Products from earth observation data

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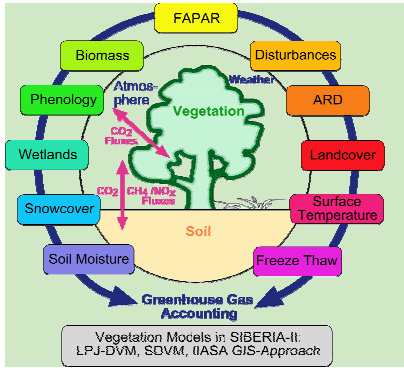
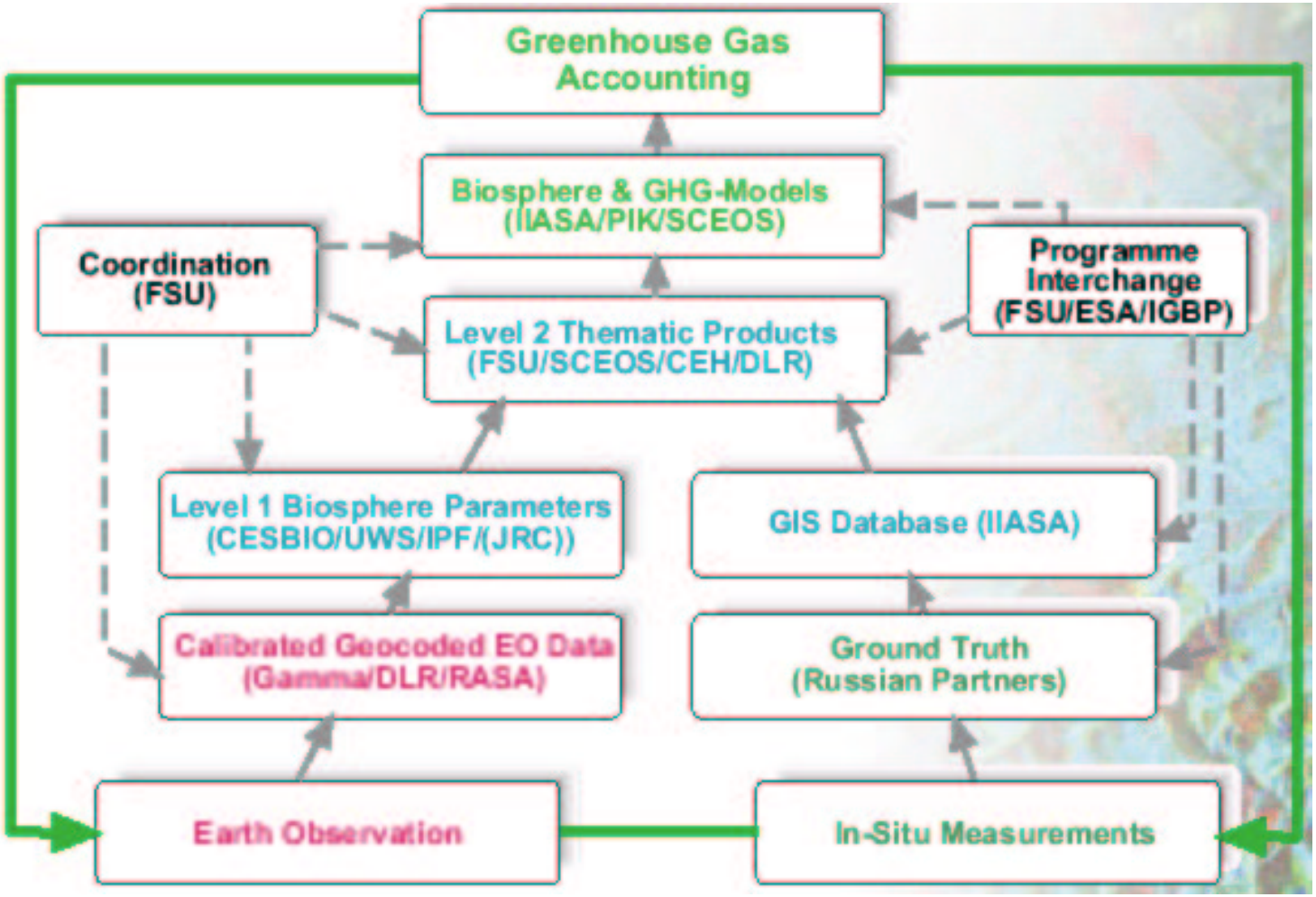


Siberia-II project:

Multi-Sensor Concepts for Greenhouse Gas Accounting in Northern Eurasia

(5th Framework Program of the European Commission)

SIBERIA-II


Greenhouse Gas Accounting
Biosphere & GHG-Models (IIASA/PIK/SCEOS)
Coordination (FSU)
Programme Interchange (FSU/ESA/IGBP)
Level 2 Thematic Products (FSU/SCEOS/CEH/DLR)
Level 1 Biosphere Parameters (CESBIO/UWS/IPF/(JRC))
GIS Database (IIASA)
Calibrated Geocoded EO Data (Gamma/DLR/RASA)
Ground Truth (Russian Partners)
Earth Observation
In-Situ Measurements

Earth observation products overview

used by ecosystems models

fPAR

LAI

Landcover

Disturbances (fires)

Phenology

Snow depth & melt

Freeze/thaw

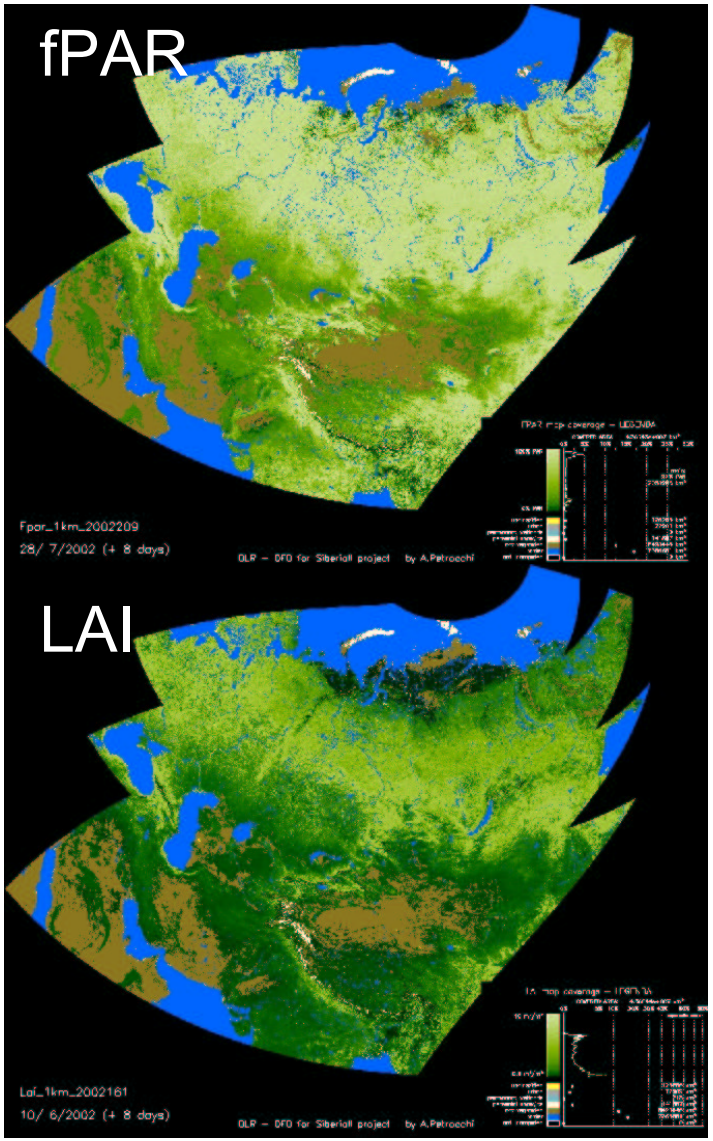
Experimental

ARD

Wetlands

Above-ground-Phytomass

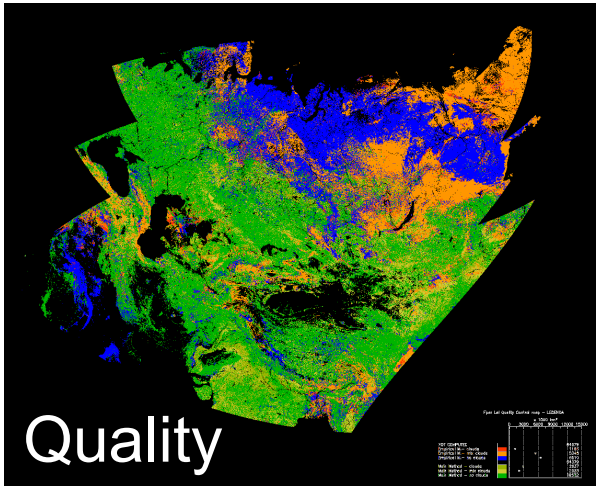
fPAR, LAI



FPAR, LAI and
Albedo from MODIS

DLR

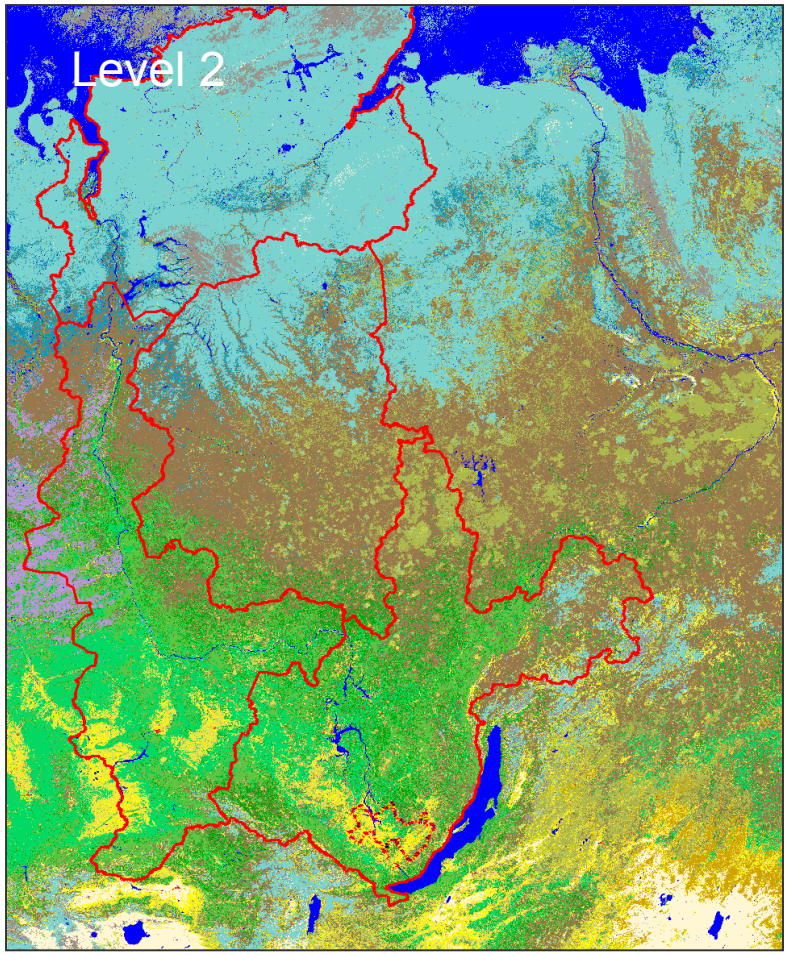
Every 8 days for year 2002



Landcover

Sources MODIS (+MERIS), ASAR WS (water)

UNIVERSITY OF WALES SWANSEA



500m pixel size

3 LC maps (2001, 2002, 2003)

Results similar to GLC, UMD, IGBP

16 Classes identified

+ water
on 150 m resolution

Forest classes:

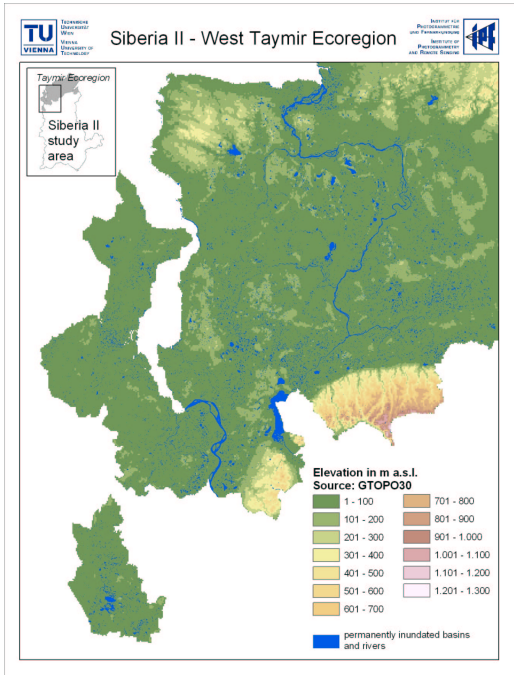
Light Coniferous

Dark Coniferous

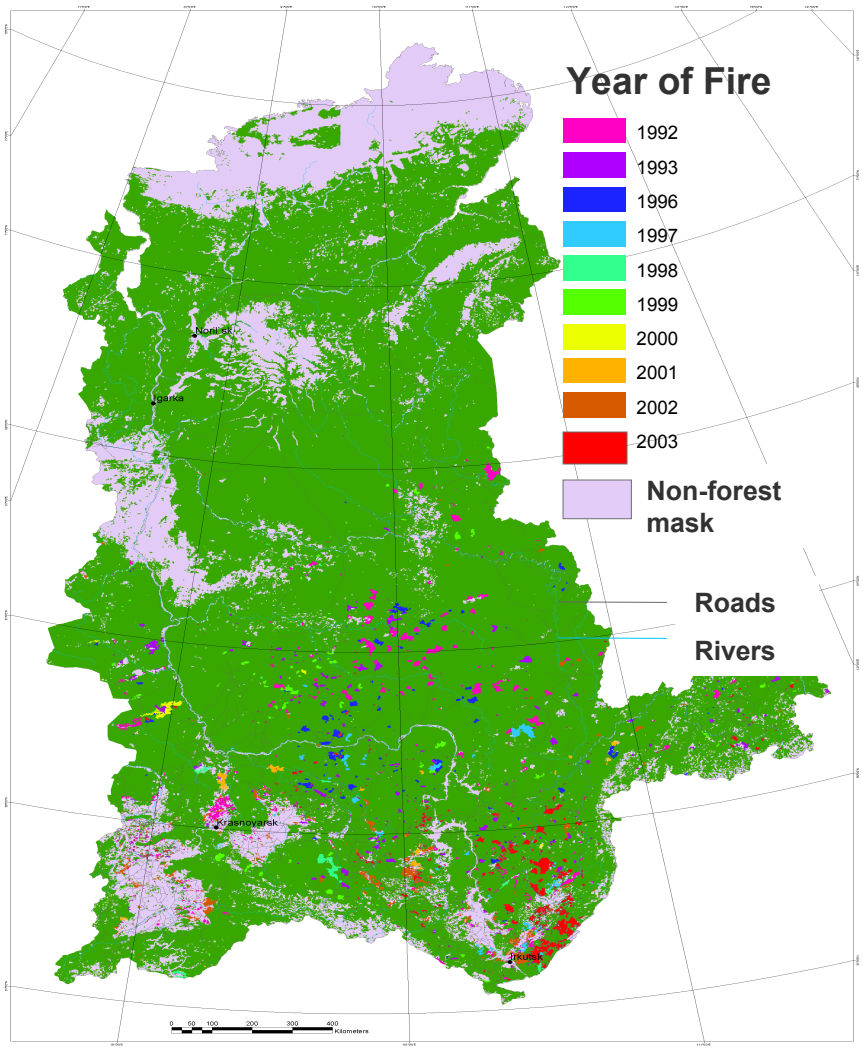
Soft Deciduous

Sparse Needle-leaf Forest

Sparse Broadleaf Forest



Disturbances (fire)



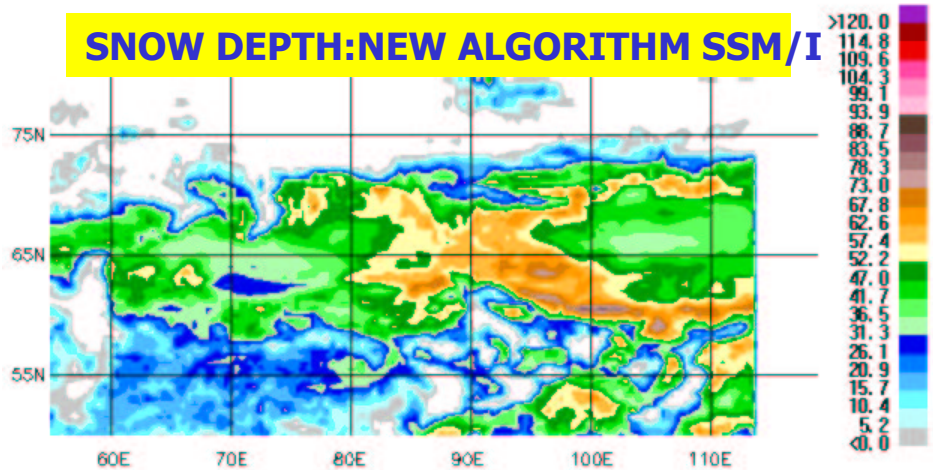
Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

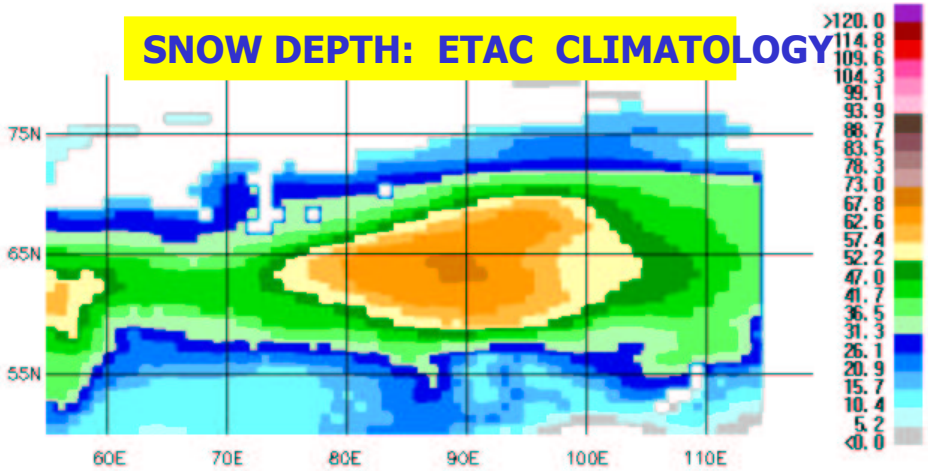
MODIS vegetation index

$$NDSWIR = \frac{NIR-SWIR}{NIR+SWIR}$$

Sensitive to canopy moisture content

snow depth & melt



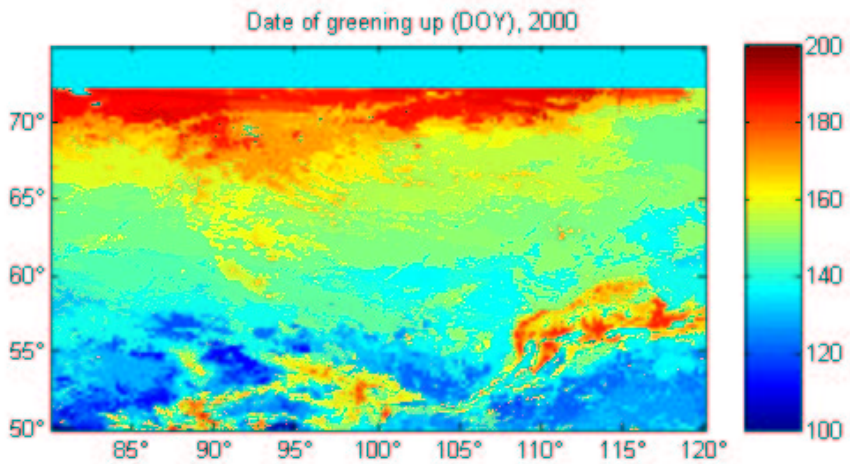


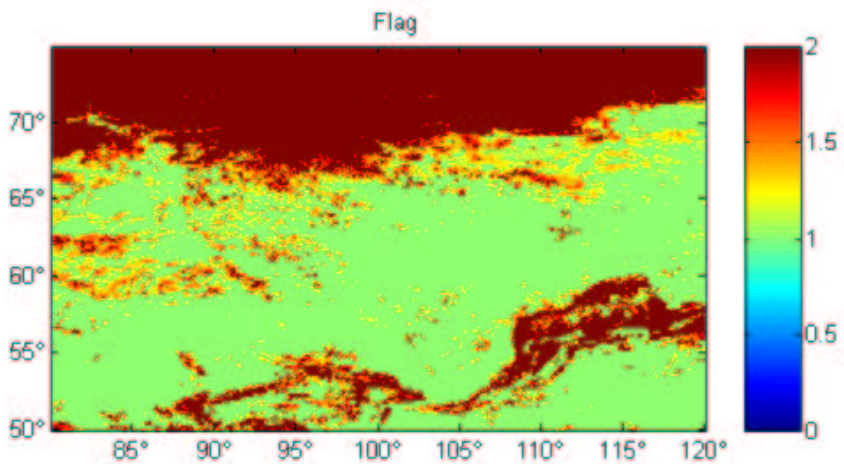
SSM/I for both snow depth and snowmelt dates.

New algorithm to derive the snow depth that takes into account the snowpack methamorphosis in space and time

SSM/I snow depth estimates (January): averages over 1988-2001

Phenology

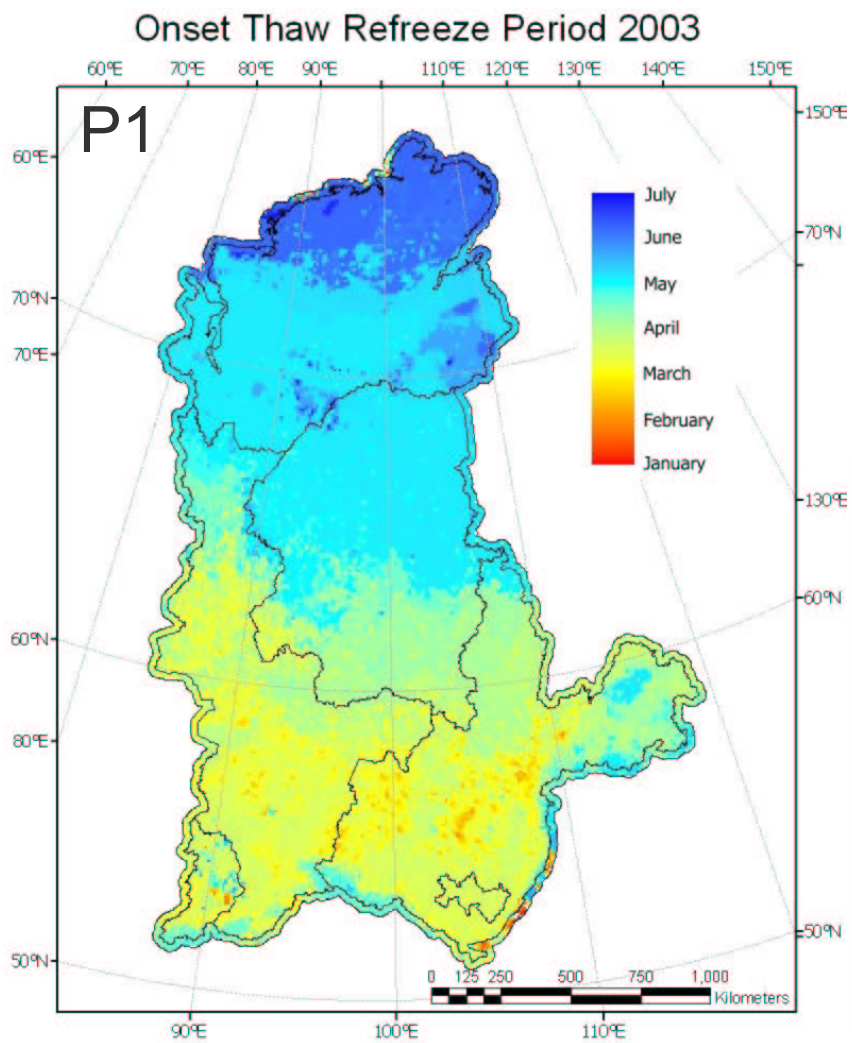




Greening and senescence dates

from NOAA-AVHRR + Use of SPOT VGT

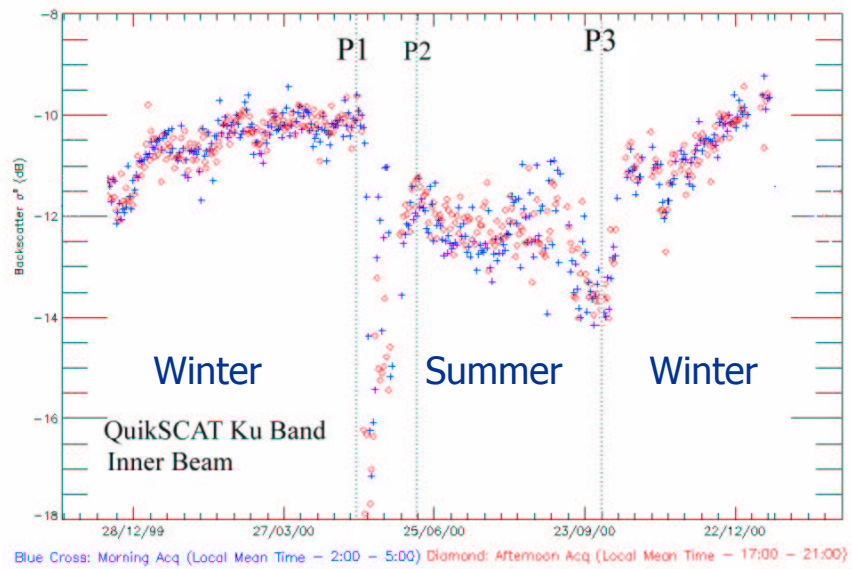
Freeze/thaw



from QuikScat scatterometer

Annual Backscatter Cycle at Northern Latitude (70°N)

Diurnal measurements



Seasonal dynamics - comparison

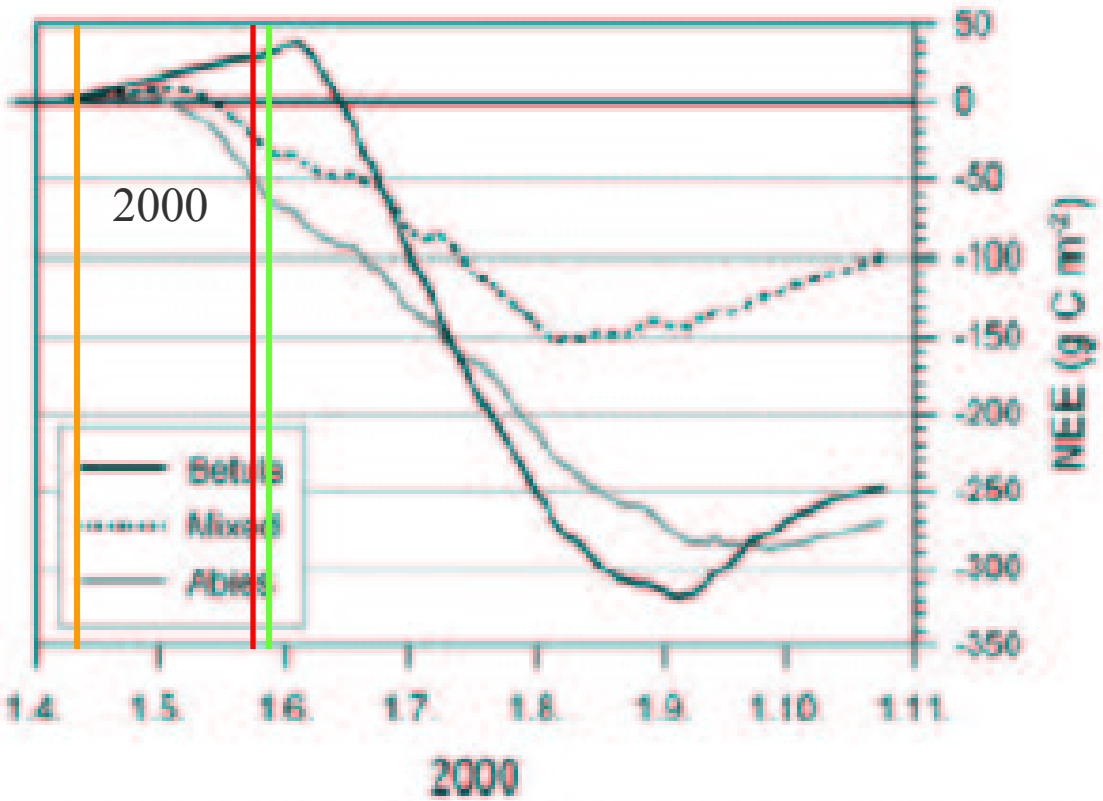


Fig. 7. Cumulative NEE of CO_2 from early April until late October 2000 for the Betula stand (solid black line), the mixed stand (dashed black line), and the Abies stand (solid grey line).

2000

Snowmelt:143 (17 May)

Budburst: 146 (20 May)

Thaw start:100(10April)

61°01 'N, 89°34 'E
(Roser et al., 2002)

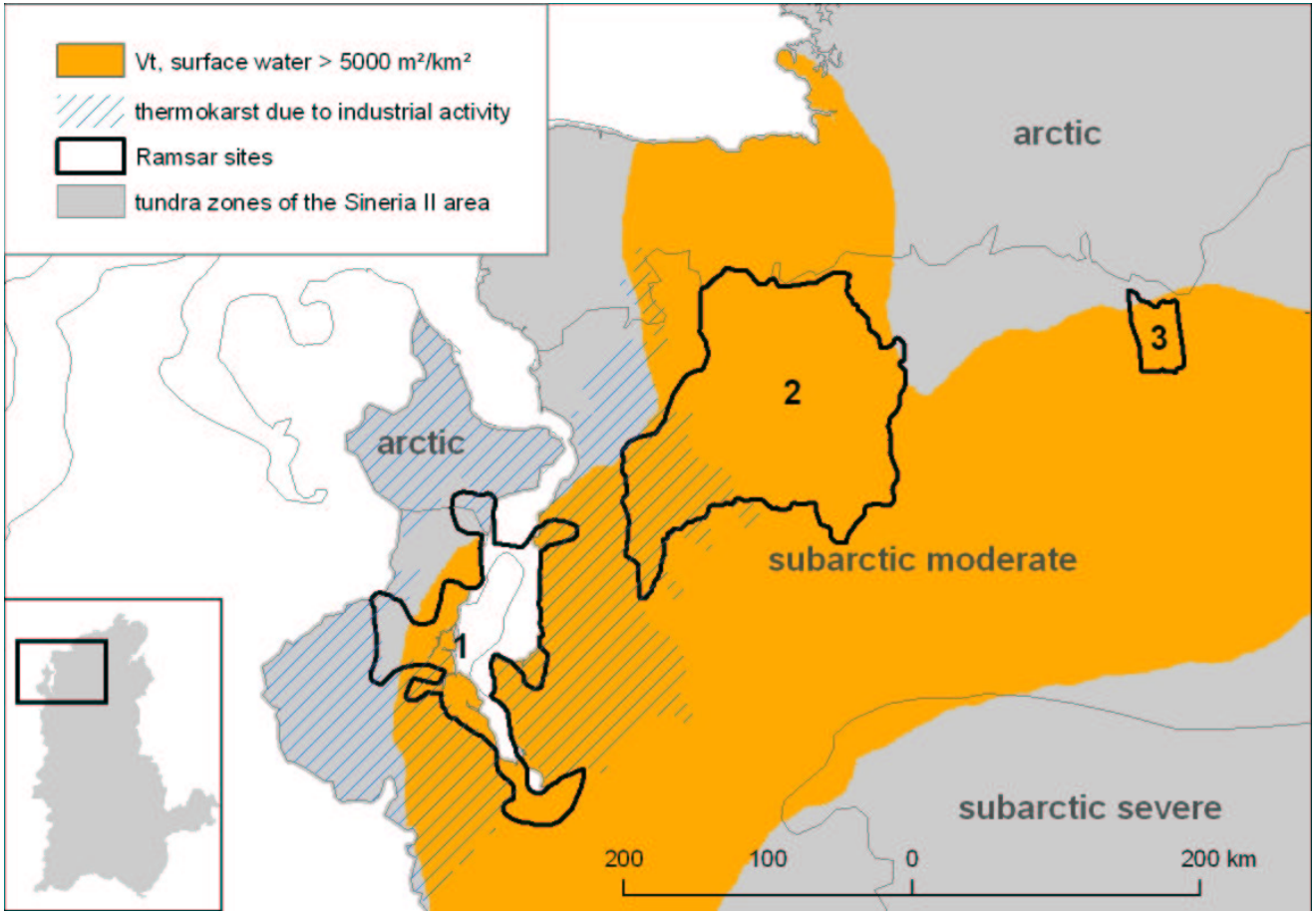
ARD

Table B: Forest change area statistics for 3 Landsat scenes for the test territories Chunsky and Bolshe Murtinsky. Changes between 1989 and 2000. (Afforestation, Reforestation and Deforestation do not represent the KP definition of ARD classes).

Class	Area in hectares
Path/Row: 142/20 (Bolshe Murtinsky)	
Deforestation	157668.53
Reforestation	74761.91
Afforestation	1495.68
No change	2669942.00
Masked	178128.33
Path/Row: 143/20 (Bolshe Murtinsky)	
Deforestation	104981.10
Reforestation	101454.97
Afforestation	1931.98
No change	2837849.50
Masked	68684.27
Path/Row: 140/20 (Chunsky)	
Deforestation	134878.34
Reforestation	124979.38
Afforestation	6386.06
No change	2663196.25
Masked	189718.58

Wetlands

Ramsar Wetland type **Vt** (tundra wetlands)



Tundra freshwater ecosystems

dissolved CO_2 in surface waters

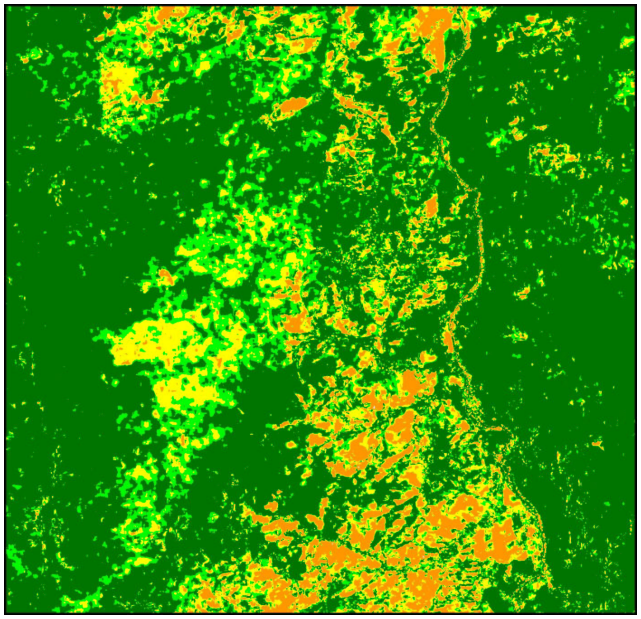
methane emissions during all seasons

thermokarst

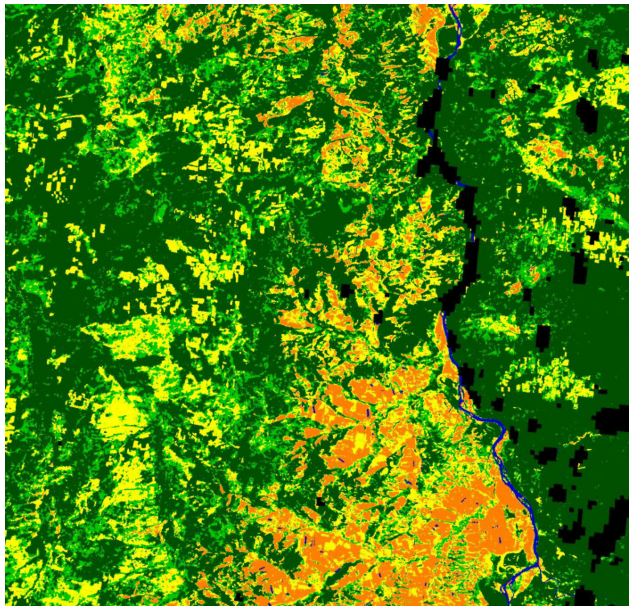
1 - Brekhovsky islands
2 - Pura and Moritto river
3 - Gorbita

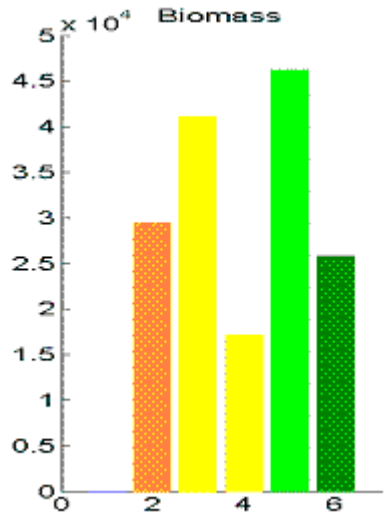
Above-ground Phytomass

ASAR WS Biomass map (2004)



Siberia-1 Biomass map (1997-8)





1 Water
2 Agriculture, bogs, grass
3 Open forest, cut,fire
4 Forest 10-30 t/ha
5 Forest 30-50 t/ha
6 Forest >50 t/ha

Summary

Source:
LeToan, T. (2005)

Products	Years	EO data	Pixel Size / Scale	Partner responsible	integration/ comparison
Disturbances	1992- 2003 on yearly basis (except 94-95)	MODIS, AVHRR ATSR-2	1 km	CEH	**IIASA (I)**
FAPAR & LAI	2002 &2003 8 day and monthly	**MODIS**	1km	DLR	**SDGVM ©**
Phenology	2000-2003 (1982-2003 for collaboration work)	**SPOT-VGT** NOAA/AVHRR	1km & 10km	CESBIO	**SDGVM (I)**
Freeze/ Thaw	1999- ongoing	**Quikscat**	10km	IPF	**SDGVM(C)**
Land cover	2001-2004	**MODIS**	500m	UWS	**IIASA (I)** **SDGVM (I)** **LPJ (I)**
Snow Depth & Snow melt	2000-2003 (1988-2003 for collaboration work)	**SSMI**	25km	CESBIO	**SDGVM (C)** **LPJ (C)**
Water bodies	(2003/ 04)	**ASAR WS**	75m	IPF	**IIASA (I)** **LPJ(I)**
Topography	2000	**SRTM**	3arcsec<60°N I km > 60° N	Gamma	**SDGVM (I)**

Ackeknowledgements

Siberia II project: shared-cost action financed through the 5th Framework Program of the European Commission, Generic Activity 7.2: Development of generic Earth Observation Technologies (EVG1-CT-2001-00048).

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c.schmullius@uni-jena.de

Thursday, Room 12

Chairperson: SCHMULLIUS, C.

10:30 - 10:45 EGU05-A-08581; BG1.07-1TH2O-001
Plummer, S; Ranera, F; Arino, O
The GLOBCARBON Initiative: Populating the Earth with Burned Areas

10:45 - 11:00 EGU05-A-09558; BG1.07-1TH2O-002
Le Toan, T.; Delbart, N.; Grippa, M. ; Vicente-Serrano, S.; Kergoat, L.; Mognard, N.; Kidd, R. ; Wagner, W.
Multi-sensor satellite observations of growing season initiation as related to snowmelt and spring thaw in Siberia

11:00 - 11:15 EGU05-A-01283; BG1.07-1TH2O-003
Delbart, N; Picard, G; Letoan, T; Kergoat, L; Quegan, S
Spring phenology in Siberia in 1982-2004 : observations by remote sensing, modelling and impact on the terrestrial carbon budget.

11:15 - 11:30 EGU05-A-06434; BG1.07-1TH2O-004
Bartsch, A.; Kidd, R. A.; Shvidenko, A.; McCallum, I.; Wagner, W.
The use and potential of radar satellite data as input for ecosystem modelling in boreal and sub-arctic environments

11:30 - 11:45 EGU05-A-07856; BG1.07-1TH2O-005
Shvidenko, A.; Nilsson, S.; McCallum, I.; Schmullius, C.; Quegan, S.; LeTuan, T.; Bartsch, A.; Kidd, R.; Wagner, W.; Santoro, M.
Regional certified full carbon account: fusion of remotely sensed data, on ground information and ecological modeling

11:45 - 12:00 EGU05-A-10271; BG1.07-1TH2O-006
Beer, C.; Schmullius, C.; Lucht, W.
Estimating the current carbon balance of Northern Eurasia by incorporating satellite-derived land cover information into a Dynamic Global Vegetation Model