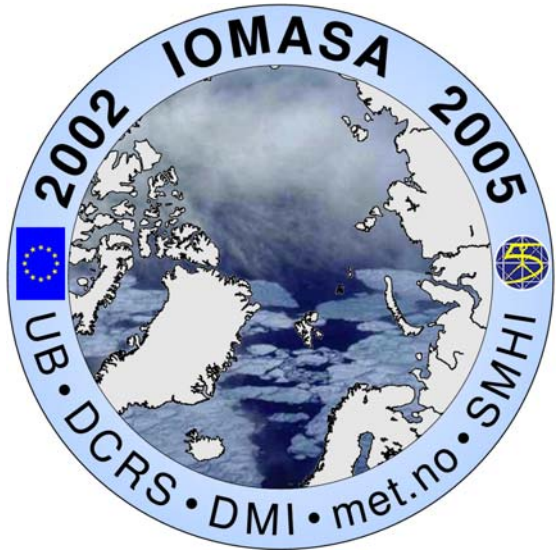
Welcome to the

IOMASA Mid-Term Review !

At met.no, 10-11May, 2004!

IOMASA – Integrated Observing and Modeling of the Arctic Sea ice and Atmosphere



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Project Phases and Schedule

Table 1: IOMASA Project Planning and Time Table

Project Month	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35
Project Phase	I			II											III		IV	
Meeting	⇓		⇓							⇓				⇓		⇓		⇓
Management	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Part 1: Remote sensing of atmospheric parameters (Partner 1)																		
1.1: Data and day 0 algorithms	■	■	■															
1.2: Atmospheric algorithms				■	■	■	■	■	■	■	■	■	■	■				
1.3: Produce retrieved fields															■	■		
1.4: Validation																	■	■
Part 2: Improving numerical weather prediction models (Partners 4,5)																		
2.1: Prepare NWP activities	■	■	■															
2.2: Improve Arctic high-resolution NWP				■	■	■	■	■	■	■	■	■	■	■				
2.3: Prepare real time assimilation															■	■		
2.4: NWP Production and validation																	■	■
Part 3: Empirical model for emissisivity and backscatter of sea ice (Partner 2)																		
3.1: Prepare sea ice modeling	■	■	■															
3.2: Sea ice foreward models				■	■	■	■	■	■	■								
3.3: Influence of snow											■	■	■	■	■	■		
3.4: Validate sea ice foreward models																	■	■
Part 4: Sea ice concentration retrieval (Partner 3)																		
4.1: Prepare sea ice retrieval	■	■	■															
4.3: Sea ice retrieval algorithm				■	■	■	■	■	■	■	■	■	■	■				
4.3: Produce sea ice fields															■	■		
4.4: Validate sea ice algorithm																	■	■
Part 5: Real time processing and user interface (Partner 2)																		
5.1: Define interfaces and formats	■	■	■															
5.2: —																		
5.3: Setup of production and interface															■			
5.4: Validate production and interface																	■	■

Activities at IUP

Activities within WP 1.2: Atmospheric remote sensing algorithms

- Algorithm for TWV from AMSU-B (C. Melsheimer)
- CLW from SSM/I: no activities to report, continued in July.
- Surface emissivity at AMSU frequencies (Mathew and Heygster)

Other activities:

- Daily ice charts at www.iup.physik.uni-bremen.de

Surface emissivity at AMSU-A frequencies (Mathew and Heygster)

Purposes:

- Improve assimilation of AMSU-A radiances into NWP models (IOMASA)
- Improve temperature profile retrieval near surface

Method: Use

- AMSU-A data,
- colocated radiosonde profiles, and
- Ice concentrations from SSM/I

3 steps:

1. Determine bulk emissivity within one AMSU-A footprint
2. Dertermine contributions from different surface types
3. Determine emissivities of surface types

3 steps to determine surface emissivity

1. Bulk emissivity ε within one AMSU-A footprint:
   - RTE for horizontally homogeneous atmosphere

$$T_B = \varepsilon T_s e^{-\tau} + T_u e^{-\tau} + (1-\varepsilon) T_d (1-e^{-\tau}) e^{-\tau}$$

   - Caculate $T_{b,0}$ and $T_{b,0}$ for $\varepsilon = 0$ and $\varepsilon = 0$,resp:

$$\varepsilon = 0: \qquad T_{b,0} = T_u + T_d e^{\tau}$$

$$\varepsilon = 1: \qquad T_{b,1} = T_u + T_s e^{\tau}$$

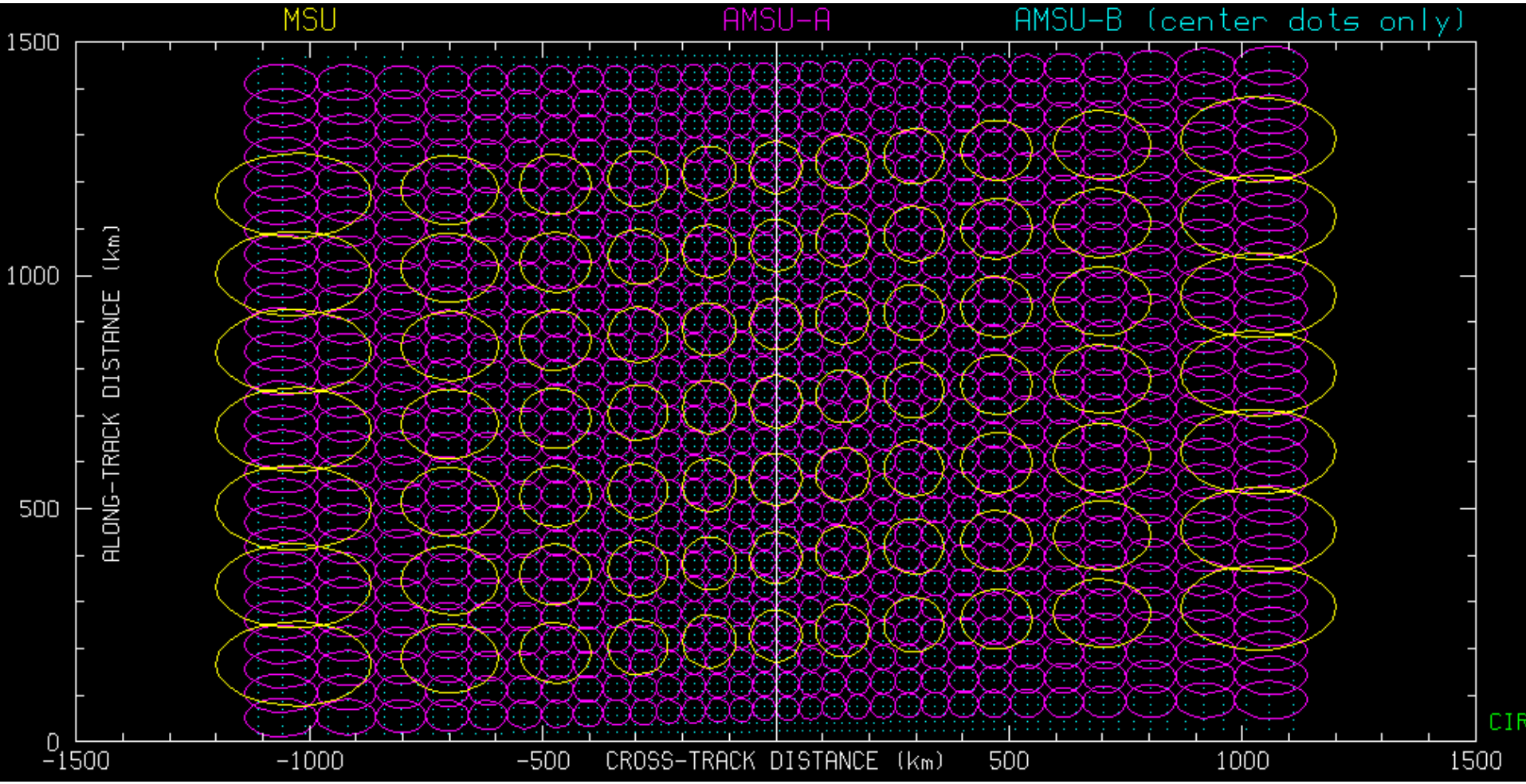
   - Solve for

$$\varepsilon = \left(T_b - T_{b,0}\right) / \left(T_{b,1} - T_{b,0}\right)$$

   - All quantities depend on frequency ν and incidence angle θ

3 steps to determine surface emissivity

2. Determine contributions from different surface types within footprint



3 steps to determine surface emissivity

2. Determine contributions from different surface types *k* =1,2,3 = OW, FY, MY within one footprint:

$$\varepsilon = \sum_{i,j} \sum_{k} A_{i,j} \; P_{i,j,k} \; \varepsilon_k$$

with $A_{i,j}$ antenna weight at SSMI/ pixel *(i,j)*,
$P_{i,j,k}$ fraction of surface constituent *k* at pixel *(i,j)*
ε_k emissivity of surface type *k*

3 steps to determine surface emissivity

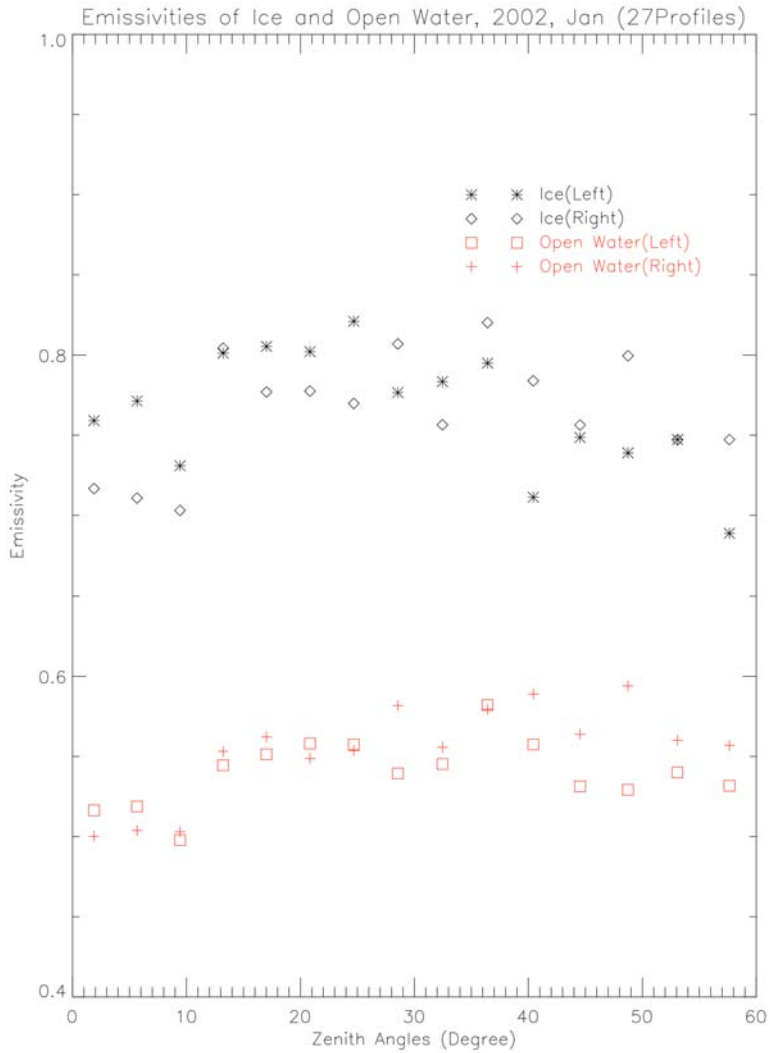
3. Determine emissivities of surface types by solving the linear system in ε_k:

$$\varepsilon = \sum_{i,j} \sum_{k} A_{i,j} \; P_{i,j,k} \; \varepsilon_k$$

for many mesurements for each θ and ν of interest separately.

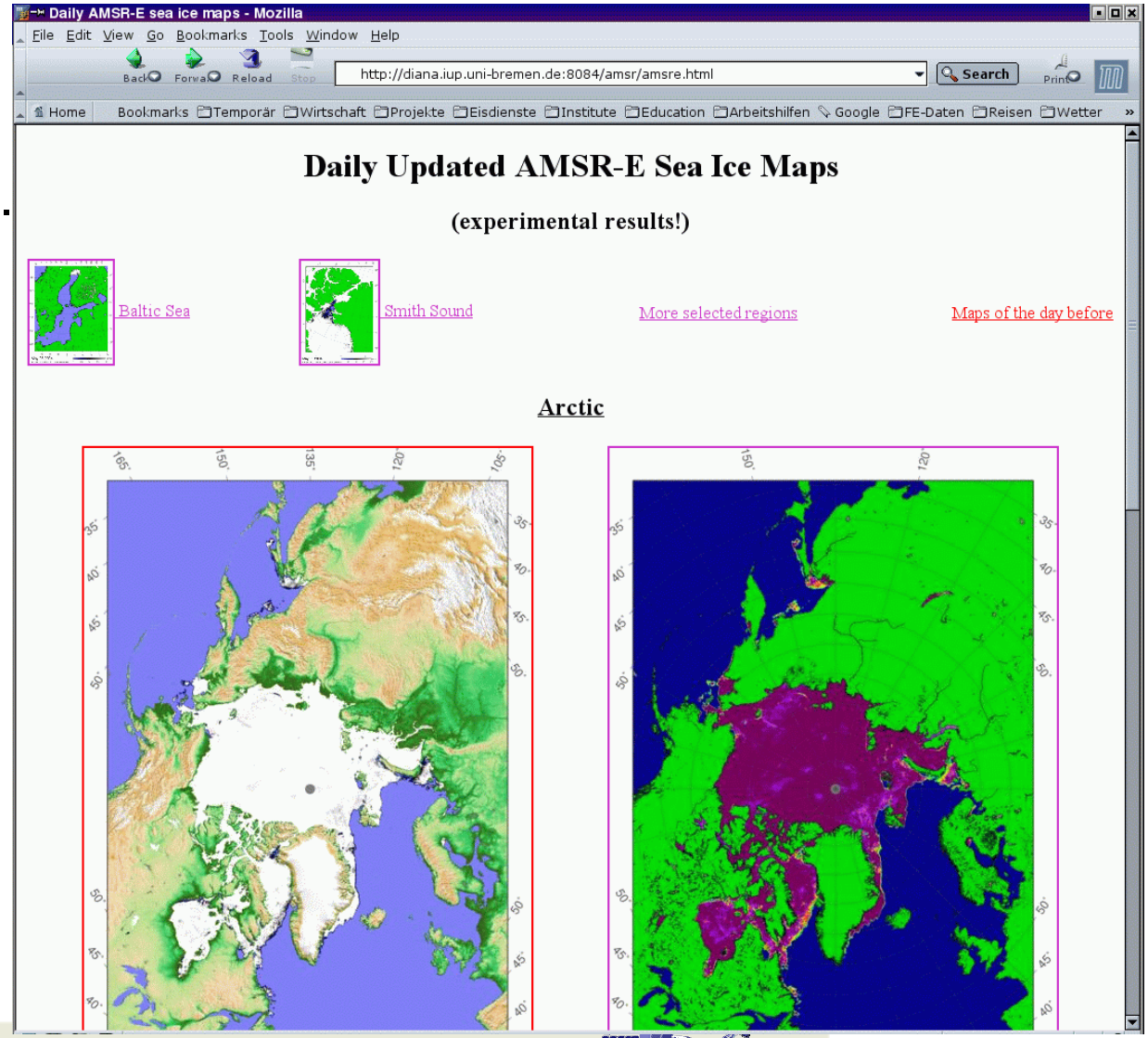
Results

- AMSU-A data 1998-2003 (except 1999) in house
- Radiosonde profiles of R/V Polarstern 1984-2003 provided
- Tool to extract colocations, adjustable tolerances in time (5h) and space (600 km)
- Emissivity at 50.4 GHz, 2 surface types (OW, ice):



Daily AMSR ice charts at www.iup.physik.uni-bremen.de

- NH + SH
- Resolution 6.25 km..
- More selected regions...



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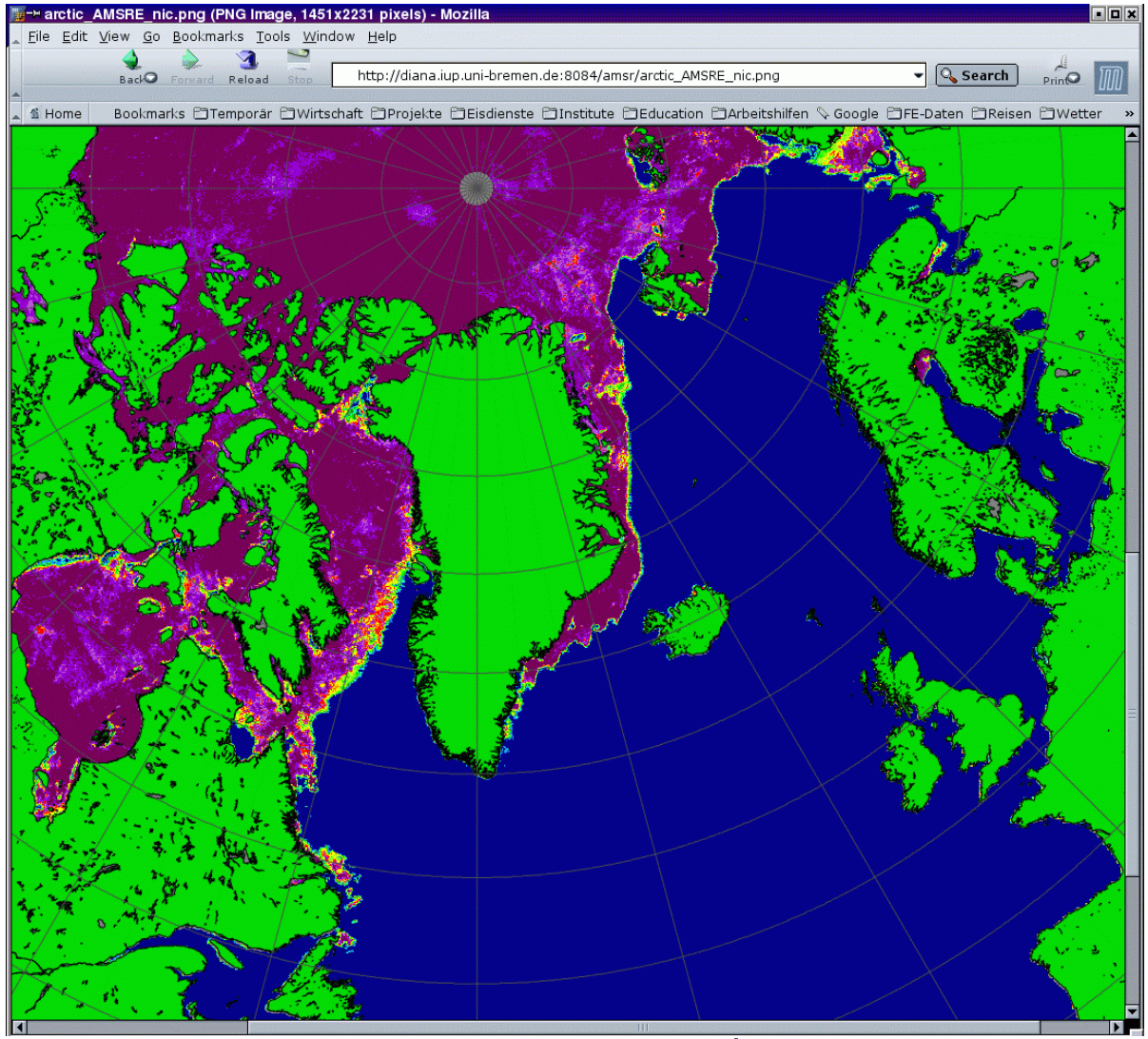

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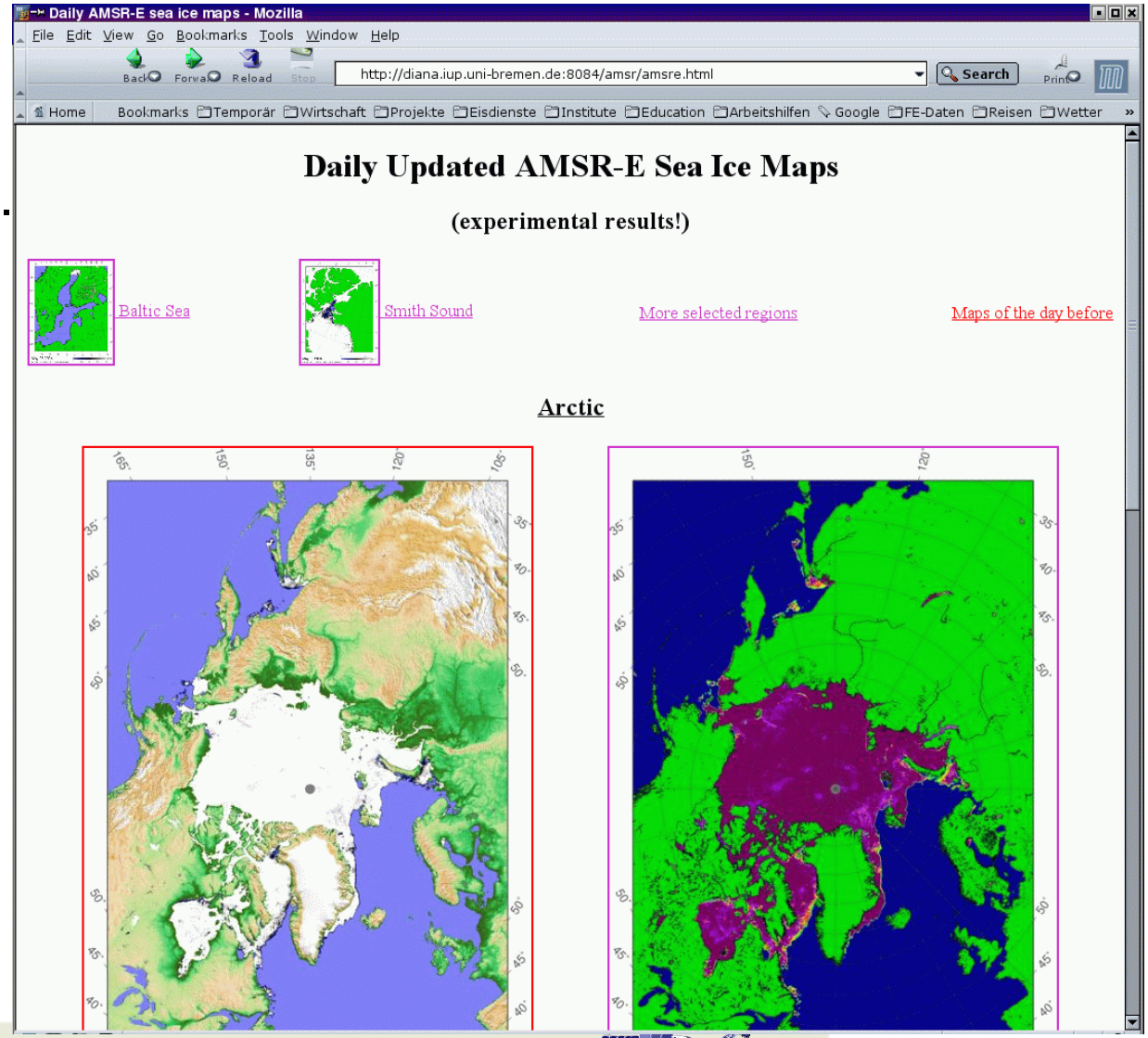

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Daily AMSR ice charts at www.iup.physik.uni-bremen.de

Daily AMSR-E sea ice maps - Regions - Mozilla

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(experimental results, not validated yet!)

Back to main page

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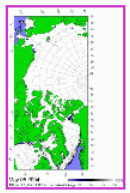
Arctic

North West Passage

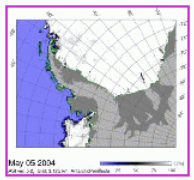


Smith Sound

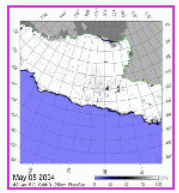
Greenland Sea

Antarctic

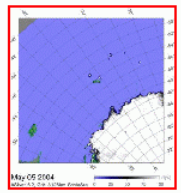
Antarctic Peninsula



Ross Sea

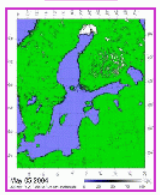


Scotia Sea

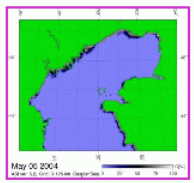


Other Regions

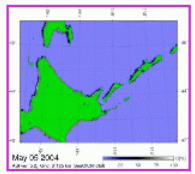
Baltic Sea



Caspian Sea



Sea of Okhotsk



Data archive: Arctic Antarctic

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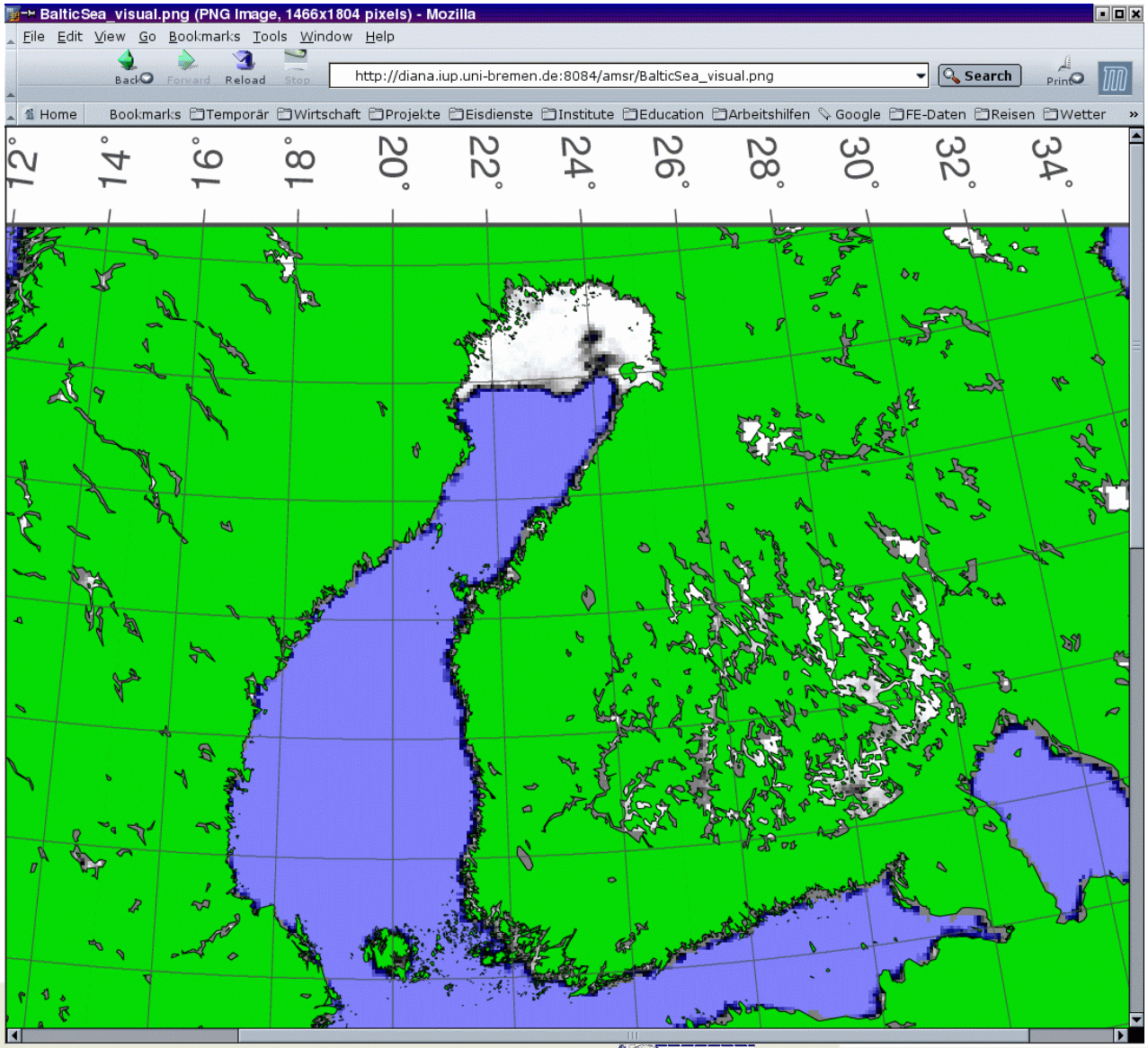
Daily AMSR ice charts at www.iup.physik.uni-bremen.de

Regional maps at 3 km



SSM/I vs. AMSR characteristics

Frequency [GHz]		Resolution [km]	
SSM/I	AMSR(-E)	SSM/I	AMSR(-E)
-	6.9	-	71x41
-	10.7	-	46x25
19	18.7	69x43	25x15
22 V	23.8	50x50	23x14
37	36.5	37x29	14x8
85	89	15x13	6x4
-	50.3 V	-	12x6
-	52.8 V	-	12x6

All channels H + V polarisation if not indicated otherwise.
Channels near 50 GHz on AMSR only.

AOB: IOMASA Follow-On Discussion

Desired?

What to propose?

Possibilities:

- IPY-CARE
- ICEMON
- other ??

IPY-CARE

IPY-CARE - Climate of the Arctic and its Role for Europe – a European component of the International Polar Year

- CARE 2003 unsuccessful IP under Global changes and Ecosystems – Hot spots in the earth system
- Running SSA to prepare IPY-CARE
- 6 modules /expert groups in SSA-CARE / WPs of CARE:
  - M1: Processes determining Arctic climate variability and changes
  - M2: Marine biological processes in response to climate changes
  - **M3: Air-sea-ice meso-scale processes and climate variability**
  - M4: Past climate variability
  - **M5: Remote sensing & new techn for data provision**
  - M6: Assessment of Arctic climate changes, European impacts and socio-economic consequences
- New module? Name?
- Open IPY symposium for IPY-CARE science plan
- SSA-CARE expert meetings for IPY-CARE science plan

ICEMON

ICEMON – Sea ice monitoring for marine operational safety, climate research, environmental management and resource exploitation on Polar Regions

- Implement a coherent European operational oceanography system for the high latitudes, consisting of sea ice, meteorological and ocenaographic services
- Part of GMES Services – Global Monitoring for Environment and Security
- 17 partners, UB new in 2004