Federal Service for Hydrometeorology
and Environmental Monitoring

VOEIKOV MAIN GEOPHYSICAL OBSERVATORY

Since 1849

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MAIN
GEOPHYSICAL
OBSERVATORY

Arctic observing networks:

METEOROLOGY

Vladimir Kattsov

SAON seminar, St.Petersburg, 7 July 2008

Arctic warming: mechanisms?

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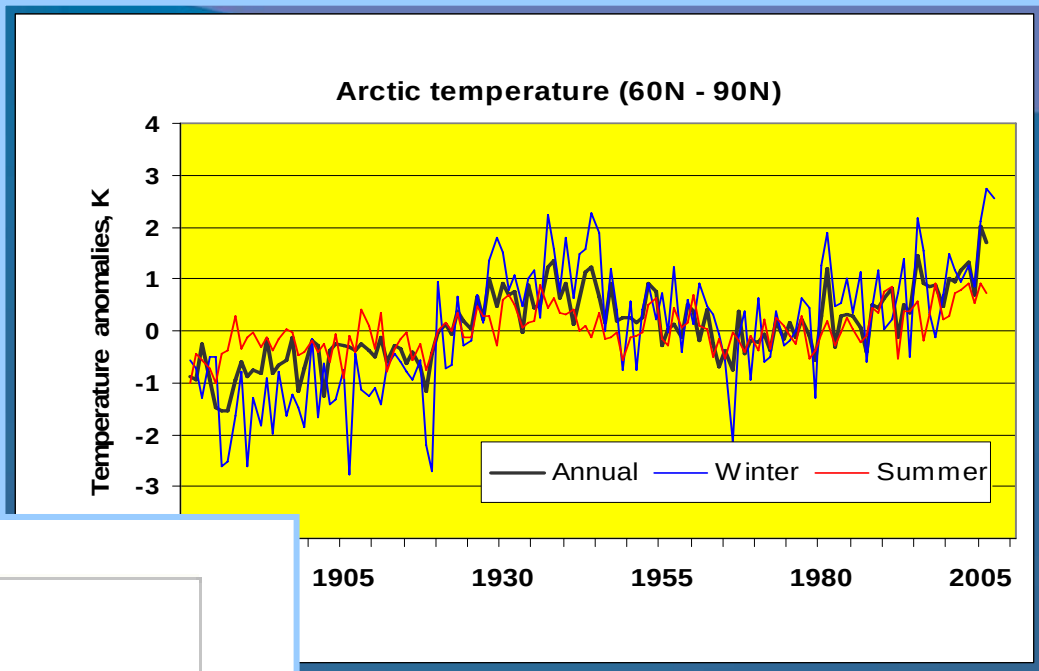

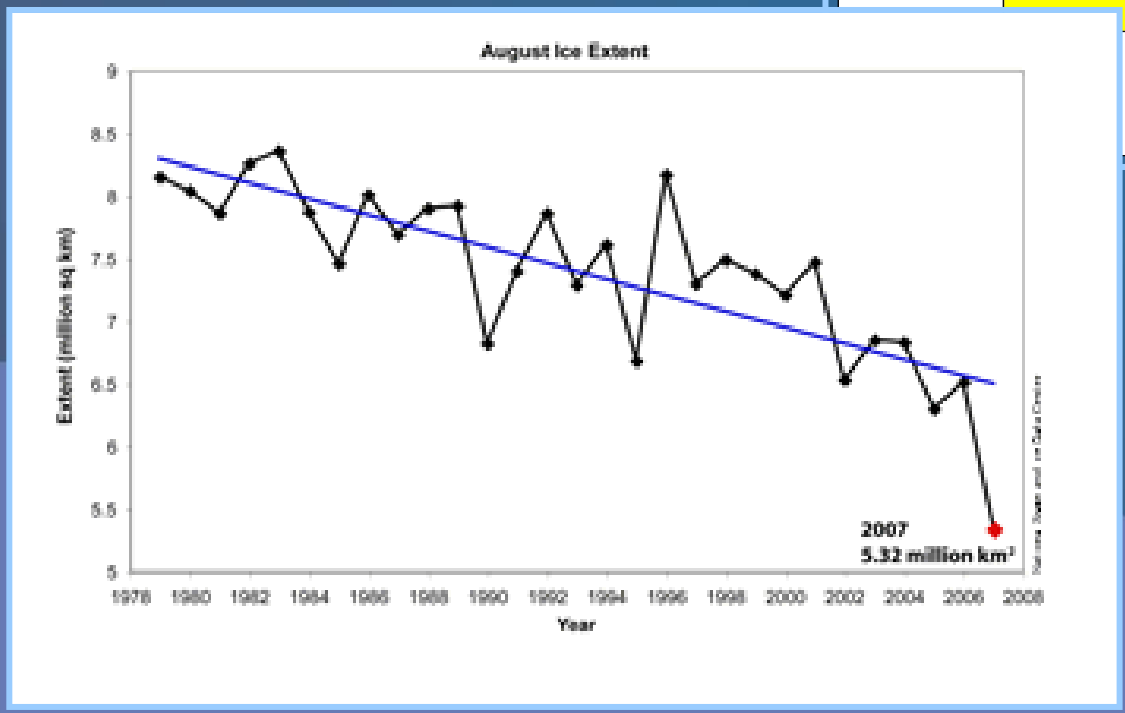

NSIDC, 2007; Lugina et al., 2007

Climate projections: uncertainties

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SLR: Greenland melt dynamic mechanisms?

Feedbacks (rate of warming):

- Permafrost carbon?
- Ice-free Arctic?
- MOC slowdown (in connection with AOFWB)

Near-term predictions (up to a decade):

- Decadal scale variability vs. anthropogenic signal

Spatial scale (adaptation and mitigation options)

IPCC., 2007

Reanalyses

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NWP models + assimilation of observational data:

comprehensive, homogeneous, long-period data sets

filling gaps in observations

insufficient quality in high lats (inter-reanalyses scatter)

Observations needed to improve reanalyses:

Satellites: coverage OK;
accuracy and number of characteristics – should be improved
In situ (surface and balloons): accuracy is an advantage,
but not the coverage

ASR (Arctic System Reanalysis)

MGO responsibility: surface meteorology

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Arctic land stations: co-responsibility with AARI

part of Russian state observing system (Roshydromet)

generally, from 1930s (but there are much earlier)

now 52 stations (vs. 110 couple of decades ago)

almost half of them (23) are a part of the bench-mark climate network of Russia

observed 48 parameters

monthly and yearly reports (on climatic stations, by 3 regional Roshydromet's operational administrations)

In situ observations are needed to:

test remote sensing data

constrain climate models

Needs as seen from MGO

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Restoring the surface station network

- continue time series
- account for spatio-temporal variability (optimum distribution)
- application of comprehensive models and maths to optimize (testing impact of observational sites)

Adding automatic stations incl. buoys

- increase density where especially necessary
- increase the number of measured parameters (precip., snow depth, visibility, etc.)

Special attention to the unification of methods, requirements, analysis

Particular attention to the wind measurements:

- urgently needed for improving reanalyses
- a potentially powerful energy resource in the Arctic

Precipitation

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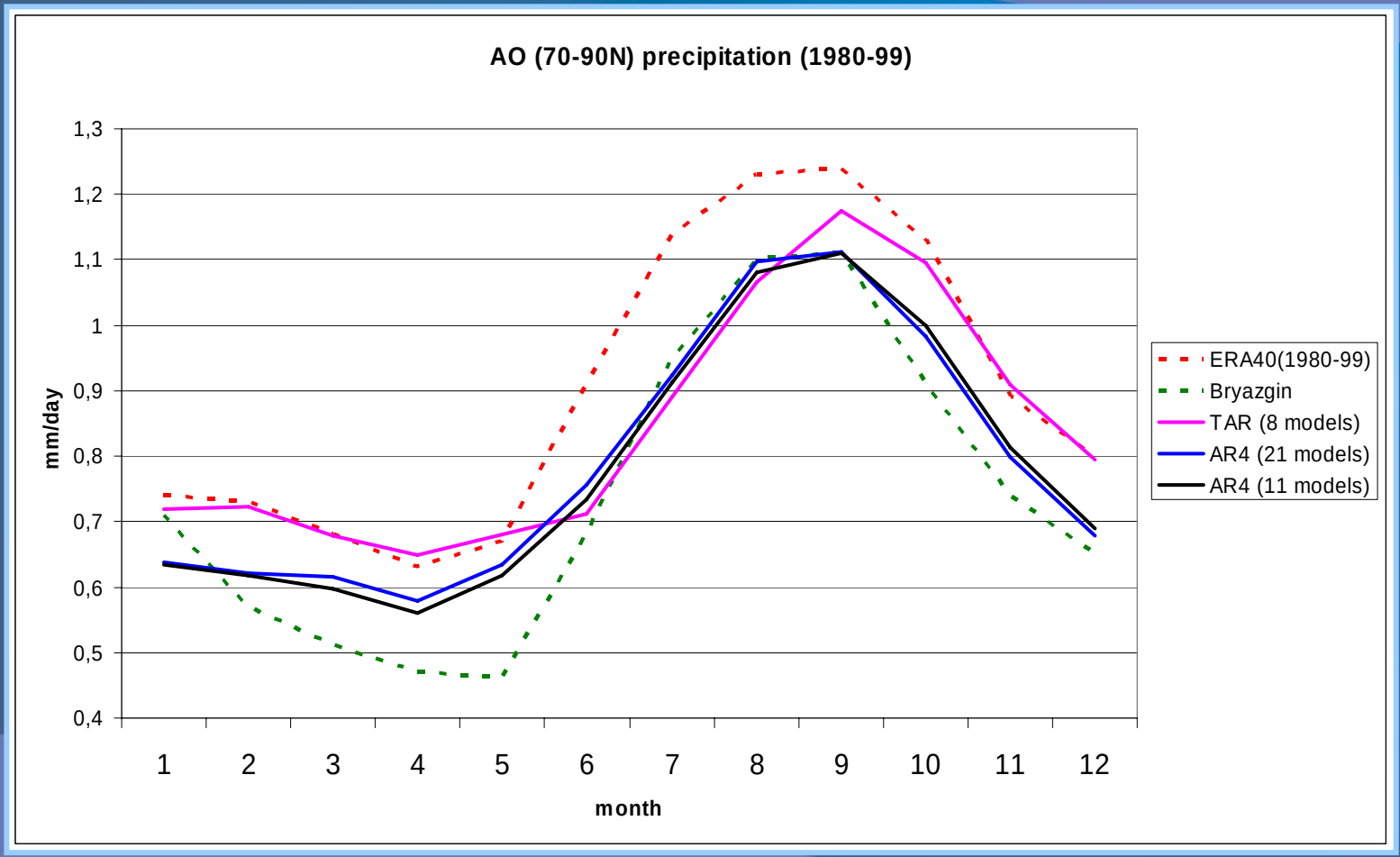

Arctic precipitation: two generations of AOGCMs

Kattsov et al., 2007