GPP



Number of animals
per administrative unit
for each year

for each year

Random
forest



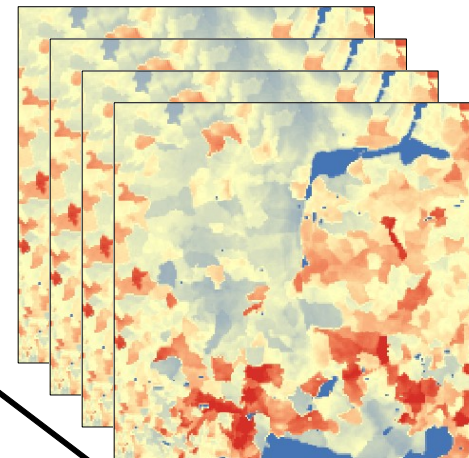
10km pixel

Number of animals
pixel

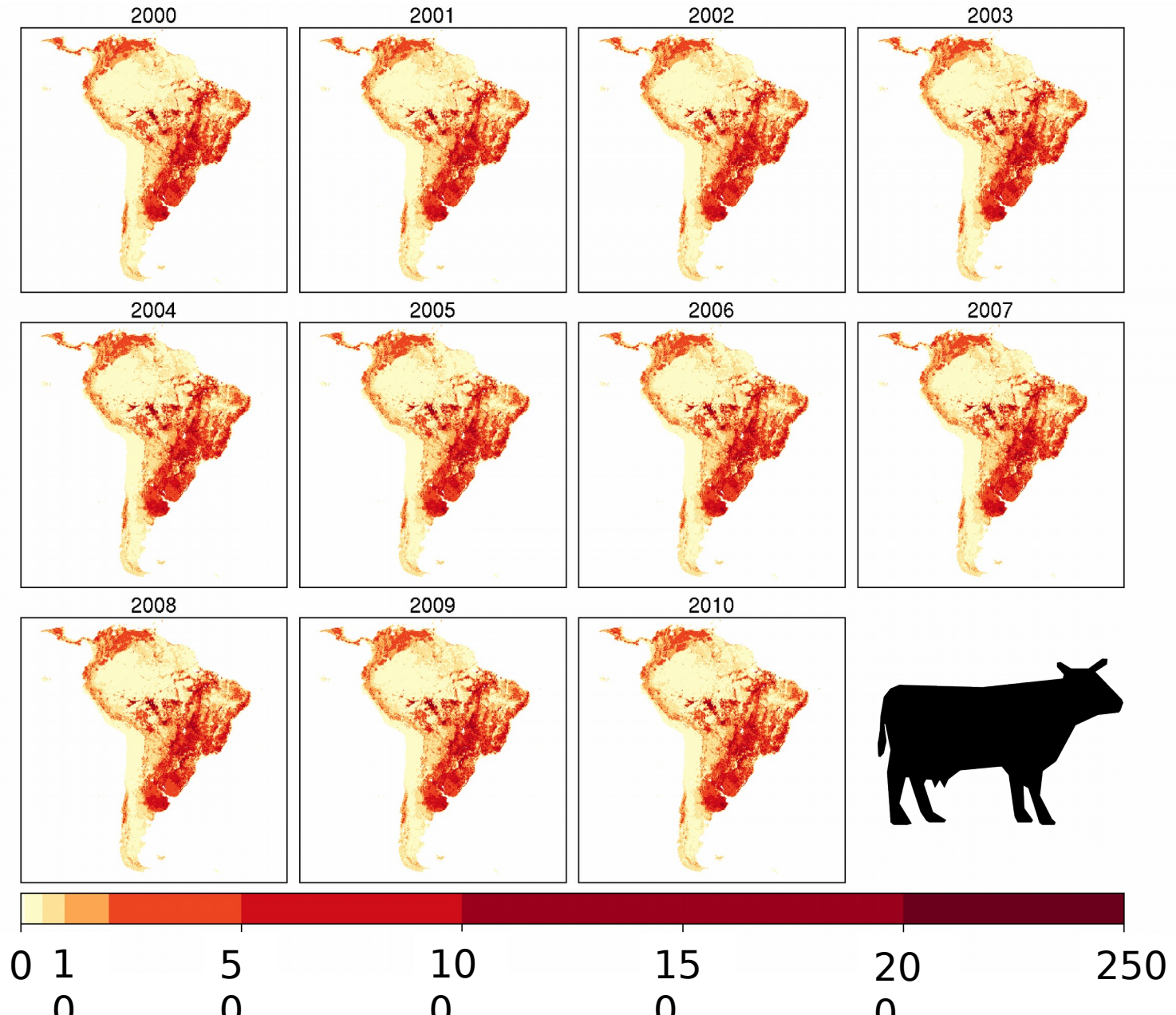
Correction of the
predictions based on
FAOSTAT

Final product

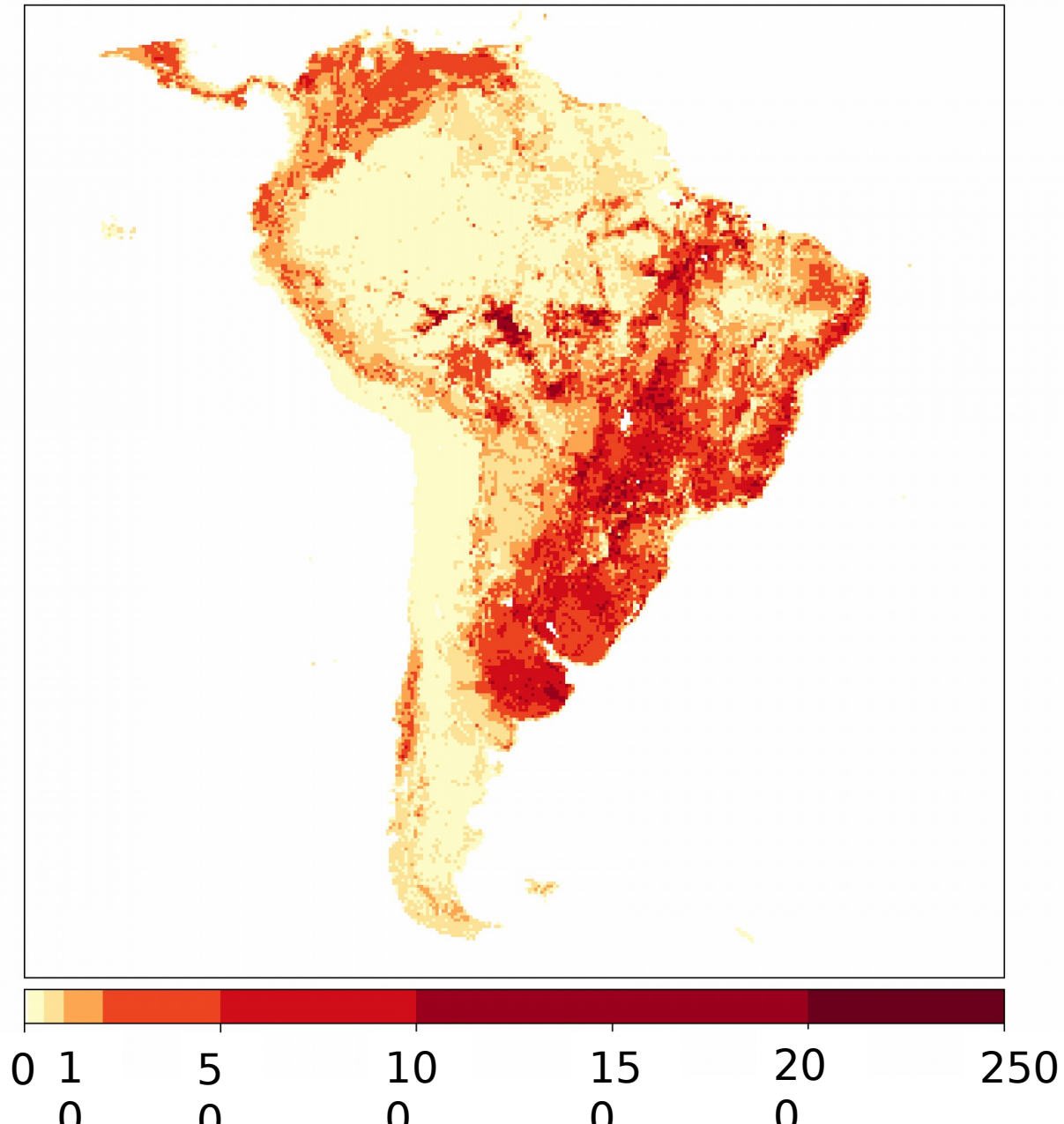
Time



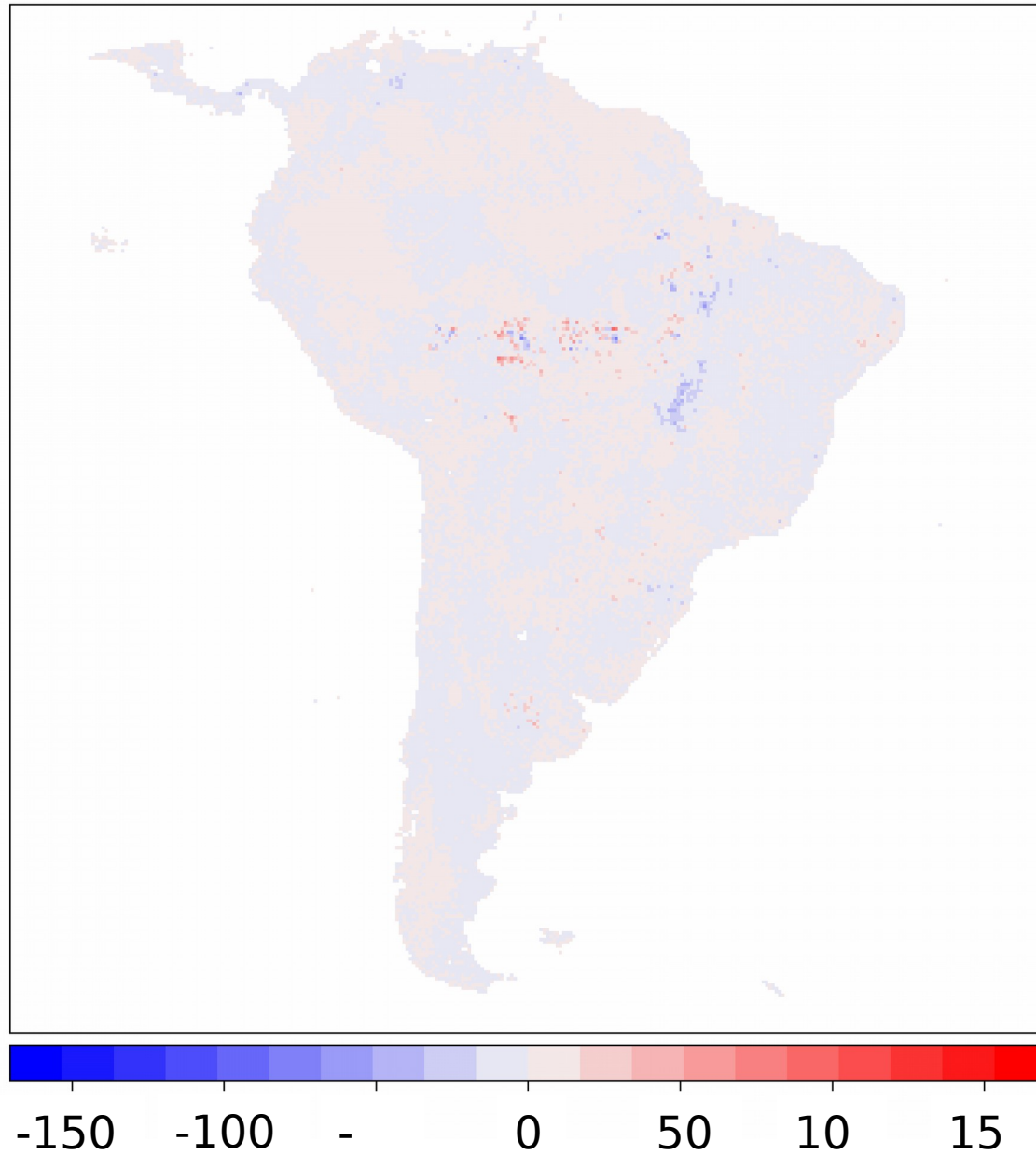
Cattle mean density by year



Cattle mean density over 2000-2010



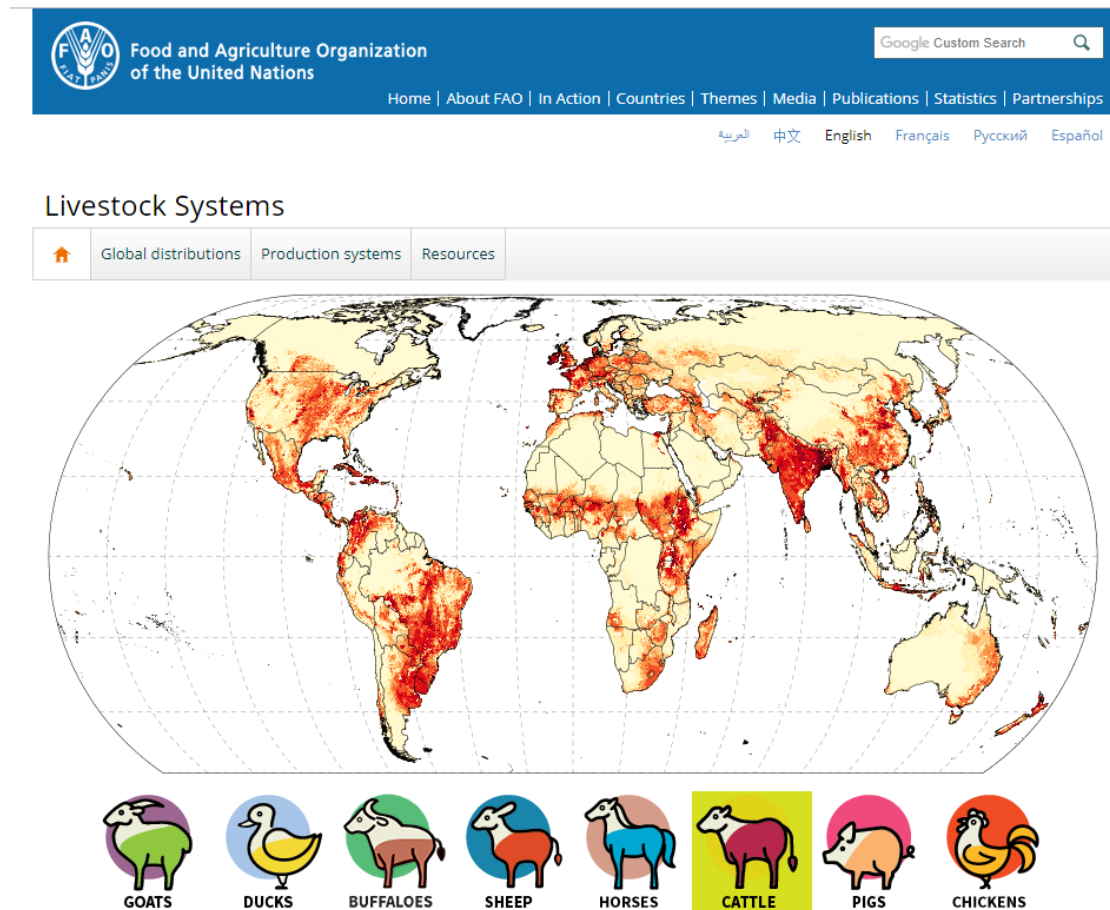
Cattle mean density 2010-2000 difference



Roadmap & dissemination

Manuscript submission: end of 2019

FAO website <http://www.fao.org/livestock-systems/en/>



Repository: Harvard Dataverse

<https://dataverse.harvard.edu/dataverse/gld>

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Gridded Livestock Data (GLD) (Université Libre de Bruxelles / Food and Agriculture Organization (FAO))

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Agricultural Sciences (3)

Publication Year: 2018 ✕ Dataverse Category: Research Project ✕

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Global Livestock Production Systems (GLPS) (Université Libre de Bruxelles / Food and Agriculture Organization (FAO))
Sep 21, 2018
This dataverse contains peer-reviewed spatial datasets on livestock production systems for applications in development, environment and health. All datasets are licensed through a Creative Commons Attribution 4.0 International License.



Gridded Livestock of the World – Latest – 2010 (GLW 3) (Université Libre de Bruxelles / Food and Agriculture Organization (FAO))
Aug 23, 2018 **Gridded Livestock of the World (GLW)**
This dataverse contains peer-reviewed spatial dataset on livestock distribution for applications in development, environment and health. It contains the most up to date version of GLW 3 for the reference year 2010 and the following species: cattle, sheep, goats, buffaloes, horses...



Gridded Livestock of the World (GLW) (Université Libre de Bruxelles / Food and Agriculture Organization (FAO))
Aug 23, 2018
This dataverse contains peer-reviewed spatial dataset on livestock distribution for applications in development, environment and health. It contains the most up to date version of GLW 3, as well as previous GLW versions (1 & 2). All datasets are licensed through a Creative Commons...

Future perspectives

- Include socio-economic predictors

Future perspectives

- Include socio-economic predictors
- Include monogastric species

Future perspectives

- Include socio-economic predictors
- Include monogastric species
- Add 1990-2000 and 2015-2020 time span

Thank you

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Christoffer Axelsson

Giuseppina Cinardi

Timothy P. Robinson

Sophie Vanwambeke

Marius Gilbert