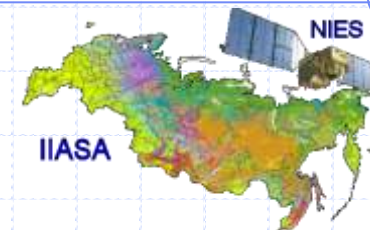


A hybrid Land Cover Dataset for Russia: a new methodology for merging statistics, remote sensing and in-situ information

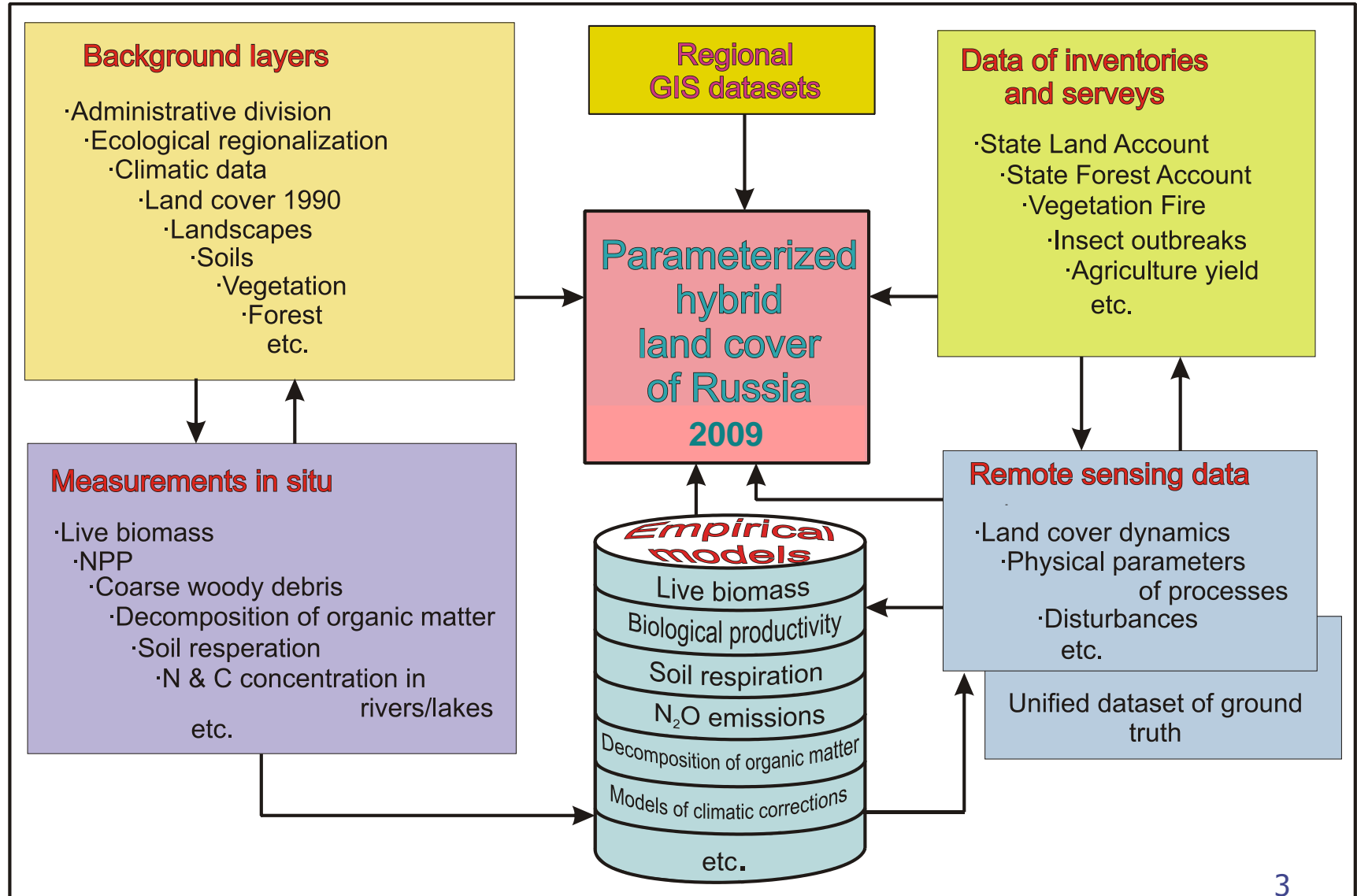
D. Schepaschenko, A. Shvidenko, I. McCallum



The overall objective is development of information base for the verified Terrestrial Biota Full Greenhouse Gas Account for Russia

- ◆ **Key words: Full, Verified, Uncertainty**
- ◆ Full: ALL ecosystems, ALL processes, ALL biophysical elements continuously in time
- ◆ Verified: (1) reliable and comprehensive assessment of uncertainties; (2) possibility to manage uncertainties
- ◆ Uncertainty is an aggregation of insufficiencies of outputs of the accounting system, regardless of whether those insufficiencies result from a lack of knowledge, intricacy of the system, or other causes

Structure of the Integrated Land Information System



“Basic” layers of the Hybrid land cover



GIS

- Administrative division
- Bioclimatic zones
- Soil (1:2.5 Mio)
- Forest enterprises
- Vegetation (1:4 Mio)
- Rivers/lakes & roads/railways (1:1 Mio)



Remote sensing products (1 km resolution)

- GLC2000 – Global Land Cover
- MODIS Land Cover
- MODIS NPP
- VCF - Vegetation Continuous Field
- Vegetation Fire (AVHRR & LANDSAT by A.I. Sukhinin)



Statistics

- State Land Account (by 81 administrative units)
- State Forest Account (by 1585 forest enterprises, 78439 records)
- Disturbances in forests (by administrative units)



Models

- Live biomass
- Respiration
- NPP
- etc.

Spatial distribution optimization of statistic data

We calculated a suitability index (S_{ts}) for each pair: grid of territory (t) and statistics record (s). Then we allocated statistic records to the most suitable place within the territory unit (forest enterprise, administrative region).

Suitability index (S_{ts}) is the quantitative correspondence of statistics (forest and land account) and spatial (remote sensing, GIS) data

$$S_{ts} = \frac{1}{q} \left(\sum_{j=1}^q (x_{tj}^{norm} - x_{sj}^{norm})^2 \right)^{1/2}$$

$$x_j^{norm} = \frac{x_j - x_{j\min}}{x_{j\max} - x_{j\min}}$$

q - number of parameter;

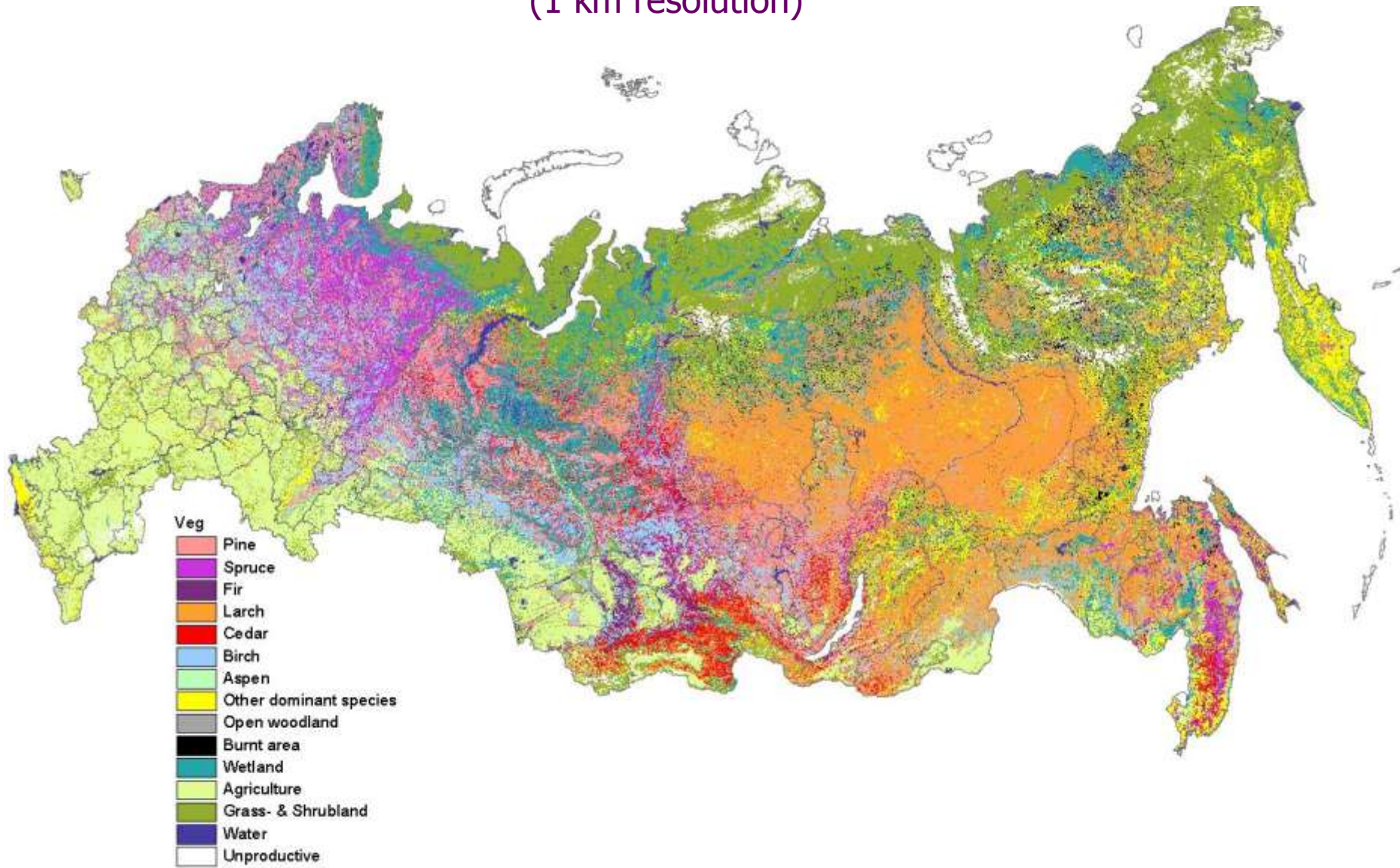
x_{tj}^{norm} , x_{sj}^{norm} - normalized value of parameter j for territory pixel t and statistic record s;

$x_{j\max}$, $x_{j\min}$ - maximum and minimum values of parameter j within the certain area (forest enterprise, administrative unit).

Parameter	Statistics	Remote sensing/ GIS
Land cover	Land use, tree species	GLC2000; Modis land cover
Tree stocking	Relative stocking	VCF trees
Site quality	Site index	Zone; Soil
NPP	Ground NPP	Modis NPP

Hybrid land cover 2009 – vegetation classes

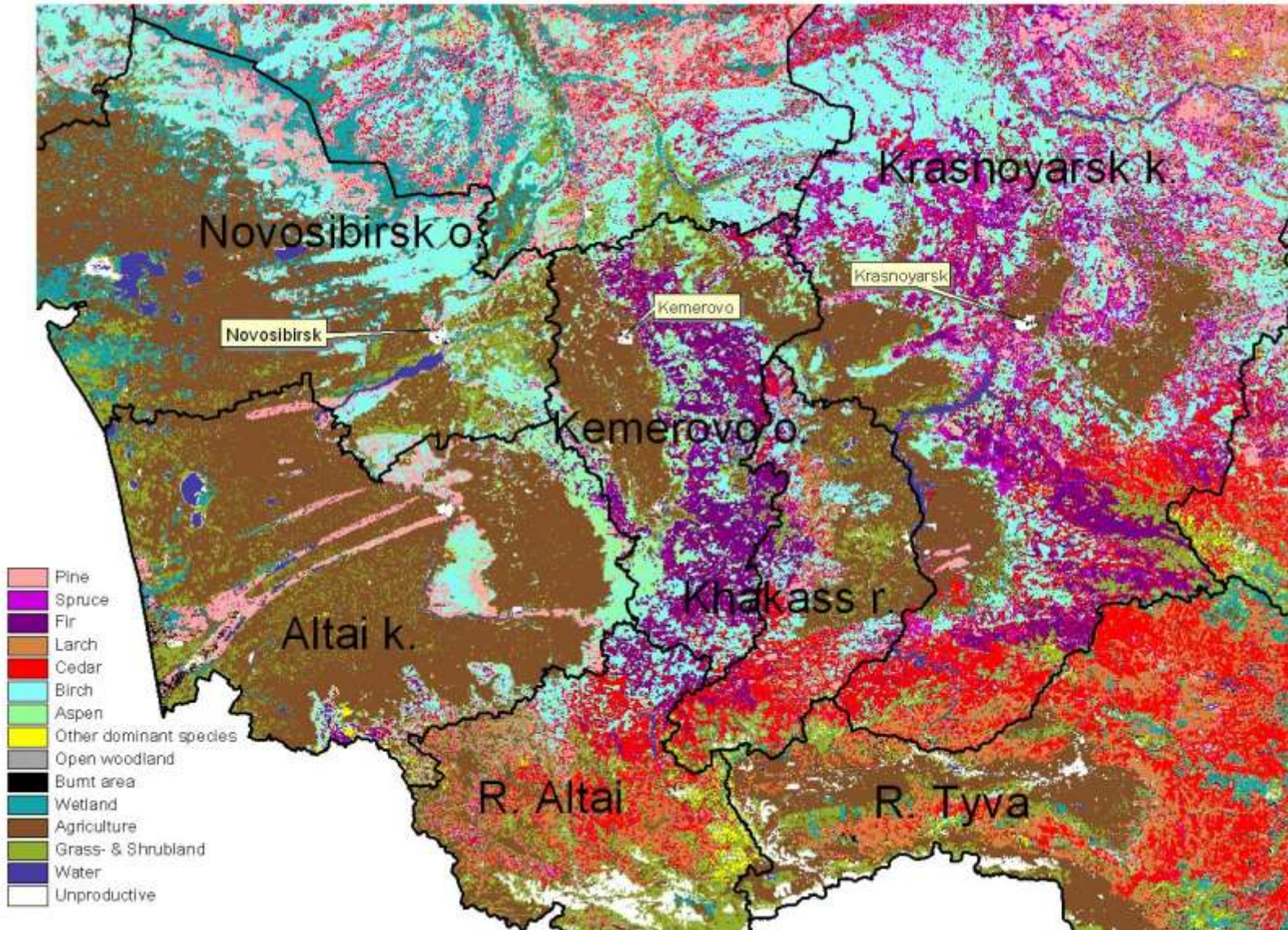
(1 km resolution)



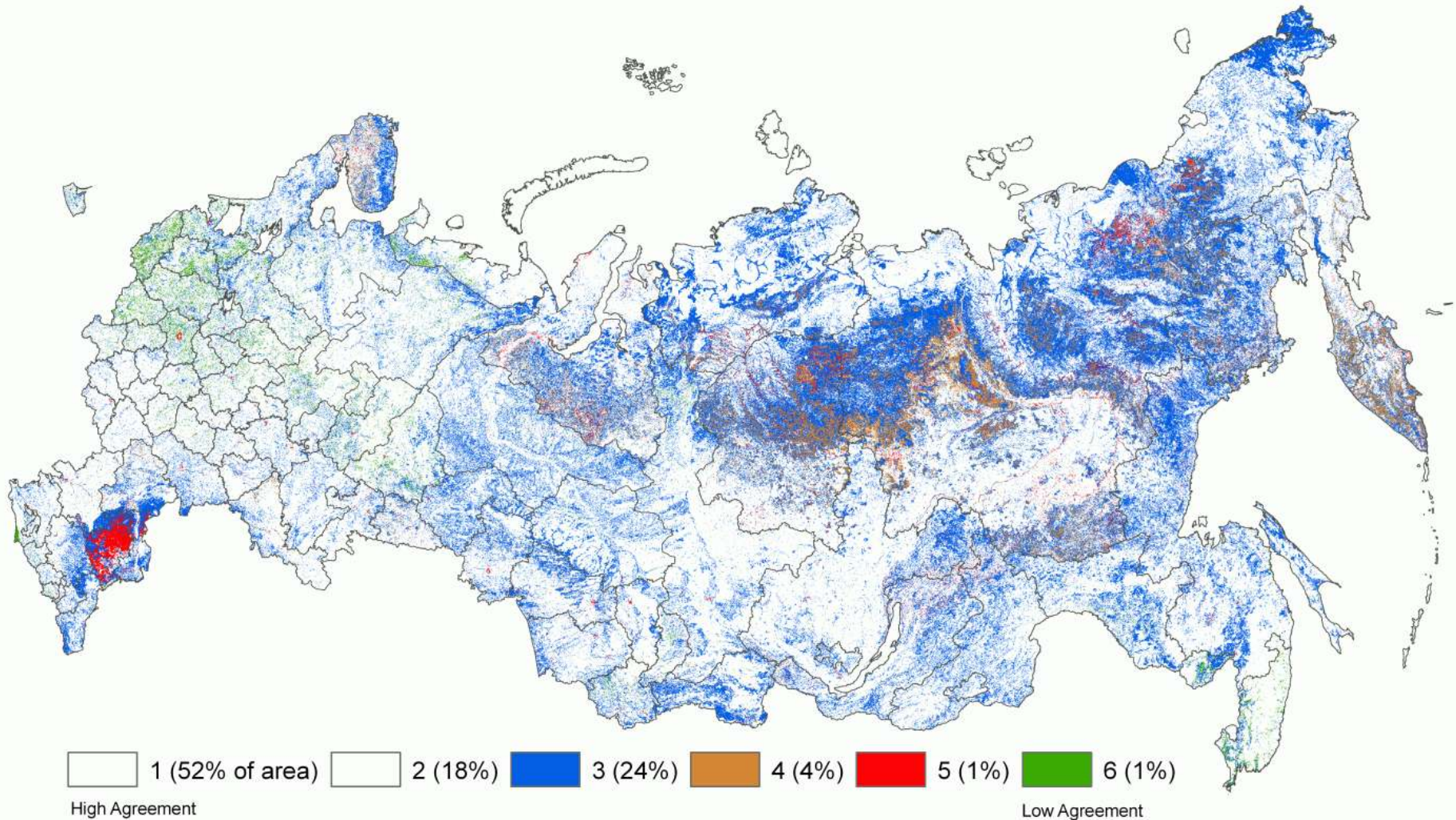
The Land Cover vegetation classes

- ◆ **Forest** (78639 units with detailed information about tree species, age class, growing stock, etc.)
- ◆ **Open woodland** (32 classes by main tree species and regions)
- ◆ **Agriculture** (arable land, hayfield, pasture, fallow, abandoned arable by 81 admin. units)
- ◆ **Wetland** (8 classes by 83 regions/zones)
- ◆ **Grass- & Shrubland** (about 50 classes)
- ◆ **Burnt area**
- ◆ **Water**
- ◆ **Unproductive**

Hybrid land cover 2009 –South of Siberia

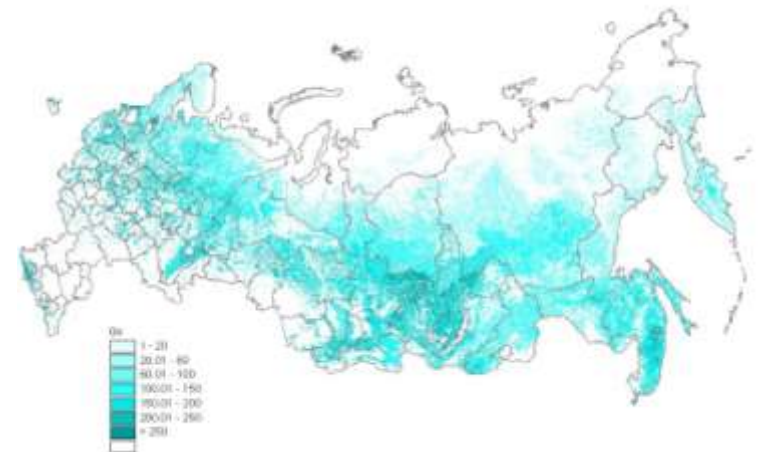
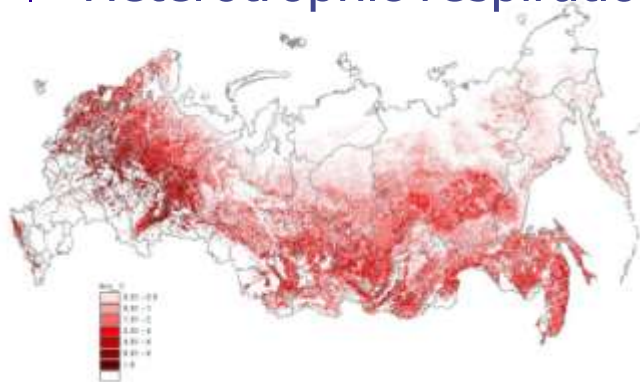


Agreement/confidence classes of the hybrid land cover map (1 & 2 omitted for clarity)

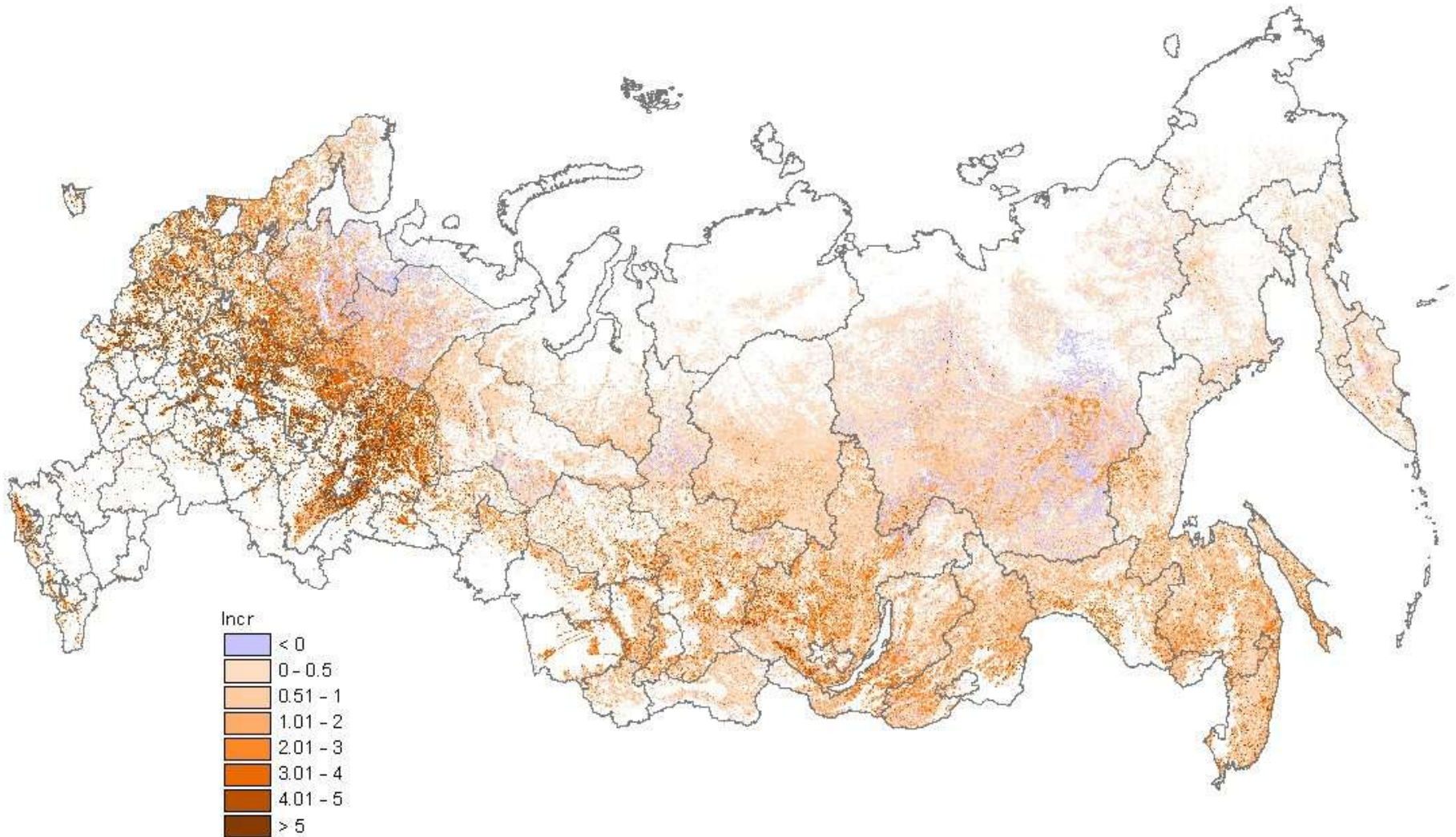


Indicators of forest productivity and carbon budget components

- ◆ Live biomass (by 7 fractions)
- ◆ Growing stock
- ◆ Growth and Mortality
- ◆ Coarse woody debris
- ◆ Net Primary Production (by 6 fractions)
- ◆ Heterotrophic respiration

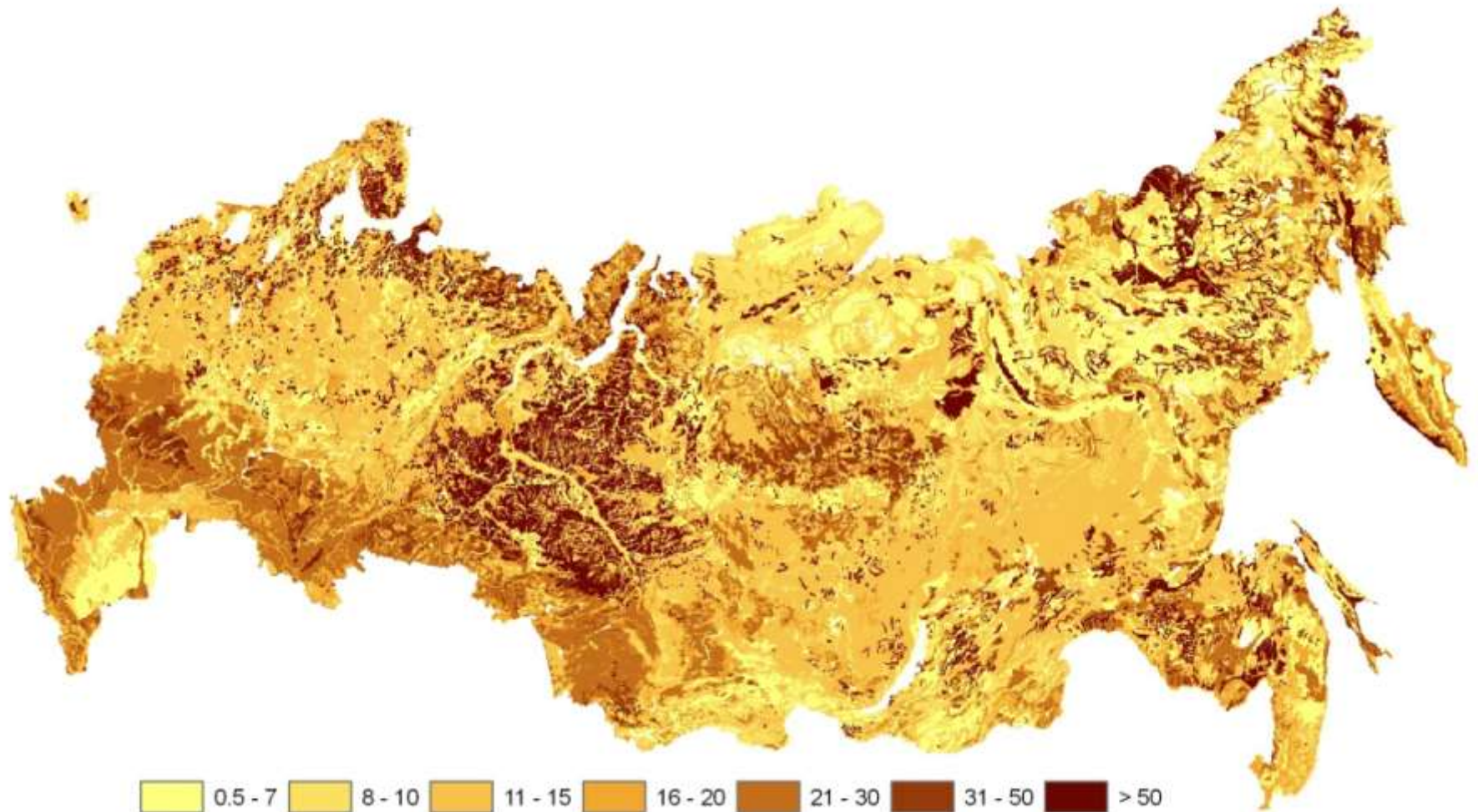


Net Current Growth, $\text{m}^3 \cdot \text{year}^{-1}$



Soil organic carbon density, kg C m⁻²

(onground organic layer + 1 m soil depth)



Thank you for your attention

