

**International Conference on Ecology, Environment and
Sustainable Development of Silk Road Economic Zone
15-16 June 2014 r., Beijing, China**

**Regional Climate Change in Central Asia in
21st Century**

Prof. Andrey G. Kostianoy

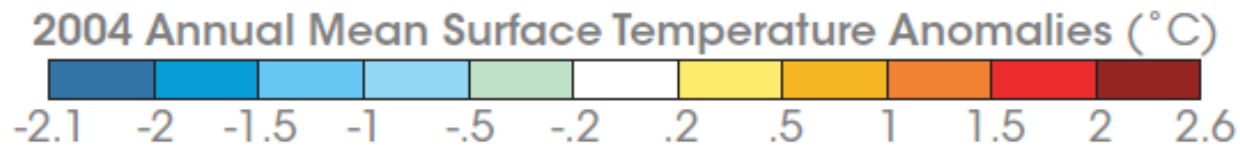
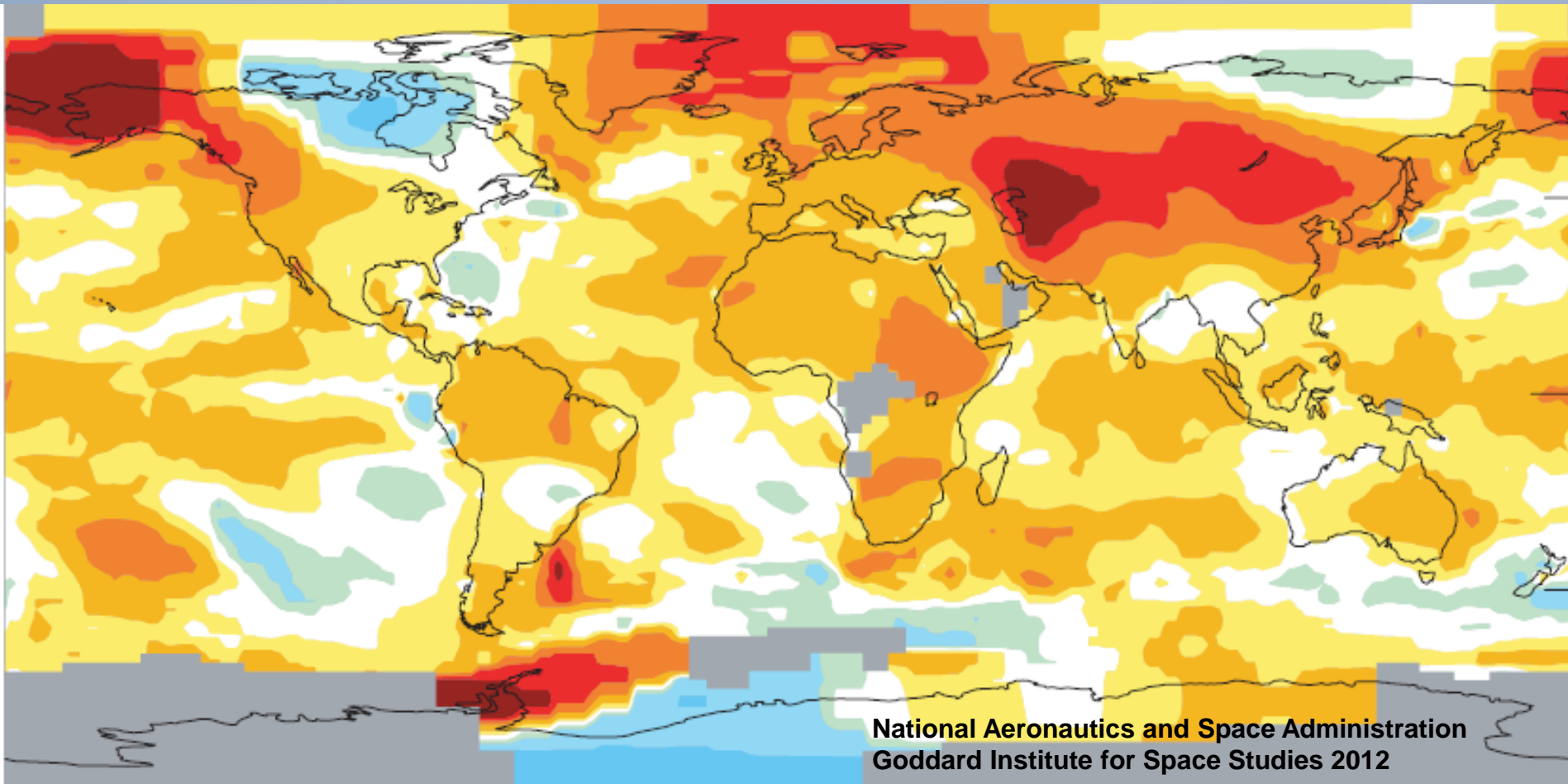
**P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences
Moscow, Russia**

Lead Author, IPCC AR5

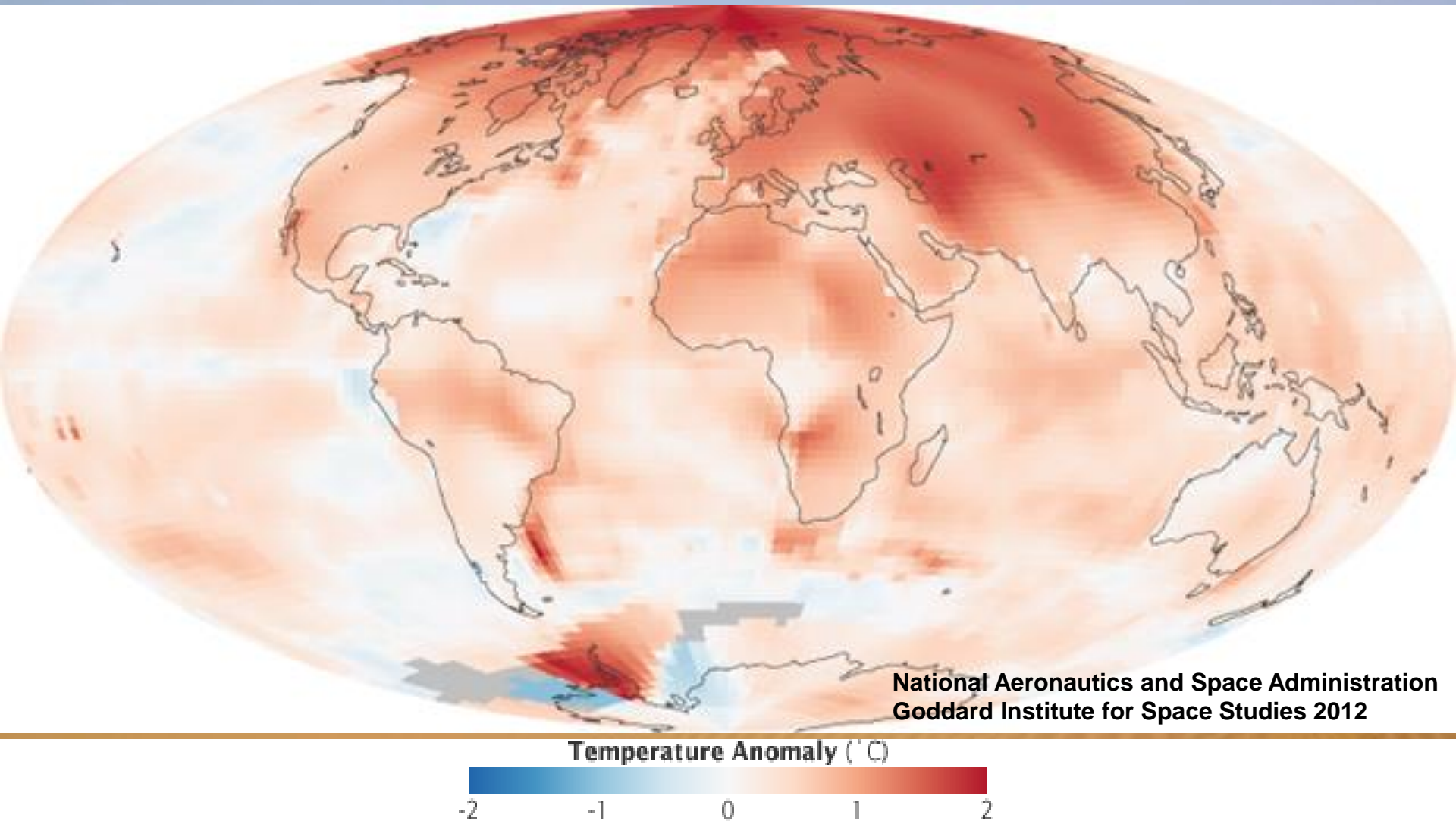
E-mail: kostianoy@gmail.com

ANNUAL MEAN SURFACE TEMPERATURE ANOMALY

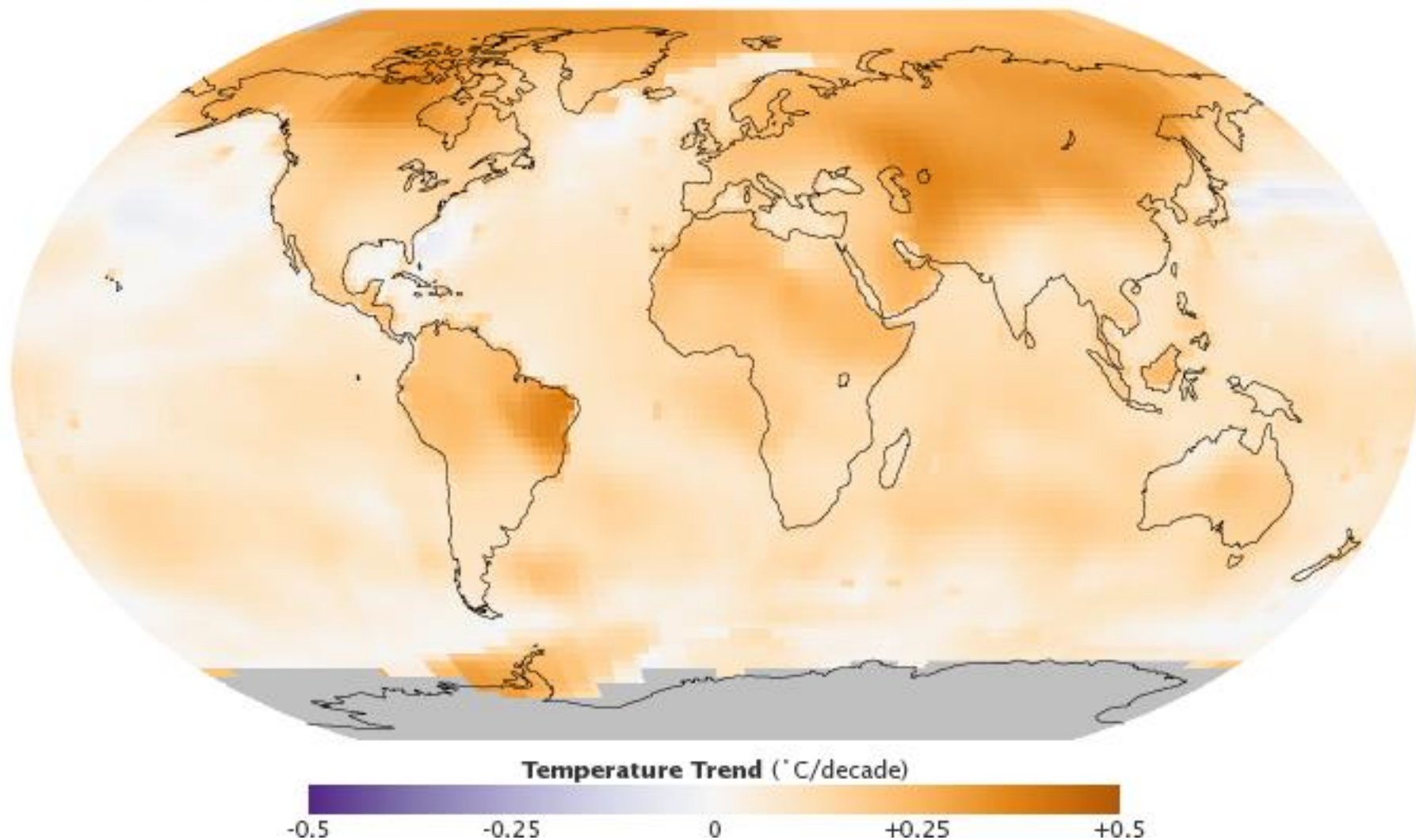
2004 vs 1880-2004



ANNUAL MEAN SURFACE TEMPERATURE ANOMALY 2000-2009 vs 1951-1980



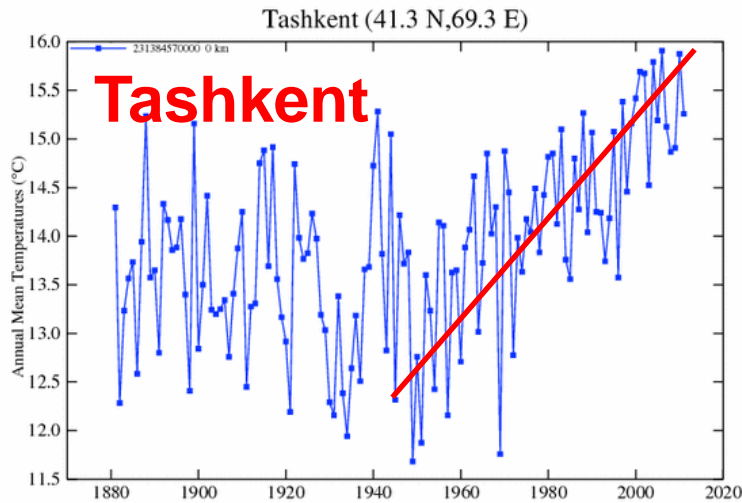
1950–2013 Temperature Trend



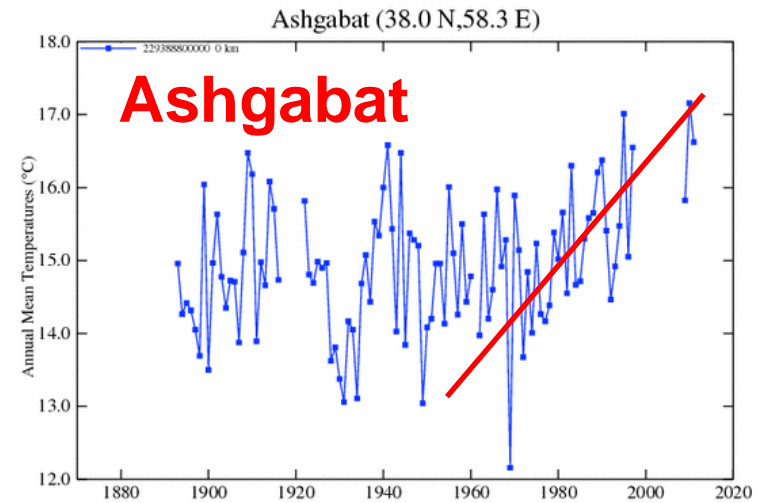
Скорость роста температуры поверхности Земли за период с 1950 по 2013 г. (C/10 лет) по данным НАСА (NASA Earth Observatory, 2014).

ANNUAL MEAN TEMPERATURE IN CA CAPITALS (1881-2011)

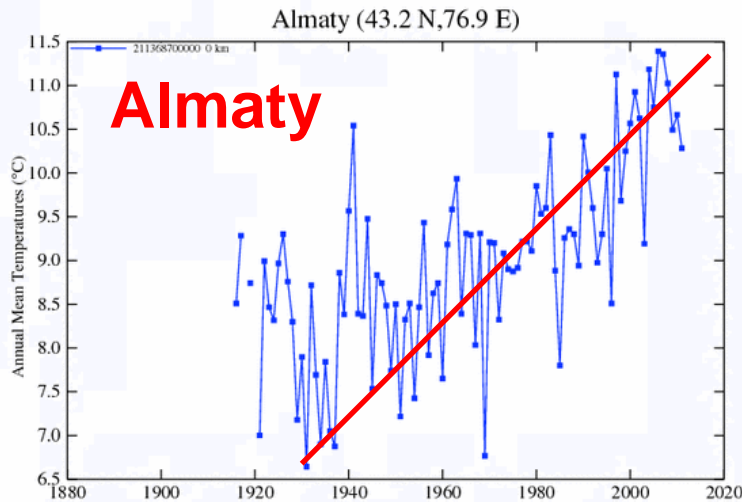
+3.0 C from 1950



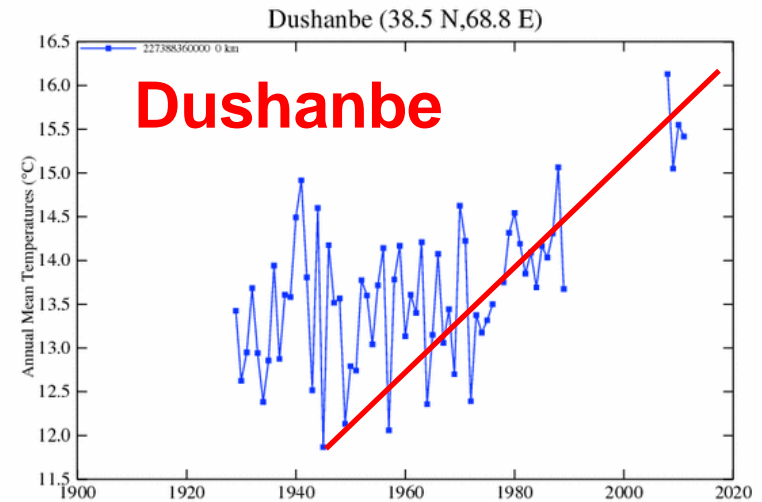
+3.0 C from 1970



+3.0 C from 1950

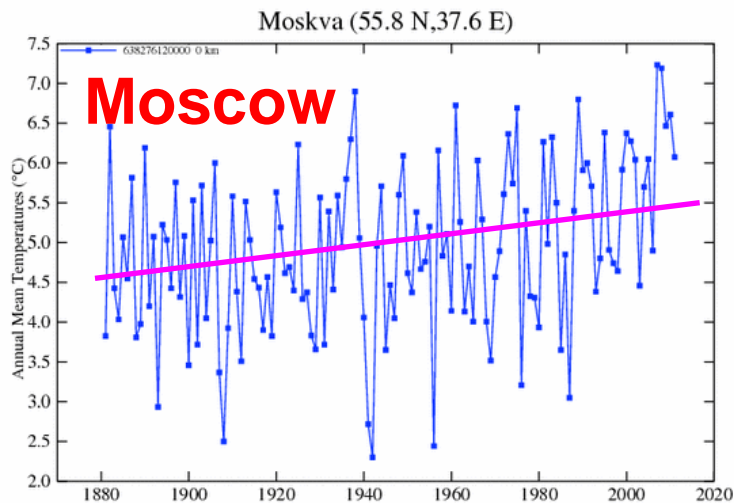


+3.0 C from 1965

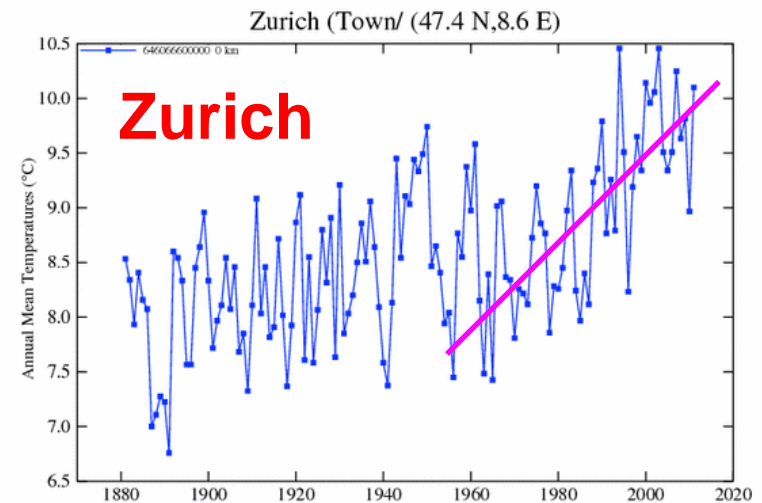


ANNUAL MEAN TEMPERATURE (1881-2011)

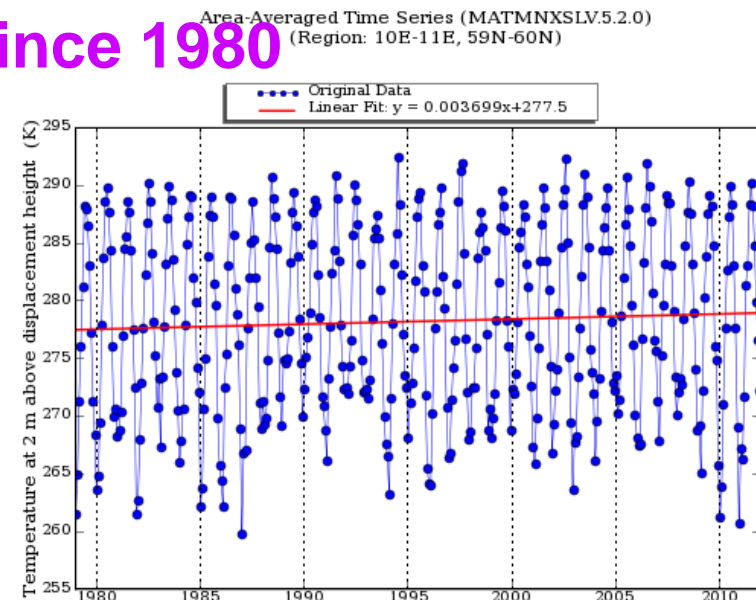
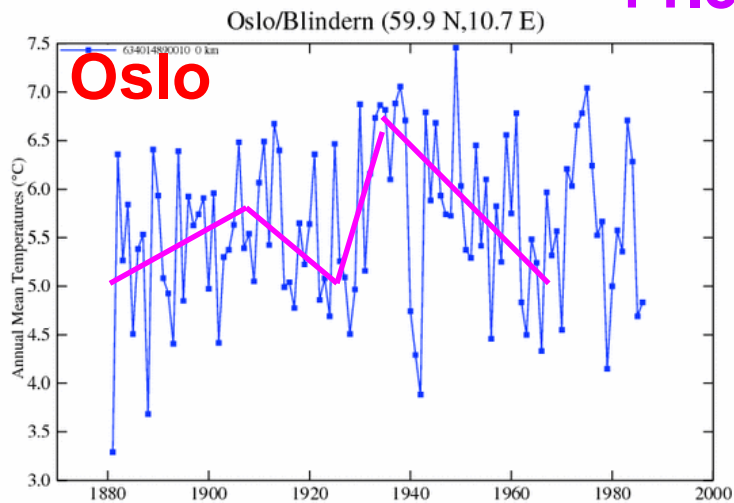
+1.0 C for 130 yr

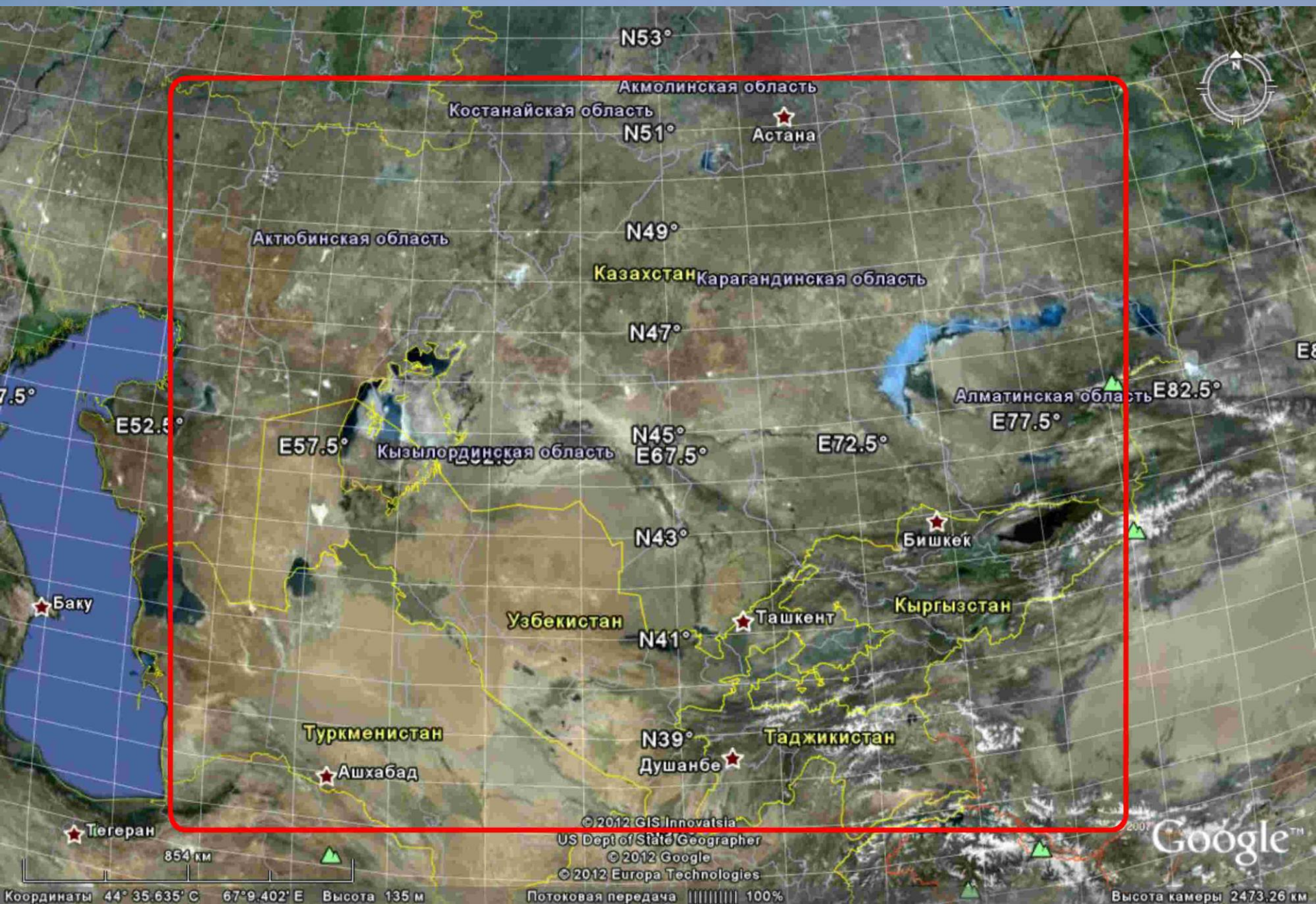


+1.5 C since 1960

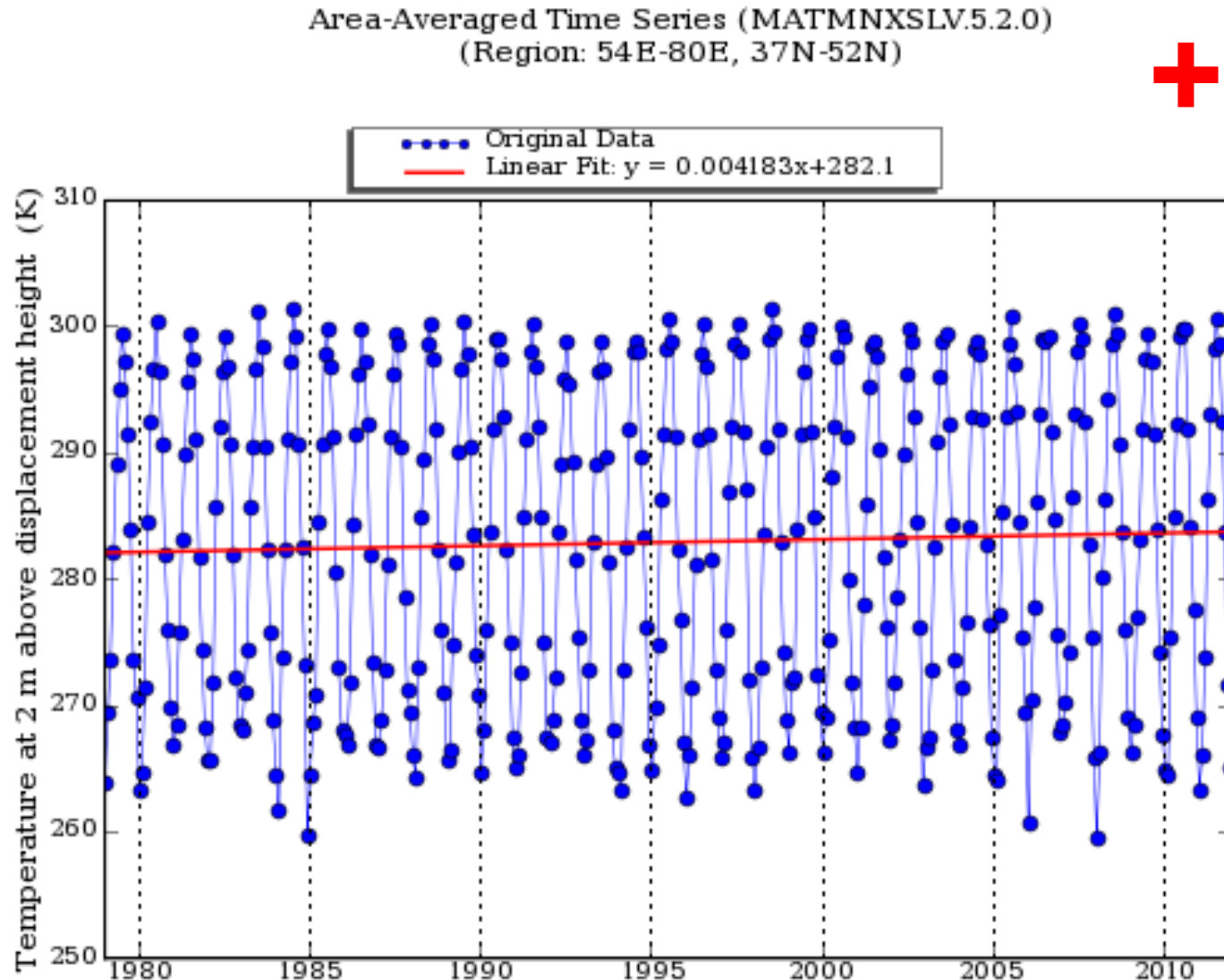


+1.5 C since 1980



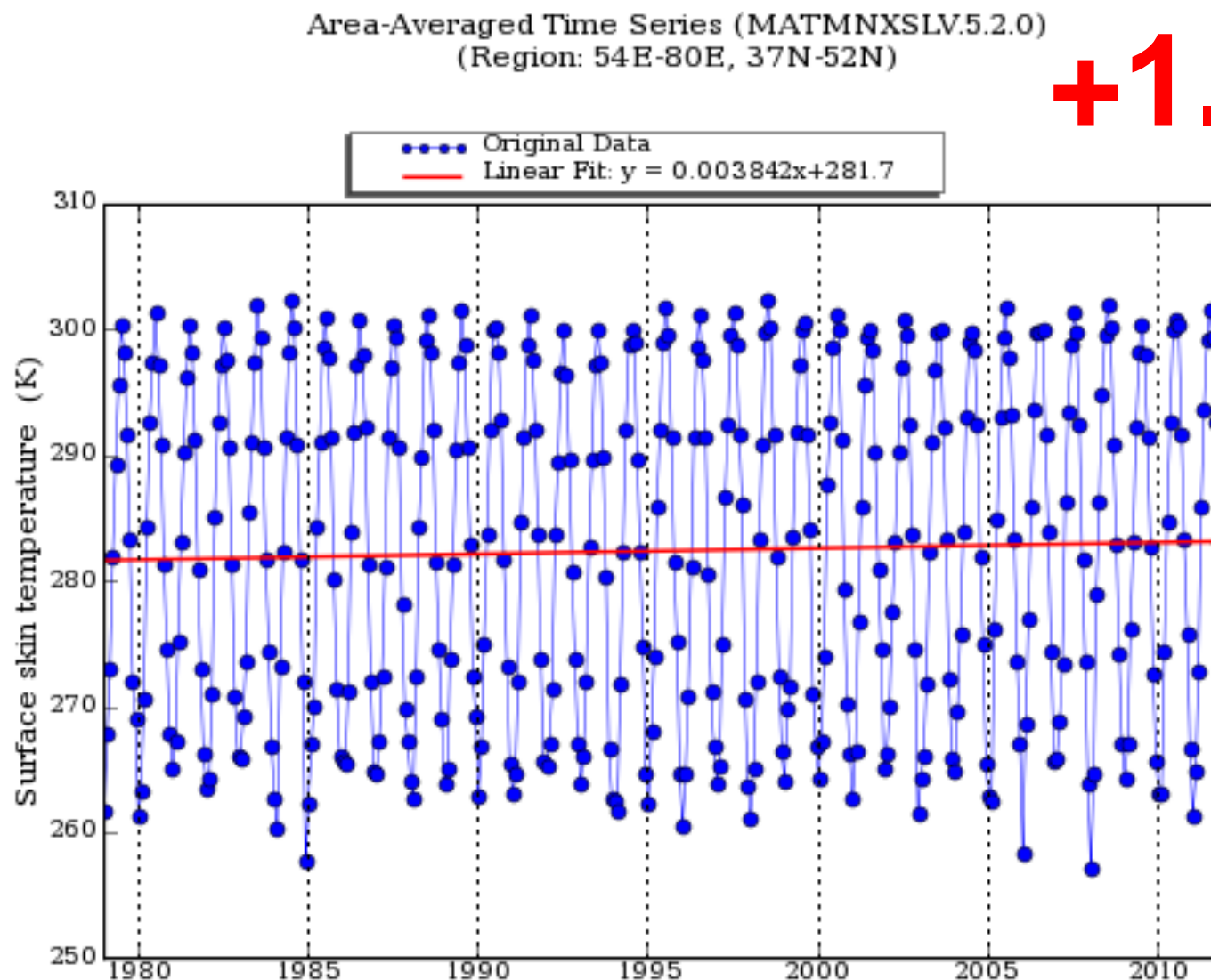


AIR TEMPERATURE (1979-2011)



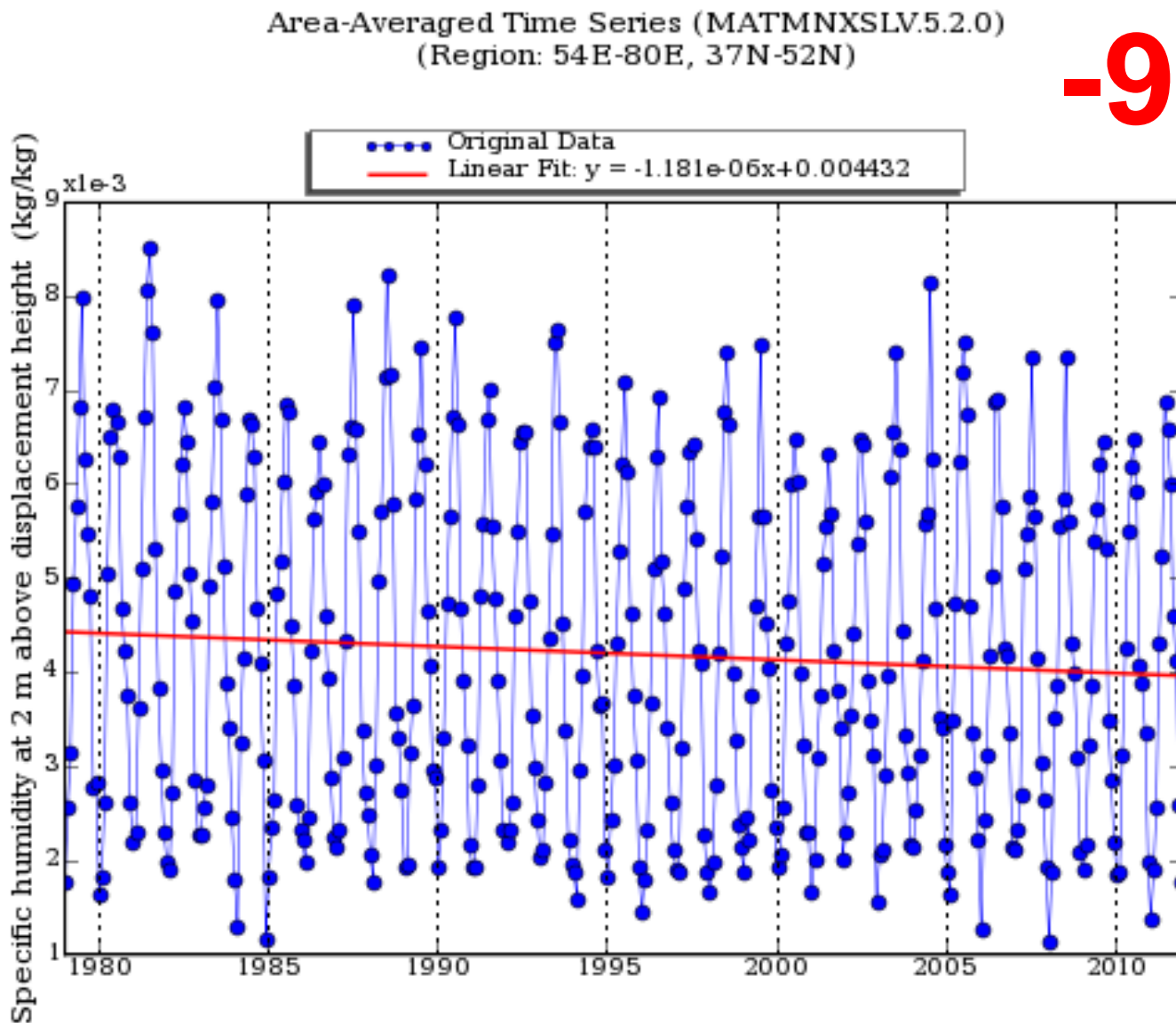
+2C

SOIL TEMPERATURE (1979-2011)



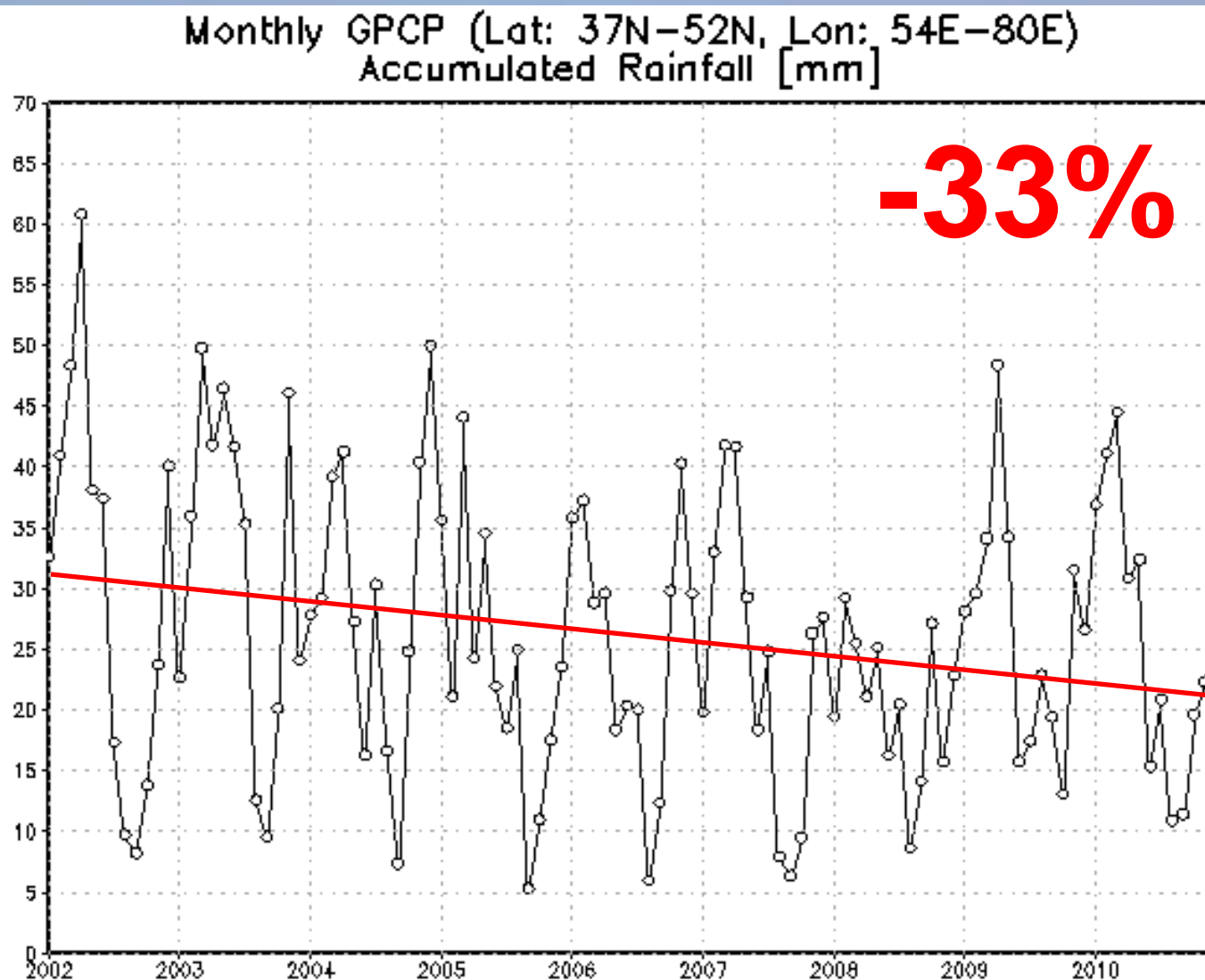
+1.5C

SPECIFIC HUMIDITY (1979-2011)



-9%

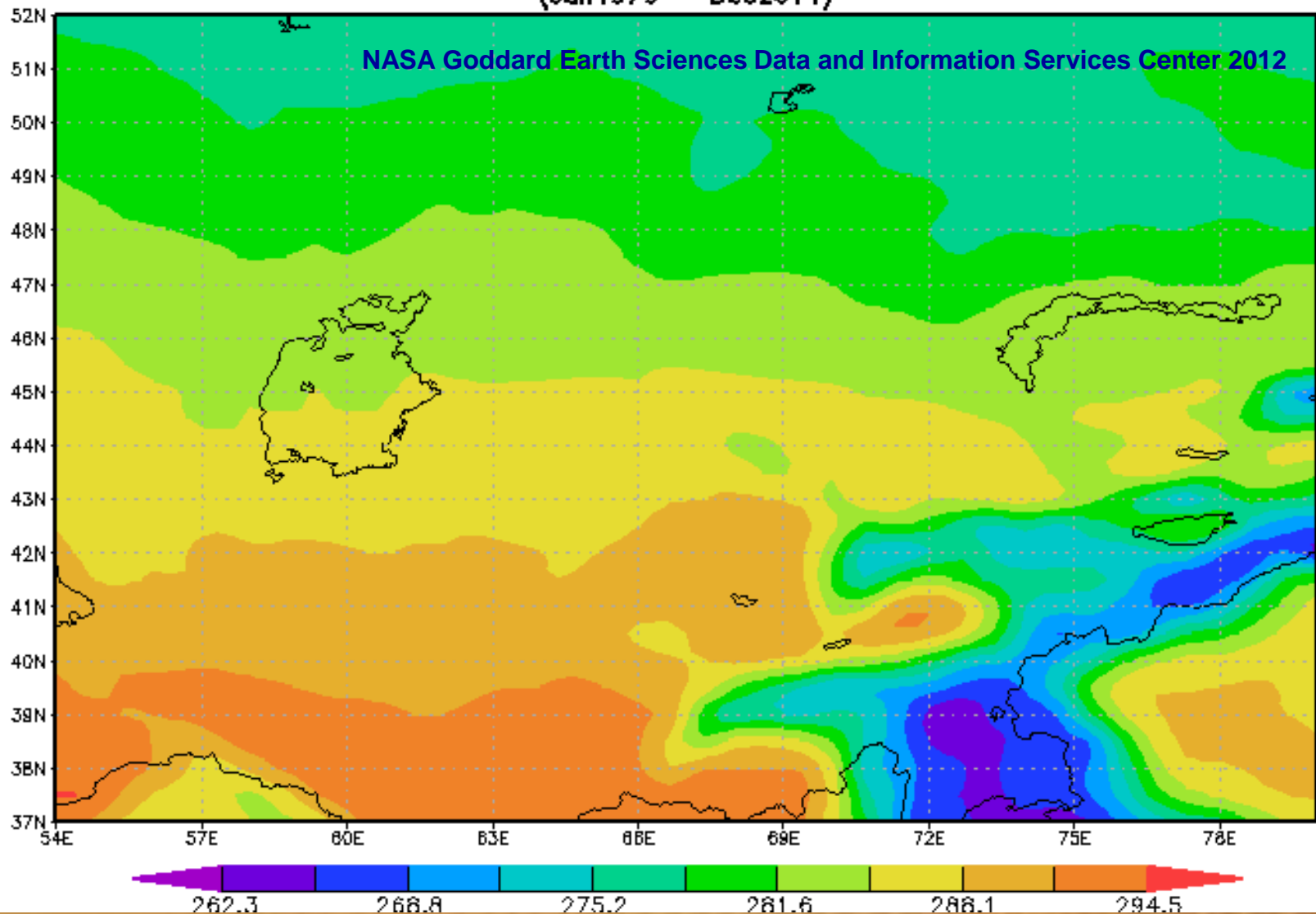
ACCUMULATED RAINFALL (2002-2010)



AIR TEMPERATURE (1979-2011)

MATMNXSLV.5.2.0 Temperature at 2 m above displacement height [K]
(Jan1979 - Dec2011)

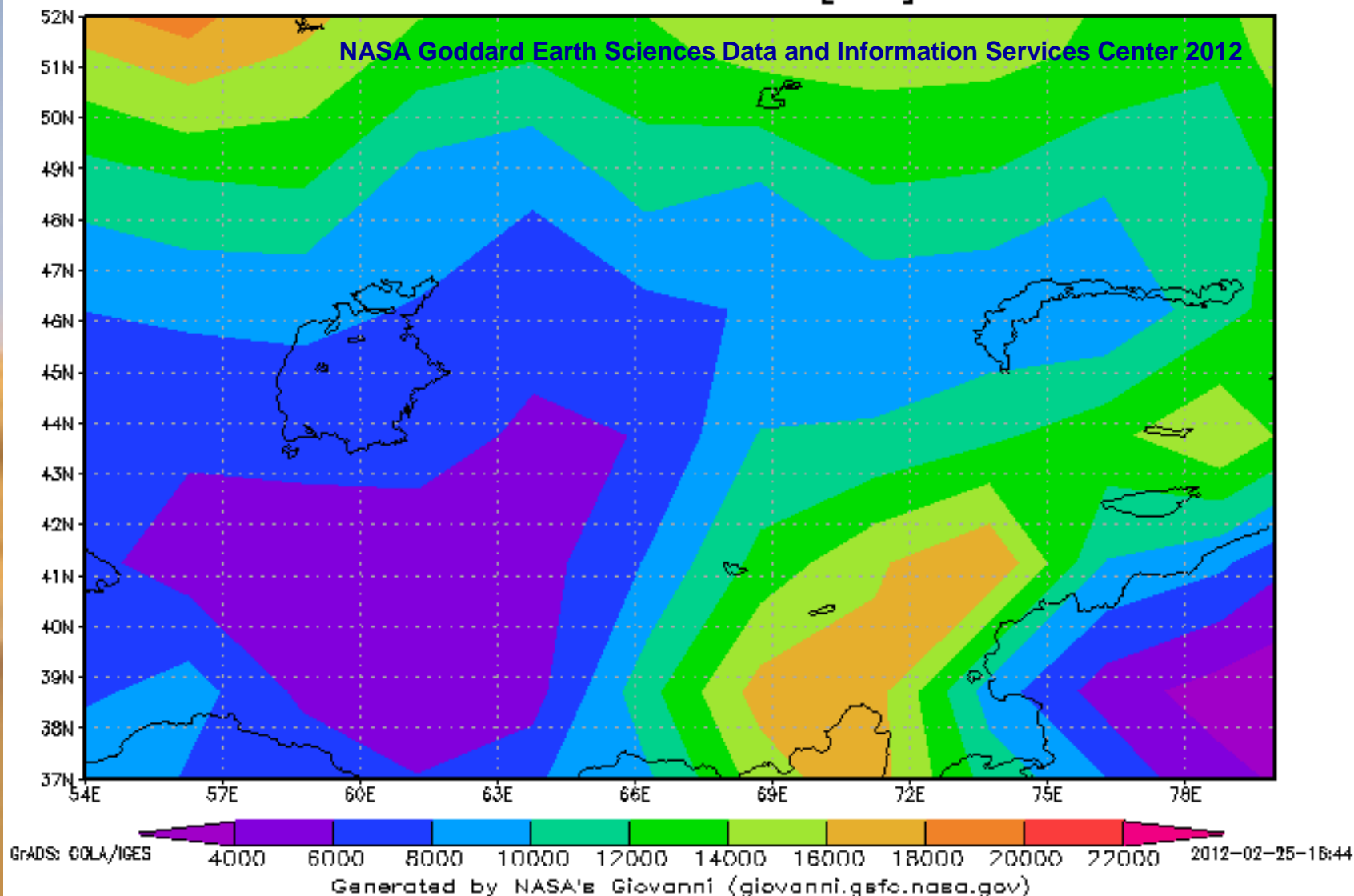
NASA Goddard Earth Sciences Data and Information Services Center 2012



ACCUMULATED RAINFALL (1979-2010)

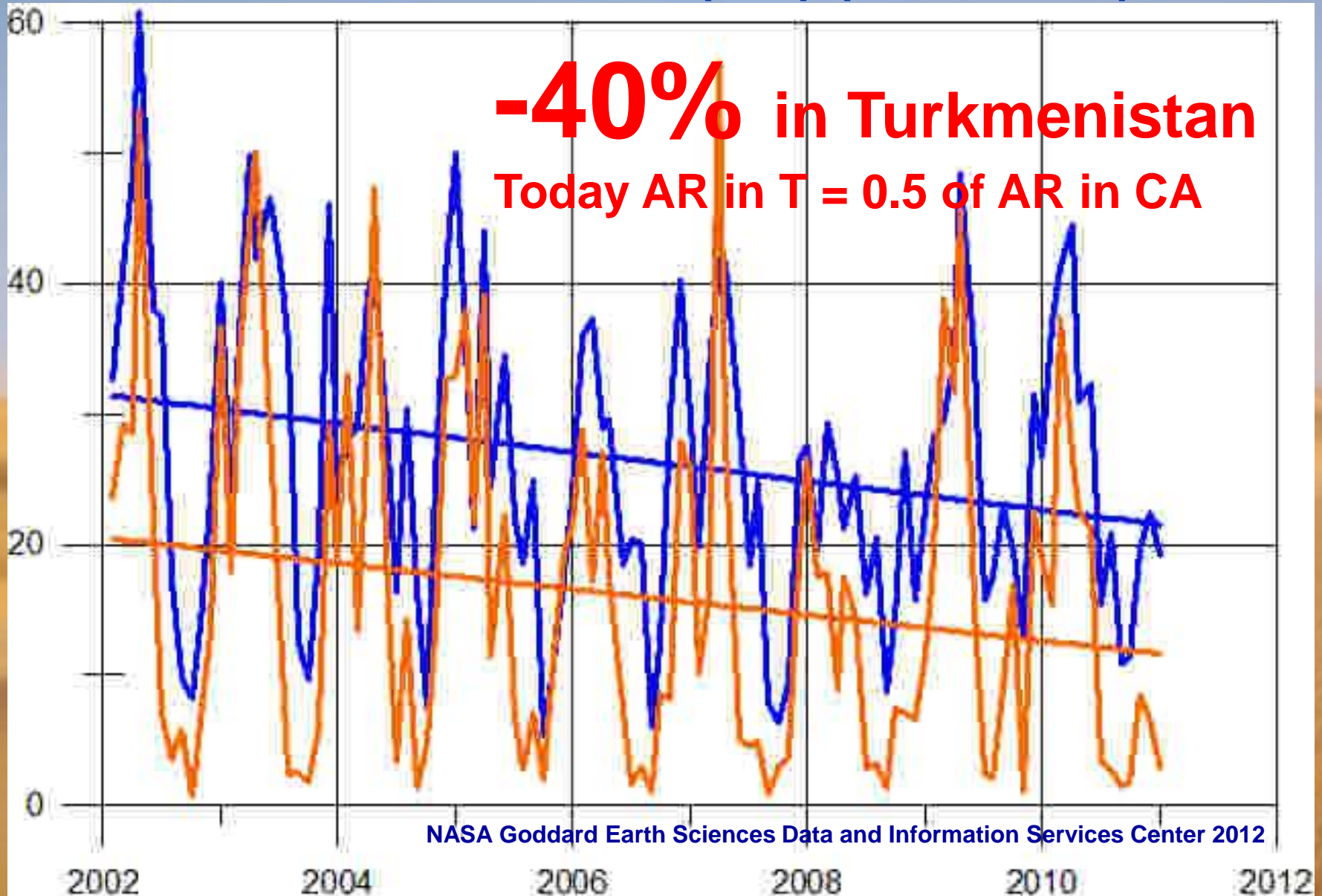
Monthly GPCP Jan1979-Dec2010
Accumulated Rainfall [mm]

NASA Goddard Earth Sciences Data and Information Services Center 2012



Accumulated Rainfall (mm) in Central Asia (blue) and Turkmenistan (red) (2002-2010)

-40% in Turkmenistan
Today AR in T = 0.5 of AR in CA

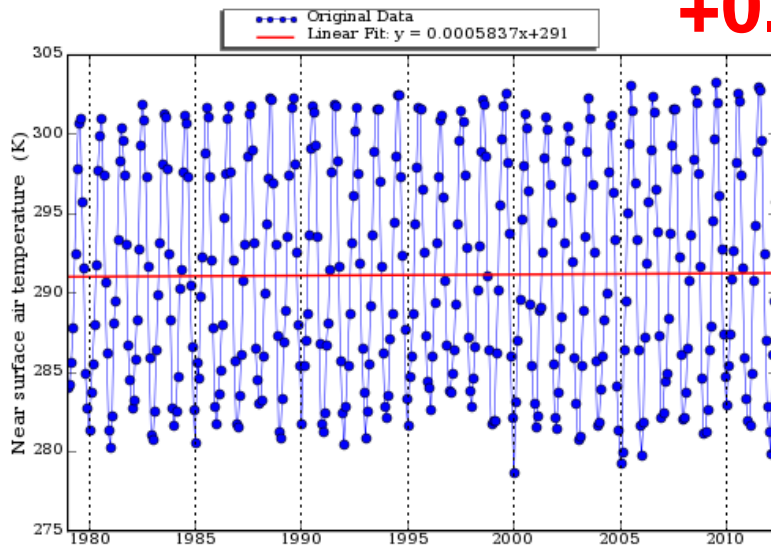


NASA Goddard Earth Sciences Data and Information Services Center 2012

AIR TEMPERATURE AND ACCUMULATED PRECIPITATION IN NW AFRICA (1979-2011)

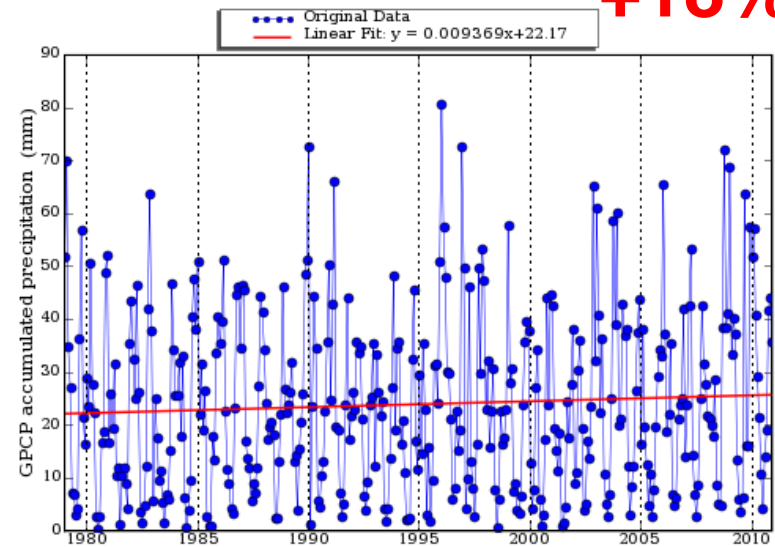


Area-Averaged Time Series (GLDAS_CLM10_M.001)
(Region: 7W-11E, 32N-37N)



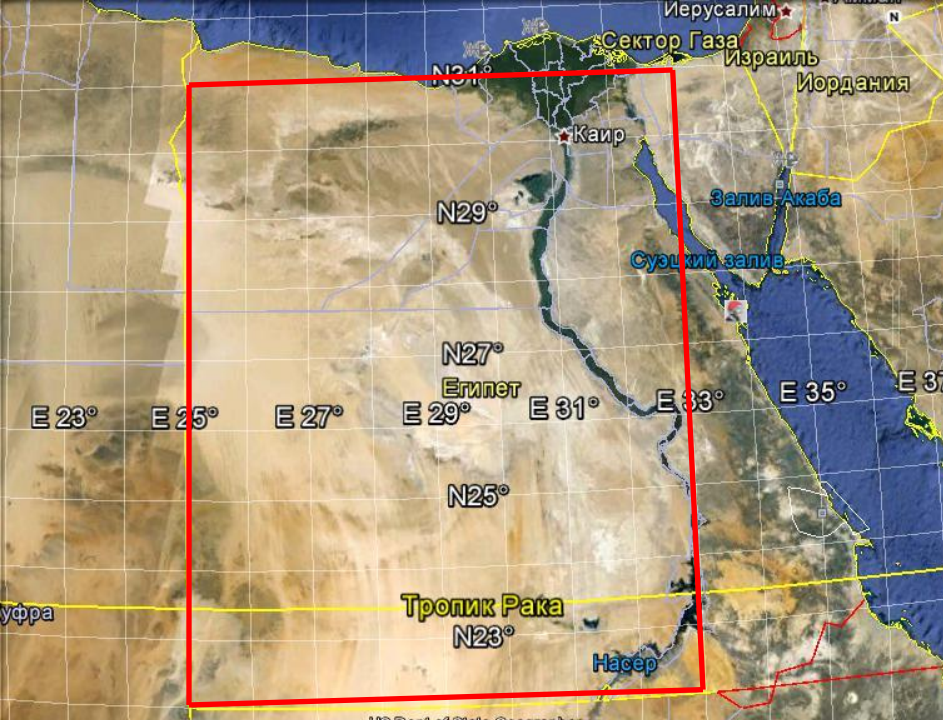
+0.2C

Area-Averaged Time Series (GPCP_RAIN_ACC.2.2)
(Region: 7W-11E, 32N-37N)



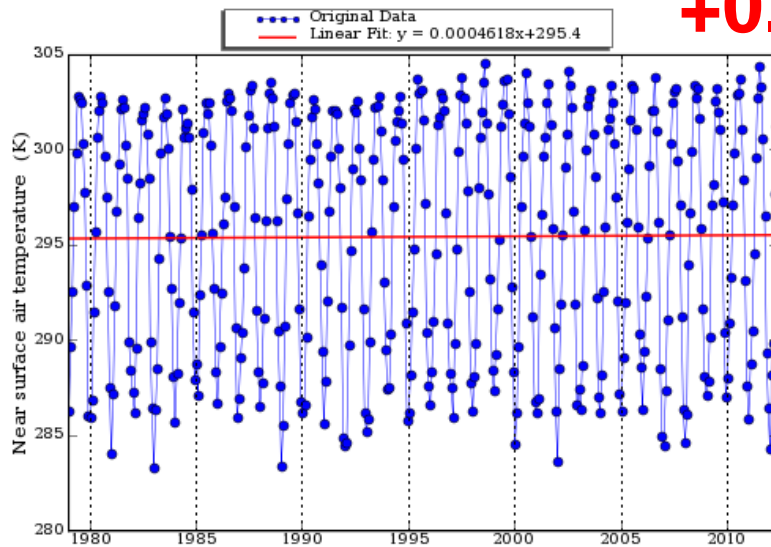
+18% !

AIR TEMPERATURE AND ACCUMULATED PRECIPITATION IN EGYPT (1979-2011)



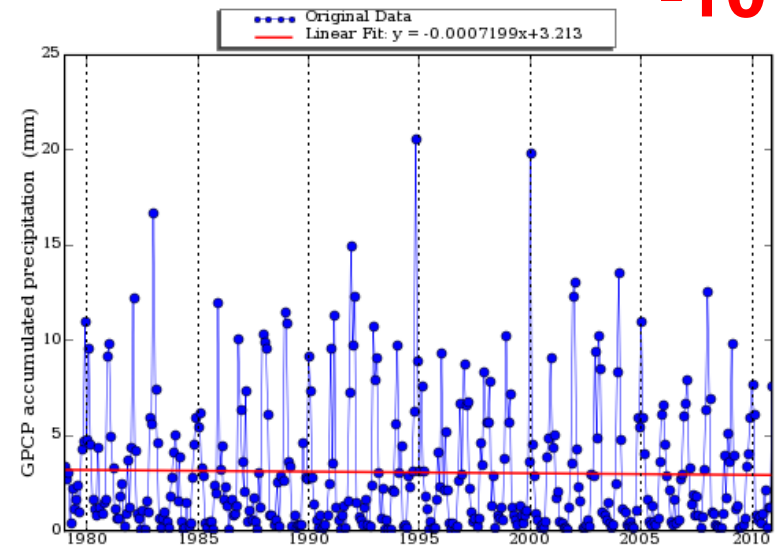
Area-Averaged Time Series (GLDAS_CLM10_M.001)
(Region: 25E-33E, 22N-31N)

+0.2C



Area-Averaged Time Series (GPCP_RAIN_ACC.2.2)
(Region: 25E-33E, 22N-31N)

-10%

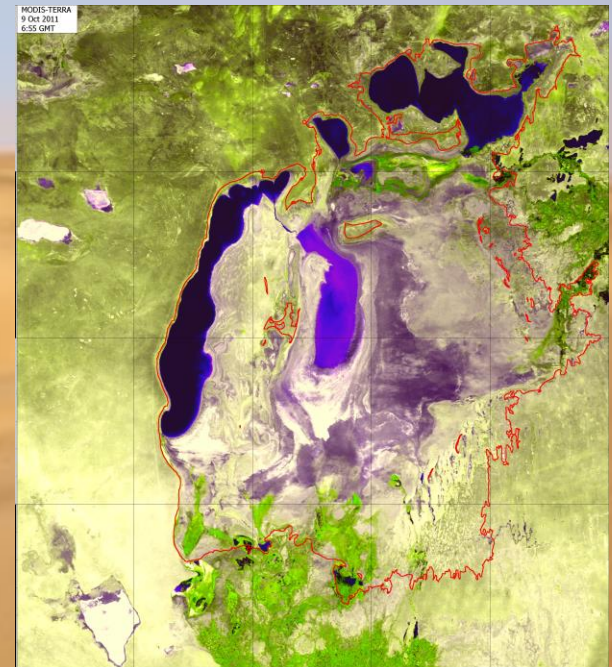


POTENTIAL IMPACTS of REGIONAL CLIMATE CHANGE and CONSEQUENCES for CENTRAL ASIA

1. Increase in air and soil temperature (IPCC-2007: +1.6-7.4 C by 2050)
2. Decrease in precipitation (IPCC-2007: -3% by 2100) and humidity
3. Increase in evaporation and aridity
4. Land degradation, desertification and salinization of soils
5. Increase in frequency of extreme weather events (draughts, floods, frosts, very high/low air temperature, dust/salt storms)
6. Shift of seasons



1. Water resources and quality
2. Agriculture
3. Ecosystems
4. Food security
5. Human health
6. Water, economic, social and political conflicts
7. Risks for sustainable development
8. Turkmenistan, western parts of Kazakhstan and Uzbekistan are and will be under the largest stress



 **Environmental/climate migrants/refugees**

A. Kostianoy
A. Kosarev
Editors

The Caspian Sea Environment

 Springer

of
Chemistry

I. Zonn
M. Glantz
A. Kostianoy
A. Kosarev

The Caspian Sea Encyclopedia

 Springer

OUR BOOKS ON CENTRAL ASIA ENVIRONMENT PUBLISHED IN SPRINGER IN 2005-2013

THE HANDBOOK OF
ENVIRONMENTAL CHEMISTRY

07

Volume Editors Andrey G. Kostianoy
Aleksy N. Kosarev

The Aral Sea Environment

 Springer

I. Zonn
M. Glantz
A. Kostianoy
A. Kosarev

The Aral Sea Encyclopedia

 Springer

The Handbook of Environmental Chemistry 28
Series Editors: Damià Barceló · Andrey G. Kostianoy

Igor S. Zonn
Andrey G. Kostianoy *Editors*

The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan

 Springer

2013

Thank you for your attention



E-mail: kostianoy@gmail.com