Goal and products of PAGES LandCover6k
2018-2020
Past Global Land Cover and Land Use for Climate Modelling

Marie-José Gaillard, Linnaeus University, Kalmar, Sweden
Andria Dawson, Ralph Fyfe, Esther Githumbi, Emily Hammer, Sandy Harrison, Furong Li, Marco Madella, Kathleen D. Morrison, Benjamin Stocker, Marc Vander Linden, Nicki J. Whitehouse
Note the difference in open land!

AD 1 ca. 2000 BP
Early Iron Age

Kaplan et al. (2009)
standard scenario

Klein Goldewijk et al. (2010)
HYDE 3.1

Olofsson & Hickler (2008)

Needs improvements!!!

Fraction of grid cell under woodland/forest

Review in Gaillard et al. (2010)
Clim Past 6
Example from LandClim I: Strandberg et al. 2014, Clim Past
WINTER and SUMMER TEMPERATURES – 200 BP (1750 CE)

Potential vegetation

+ anthropogenic vegetation

HYDE

KK

WINTER

SUMMER
Started in February 2015
http://pastglobalchanges.org/landcover6k

First period 2015-2017; re-endorsed for second period 2018-2020

- 5 large regions with their coordinators
- 4 main activities:
  - 1. pollen-based land-cover reconstructions (REVEALS)=”land-cover”
  - 2. History/archaeology-based land-use reconstructions=”land use”
  - 3. Anthropogenic land-cover change (ALCC) modelling
  - 4. Co-design of climate and carbon cycle modelling experiments

Marie-José Gaillard et al. - EGU 2020 BG 3.32
LandCover6k strategy
modified from Harrison et al., GMD
https://doi.org/10.5194/gmd-13-805-2020

Archaeology-based LAND USE MAPS LOOK-UP TABLES
- per-capita land-use
- Type of grazing animals
- Date of first arrival of agriculture
- Population data (14C – based)
- Etc.

EMPIRICAL LAND COVER AND LAND USE DATA

Pollen-based REVEALS LAND COVER

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Pollen-based REVEALS LAND COVER

CLIMATE EARTH-S MODELS Experiments

Kaplan’s KK/ALVAR scenarios

Hyde LAND-USE Database

BioGeoChem. BCG MODELS Experiments

VEGETATION MODELS

5

CO2

EMP. CO2

4

Simulated CLIMATE

5

5

CO2

8

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1-5: LandCover6k major regions

1-5: LandCover6k major regions

Single – many RPP study(ies)

REVEALS-based land-cover - gridded

Single sites-few sites
New REVEALS reconstruction Europe

LandClim II: Example: Cereal type

Trondman et al. 2015

Githumbi, Fyfe et al. in prep.

Marie-José Gaillard - MERGE Fall meeting 27-28 Nov 2019

TRANSIENT RECONSTRUCTIONS FROM 11.7 k until today:
0-100, 100-350, 350-700, and 500 yrs time windows from 700 BP:
700-1200, 1200-1700, 1700-2200, etc...

doi: 10.1111/gcb.12737

light green: \( \leq 1.5\% \)

intermediate green: \(1.5\% - 5\%\)

dark green: \(> 5\%\)
Collaboration with Chinese scientists (STINT)
Relative pollen productivities in China 2015-2019

doi: 10.3389/fpls.2018.01214
Cover of the gridded REVEALS reconstruction in China

Li et al.
soon to be submitted
in ESSD

Li et al. 2020
First REVEALS reconstruction in China, non-gridded
https://doi.org/10.1016/j.earscirev.2020.103119
Largest synthesis of REVEALS estimates so far

Northern Hemisphere $\geq 40^\circ$ N
Open land 100-350 cal BP (AD 1600-1850)

Dawson et al. 2018  https://doi.org/10.22498/pages.26.1.34

PAGES Magazine

Northern China
Archaeology-based
LAND USE MAPS & LOOK-UP TABLES
Publication in progress

- **Global land-use categorisation**
- Short publication
doi.org/10.22498/pages.26.1.8
- Full publ. soon submitted
- **Land-use maps + database**
- **per-capita land use**
- Type of grazing animals and crops
- Date of first arrival of agriculture
- Etc.
PLANS AHEAD

– publication of LandCover6k results (2020-2022);
– LC6k land cover and land use ”products” Open Access (archived in PANGAEA)
– Use LandCover6k products following the published protocol, Harrison et al. (from 2020) – use of the results in IPCC reports
– proposal of new PAGES working group (two phases: 2021-2026)