COMPARISON OF GLOBAL CLOUD CLIMATOLOGIES

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Cloud cover plays the key role in the Earth's climate system. Clouds regulate radiation budget of the planet thru reflecting shortwave radiation coming from the sun and absorbing longwave radiation coming from the Earth. It should be noted, that the largest uncertainty in the climate change is connected with cloudiness changes.

The key problem of cloudiness detection is the lack of reference observations. There are several up-to-date datasets for cloudiness, based on satellite or surface observations.

In our work we carried out an analysis to assess and compare different characteristics of global cloudiness using different data based on satellite and surface observations and also on reanalysis data.

Global cloudiness from observations is about 2/3, for certain data it reaches 3/4. Global cloudiness over land from satellite and surface observations is between 1/2 and 3/5. Global cloudiness over ocean is higher. It is about 70% from satellite data and ship's observations. Global cloudiness from reanalysis data is less than from observations. It is evaluated between 1/2 and 3/5.

It is worthwhile pointing out that the largest distinctions between different data are noted in high latitudes, especially in winter.

CLOUDINESS DATASETS

Satellite observations	**ISCCP**	The International Satellite Cloud Climatology Project (D2 data product) Rossow W.B., Duenas E. The International Satellite Cloud Climatology Project (ISCCP) web site: An online resource for research. // Bull. Amer. Meteor.Soc. 2004. Vol.85. P.167-172.	07/1983 - 06/2007	2.5^ox2.5^o
	UW HIRS	University of Wisconsin High-resolution Infrared Radiation Sounder Wylie D., Jackson D.L., Menzel W.P., and J.J. Bates. Trends in Global Cloud Cover in Two Decades of HIRS Observations // J. Climate. 2005. Vol.18. P.3021-3031.	01/1979 - 12/2001	1^ox1^o
	Patmos-X	Pathfinder Atmosphere - Extended (Advanced Very High Resolution Radiometer) Jacobowitz H., Stowe L.L., Ohring G. et al. The Advanced Very High Resolution Radiometer Pathfinder Atmosphere (PATMOS) Climate Dataset: A Resource for Climate Research // Bull. Amer. Meteor. Soc. 2003. Vol.84. P.785-793.	01/1981 - 12/2005	0.5^ox0.5^o
	MODIS	The Moderate Resolution Imaging Spectroradiometer, (Terra, Aqua) (collection 5) Barnes W.L., Pagano T.S., Salomonson V.V. Prelaunch characteristics of the Moderate Resolution Imaging Spectroradiometer (MODIS) on EOS-AM1 // IEEE Transactions on Geoscience and Remote Sensing. 1998. Vol.36. No.4. P.1088-1100.	02/2000 - 12/2008; 07/2002 - 12/2008	1^ox1^o
Ground-based observations	**EECRA**	Extended Edited Synoptic Cloud Reports Archive (E series) Hahn C.J., Warren S. G. A gridded climatology of clouds over land (1971-96) from surface observations worldwide. Tech. Rep. NDP-026E. Oak Ridge: Carbon Dioxide Information Analysis Center. 71 pp.	01/1971 - 12/1996 (land); 01/1954 - 12/1997 (ocean)	5^ox5^o; 10^ox10^o
	CRU	Climatic Research Unit (dataset TS 2.1) Mitchell T.D., Jones P.D. An improved method of constructing a database of monthly climate observations and associated high-resolution grids. // Int. J. Climatol. Vol.25. No.6. P.693-712.	10/1971 - 12/2002 (land w/o Antartica)	0.5^ox0.5^o
	ICOADS	The International Comprehensive Ocean-Atmosphere Data Set (release 2.1) Worley S.J., Woodruff S.D., Reynolds R.W. et al. ICOADS release 2.1 data and products // Int. J. Climatol. 2005. Vol. 5. No.7. P.823-842.	01/1960 - 05/2007 (ocean)	1^ox1^o
Reanalysis	**ERA**	European Center for Medium-Range Weather Forecasts ReAnalysis (ERA-40, ERA-Interim) Uppala S.M., Kallberg P.W., Simmons A.J. et al. The ERA-40 re-analysis // Quart. J. R. Meteorol. Soc. 2005. Vol.131. P.2961-3012. ECMWFE Newsletter No. 110 - Winter 2006/07. Reading: European Centre for Medium-Range Weather Forecasts / Riddaway B. (ed.). 2007. 53 pp.	07/1957 - 08/2002; 01/1989 - 12/2008	2.5^ox2.5^o;1.5^ox1.5^o
	NCEP	National Centers for Environmental Prediction Reanalysis (NCEP/NCAR, NCEP/DOE) Kistler R., Kalnay E., Collins W. et al. The NCEP-NCAR 50-Year reanalysis: Monthly Means CD-ROM and Documentation // Bull. Amer. Meteor. Soc. 2001. Vol.82(2). P.247-267. Kanamitsu M., Ebisuzaki W., Woollen J. et al. NCEP-DOE AMIP-II Reanalysis (R-2) // Bull. Amer. Meteor. Soc. 2002. Vol.83. P.1631-1643.	01/1948 - 12/2008; 01/1979 - 12/2008	1.875^ox1.875^o
	JRA	Japanese ReAnalysis (JRA-25) Onogi K., Tsutsui J., Koide H., et al. The JRA-25 Reanalysis // J. Meteor. Soc. Japan 2007. Vol.85. P.369-432.	01/1979 - 12/2008	2.5^ox2.5^o

CLOUDINESS OVER LAND AND OCEAN

CLOUDINESS OVER LAND

CLOUDINESS OVER OCEAN

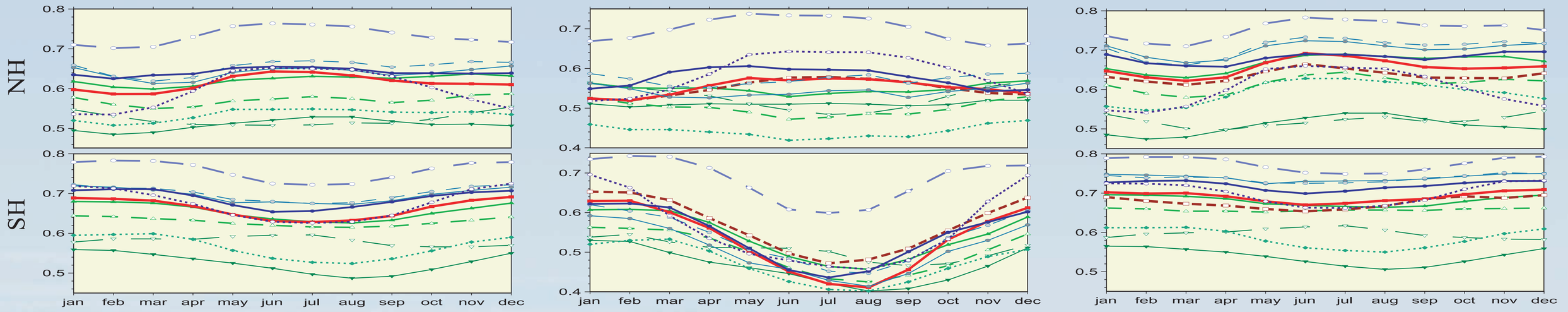
ANNUAL MEAN

Data	*Global mean*	*NH*	*SH*
ISCCP	0.66 (0.012)	0.64 (0.014)	0.69 (0.011)
UW HIRS	0.75 (0.003)	0.74 (0.005)	0.76 (0.005)
Patmos-X	0.64 (0.009)	0.60 (0.011)	0.67 (0.010)
MODIS Terra	0.67 (0.001)	0.64 (0.003)	0.70 (0.002)
MODIS Aqua	0.68 (0.001)	0.65 (0.003)	0.70 (0.002)
EECRA	0.65	0.62	0.68
ERA-40	0.64 (0.016)	0.62 (0.019)	0.66 (0.016)
ERA-Interim	0.60 (0.003)	0.57 (0.005)	0.63 (0.004)
NCEP/NCAR	0.51 (0.006)	0.53 (0.011)	0.50 (0.007)
NCEP/DOE	0.55 (0.004)	0.52 (0.004)	0.58 (0.005)
JRA-25	0.55 (0.003)	0.53 (0.004)	0.56 (0.005)

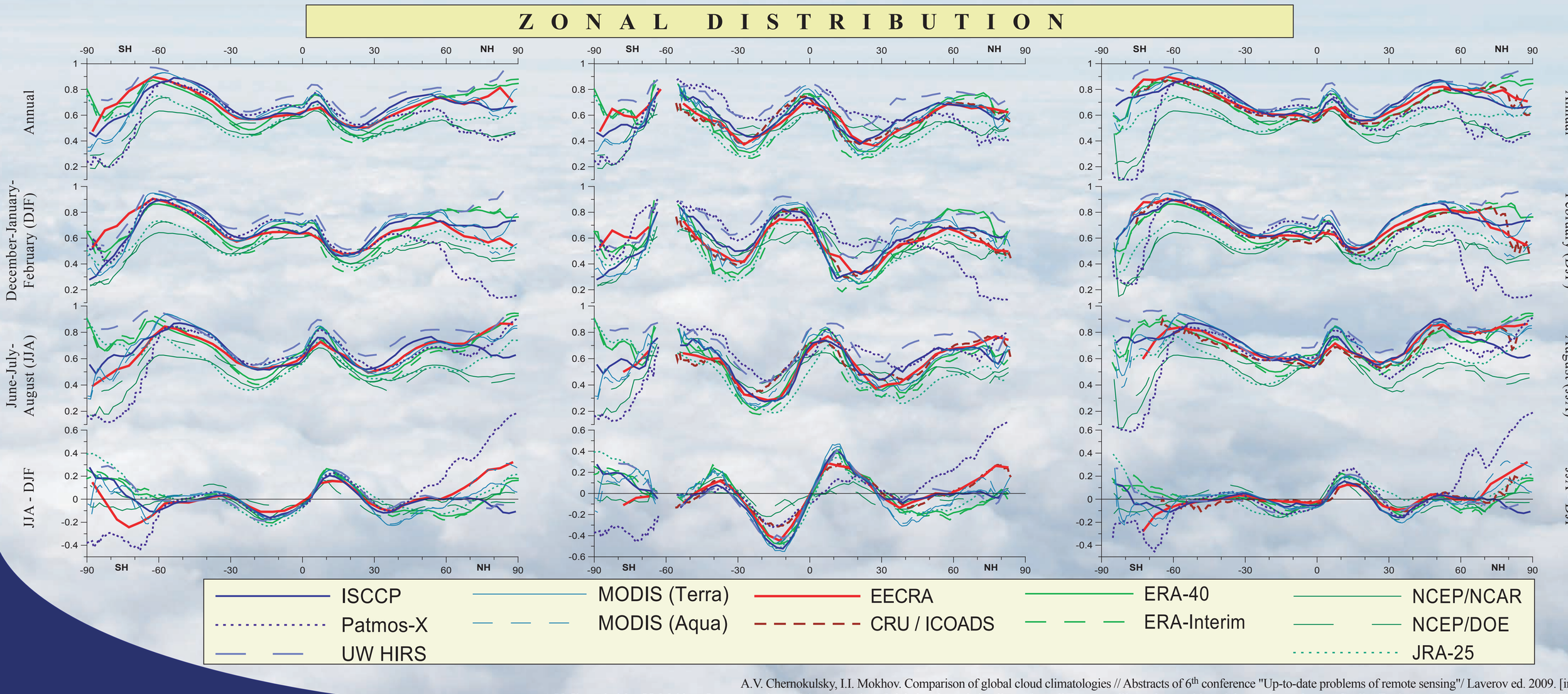
Data	*Global mean*	*NH*	*SH*
ISCCP	0.57 (0.011)	0.58 (0.011)	0.54 (0.014)
UW HIRS	0.69 (0.006)	0.70 (0.007)	0.68 (0.011)
Patmos-X	0.58 (0.010)	0.59 (0.011)	0.56 (0.016)
MODIS Terra	0.53 (0.005)	0.54 (0.004)	0.51 (0.012)
MODIS Aqua	0.56 (0.004)	0.57 (0.003)	0.54 (0.006)
EECRA	0.55	0.55	0.53
CRU	0.55 (0.004)	0.55 (0.004)	0.57 (0.007)
ERA-40	0.55 (0.023)	0.55 (0.024)	0.54 (0.027)
ERA-Interim	0.50 (0.004)	0.50 (0.005)	0.50 (0.007)
NCEP/NCAR	0.50 (0.008)	0.51 (0.010)	0.46 (0.009)
NCEP/DOE	0.52 (0.003)	0.53 (0.005)	0.51 (0.009)
JRA-25	0.45 (0.007)	0.44 (0.007)	0.47 (0.013)

Data	*Global mean*	*NH*	*SH*
ISCCP	0.70 (0.013)	0.68 (0.017)	0.72 (0.011)
UW HIRS	0.77 (0.005)	0.75 (0.006)	0.77 (0.006)
Patmos-X	0.66 (0.009)	0.60 (0.011)	0.70 (0.009)
MODIS Terra	0.72 (0.001)	0.70 (0.003)	0.74 (0.002)
MODIS Aqua	0.72 (0.001)	0.71 (0.002)	0.74 (0.002)
EECRA	0.68	0.66	0.69
ICOADS	0.66 (0.008)	0.64 (0.009)	0.68 (0.008)
ERA-40	0.68 (0.014)	0.67 (0.017)	0.68 (0.013)
ERA-Interim	0.64 (0.004)	0.61 (0.007)	0.66 (0.005)
NCEP/NCAR	0.53 (0.006)	0.51 (0.013)	0.54 (0.009)
NCEP/DOE	0.56 (0.004)	0.52 (0.005)	0.60 (0.007)
JRA-25	0.59 (0.005)	0.59 (0.007)	0.59 (0.006)

ANNUAL CYCLE



ZONAL DISTRIBUTION



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