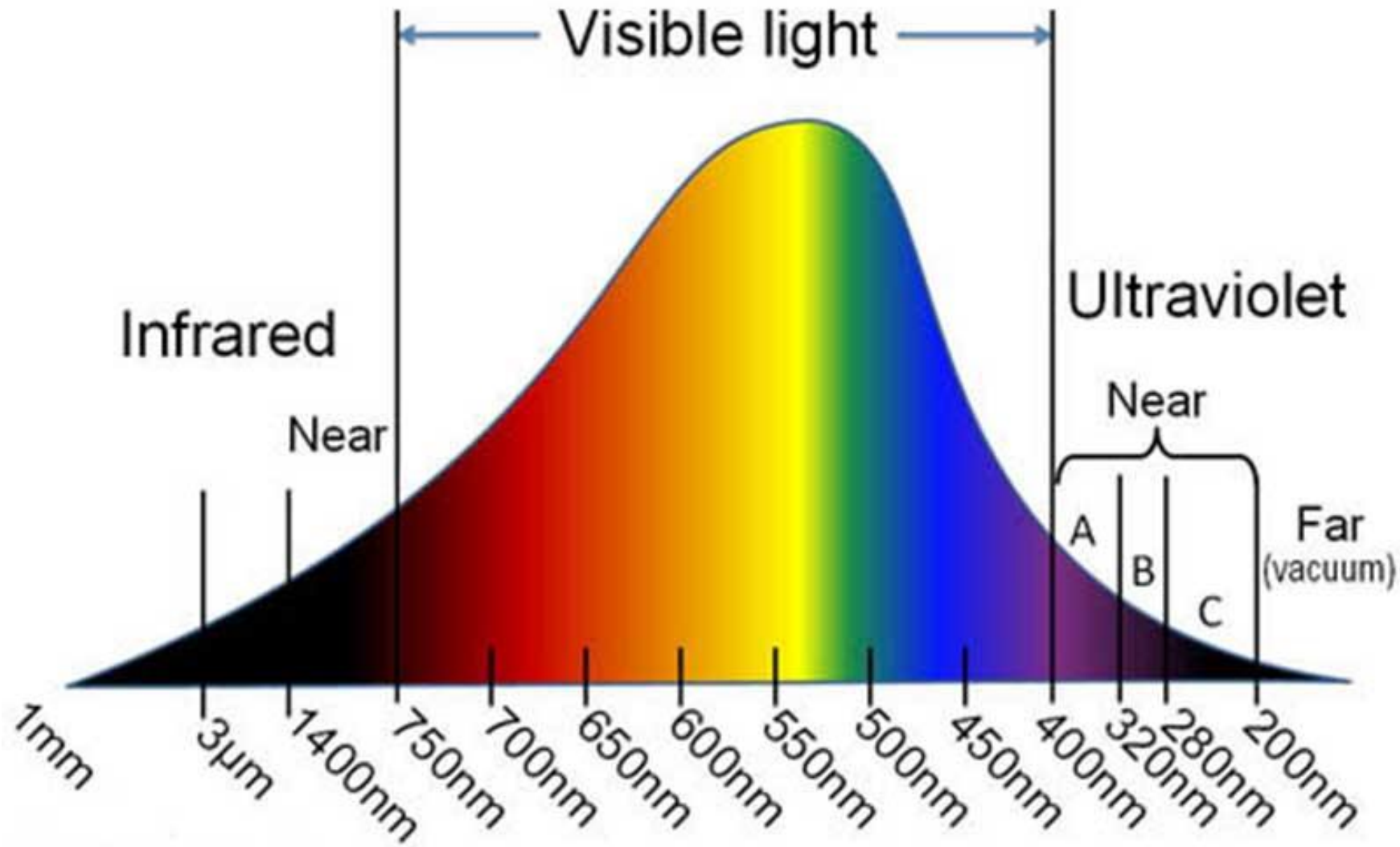
UV sončno sevanje, zaščitna ozonska plast in UV indeks

Agencija RS za okolje, Tanja Cegnar

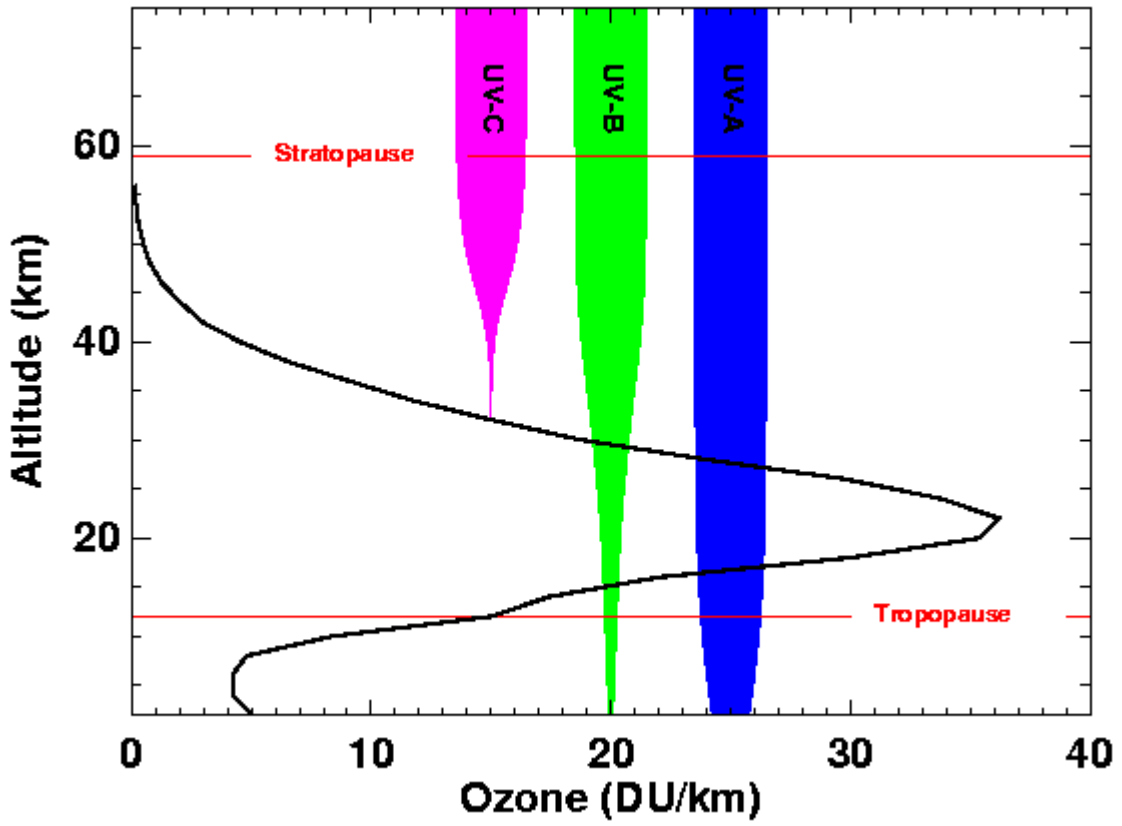

Visible light
Infrared
Near
Ultraviolet
Near
A
B
C
Far
(vacuum)
1mm
3µm
1400nm
750nm
700nm
650nm
600nm
550nm
500nm
450nm
400nm
320nm
280nm
200nm

UV sončno sevanje ločimo na tri spektralne pasove:

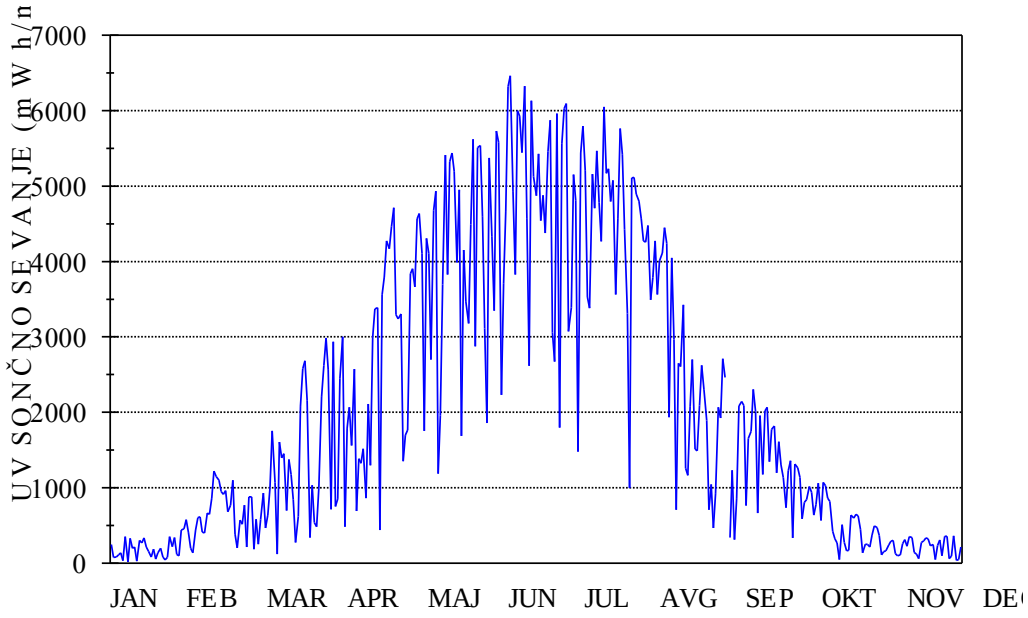
U**VC** del ima valovno dolžino med 100 in 280 nm, ta del sončnega sevanja povsem vpijejo molekule kisika in ozona in ne pride do tal;

UVB del z valovno dolžino med 280 in 315 nm (nekateri avtorji postavljajo mejo pri 320 nm) večinoma vpijejo molekule ozona in do tal prodre le manjši del tega sevanja;

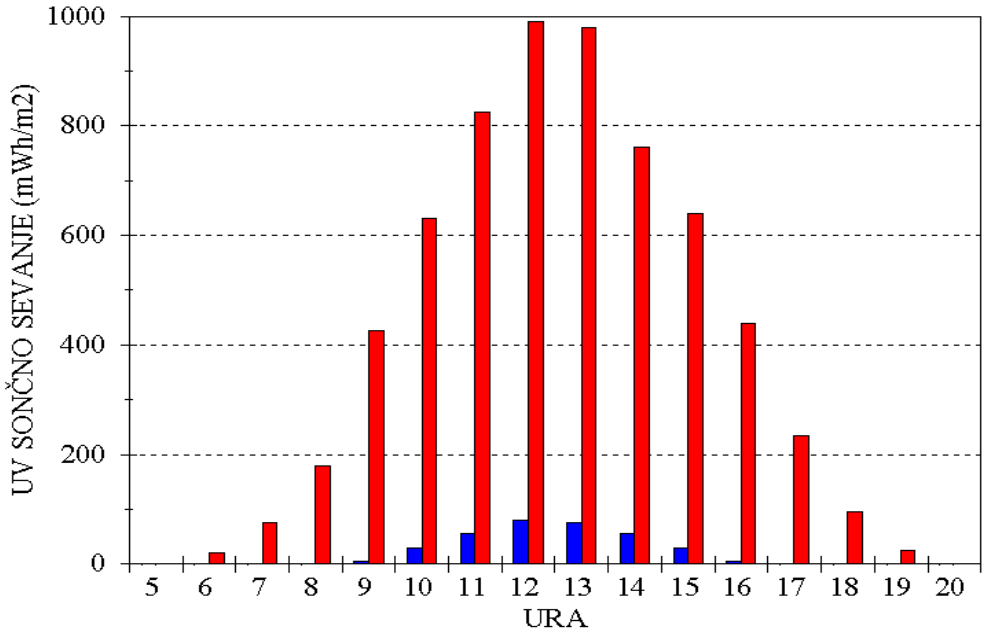
UVA del z valovno dolžino med 315 in 400 nm skoraj v celoti prispe do tal, saj ga ne vpijata niti ozon niti kisik.



Razmerje december – junij/julij



Dnevni potek



Sestava ozračja (masni delež):

Dušik	76 %
Kisik	23 %
Argon	1,3 %
Vodna para	do največ nekaj %

Ozon zelo malo, a je zelo pomemben!

200 – 500 DU (2 do 5 mm pri 0 °C na morski gladini)

Zaščitna ozonska plast

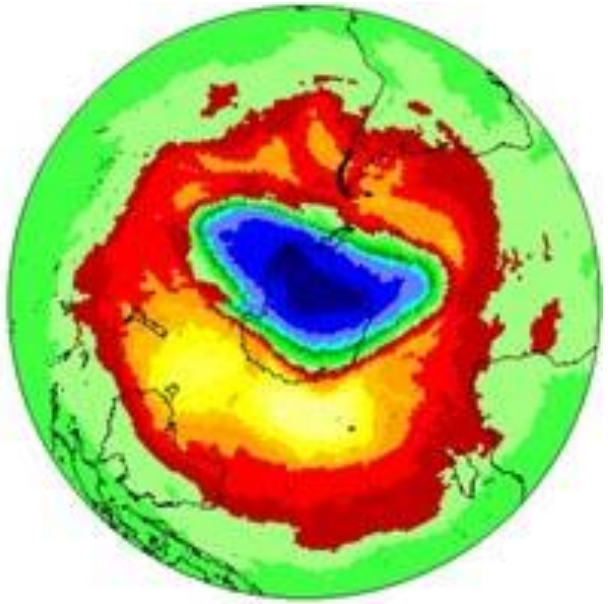
Razporejen je v plasti med 10 in 50 km - največ med 19 in 23 km

Debelino ozonske plasti podajamo z Dobsonovimi enotami

Če bi ves ozon v ozračju zbrali na morski gladini pri temperaturi 0 °C, bi dobili komaj 2 do 5 mm debelo plast

Varuje nas pred nevarnim delom UV sevanja

Posledica nižje koncentracije ozona v stratosferi so močnejši UV žarki pri tleh (stanjšanje ozonske plasti za 1 % pomeni 1,3 % okrepitev UV sončnega sevanja pri tleh)



Razporeditev ozona v ozračju je odvisna od:
nadmorske višine,
zemljepisne širine,
letnega časa,
ure,
zračnih tokov (višinski grebeni, doline)
temperature ozračja in plinov, ki sodelujejo v fotokemičnih reakcijah

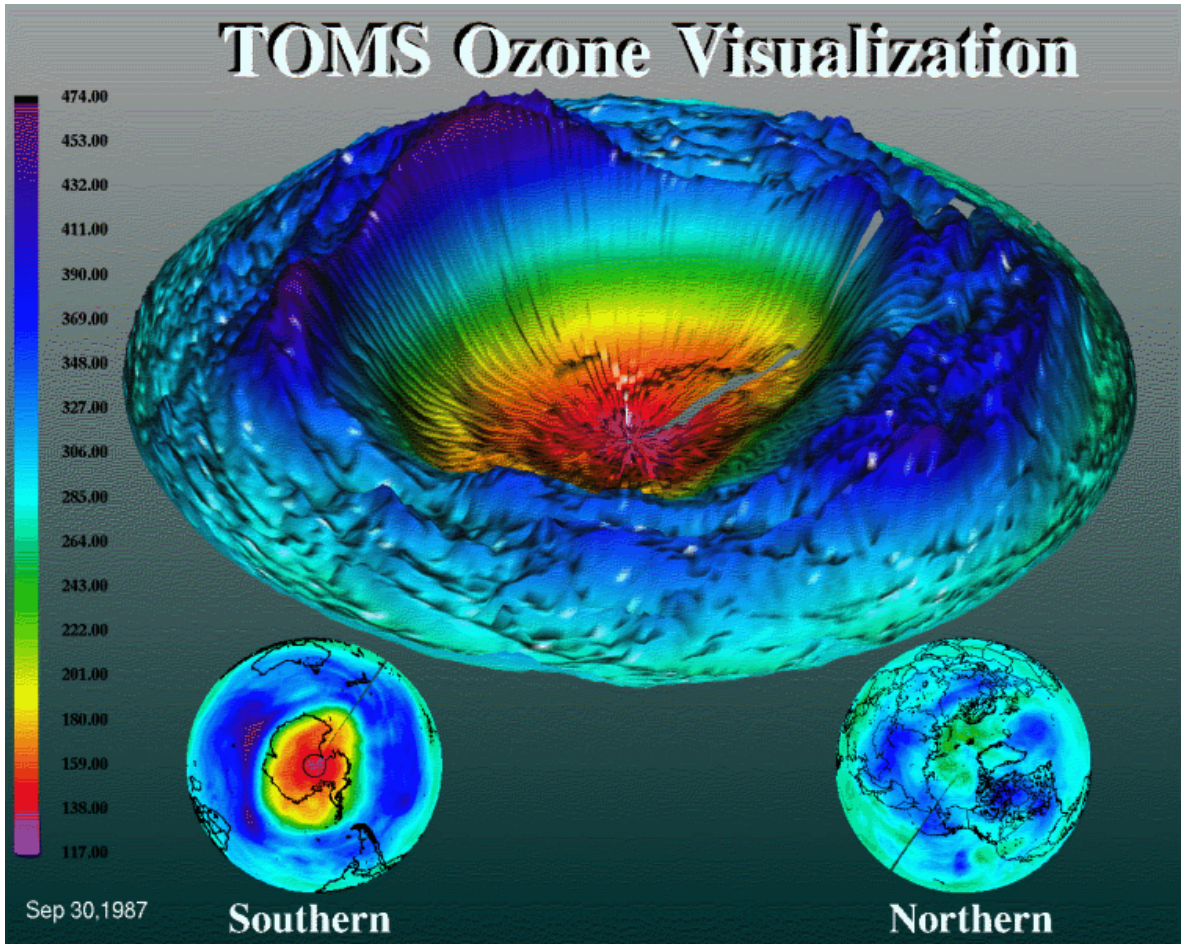
Ozonska luknja

- Nedvomno jo pripisujemo prisotnosti klorovih in fluorovih spojin v ozračju (v naravi teh snovi ne najdemo, naredil jih je človek)
- Je sezonski pojav, geografsko je ostro omejena in odločilno vpliva na delež UV-B sončnih žarkov, ki desežejo tla

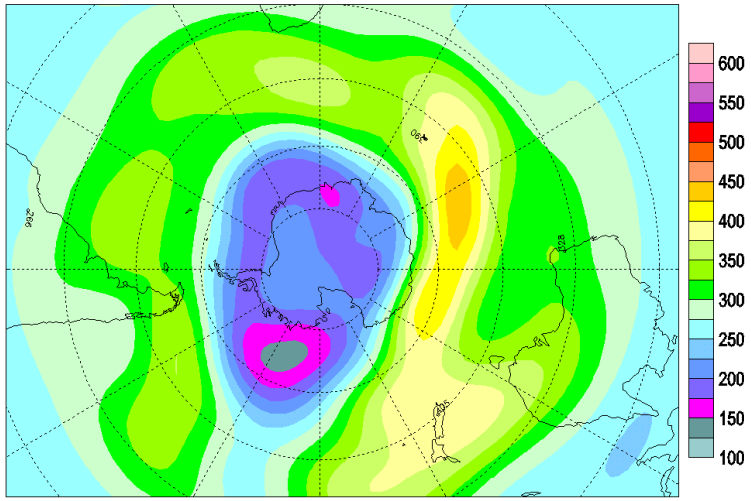
Ozonska luknja je odvisna od podnebnih razmer (zračnih tokov nad poloma)

- Bolj izrazita je nad Antarktiko – posledica razmerja in razporeditve kopno : ocean na južni polobli
- Iz leta v leto se po obsegu in obliki razlikuje
- Manjši negativni trend v debelini ozonske plasti so opazili tudi v zmernih širinah severne poloble

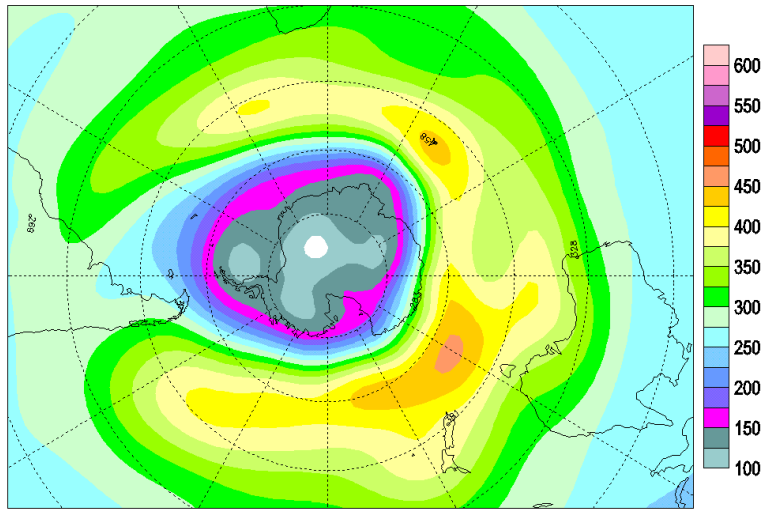
Prikazi ozonske luknje, od kod ime ozonska luknja?



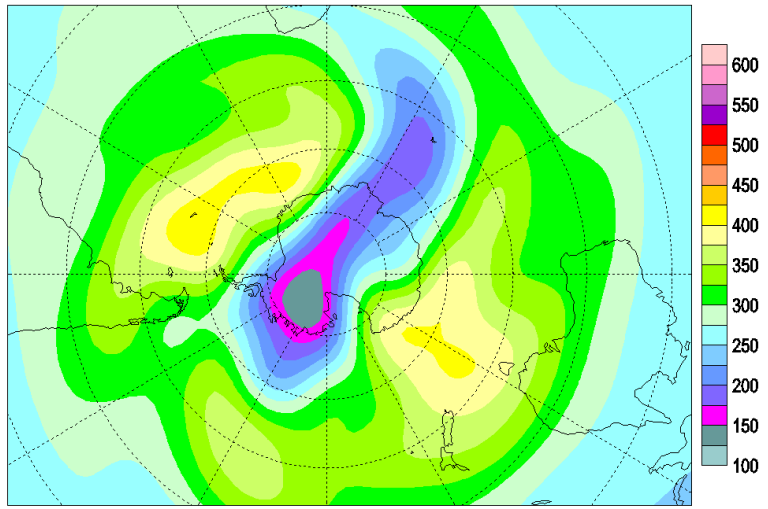
Total ozone (DU) / Ozone total (UD), 2003/09/01

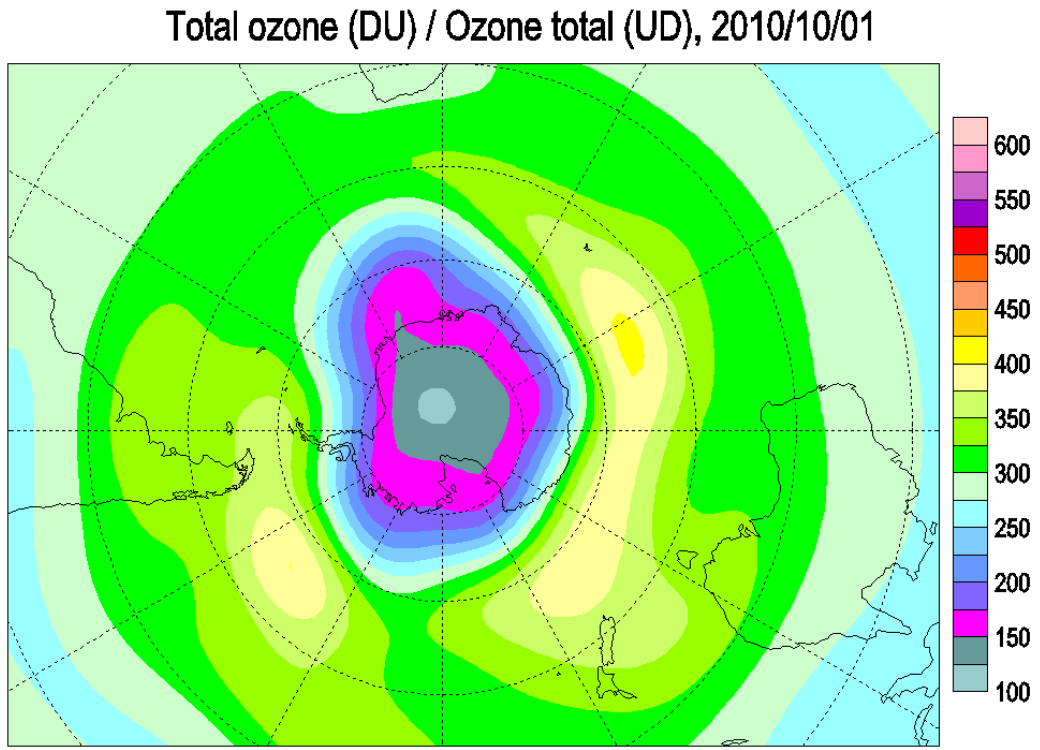


Total ozone (DU) / Ozone total (UD), 2003/10/01

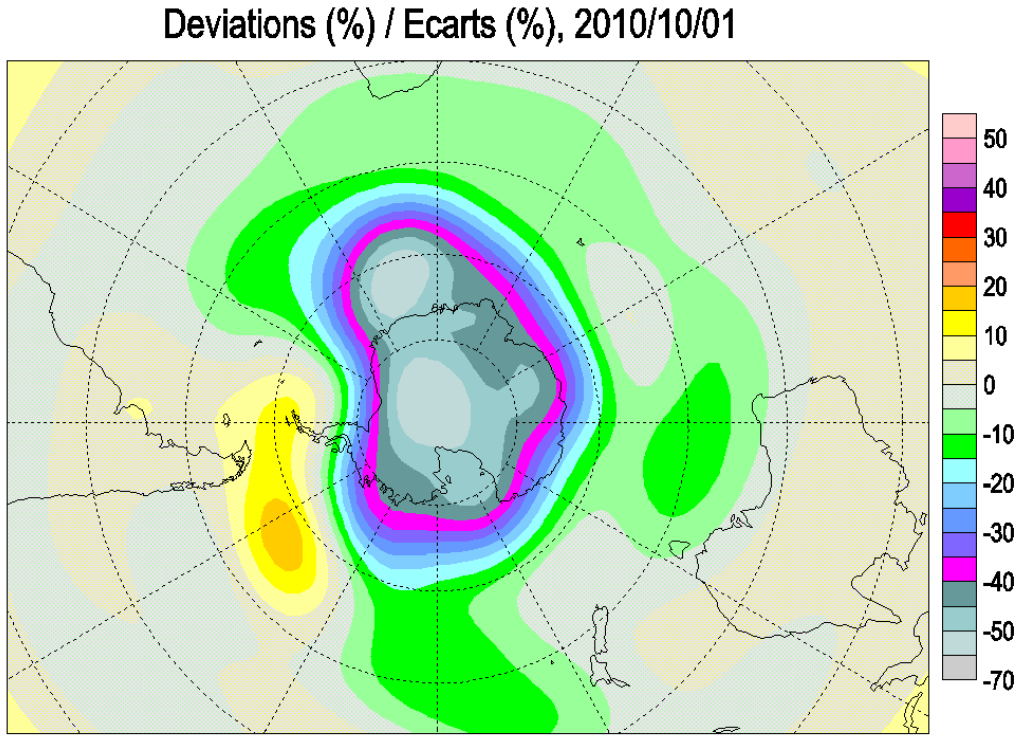


Total ozone (DU) / Ozone total (UD), 2003/11/01





Primer ozonske zaščitne plasti
Antarktika



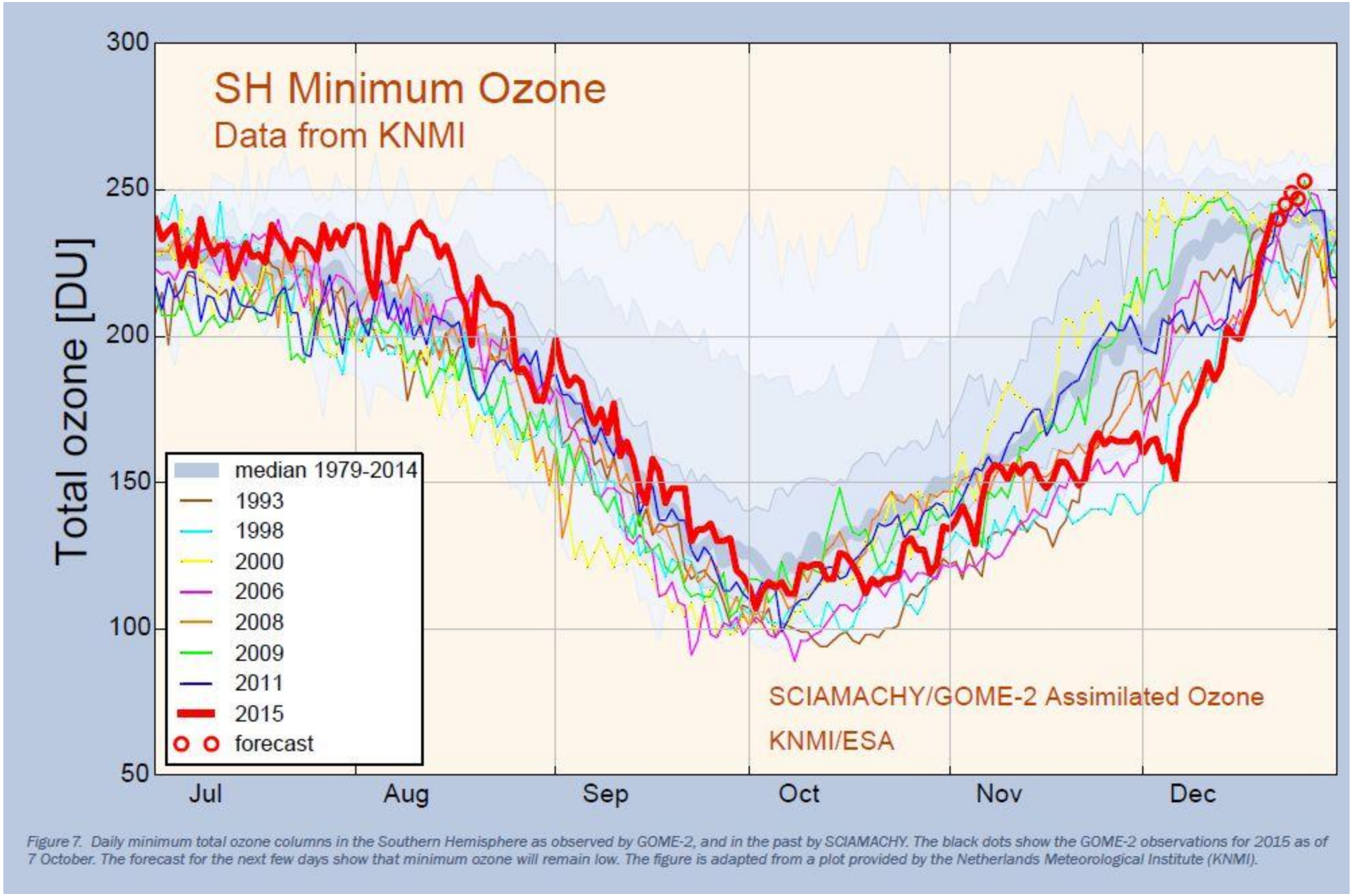


Figure 7. Daily minimum total ozone columns in the Southern Hemisphere as observed by GOME-2, and in the past by SCIAMACHY. The black dots show the GOME-2 observations for 2015 as of 7 October. The forecast for the next few days show that minimum ozone will remain low. The figure is adapted from a plot provided by the Netherlands Meteorological Institute (KNMI).

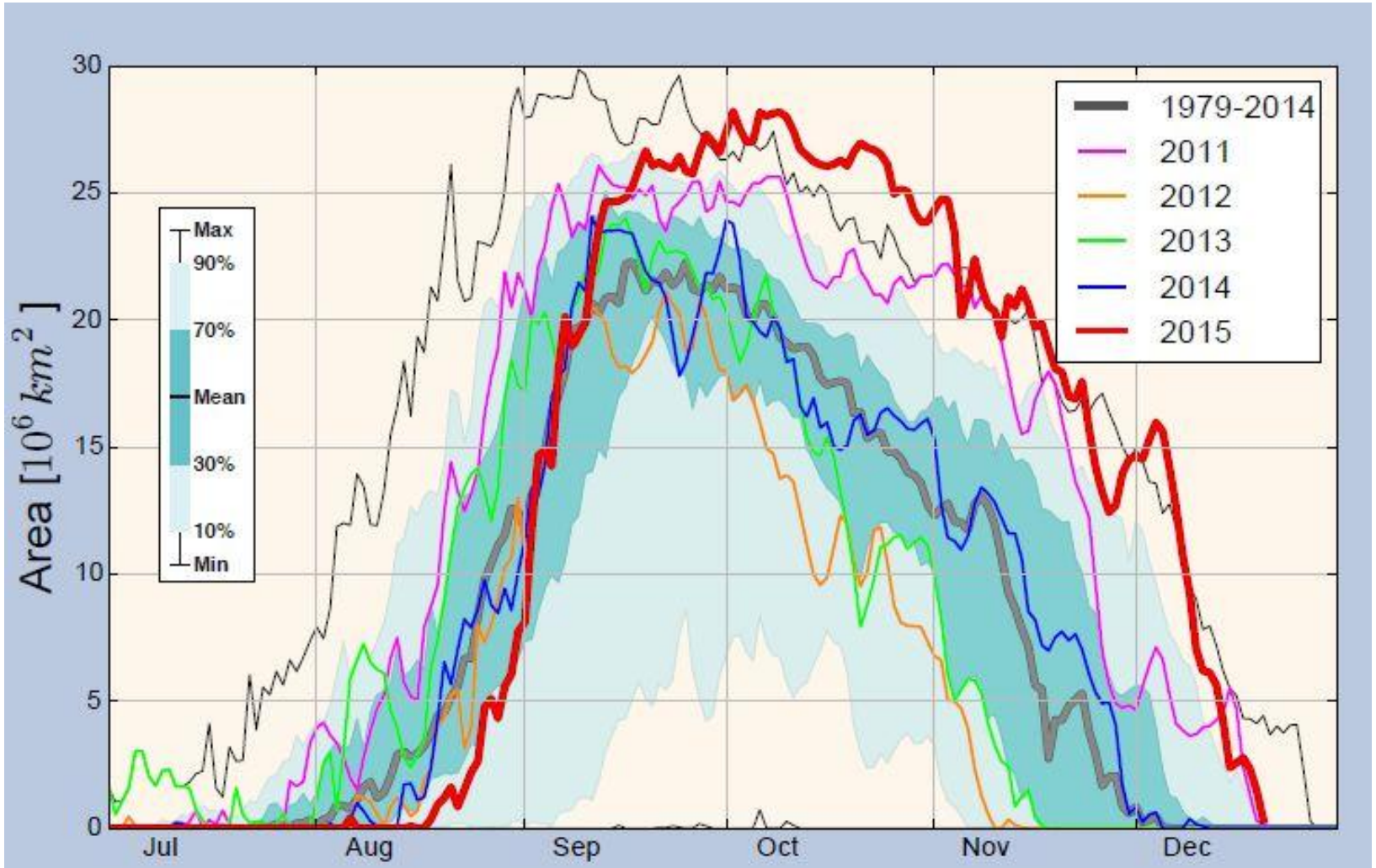
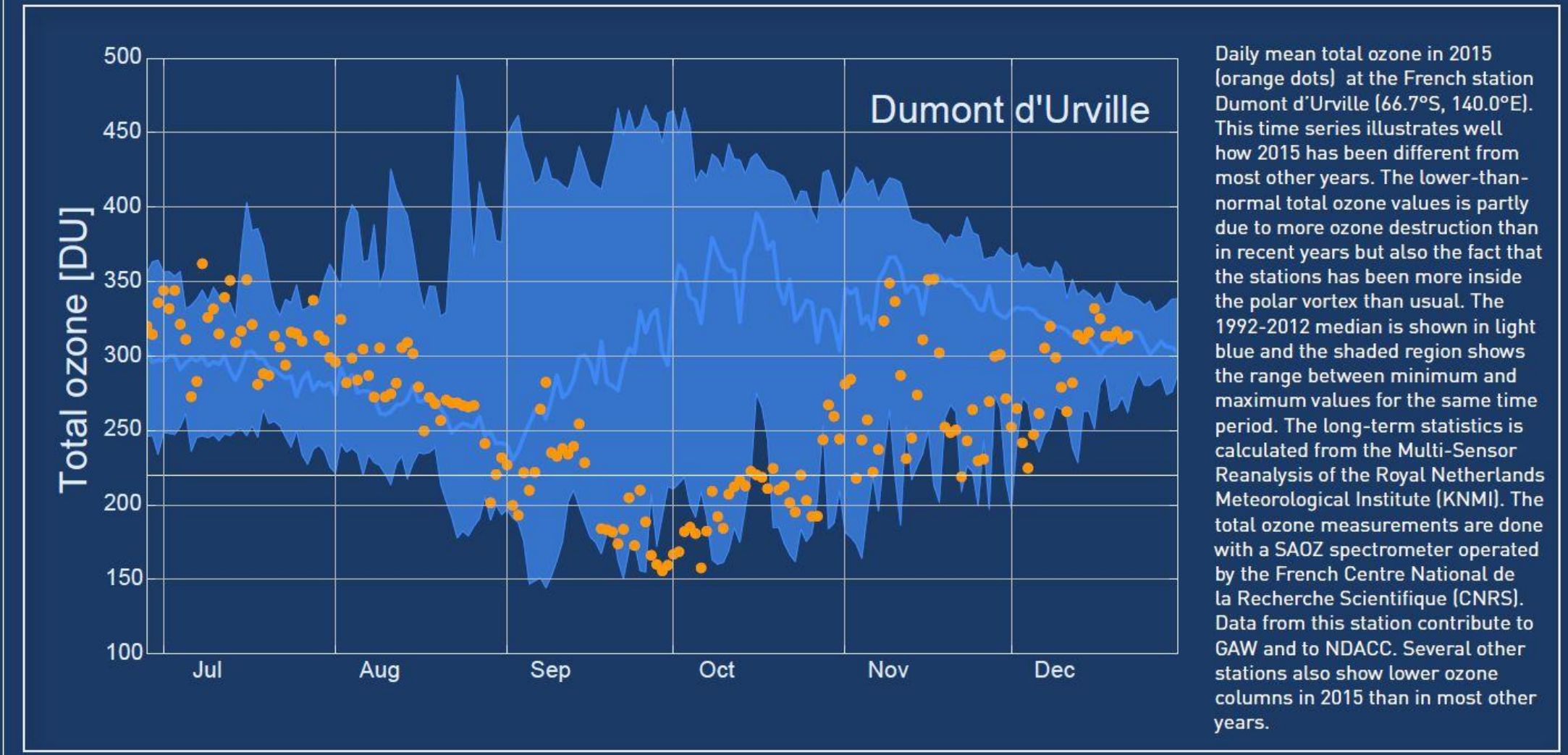


Figure 52. Area (millions of km^2) where the total ozone column is less than 220 Dobson units. 2015 is showed in red (until 4 October). 2014 is shown in blue, 2013 in green, 2012 in orange and 2011 in magenta. The smooth grey line is the 1979-2014 average. The dark green-blue shaded area represents the 30th to 70th percentiles and the light green-blue shaded area represents the 10th and 90th percentiles for the time period 1979-2014. The ozone hole area on 27 August is 5.1 million km^2, which is about half the long term average for that particular date. The plot is made at WMO based on data downloaded from the Ozonewatch web site at NASA, which are based on data from NOAA/NCEP.

Antarctic Ozone Bulletin



Daily mean total ozone in 2015 (orange dots) at the French station Dumont d'Urville (66.7°S, 140.0°E). This time series illustrates well how 2015 has been different from most other years. The lower-than-normal total ozone values is partly due to more ozone destruction than in recent years but also the fact that the stations has been more inside the polar vortex than usual. The 1992-2012 median is shown in light blue and the shaded region shows the range between minimum and maximum values for the same time period. The long-term statistics is calculated from the Multi-Sensor Reanalysis of the Royal Netherlands Meteorological Institute (KNMI). The total ozone measurements are done with a SAOZ spectrometer operated by the French Centre National de la Recherche Scientifique (CNRS). Data from this station contribute to GAW and to NDACC. Several other stations also show lower ozone columns in 2015 than in most other years.

WMO OMM
No 5 / 2015
24 December

Global Atmosphere Watch

GAW

Velike razlike iz leta v leto – vpliv meteoroloških razmer na velikost polarnega vrtinca

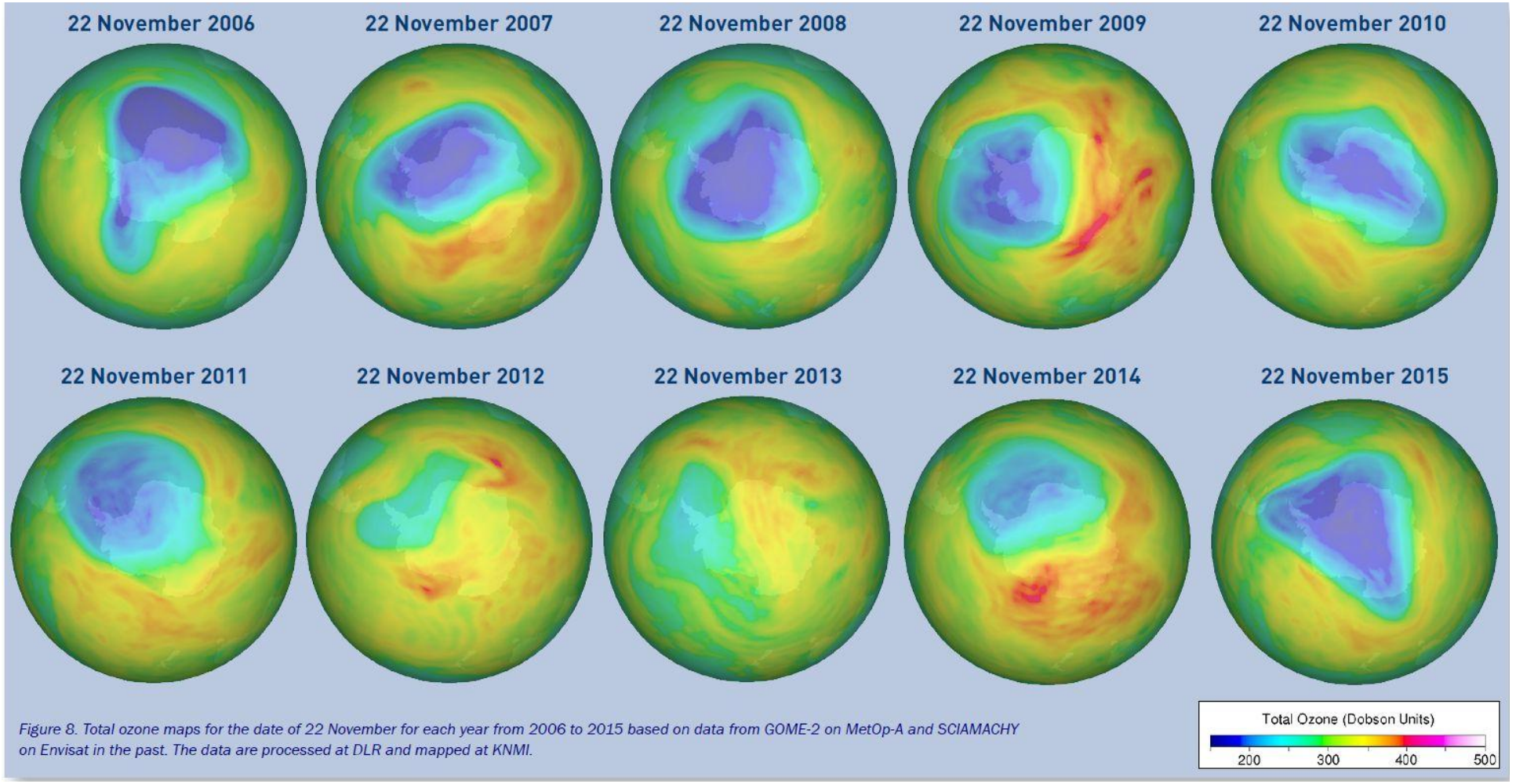
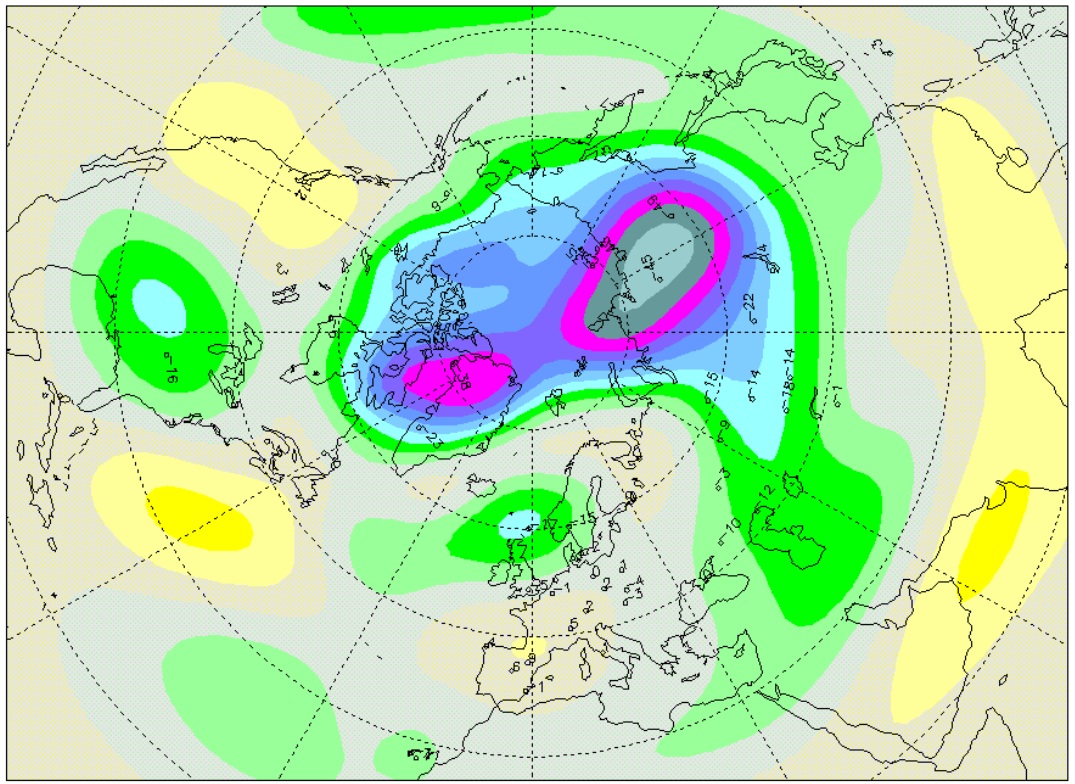
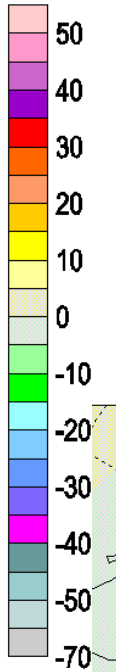


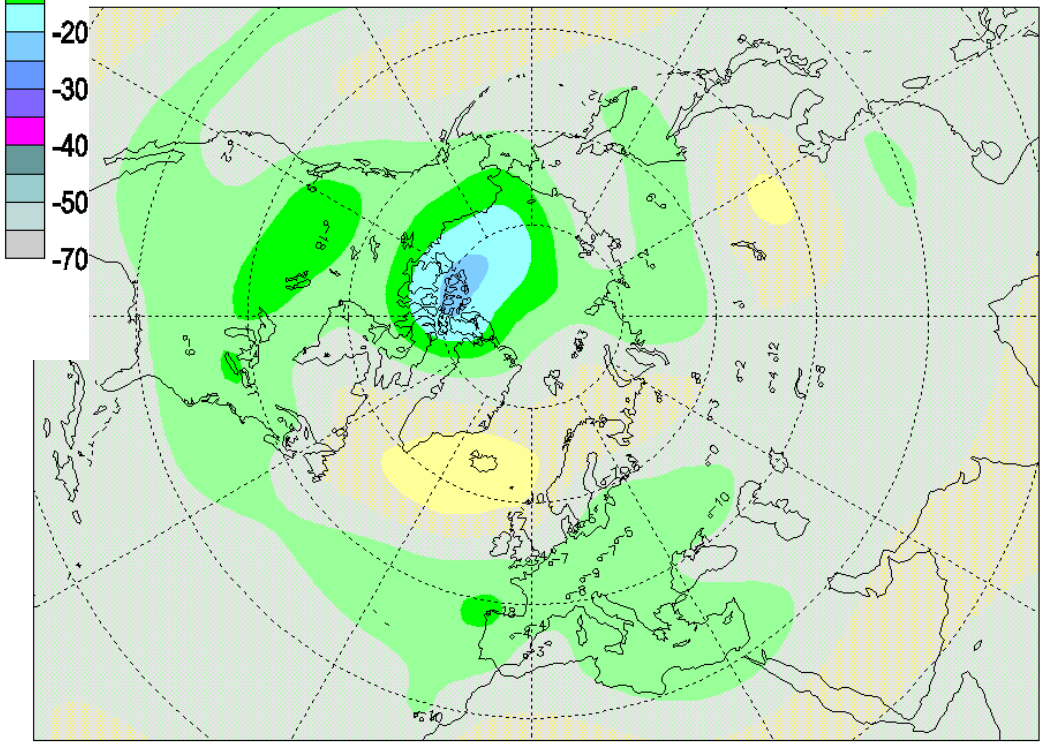
Figure 8. Total ozone maps for the date of 22 November for each year from 2006 to 2015 based on data from GOME-2 on MetOp-A and SCIAMACHY on Envisat in the past. The data are processed at DLR and mapped at KNMI.

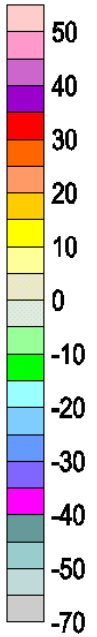
Deviations (%) / Ecarts (%), 2011/03/21



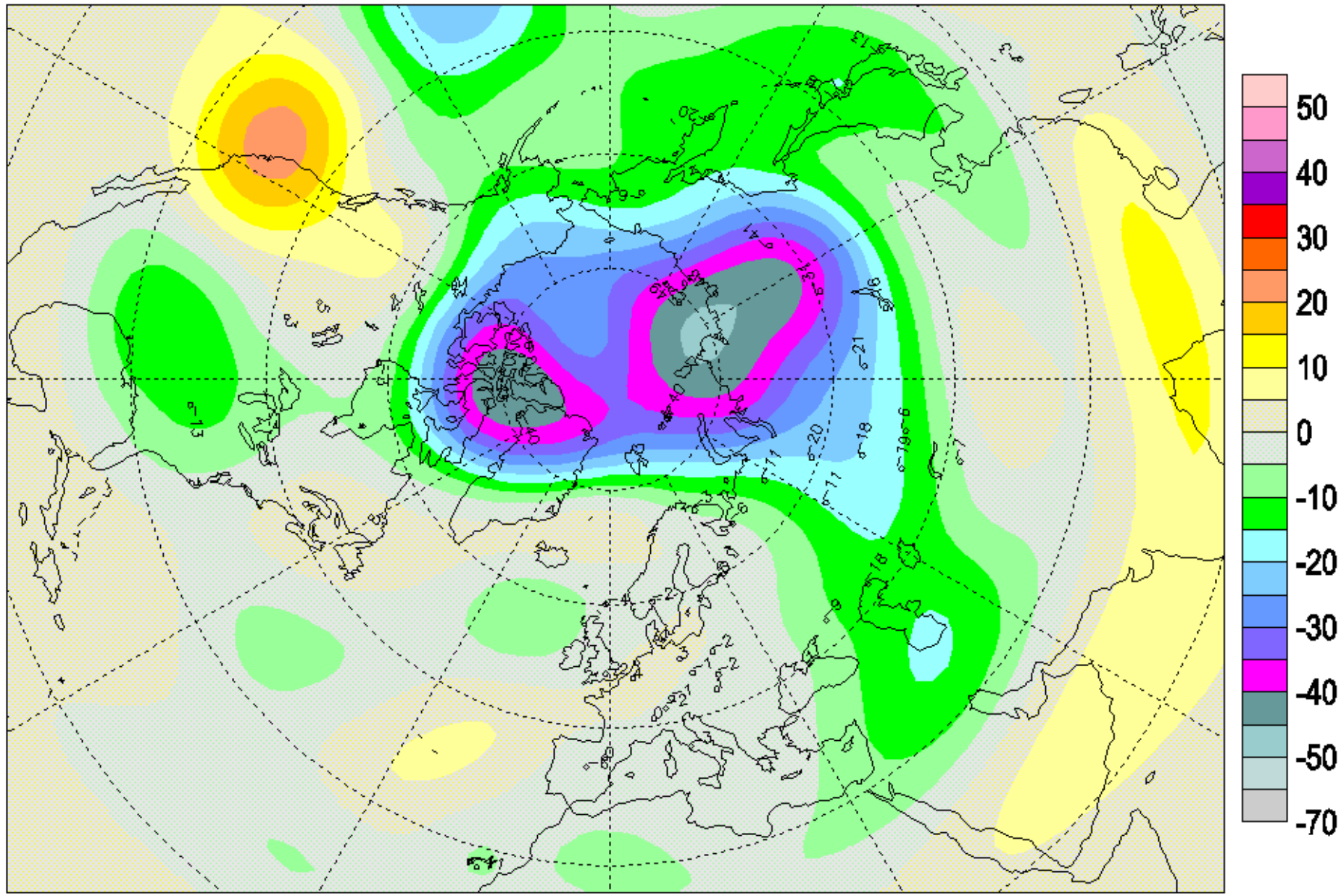


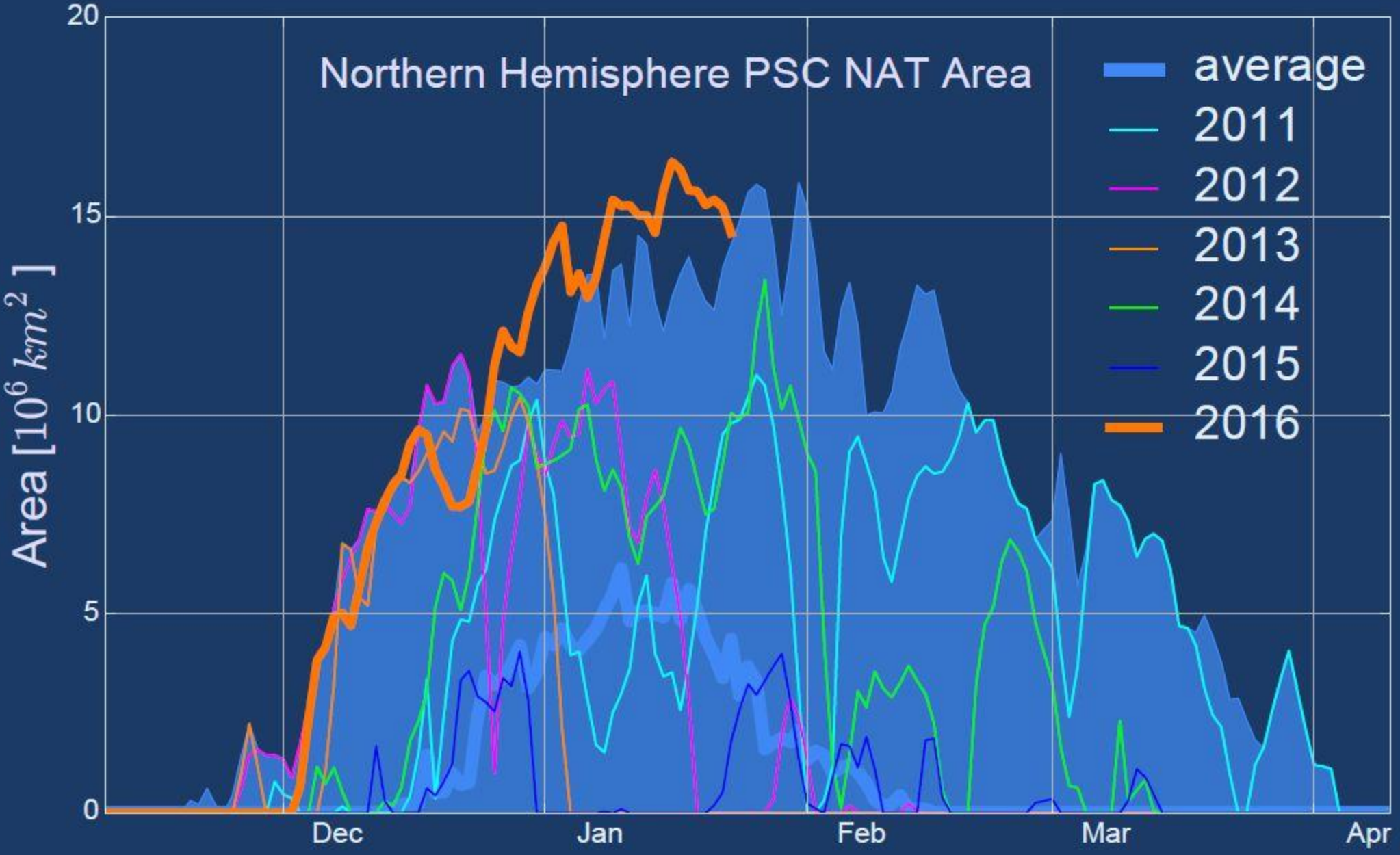
Deviations (%) / Ecarts (%), 2011/05/22





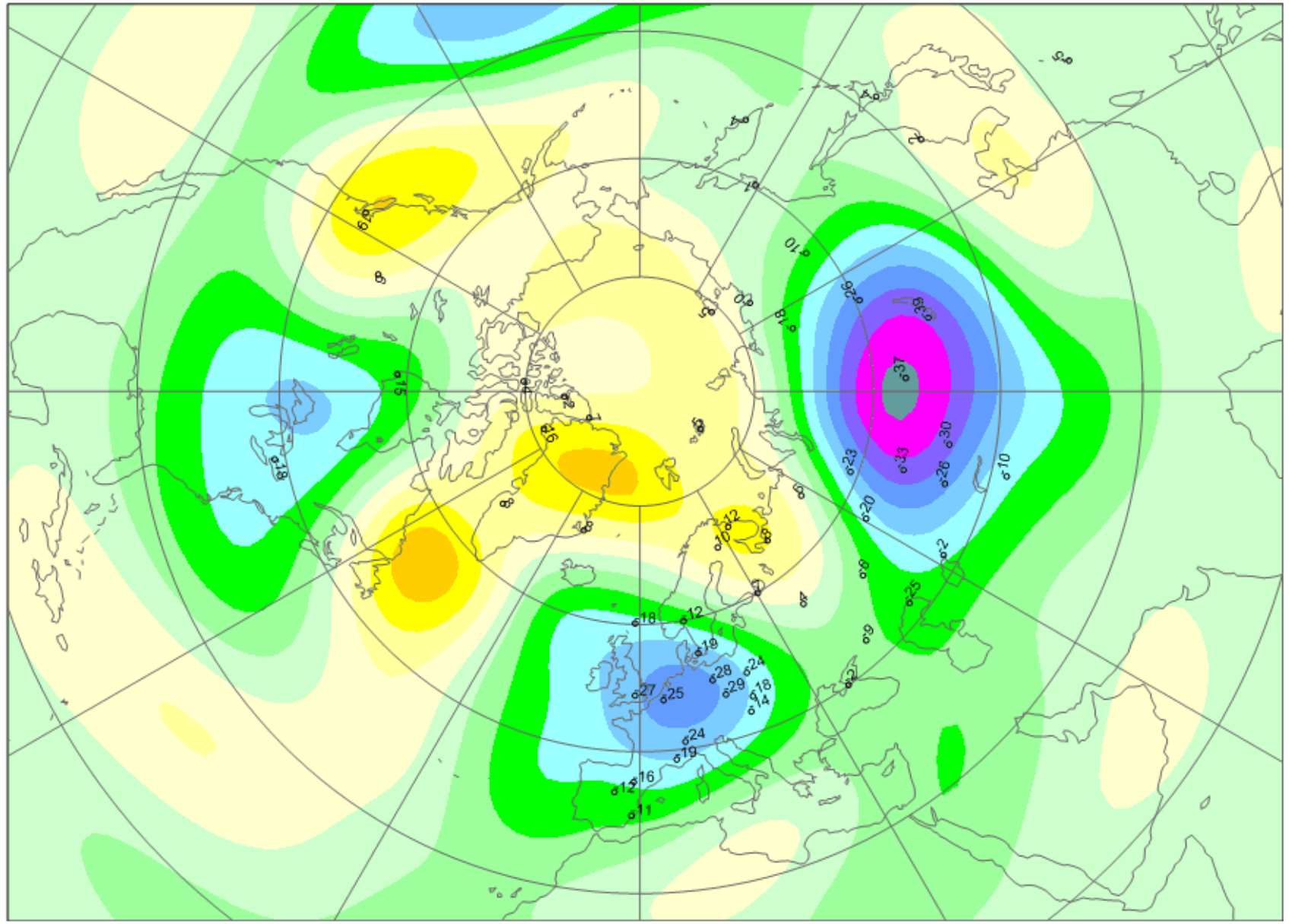
Deviations (%) / Ecarts (%), 2011/03/20





Daily progression of th
temperatures are colo
the existence of polar
clouds of type I (NAT,
trihydrate) at the 50 hl
light blue shaded regi
maximum value for ea
the 1978/79 to 2014/1
riod. The data used fo
downloaded from the
web page at NASA.

Deviations (%) / Ecarts (%), 2016/03/13

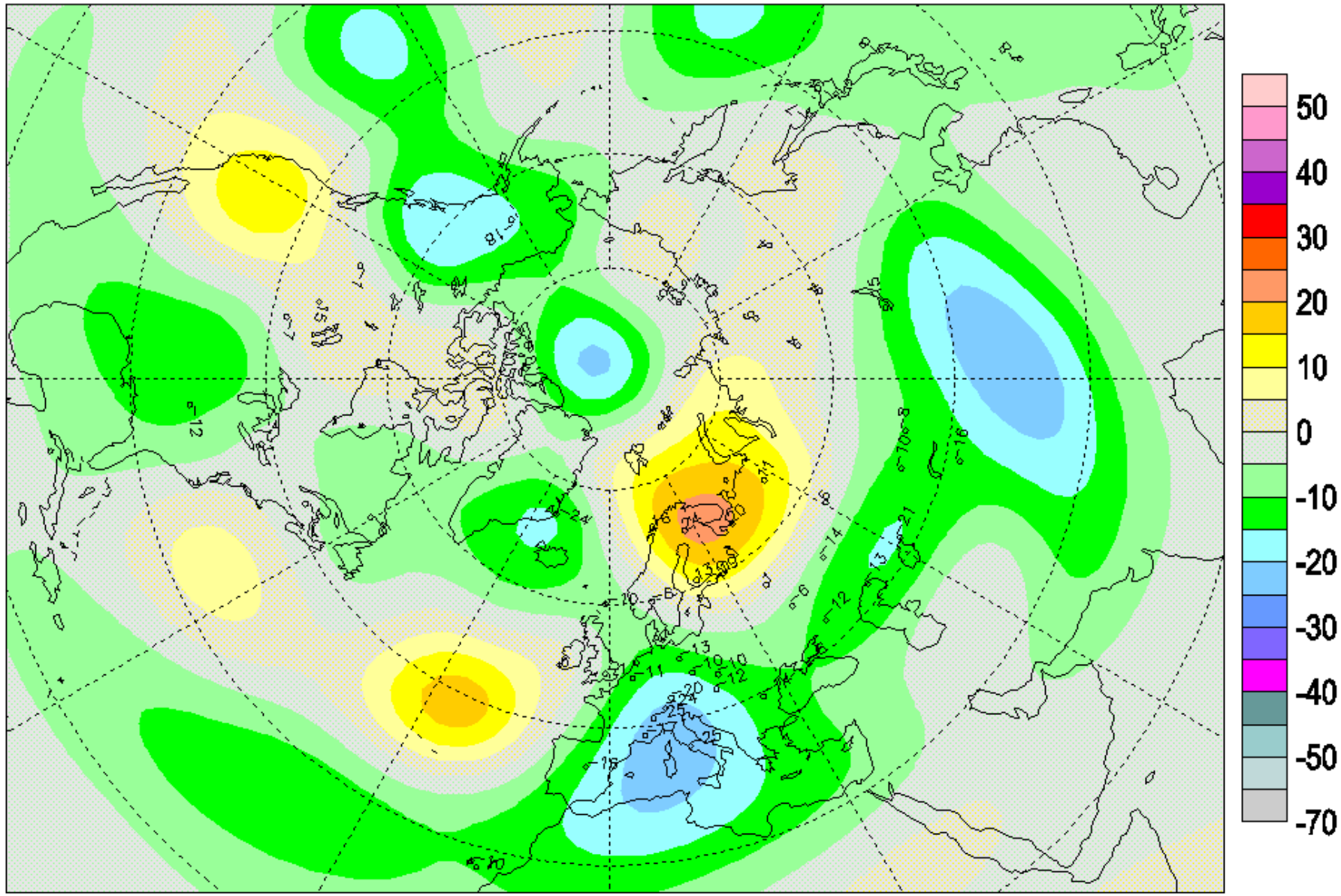


Environment Canada Environnement Canada

2016-03-18 23:01:23

Canada

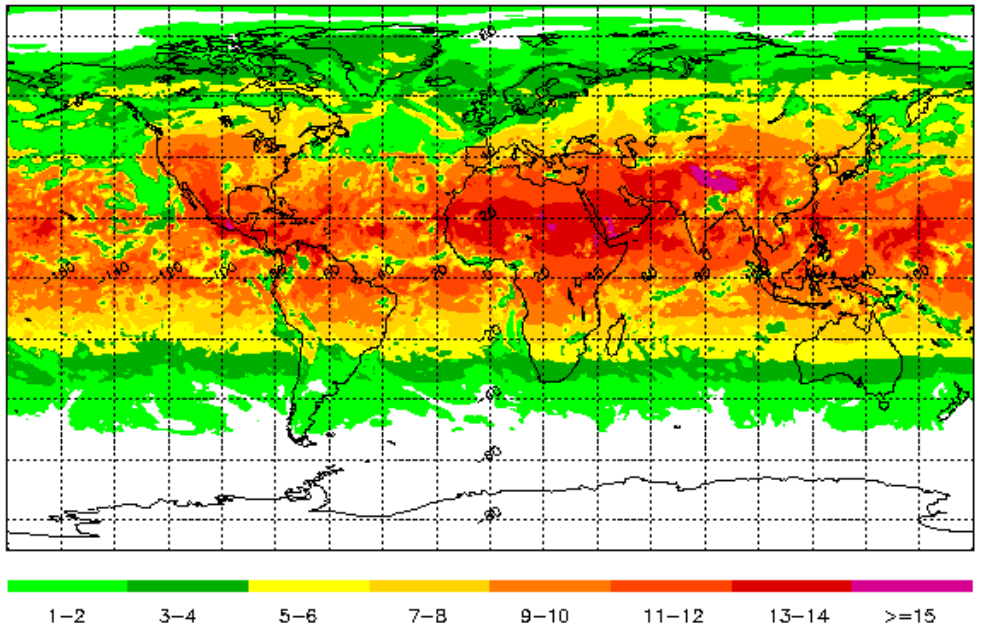
Deviations (%) / Ecarts (%), 2013/03/08



Junija in julija doseže UV indeks ob jasnem vremenu sredi dneva najvišje vrednosti.

V gorah je višji kot po nižinah, saj moč UV žarkov z nadmorsko višino narašča precej hitreje kot moč ostalega dela sončnega sevanja: v povprečju je na višini 2000 m 15% več UVB sevanja kot na morski obali.

Oblaki



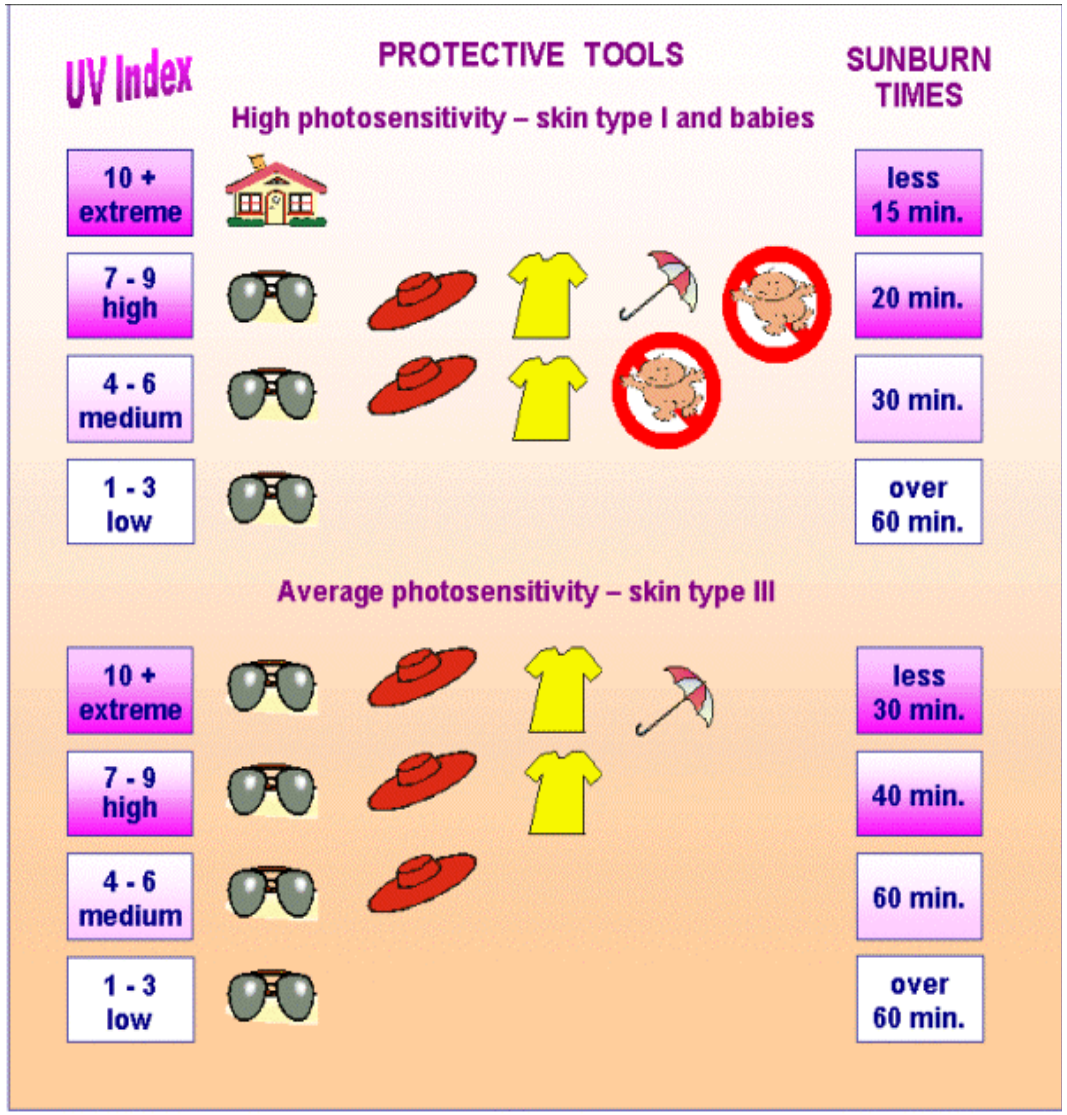
V Sloveniji ne merimo koncentracije ozona v višjih plasteh ozračja, oziroma njegove skupne količine v stolpcu zraka, merimo pa UVB del sončnega sevanja (valovna dolžina 290-315 nm).

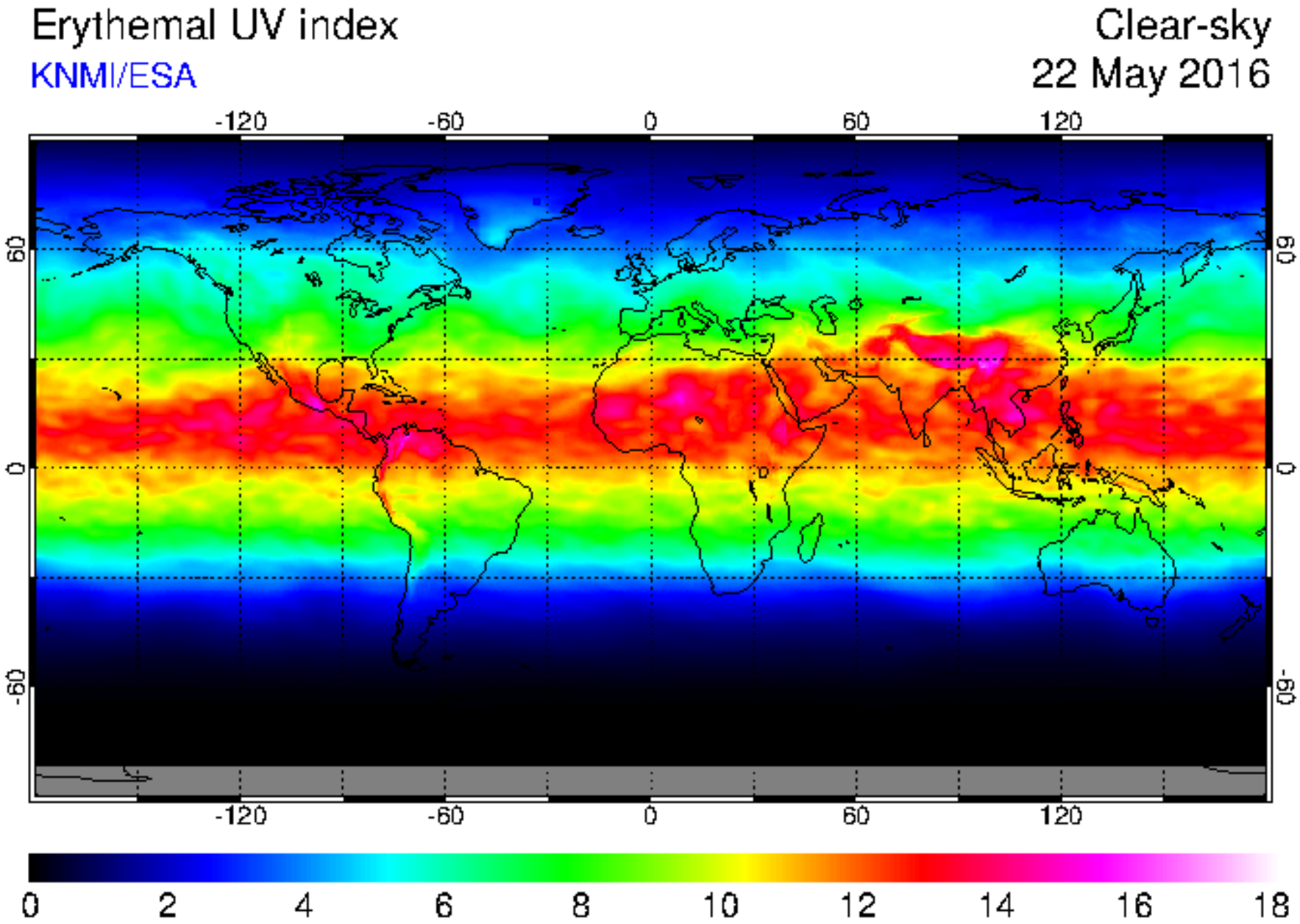
Z meritvami smo začeli leta 1993 v Portorožu in nato še v Ljubljani, leta 1995 so meritve stekle tudi na Kredarici.

UV indeks je mednarodno sprejeta in enotna mera za moč ultravijoličnega sončnega sevanja.

UV indeks povezuje energijski tok UV sončnega sevanja z občutljivostjo kože.

Pri njegovem določanju upoštevamo povprečno občutljivost bele kože.




Erythemal UV index
KNMI/ESA
Clear-sky
22 May 2016
-120
-60
0
60
120
60
0
-60
0
2
4
6
8
10
12
14
16
18

UV indeks 28. maj 2016