

# What is GOFC-GOLD?

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- GOFC-GOLD is a coordinated international effort:
  - to ensure a continuous program of space-based and on-the-ground forest and land cover observations for global monitoring of terrestrial resources and the study of global change.
- A technical panel of the Global Terrestrial Observing System (GTOS)
- A network of participants implementing coordinated research, demonstration and operational projects
- A vision to share data, information and knowledge, leading to informed action and decision support
- A long term process of building an improved match between Observations, Data Products and User Needs
- GOFC-GOLD operates through:
  - Executive committee, Science and technical board
  - Implementation teams and 3 project offices (CA, US, Germany)
  - Dedicated working groups (i.e. on REDD, GEO etc.)
  - 6 Regional networks

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# Land Cover Team Current Activities

UNFCCC ECV Standards

REDD Sourcebook

Decadal Survey and CEOS LSI Constellation

GEO Land Cover Task

Global Validation/Best Map Effort

FAO FRA Activities

Support for Regional Networks

“Best Practices” for Land Cover Change and Area Estimation

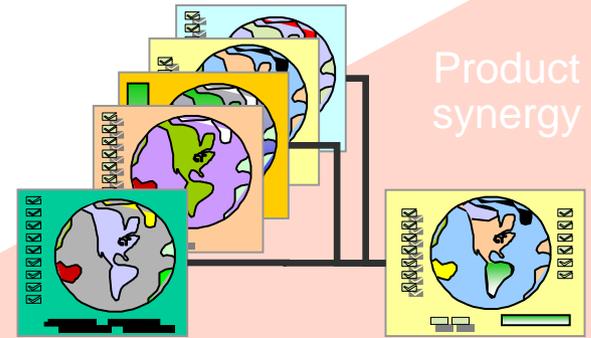
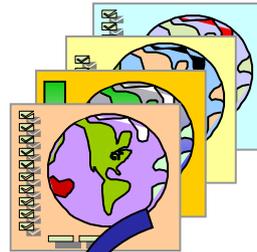
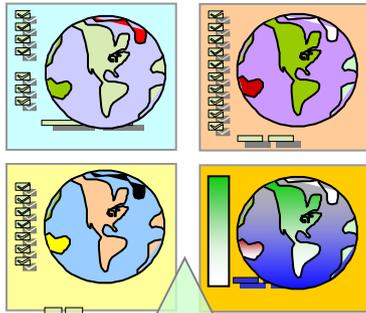
# Operational Ic validation framework

Existing global  
LC products

Comparative  
validation

Updated  
valid./change

Validation of  
new products



Product  
synergy

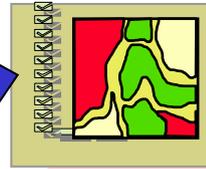
Data reprocessing

global

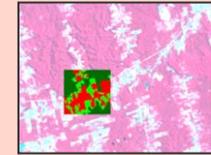
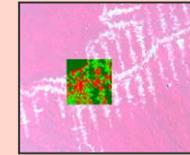
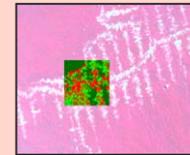
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Legend translations

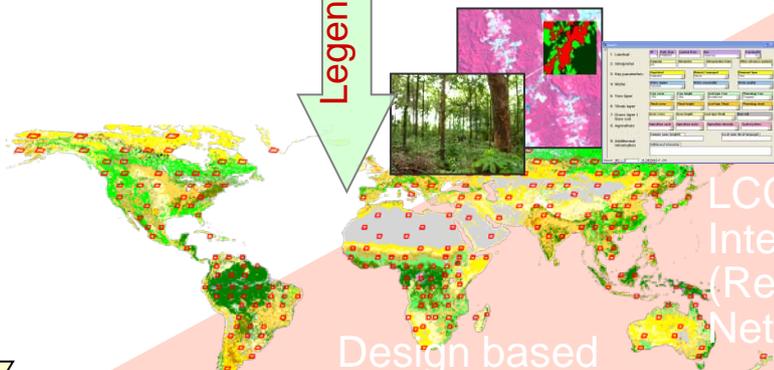
Link to  
regional datasets



Updated interpretations



Reference database:  
statistically robust, consistent, harmonized  
updated, and accessible



Design based  
sample of reference sites

LCSS-based  
Interpretation  
(Regional  
Networks)

**GOFC-GOLD**

# Accuracy Assessment of Global Land Cover Products

J. Pontus Olofsson and Curtis E. Woodcock;  
Mark A. Friedl, Damien Sulla-Menashe,  
Jared D. Newell and Adam M. Sibley

*Dept of of Geography and Environment, Boston University  
675 Commonwealth Avenue, Boston, MA 02215, USA*

Steve V. Stehman

*Dept of Forest and Natural Resources Management, State University of New York  
1 Forestry Drive, Syracuse, NY 13210, USA*

Martin Herold

*Dept of Geography, Friedrich Schiller University  
Loebdergraben 32, 07743 Jena, Germany*

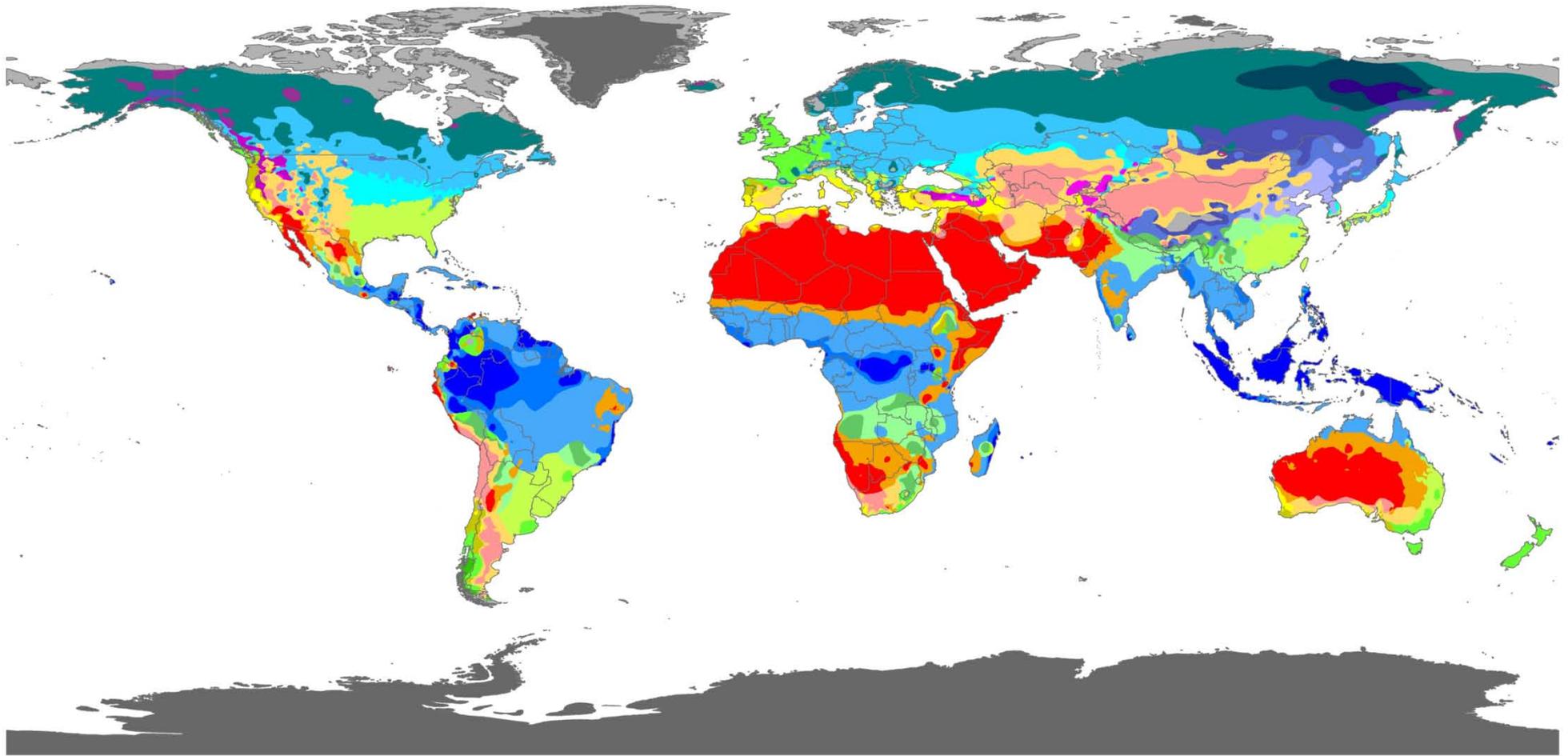
Corresponding author: [olofsson@bu.edu](mailto:olofsson@bu.edu)  
Research funded by NASA



# Sampling Design

- Random, stratified, global sampling
- Continents and national boundaries not taken into account
- Must be independent of land cover (LC) products
  - strata can not be based on any LC product
- Strata based on the Koppen Climate System, population density and land/water proportion
- 500 10X10 km (5x5?) blocks sampled globally

# World map of Köppen-Geiger climate classification



 Af	 BWh	 Csa	 Cwa	 Cfa	 Dsa	 Dwa	 Dfa	 ET
 Am	 BWk	 Csb	 Cwb	 Cfb	 Dsb	 Dwb	 Dfb	 EF
 Aw	 BSh	 Cwc	 Cfc	 Dsc	 Dwc	 Dfc		
 BSk				 Dsd	 Dwd	 Dfd		

**DATA SOURCE :** GHCN v2.0 station data  
Temperature (N = 4,844) and  
Precipitation (N = 12,396)

**PERIOD OF RECORD :** All available

**MIN LENGTH :** ≥30 for each month.

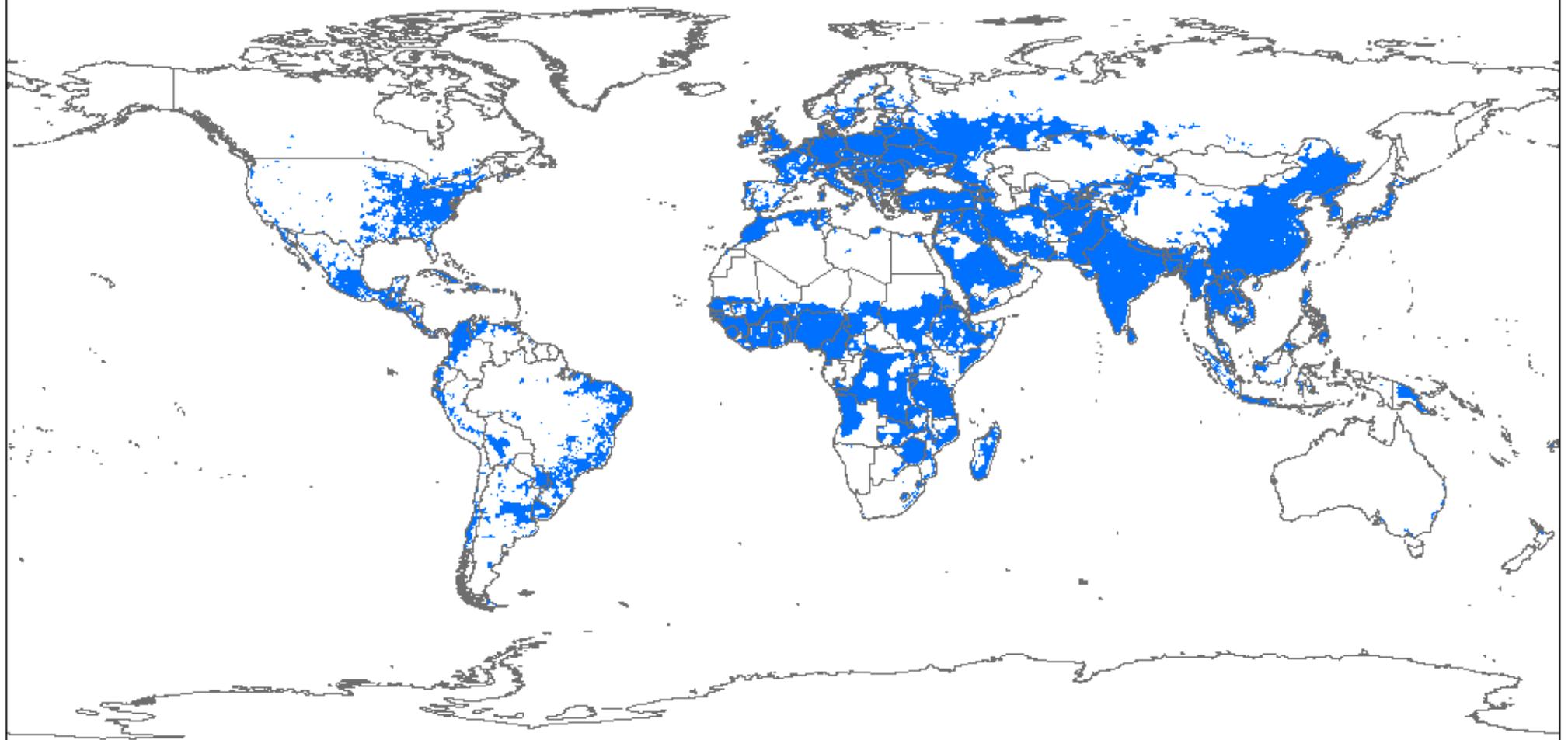
**RESOLUTION :** 0.1 degree lat/long

**Contact :** Murray C. Peel (mpeel@unimelb.edu.au) for further information



THE UNIVERSITY OF  
MELBOURNE

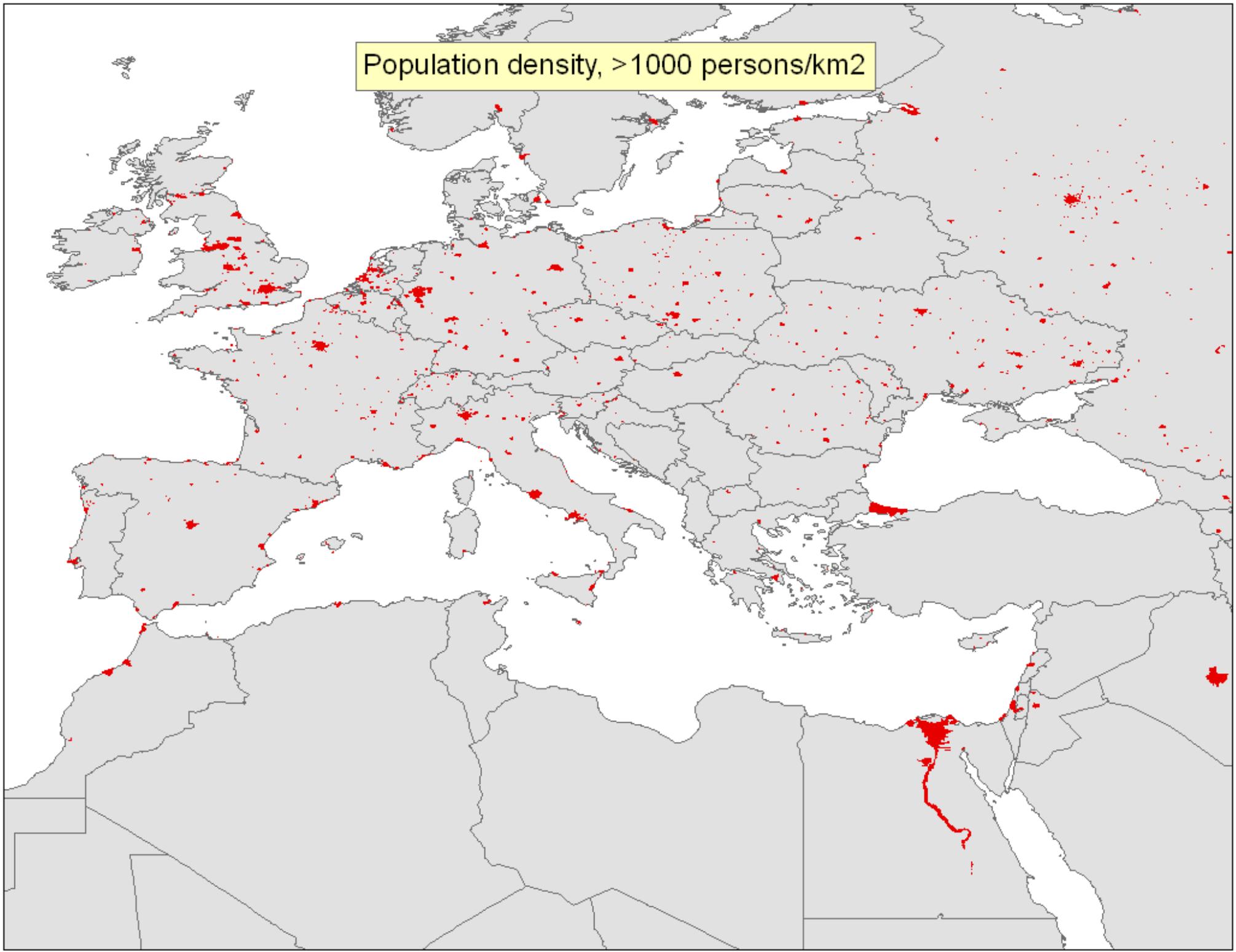
## Population density, >5 persons/km<sup>2</sup>



Center for International Earth Science Information Network (CIESIN), Columbia University; and Centro Internacional de Agricultura Tropical (CIAT) 2005. Gridded Population of the World Version 3 (GPWv3): Population Density Grids. Palisades, NY: Socioeconomic Data and Applications Center (SEDAC), Columbia University.

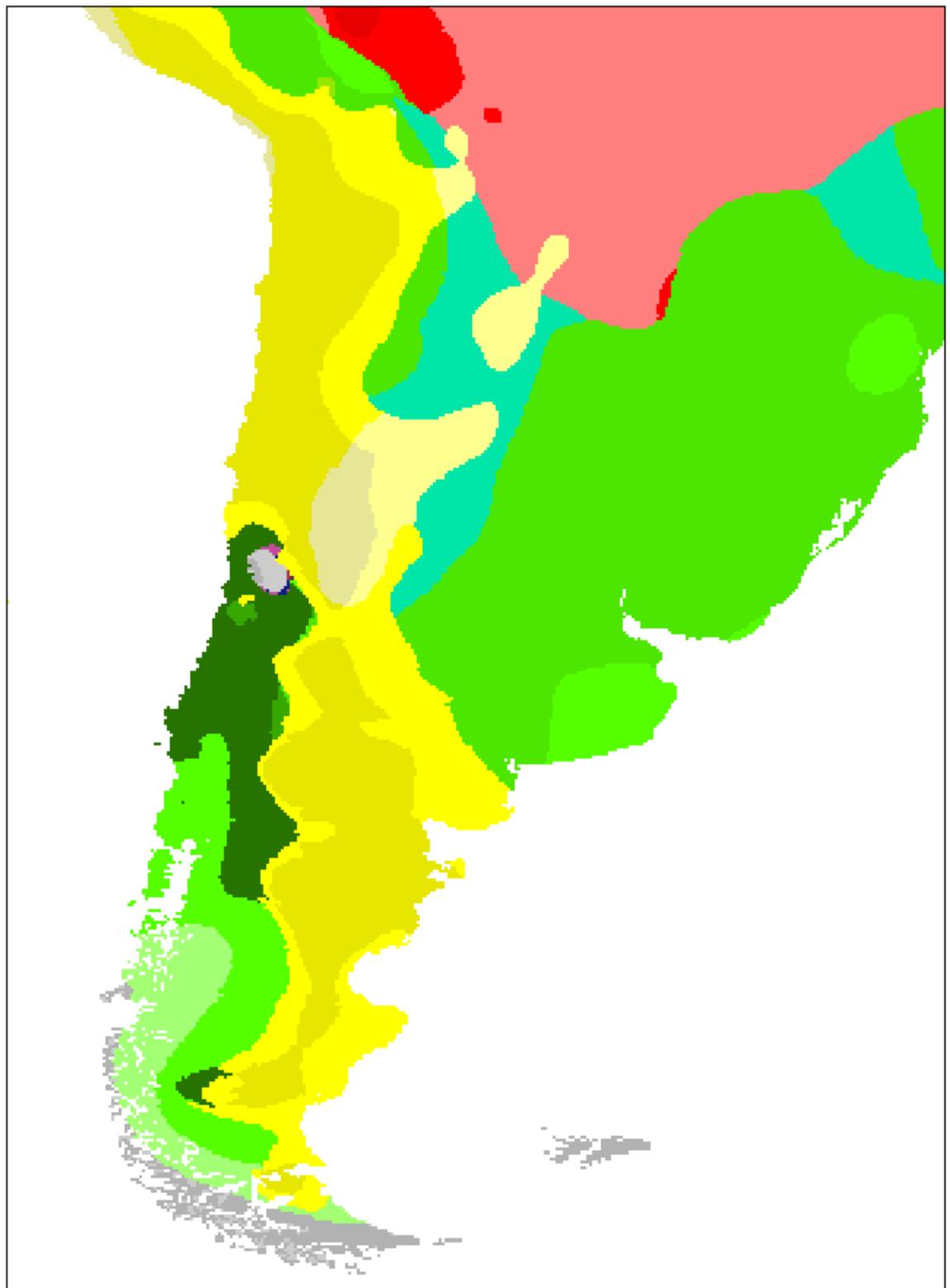
Available at <http://sedac.ciesin.columbia.edu/gpw>. (data download June 2009).

Population density, >1000 persons/km<sup>2</sup>



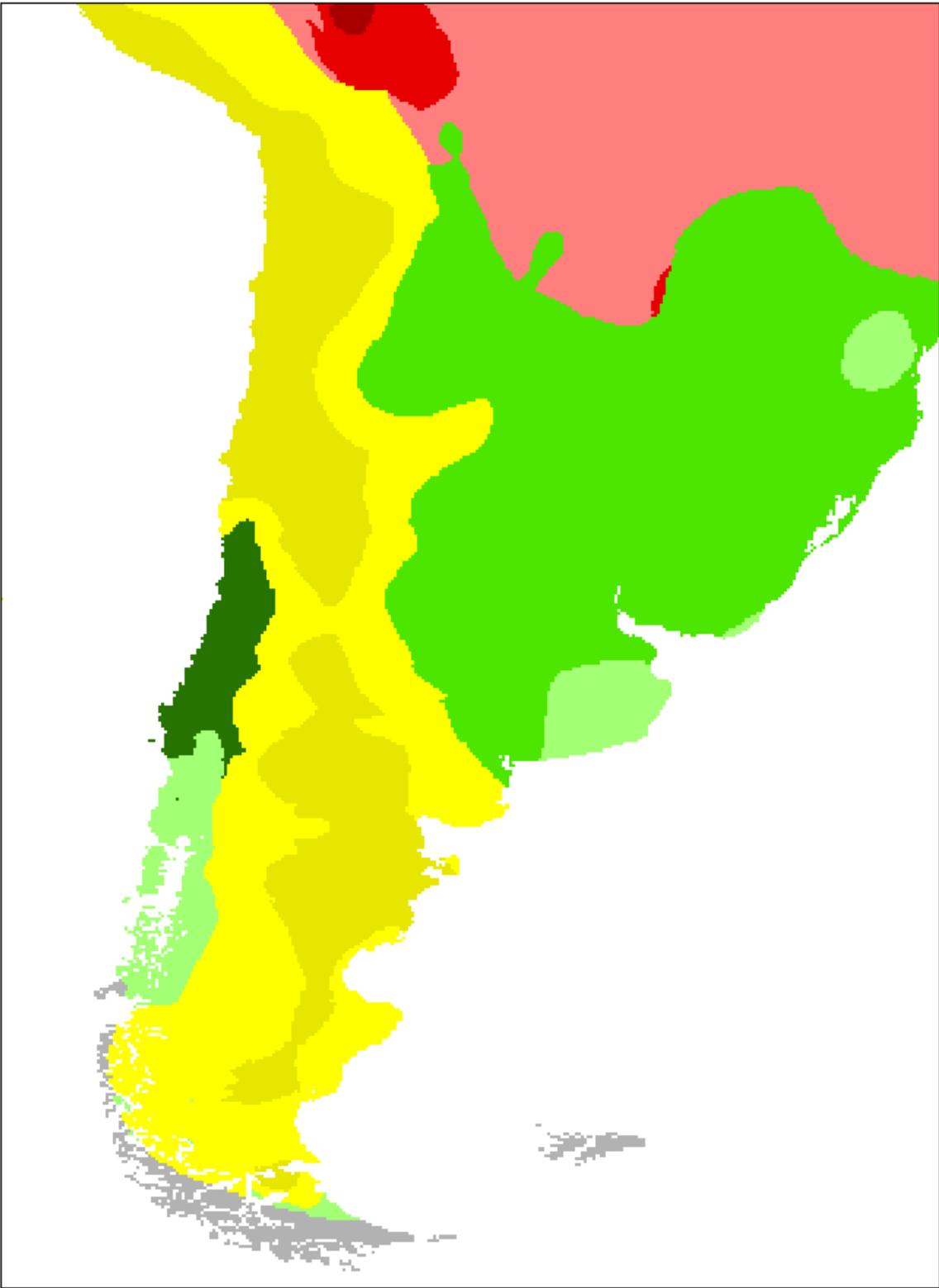
## Original Koppen classes

- Af. Tropical Rainforest
- Am. Tropical Monsoon
- Aw. Tropical Savannah
- BWh. Arid Desert Hot
- BWk. Arid Desert Cold
- BSh. Arid Steppe Hot
- BSk. Arid Steppe Cold
- Csa. Temp Dry Summer Hot Summer
- Csb. Temp Dry Summer Warm Summer
- Owa. Temp Dry Winter Hot Summer
- Owb. Temp Dry Winter Warm Summer
- Owc. Temp Dry Winter Cold Summer
- Cfa. Temp No dry season Hot Summer
- Cfb. Temp No dry season Warm Summer
- Cfc. Temp No dry season Cold Summer
- ET. Polar Tundra



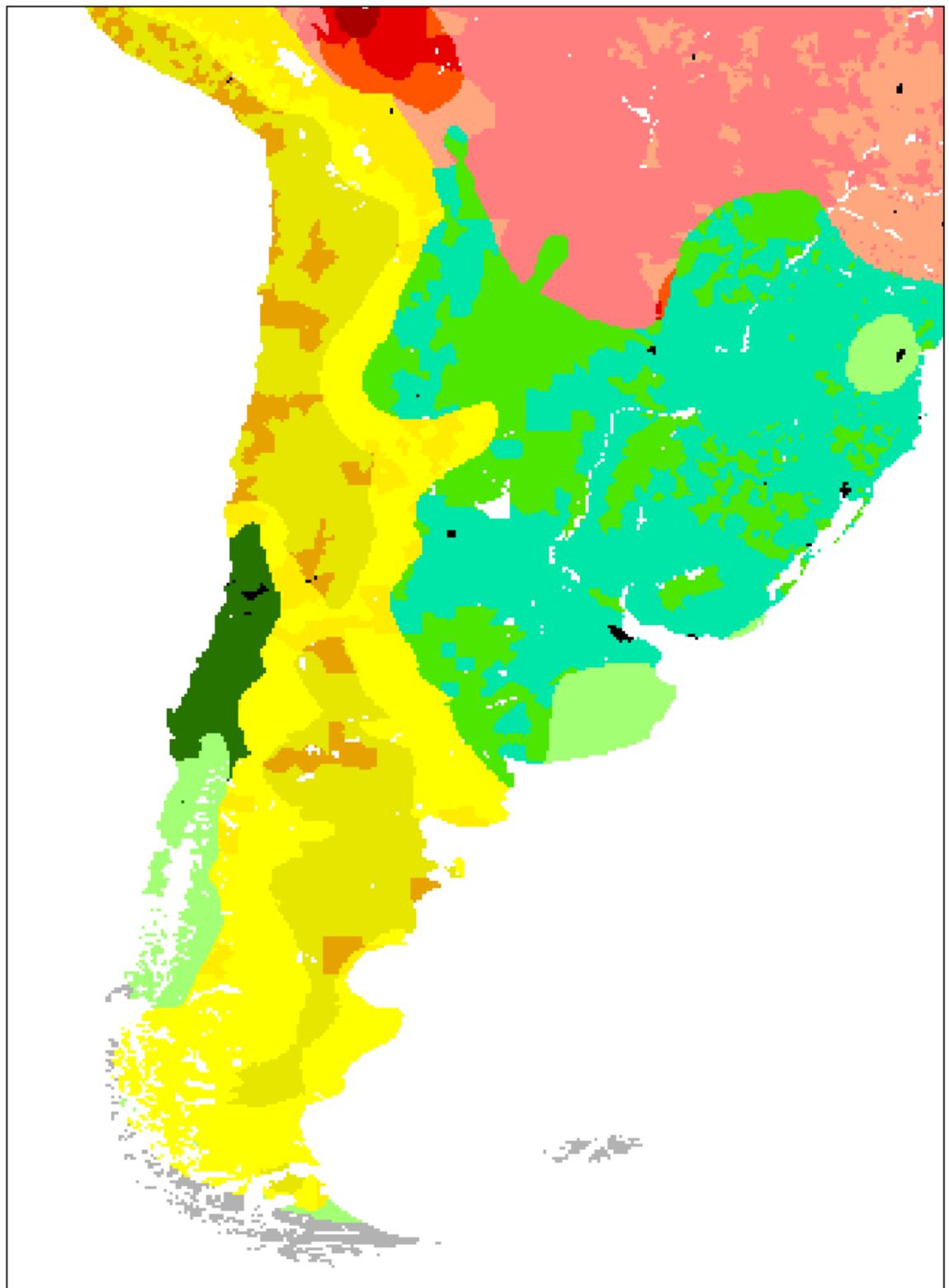
# Edited Koppen classes

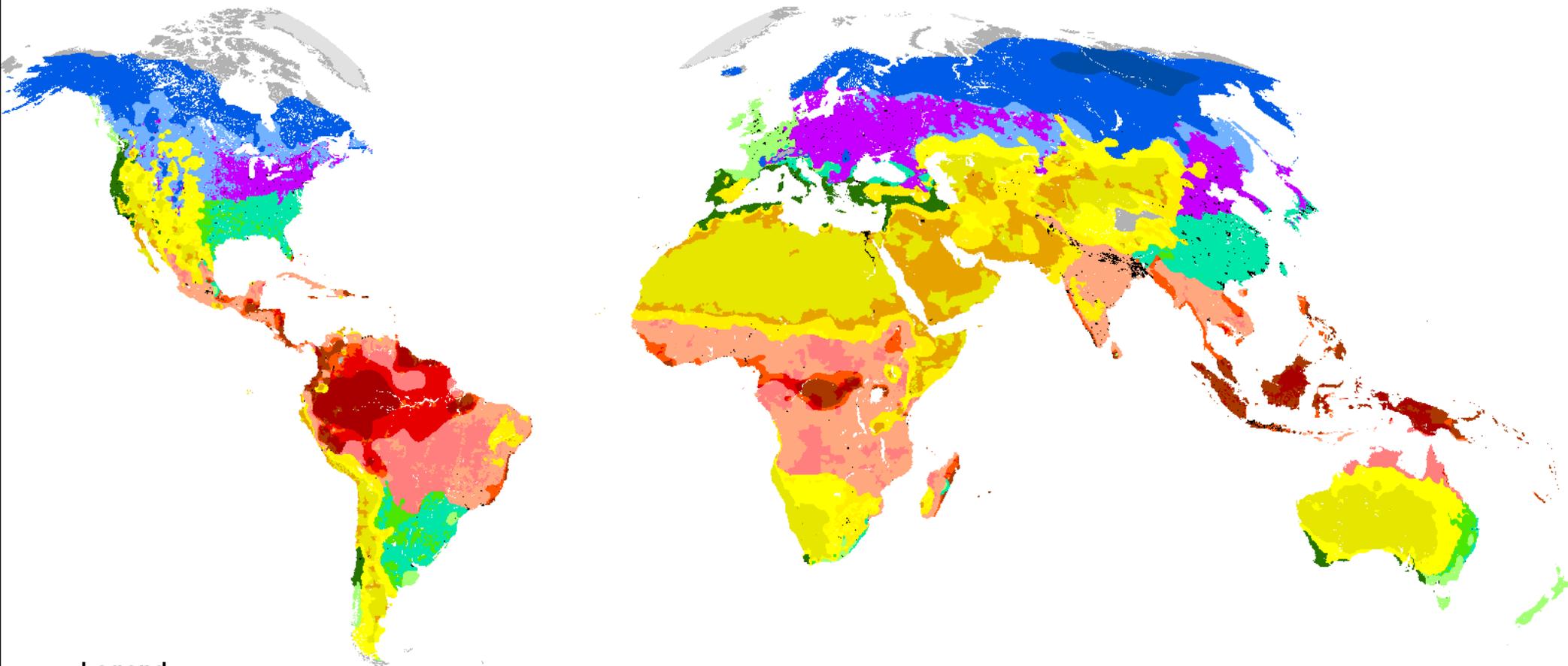
- Tropical Rainforest
- Tropical Seasonal Forest
- Tropical Savannah
- Desert
- Steppe
- Mediterranean
- Temperate Evergreen Forest
- Marine West-coast
- Tundra



# Final strata

- Tropical Rainforest
- Tropical Seasonal Forest
- Tropical Savannah
- Desert
- Steppe
- Mediterranean
- Temperate Evergreen Forest
- Marine West-coast
- Tundra
- pTropical Rainforest
- pTropical Seasonal Forest
- pTropical Savannah
- pDesert
- pSteppe
- pTemperate Evergreen Forest
- Urban





**Legend**

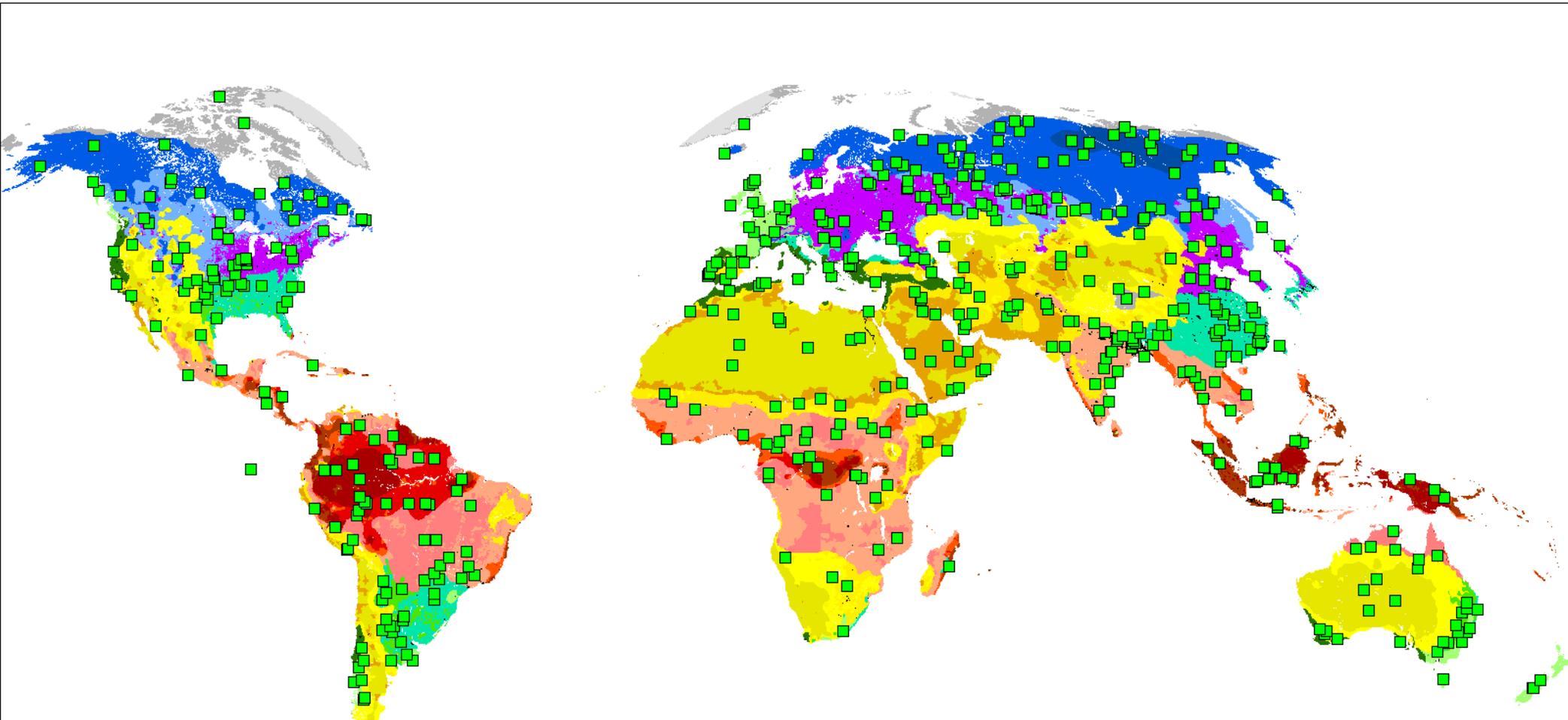
 Tropical Rainforest	 Mediterranean	 Cold Boreal Forest	 pSteppe	 Tundra
 Tropical Seasonal Forest	 Temperate Evergreen Forest	 pTropical Rainforest	 pTemperate Evergreen Forest	 Snow and Ice
 Tropical Savannah	 Marine West-coast	 pTropical Seasonal Forest	 pContinental Forest	
 Desert	 Continental Forest	 pTropical Savannah	 Urban	
 Steppe	 Boreal Forest	 pDesert		

#	Final strata	Global cover	Prop all.	Final all.
1	Tropical rainforest	2.4%	12	10
2	Tropical seasonal forest	2.0%	10	10
3	Savannah	5.0%	25	15
4	Desert	14.4%	72	20
5	Steppe	8.3%	41	20
6	Mediterranean	1.6%	8	25
7	Temp. evergreen forest	1.2%	6	25
8	Marine west-coast	1.6%	8	25
9	Continental forest	4.3%	22	30
10	Boreal forest	12.7%	63	50
11	Cold boreal forest	1.2%	6	10
12	Tundra	3.3%	17	10
13	Frost	1.2%	6	0
14	pTropical rainforest	2.2%	11	15
15	pTropical seasonal forest	1.9%	10	10
16	pTropical savannah	11.0%	55	40
17	pDesert	6.0%	30	25
18	pSteppe	7.0%	35	35
19	pTemp. evergreen forest	5.2%	26	40
20	pContinental forest	6.7%	34	50
21	Urban	0.6%	3	35
Sum		100%	500	500

*“p” denotes strata with >5 pers/km<sup>2</sup>.*

*“Prop. all.” is the sample allocation proportional to the area of the strata.*

*“Final all.” is the allocation that we decided.*



**Legend**

- |  |  |   |   |  |
|--|--|---|---|--|
|  Tropical Rainforest      |  Mediterranean              |  Cold Boreal Forest        |  pSteppe                     |  Tundra                 |
|  Tropical Seasonal Forest |  Temperate Evergreen Forest |  pTropical Rainforest      |  pTemperate Evergreen Forest |  Snow and Ice           |
|  Tropical Savannah        |  Marine West-coast          |  pTropical Seasonal Forest |  pContinental Forest         |  |
|  Desert                   |  Continental Forest         |  pTropical Savannah        |  Urban                       |  |
|  Steppe                   |  Boreal Forest              |  pDesert                   |   |  Sample selection (500) |

# Response Design

## LCCS-based legend

### A. Tree dominated

#### 1. Needleleaved

*a. Evergreen*

1. Closed
2. Open

*b. Deciduous*

1. Closed
2. Open

#### 2. Broadleaved

*a. Evergreen*

1. Closed
2. Open

*b. Deciduous*

1. Closed
2. Open

#### 3. Mixed

- a. Closed
- b. Open

### C. Herbaceous dominated

#### 1. Cultivated lands

#### 2. Pasture

#### 3. Tundra

#### 4. Other

### B. Shrub dominated

#### 1. Needleleaved

1. Closed
2. Open

#### 2. Broadleaved

1. Closed
2. Open

### D. Urban

### E. Bare areas

### F. Snow and ice (present > 11 mo/year)

### G. Water (present > 11 mo/year)

*Closed is defined as > 65% cover.  
Open is defined as 65-15% cover.*

# Validation Workshops

Interpretation of very high resolution (VHR) data by local experts. First prototype workshop is scheduled for this meeting!

1. Classification
2. Segmentation (Woodcock & Harward, 1992)
3. Labelling of regions by local experts
4. GoogleEarth, in addition
5. VHR sources (SPOT, best coverage)

