Global Fire Monitoring Center

Heat, Drought and Wildland Fires in Eurasia in 2003

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Global Fire Monitoring Center (GFMC)
UN-ISDR Wildland Fire Advisory Group

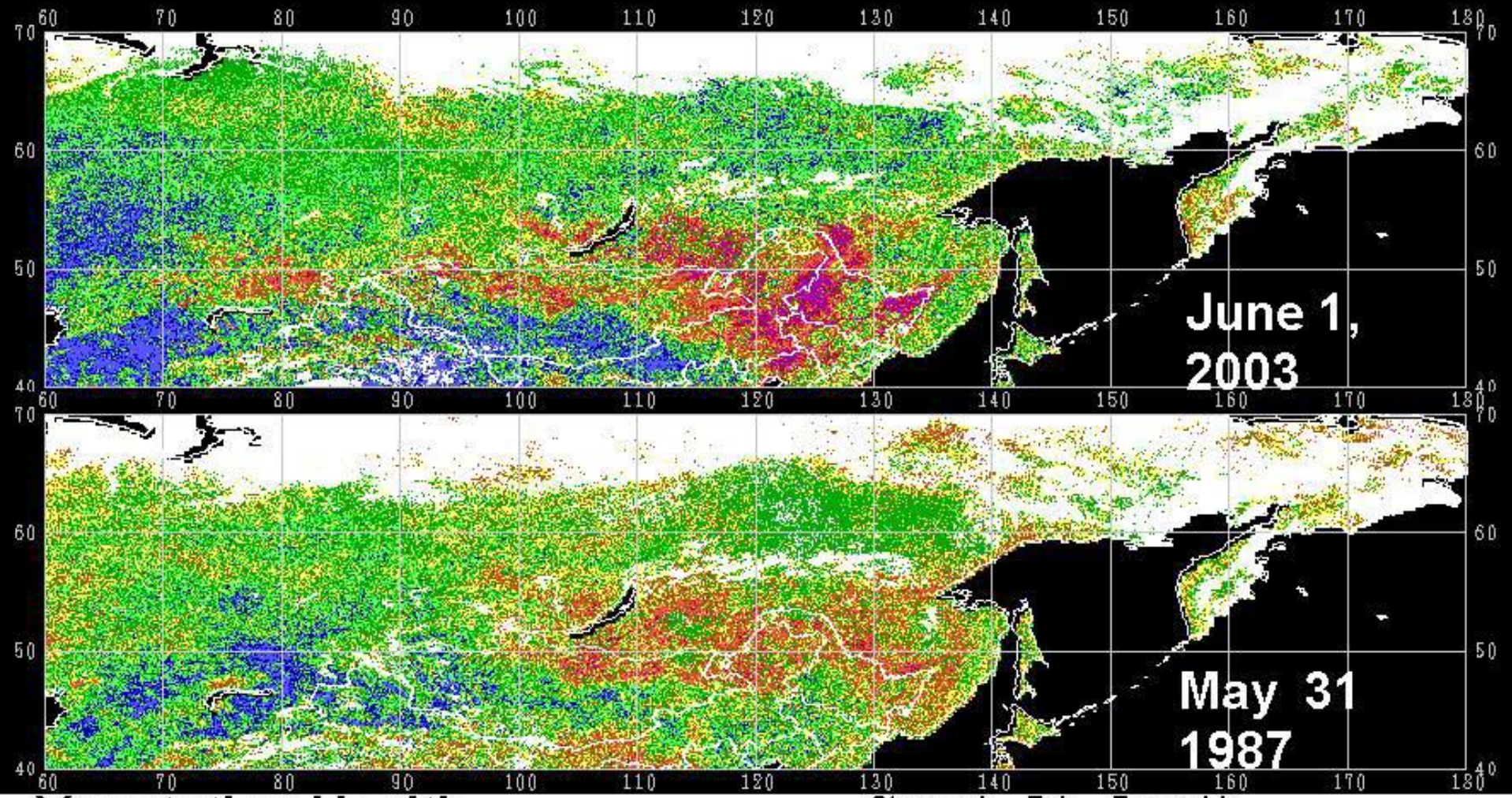
Impacts of the Drought and Heat in 2003 on Forests

17 – 19 November 2004, Freiburg im Breisgau, Germany

- Droughts are associated with an increase in forest fire activity
- Fires are obviously strongly influenced by fuel moisture content
- Drought increases the risk of ignition
- Drought can bring significant changes in fire behaviour
  - ➢larger fires
  - ➢high-severity fires

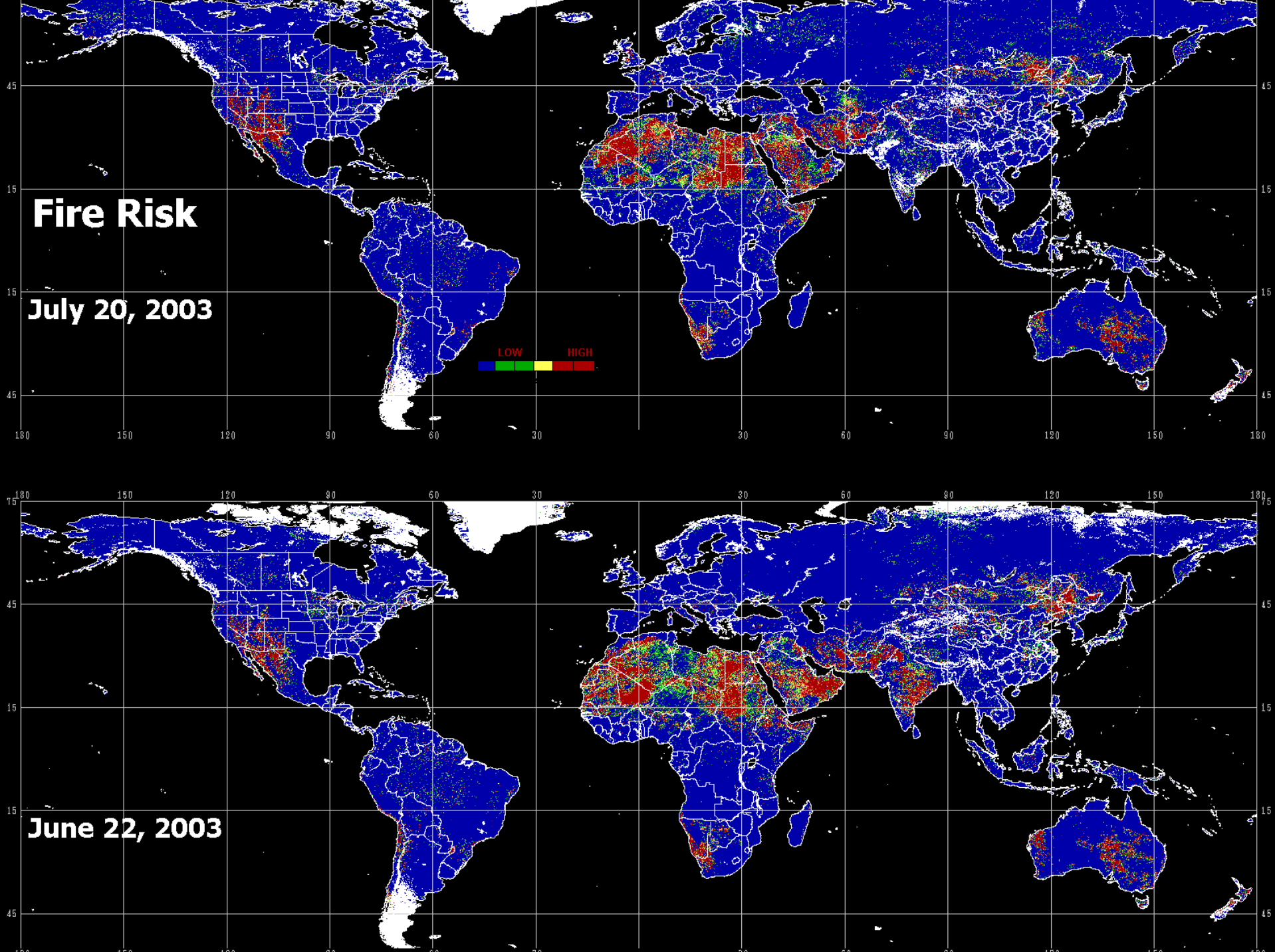
Examples of the 2003 Fire Situation in

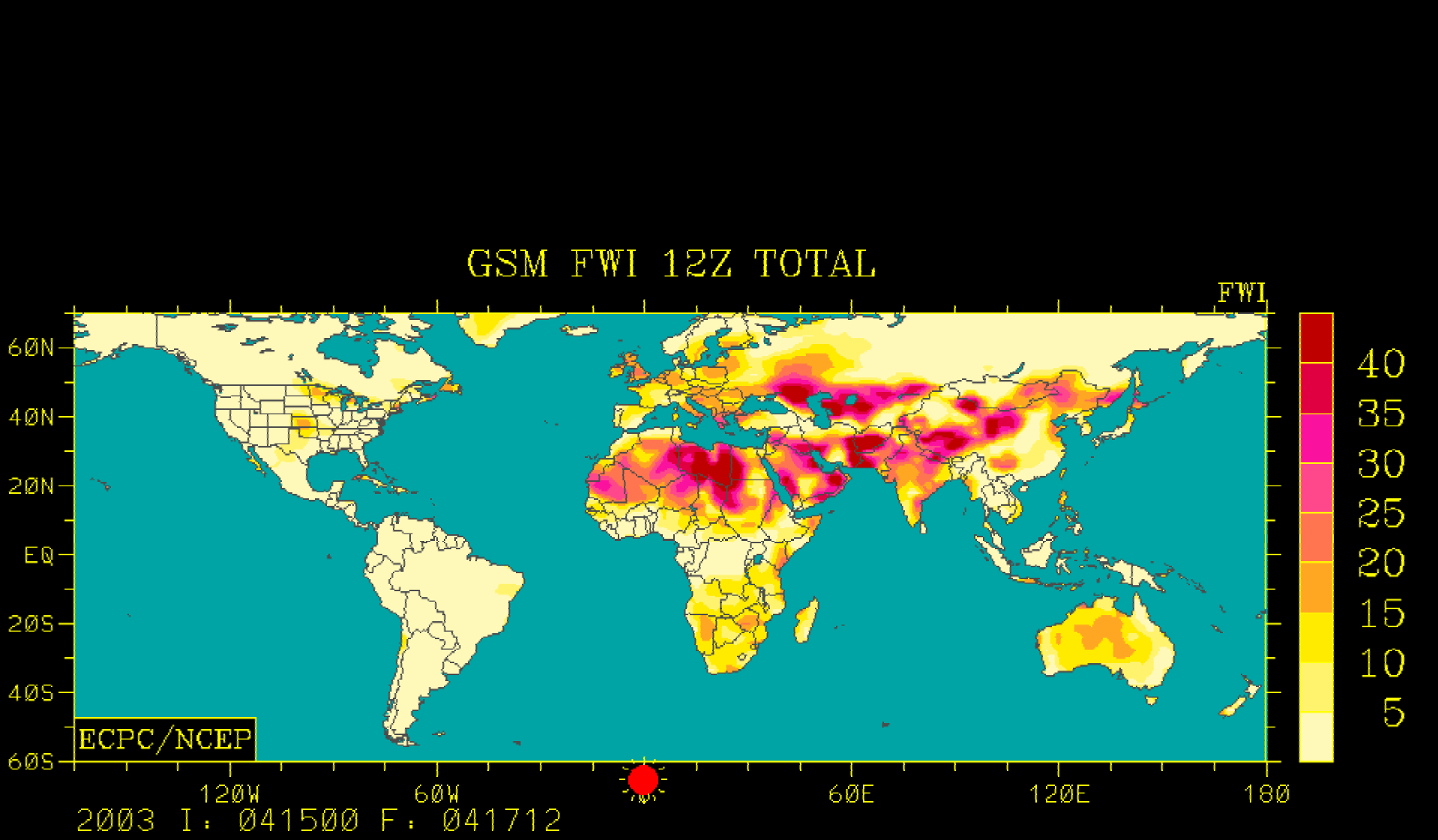
- Russian Federation
- Southern Europe
- Germany

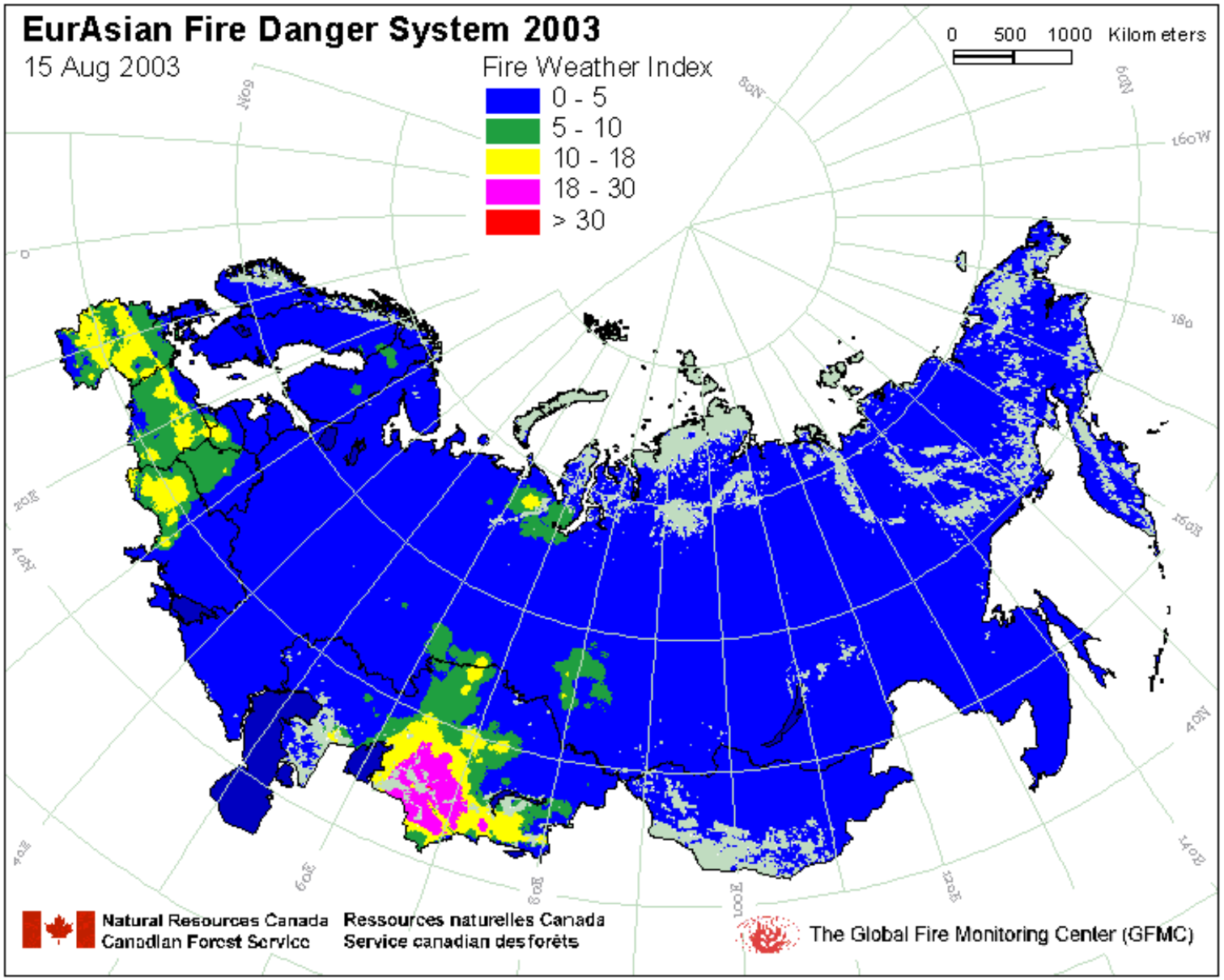


Vegetation Health

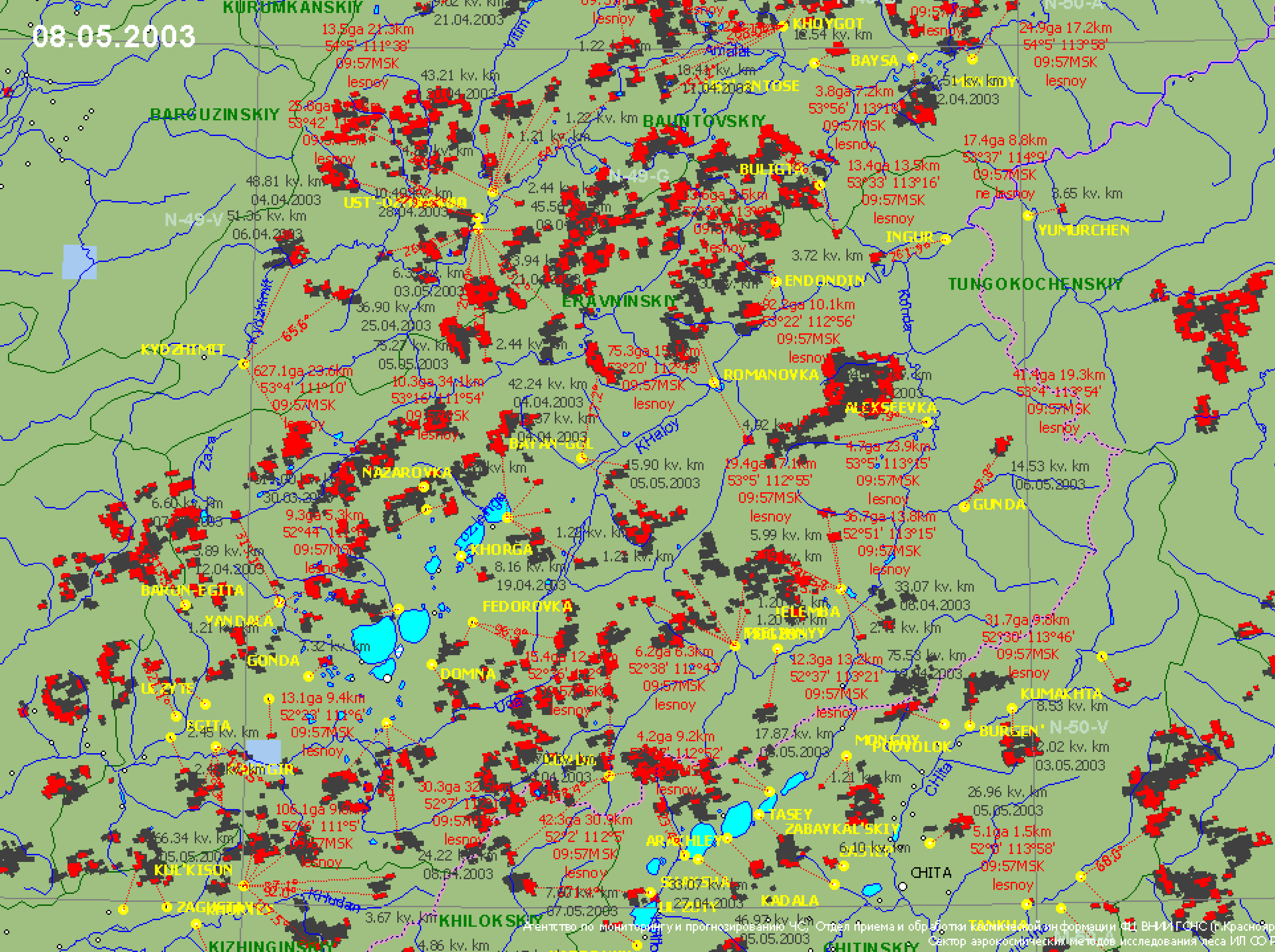
Stressed Fair Favorable

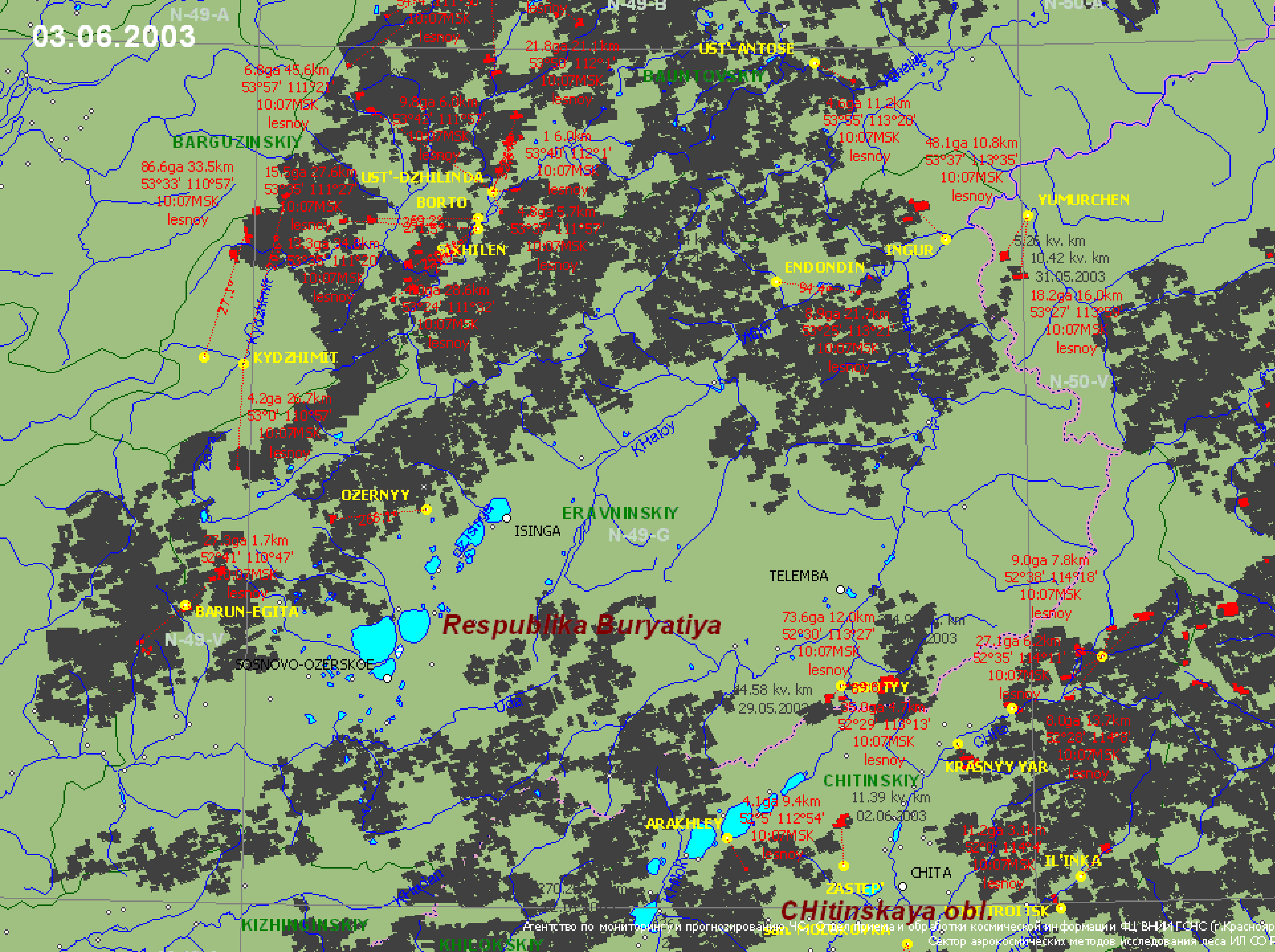

Fire Risk
July 20, 2003
LOW
HIGH
June 22, 2003


GSM FWI 12Z TOTAL
FWI
60N
40N
20N
EQ
20S
40S
60S
120W
60W
0
60E
120E
180
40
35
30
25
20
15
10
5
ECPC/NCEP
2003 I: 041500 F: 041712

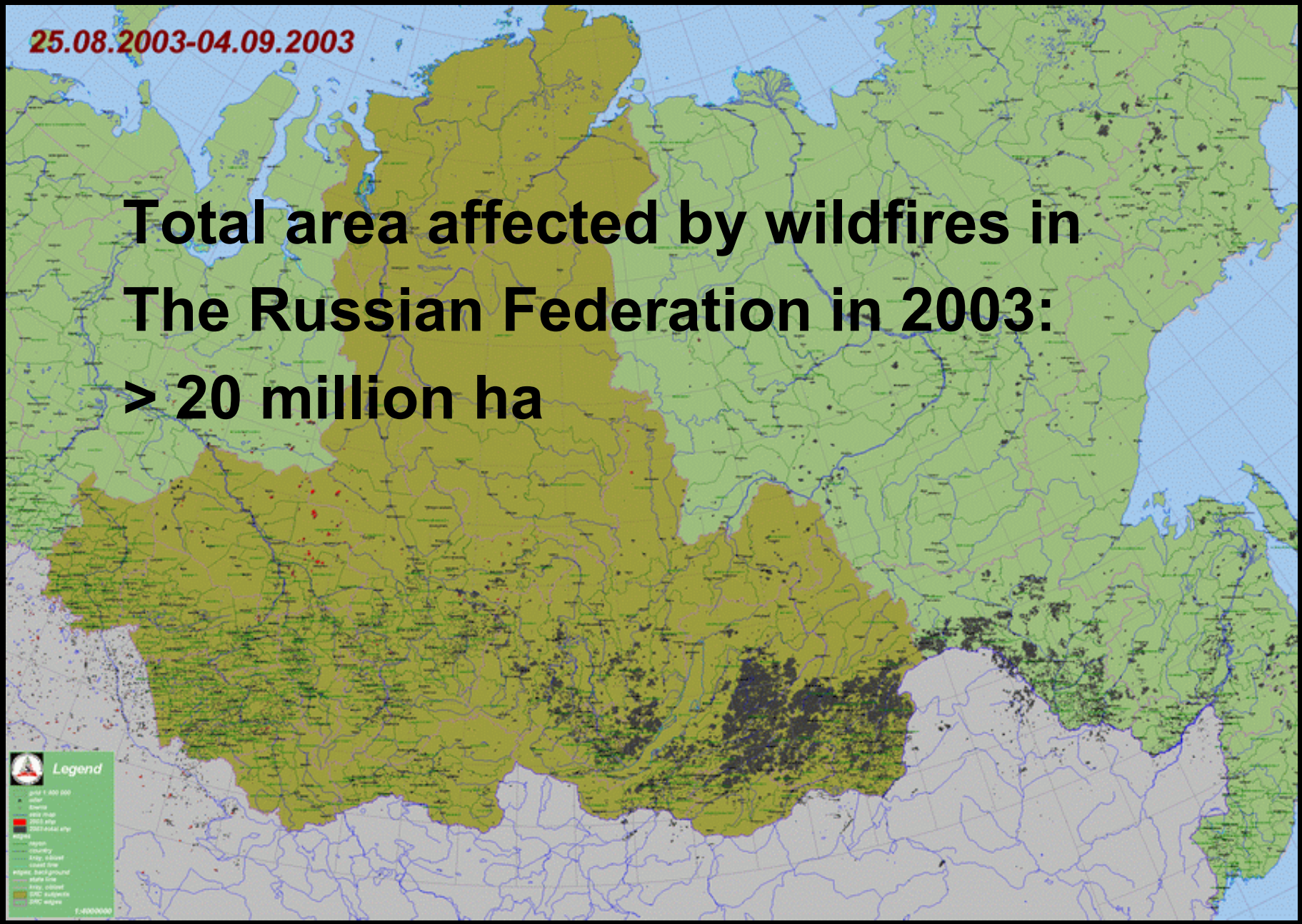

EurAsian Fire Danger System 2003
15 Aug 2003
Fire Weather Index
0 - 5
5 - 10
10 - 18
18 - 30
> 30
0 500 1000 Kilometers
Natural Resources Canada
Canadian Forest Service
Ressources naturelles Canada
Service canadian des forêts
The Global Fire Monitoring Center (GFMC)


14 May 2003
Transbaikal Region, Russian Federation


08.05.2003
KURUMKANSKIY
BARGUZINSKIY
BAUNTOVSKIY
ERAVNINSKIY
TUNGOKOCHENSKIY
KHILOKSKIY
KIZHINGINSKIY
ZABAYKAL'SKIY
CHITINSKIY
KHOYGOT
BAYSA
BULIGTA
INGUR
YUMURCHEN
ENDONDIN
ROMANOVKA
ALEKSEEVKA
GUNDA
KYDZHIMIT
BAYAN-GOL
NAZAROVKA
KHORGA
FEDOROVKA
BARUN-EGITA
YANDALA
GONDA
DOMNA
ULZYTE
EGITA
KUMAKHTA
BURGEN'
TASEY
ARAKHLEY
KADALA
KUL'KISON
ZAGUSTAY
CHITA
N-49-V
N-49-G
N-50-V
13.5ga 21.3km
54°5' 111°38'
09:57MSK
lesnoy
24.9ga 17.2km
54°5' 113°58'
09:57MSK
lesnoy
25.8ga
53°42'
3.8ga 7.2km
53°56' 113°18'
09:57MSK
lesnoy
17.4ga 8.8km
53°37' 114°9'
09:57MSK
ne lesnoy
13.4ga 13.5km
53°33' 113°16'
09:57MSK
lesnoy
92.2ga 10.1km
53°22' 112°56'
09:57MSK
lesnoy
75.3ga
09:57MSK
lesnoy
627.1ga 23.6km
53°4' 111°10'
09:57MSK
lesnoy
10.3ga 34.1km
53°16' 111°54'
09:57MSK
lesnoy
41.4ga 19.3km
53°4' 113°54'
09:57MSK
lesnoy
4.7ga 23.9km
53°5' 113°15'
09:57MSK
lesnoy
19.4ga 17.1km
53°5' 112°55'
09:57MSK
lesnoy
36.7ga 13.8km
52°51' 113°15'
09:57MSK
lesnoy
9.3ga 5.3km
09:57MSK
lesnoy
31.7ga 9.8km
52°30' 113°46'
09:57MSK
lesnoy
6.2ga 6.3km
52°38' 112°47'
09:57MSK
lesnoy
12.3ga 13.2km
52°37' 113°21'
09:57MSK
lesnoy
15.4ga
09:57MSK
lesnoy
13.1ga 9.4km
09:57MSK
lesnoy
4.2ga 9.2km
lesnoy
30.3ga
09:57MSK
lesnoy
106.1ga
52°6' 111°5'
09:57MSK
lesnoy
42.3ga 30.9km
52°2' 112°5'
09:57MSK
lesnoy
5.1ga 1.5km
09:57MSK
lesnoy
21.04.2003
43.21 kv. km
30.04.2003
1.22 kv. km
1.21 kv. km
48.81 kv. km
04.04.2003
51.36 kv. km
06.04.2003
28.04.2003
2.44 kv. km
45.56
3.72 kv. km
3.65 kv. km
6.36 kv. km
03.05.2003
36.90 kv. km
25.04.2003
05.05.2003
42.24 kv. km
04.04.2003
15.90 kv. km
05.05.2003
14.53 kv. km
06.05.2003
5.99 kv. km
33.07 kv. km
06.04.2003
30.03.2003
6.60 kv. km
3.89 kv. km
12.04.2003
8.16 kv. km
19.04.2003
1.21 kv. km
1.20 kv. km
2.45 kv. km
75.53 kv. km
8.53 kv. km
17.87 kv. km
03.05.2003
2.02 kv. km
03.05.2003
26.96 kv. km
05.05.2003
6.10 kv. km
66.34 kv. km
05.05.2003
24.22 kv. km
08.04.2003
27.04.2003
07.05.2003
3.67 kv. km
4.86 kv. km
05.05.2003
Агентство по мониторингу и прогнозированию ЧС, Отдел приема и обработки космической информации ФЦ ВНИИ ГОЧС (г.Красноярск)
Сектор аэрокосмических методов исследования леса ИЛ СО РАН



03.06.2003
N-49-A
N-49-B
BARGUZINSKIY
BAUNTOVSKIY
UST'-ANTOSE
UST'-DZHILINDA
BORTO
SAXHILEN
ENDONDIN
INGUR
YUMURCHEN
KYDZHIMIT
OZERNYY
ISINGA
ERAVNINSKIY
N-49-G
N-50-V
KHaloy
TELEMBA
Respublika Buryatiya
BARUN-EGITA
N-49-V
SOSNOVO-OZERSKOE
Uda
CHITINSKIY
KRASNYY YAR
ARAKHLEY
CHITA
IL'INKA
ZASTEP'
CHitinskaya obl.
KIZHINGINSKIY
KHILOKSKIY
6.8ga 45.6km 53°57' 111°21' 10:07MSK lesnoy
9.8ga 6.0km 53°42' 111°57' 10:07MSK lesnoy
21.8ga 21.1km 53°50' 112°1' 10:07MSK lesnoy
86.6ga 33.5km 53°33' 110°57' 10:07MSK lesnoy
15.5ga 27.6km 53°35' 111°27' 10:07MSK lesnoy
13.3ga 34.8km 53°35' 111°20' 10:07MSK lesnoy
4.0ga 28.6km 53°24' 111°32' 10:07MSK lesnoy
4.8ga 5.7km 53°37' 111°57' 10:07MSK lesnoy
4.6ga 11.2km 53°55' 113°20' 10:07MSK lesnoy
48.1ga 10.8km 53°37' 113°35' 10:07MSK lesnoy
5.26 kv. km
10.42 kv. km
31.05.2003
18.2ga 16.0km 53°27' 113°58' 10:07MSK lesnoy
8.9ga 21.7km 53°25' 113°21' 10:07MSK lesnoy
4.2ga 26.7km 53°0' 110°57' 10:07MSK lesnoy
27.3ga 1.7km 52°41' 110°47' 10:07MSK lesnoy
9.0ga 7.8km 52°38' 114°18' 10:07MSK lesnoy
73.6ga 12.0km 52°30' 113°27' 10:07MSK lesnoy
27.1ga 6.2km 52°35' 114°11' 10:07MSK lesnoy
14.58 kv. km
29.05.2003
35.0ga 4.7km 52°29' 113°13' 10:07MSK lesnoy
8.0ga 13.7km 52°28' 114°8' 10:07MSK lesnoy
11.39 kv. km
02.06.2003
4.1ga 9.4km 52°5' 112°54' 10:07MSK lesnoy
11.2ga 3.1km 52°0' 114°4' 10:07MSK lesnoy
Агентство по мониторингу и прогнозированию ЧС. Отдел приема и обработки космической информации ФЦ ВНИИ ГОЧС (г.Краснояр
Сектор аэрокосмических методов исследования леса ИЛ СО Р


25.08.2003-04.09.2003
Total area affected by wildfires in The Russian Federation in 2003:
> 20 million ha
Legend


GFMC Verification mission
September 2003

Extreme spring fire severity in the Trans-Baikal Region due lack of precipitation between August 2002 and May 2003

Buryatia Republic: 36.0 mm

Chita Oblast: 45.7 mm

Large fires as a consequence of economically motivated arson, to satisfy the markets in China and Korea with salvage-logged timber

- illegal logging
- corruption

Research Issues:

Restoration of prescribed burning on grass lands

Example: Chita, Buryatia and Amur regions

1993-1996 - annual average between 1.0-4.0 mln ha

1997 - 4.2 mln ha

1998 - 3.9 mln ha

1999 - 1.4 mln ha

2000 - 1.3 mln ha

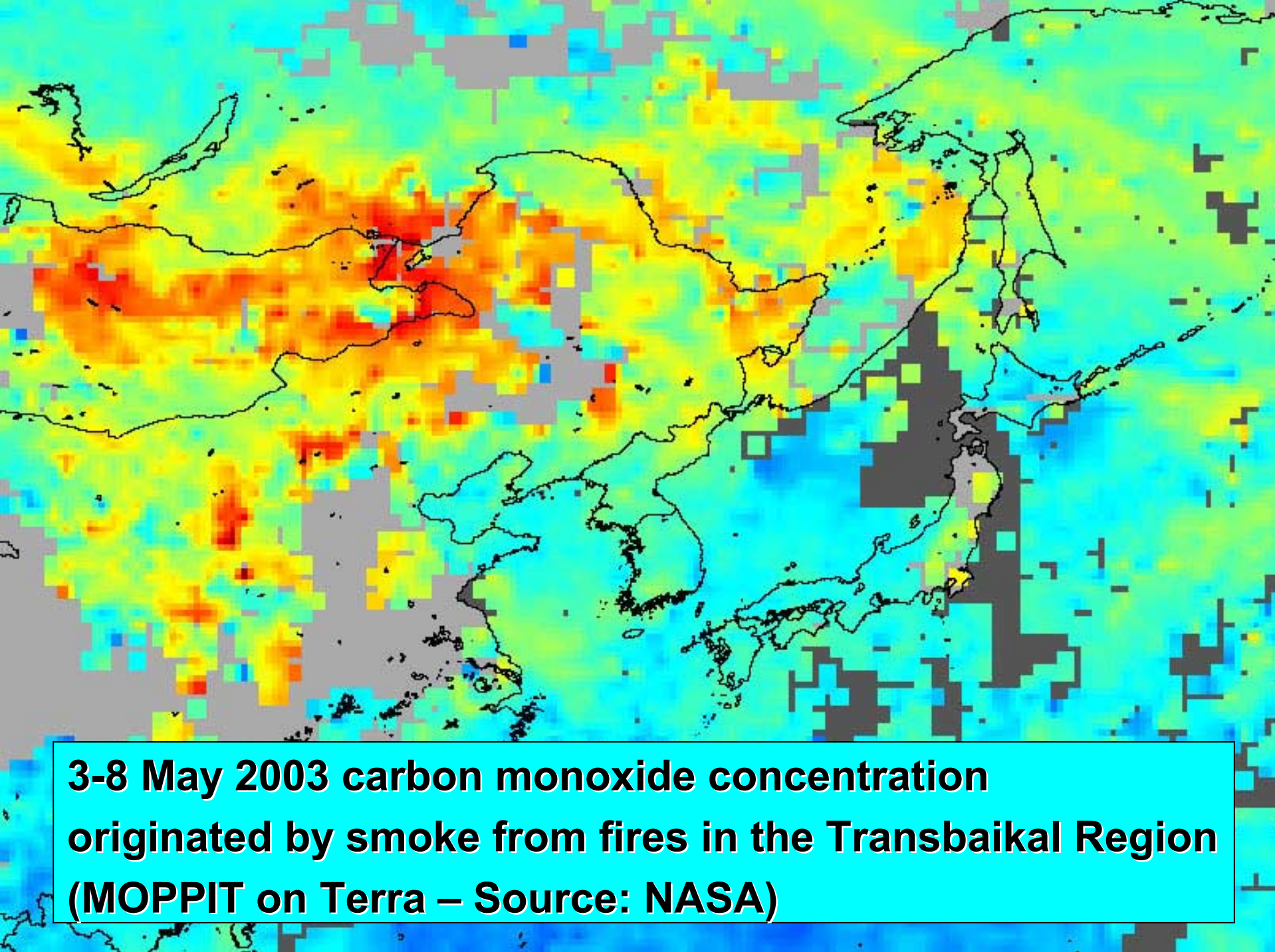
2001 - 0.05 mln ha

2002 - 0.04 mln ha

2003 - 0.06 mln ha

8 May 2003

Smoke from fires in the Transbaikal Region, extending to Sakhalin, Japan, Alaska and Europe



3-8 May 2003 carbon monoxide concentration originated by smoke from fires in the Transbaikal Region (MOPPIT on Terra – Source: NASA)

Global Fire Monitoring Center

International Strategy for Disaster Reduction

Consequences at Global Level

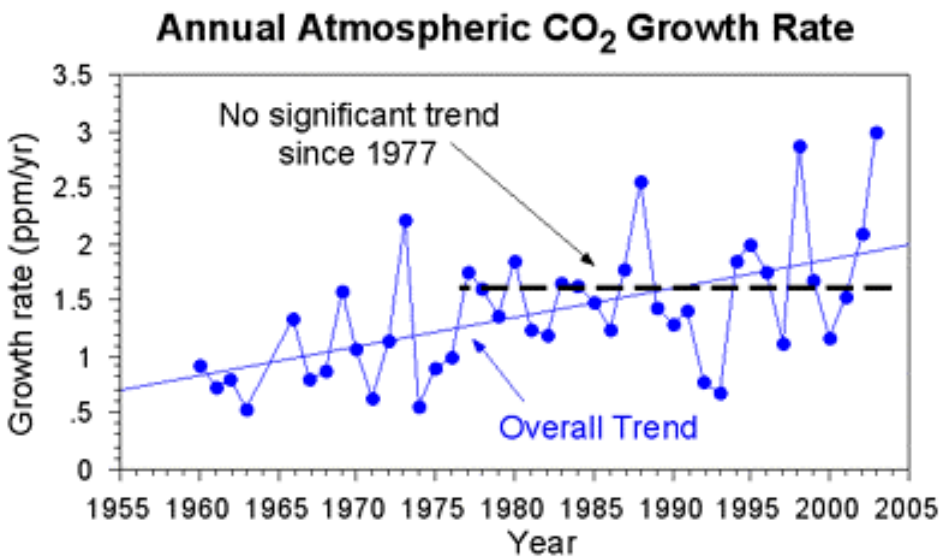
Unprecedented increase of atmospheric CO_2 concentration: A consequence of the extended vegetation fires in the Transbaikal Region?

Mauna Loa Observations:

2002: + 2.08 ppm
2003: + 2.54 ppm

August 2002: 371.49 ppm
August 2003: 374.50 ppm

➢ **Δ = 3.01** ppm



Southern Europe

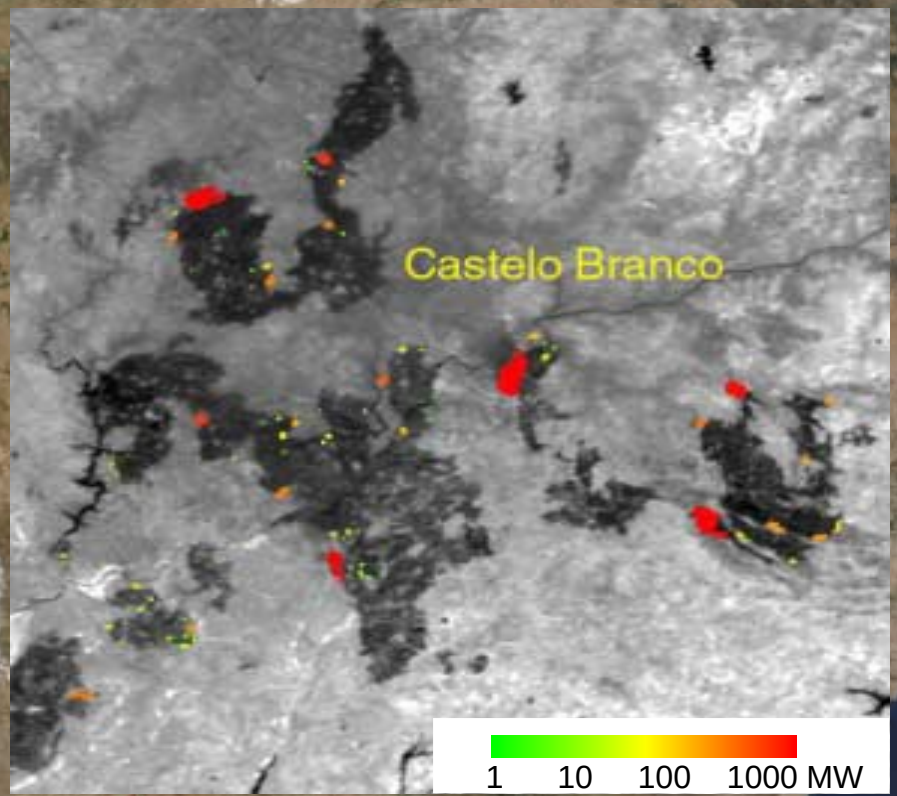
Total area burned in the EU Mediterranean countries:
740,000 ha (see presentation of S. Miguel et al.)

Underlying causes:

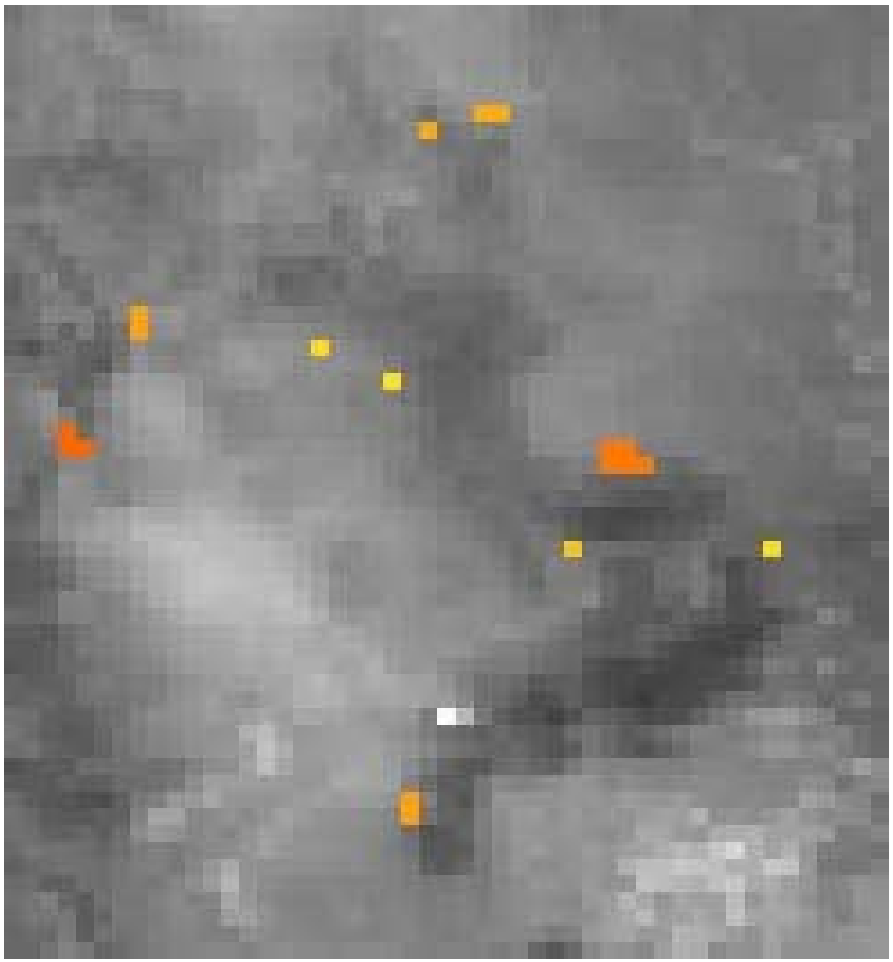
- Rural exodus, migration
- Land-use change (less intensive utilization of phytomass, e.g. for cooking, heating; pastoralism ...)
  - ➢ Increase of fuel loads / fire hazard
- Land mines (Balkans)

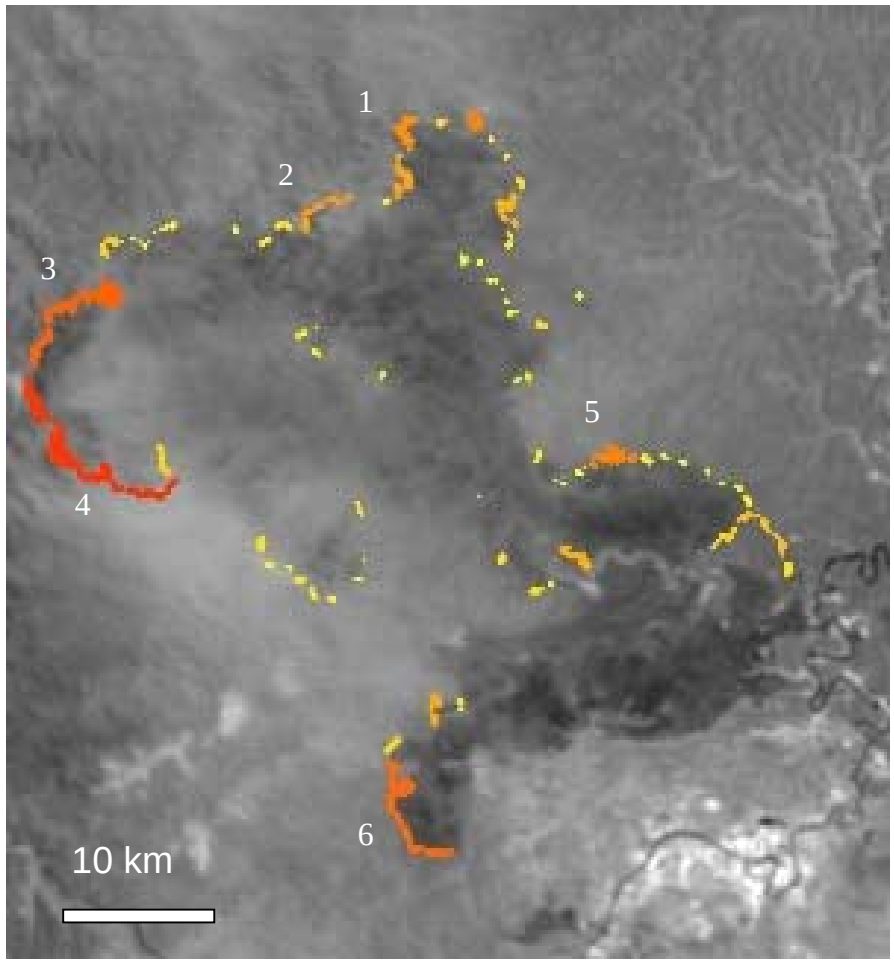
Portugal 2003 – Unprecedented Fire Intensities and Severities

BIRD scenes of opportunity were used by Portuguese authorities for decision support

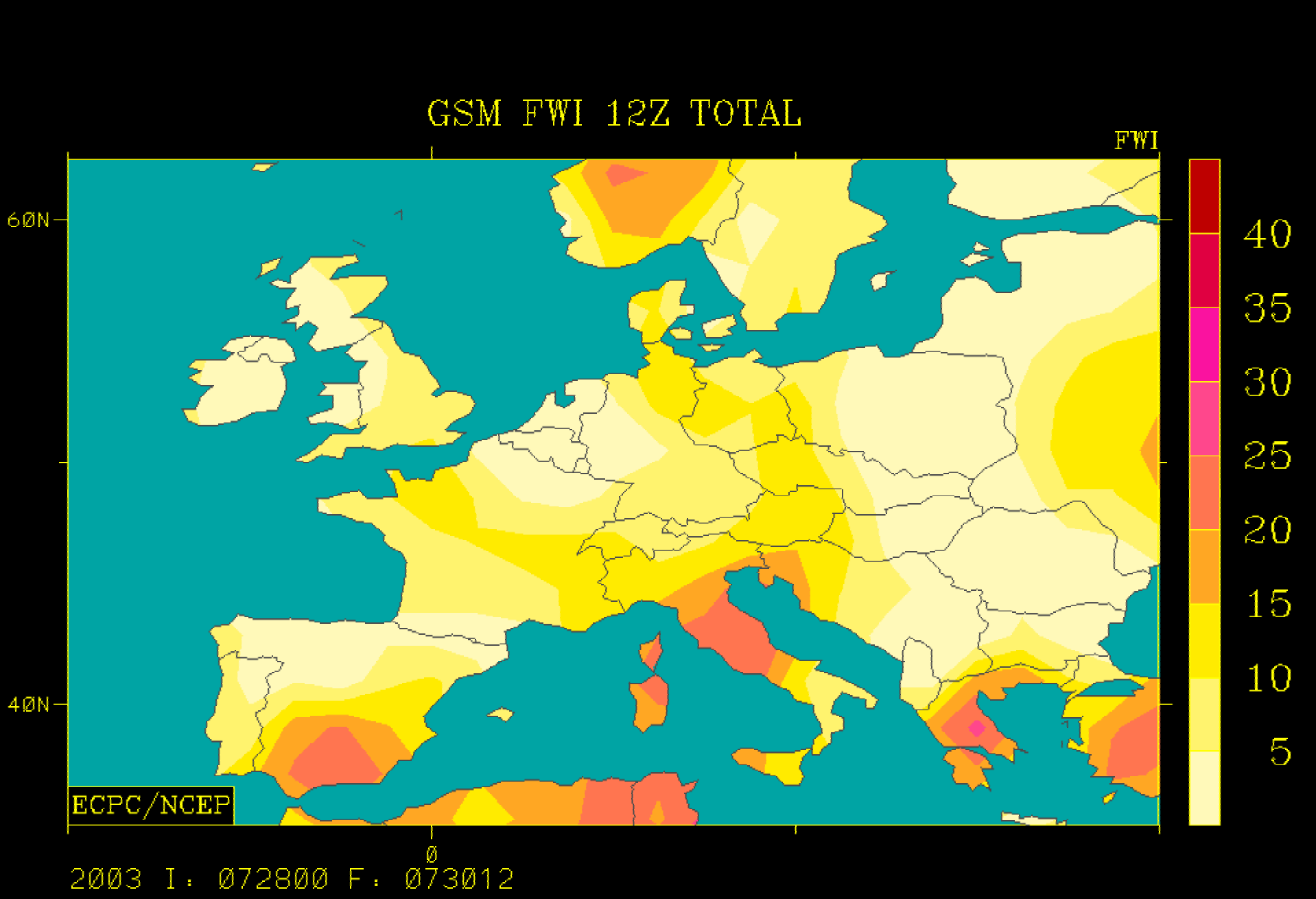


Sensors: MODIS, BIRD





Fragments of bush fire images in Australia obtained by MODIS and BIRD on 5 January 2002: hot clusters are projected on the 0.9 μm band images


GSM FWI 12Z TOTAL
FWI
40
35
30
25
20
15
10
5
60N
40N
0
ECPC/NCEP
2003 I: 072800 F: 073012

Germany 2003

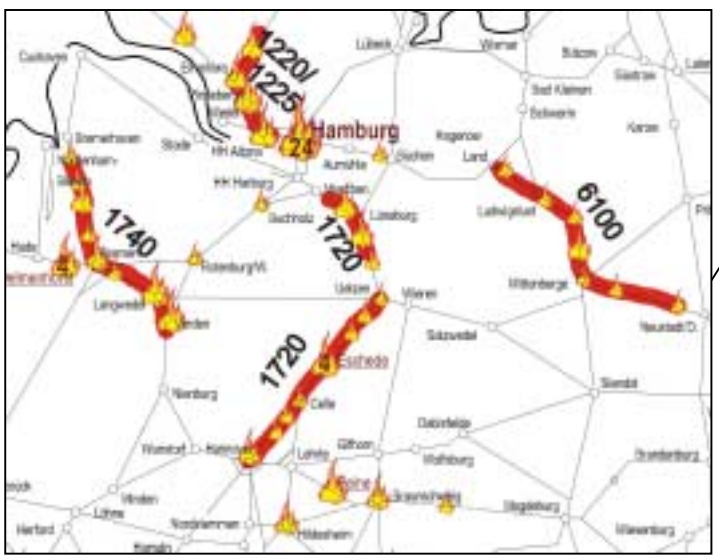
- 2003 (and before): average area burned per fire < 1 ha
- High efficiency of voluntary rural fire brigades
- Forest road network, vicinity to infrastructures allowing fast response
- However, extensive pine forests on sandy sites, in combination with very low precipitation in the summer months, resulted in high fire danger

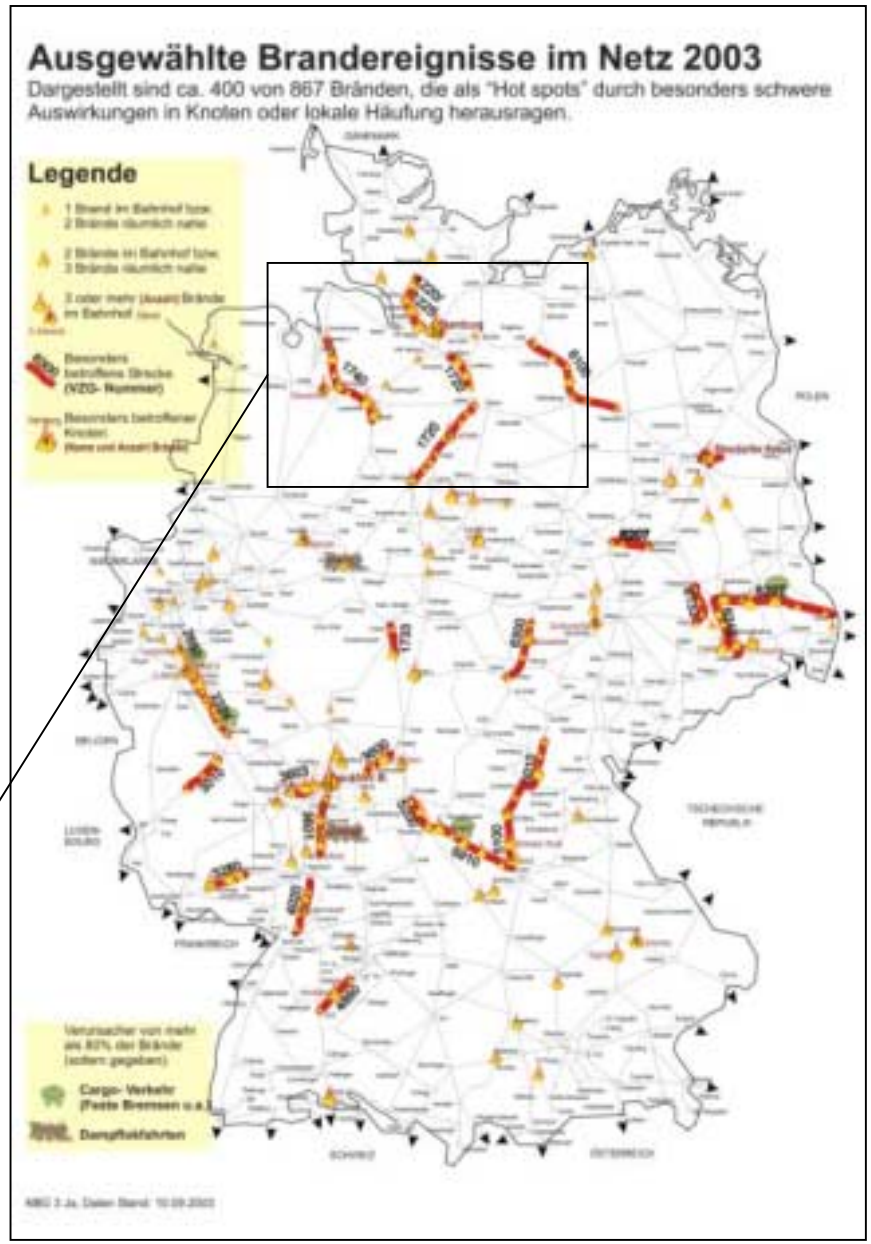
Global Fire Monitoring Center

International Strategy for Disaster Reduction

German Railways as a Source of Ignition

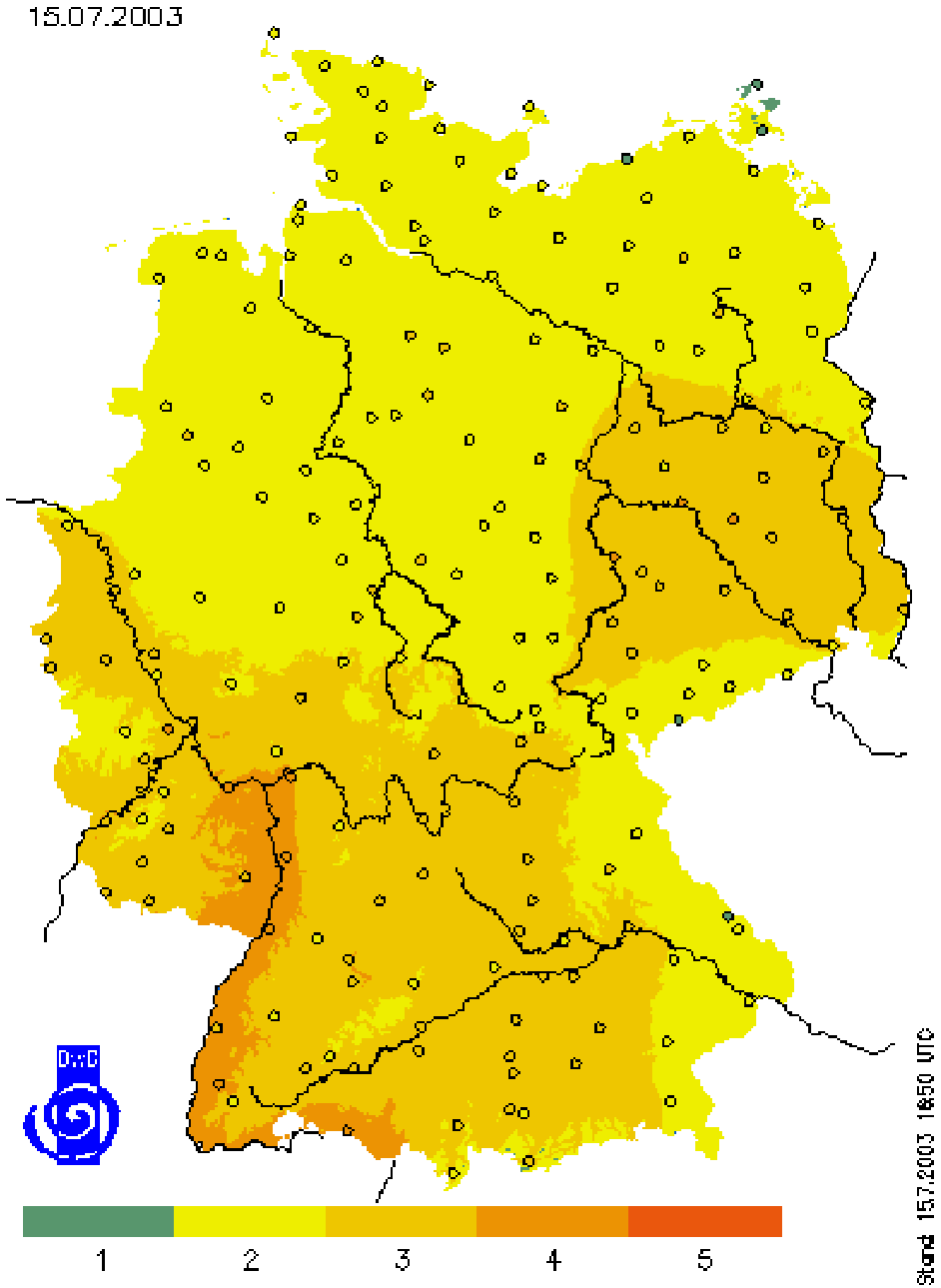
Example: Increased ignitions in 2003 in Northwest Germany





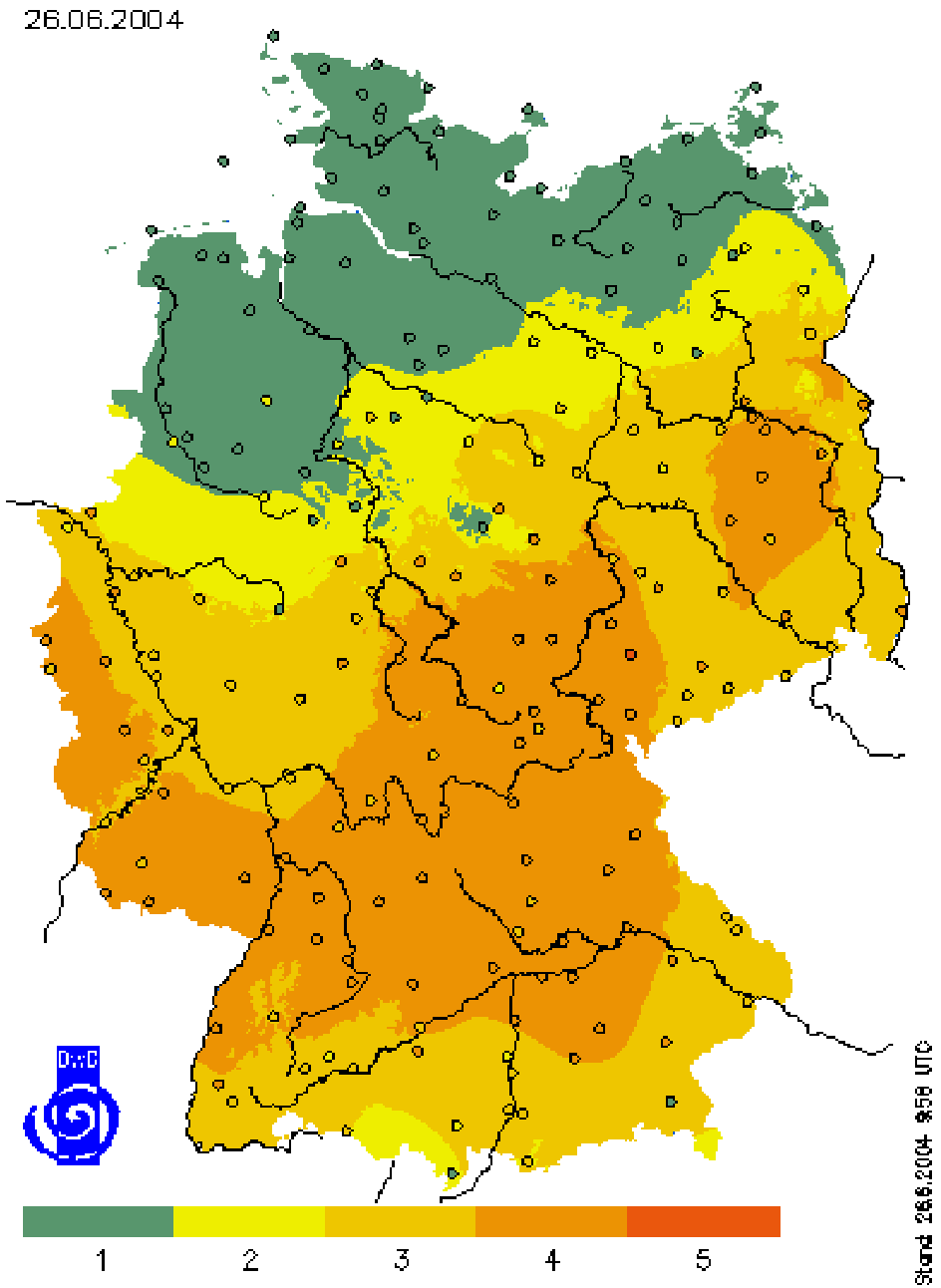
DWD
Forest Fire
Danger Index

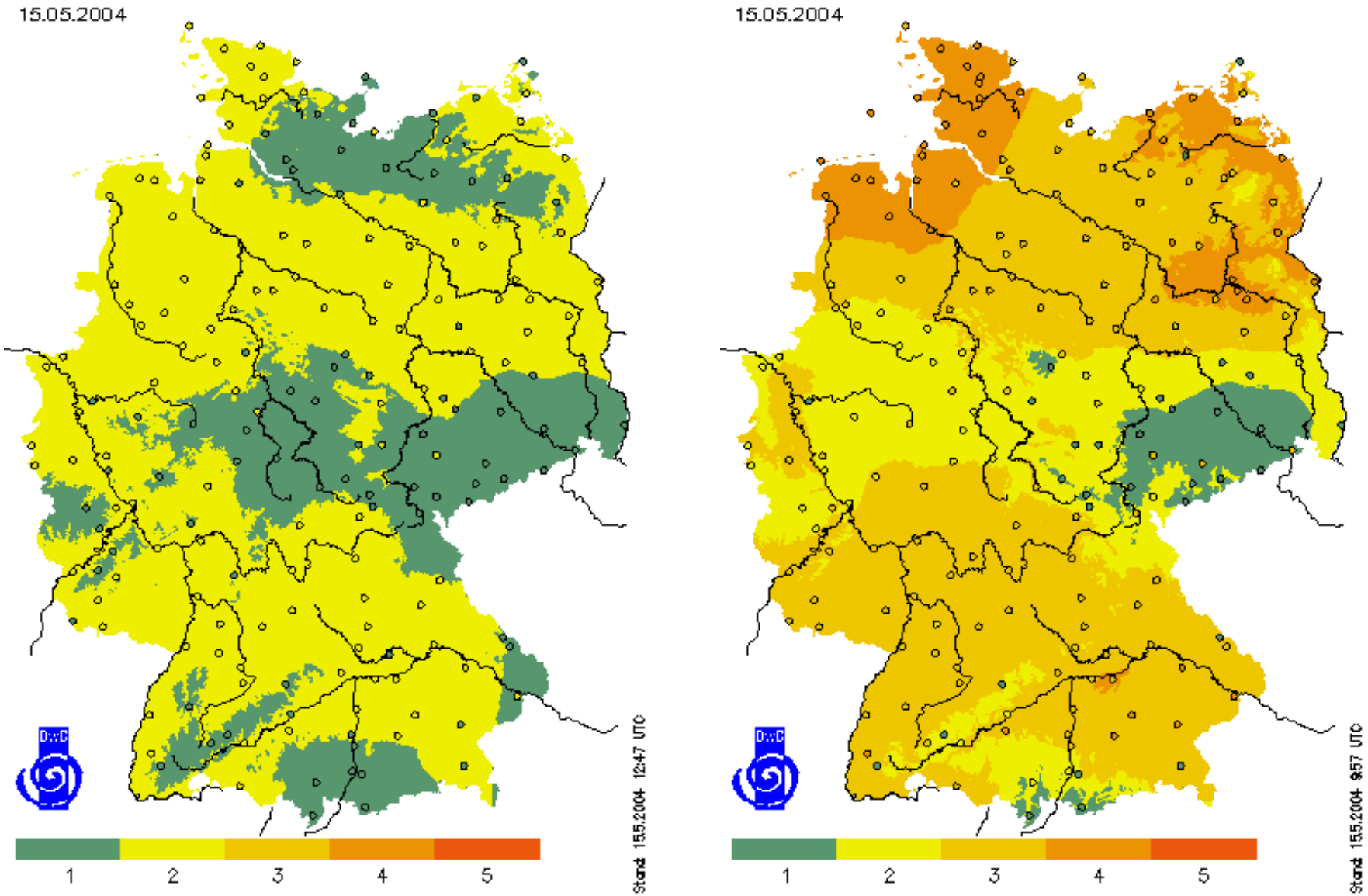
2003



DWD Experimental Grassland Fire Danger Index

2004





Example - Comparison between the DWD Forest Fire Index (left) vs. Experimental Grassland Fire Index (right), 15 May 2004

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Thanks for your attention