

CURRICULUM VITAE

Name: Vladimir Krasnopolsky

Phone: 301-683-3742

Fax: 301-683-3703

E-mail & http Addresses: Vladimir.Krasnopolsky@noaa.gov and <http://polar.ncep.noaa.gov/mmab/people/kvladimir.html>

EDUCATION

1971 **MS in Physics**, Moscow State University, Moscow, Russia

Major: Theoretical and Mathematical Physics. *Minors:* Computational Physics, Applied Mathematics, and Numerical Methods.

1978 **PhD in Physics**, Moscow State University, Moscow, Russia

BRIEF EMPLOYMENT HISTORY

2011 - present, **Physical Scientist**, Environmental Modeling Center, NCEP/NWS/NOAA

2003 - present, **Adjunct Professor**, Earth System Science Interdisciplinary Center, University of Maryland

1998 -2010, **Leader**, Marine Prediction Group, SAIC at NCEP/NWS/NOAA.

1990-1998, **Physical Scientist**, SAIC at NCEP/NWS/NOAA

1989-1990, **Research Scientist** at The George Washington University (Department of Electrical Engineering & Computer Science).

1973-1989, **Senior Research Scientist** at Institute of Nuclear Physics, Moscow State University, Moscow, Russia.

RESEARCH AWARDS

"Best of Conference" Award, 1999 International Joint Conference on Neural Networks, Washington D.C., 1999

The NMC (NOAA) Outstanding Performance Award: for innovative research on the application of neural networks to satellite image processing, NOAA, 1994.

SPECIAL EXPERIENCES

Organizer of special sessions "Computational intelligence in earth and environmental sciences" at 2005, 2006, 2007, 2009, and 2010 IEEE/INNS International Joint Conference on Neural Networks.

Member of the IEEE/CIS Working Group "Computational intelligence in earth and environmental sciences", since 2005

Member of the INNS Working Group "Computational intelligence in earth and environmental sciences", since 2005

Member of the *Committee on Artificial Intelligence Applications to Environmental Science* of American Metrological Society since 1999, **Chair** of this Committee from 2000 to 2003

Organizer and **Chair** of the 3rd AMS Conference on Artificial Intelligence Applications to the Environmental Science, Feb 9-13, 2003, Long Beach, CA; **an Organizer** of 4th to 7th AMS Conference on Artificial Intelligence Applications to the Environmental Science

Member of the organization committee of the International Workshop on "Advanced Environmental Sensing and Monitoring Technologies"

Member of the program committee and **organizer** of a special session at 2003, 2004, and 2005 IEEE International Conference on Computational Intelligence for Measurement Systems and Applications.

Short Course Invited by AMS: "Neural Network Applications to Environmental Sciences" 2 days Short Course, 84 Annual Meeting of American Meteorological Society, Seattle, WA, January 12-13 January 2004

Short Course Invited by AMS: "Neural Network Applications to Environmental Sciences" 2 days Short Course, 82 Annual Meeting of American Meteorological Society, Orlando, FL, January 12-13 January 2002

Invited Talk: "Development of neural network convection parameterizations for climate models using CRM simulations and ARM data", 90-th AMS Annual Meeting, Eighth Conference on Artificial Intelligence Applications to Environmental Science, Atlanta, GA, 18-22 January, 2010

Invited Talk: "Using Neural Networks in Numerical Climate and Weather Forecast Systems", 89-th AMS Annual Meeting, Seventh Conference on Artificial Intelligence Applications to Environmental Science, Phoenix, AZ, 11-15 January, 2009

Invited Talk: "NN Emulations of Complex Geophysical Mappings: Some Atmospheric and Oceanic Applications", University of RI, November 9, 2007

Invited Talk: "[Acceleration of Calculations and Improvement of Model Physics Using Neural Networks](#)", GFDL, Princeton, May 31, 2007

Invited Talk: "Hybrid Numerical Climate and Weather Prediction Models Combining Deterministic and Statistical Learning Model Components", 87th AMS Annual Meeting, Fifth Conference on Artificial Intelligence Applications to Environmental Science, San Antonio, TX, 14—18 January 2007

Invited Talk: "Fast and Accurate Approximation of the Long Wave Radiation Parameterization in a GCM Using Neural Networks: Evaluation of Computational Performance and Accuracy of Approximation in the NCAR CAM-2", CIMSA 2004 – IEEE International Conference on Computational Intelligence for Measurement Systems and Applications, Boston, MA, USA, 14-16 July 2004

Invited Talk: "Application of Neural Networks to Accelerate Computations in Environmental Models", Second IEEE International Workshop on Advanced Environmental Sensing and Monitoring Technologies, Como, Italy, 24-25 July, 2003

Invited Talk: "Using adaptive learning techniques for fast and accurate approximation of physics in numerical models", CIMSA2003, IEEE International Symposium on Computational Intelligence for Measurement Systems and Applications, Lugano, Switzerland, 29-31 July, 2003

Invited Talk: "NNs in satellite remote sensing, satellite meteorology and oceanography", The First International Workshop on Advanced Environmental Sensing and Monitoring Technologies, Milan, Italy, June 26-28, 2001

Invited Talk: "Using NNs to improve computational efficiency of environmental numerical models", The First International Workshop on Advanced Environmental

Sensing and Monitoring Technologies, Milan, Italy, June 26-28, 2001

Invited Talk: "Neural Networks in Environmental Modeling", Information Technology Seminars: "Focus on the Future", National Institute of Standards and Technology, Washington DC, September, 2000

Invited Talk: "Introduction to Artificial Neural Networks with Atmospheric and Oceanic Applications", 80th AMS Annual Meeting, Long Beach, California, 10-14 January 2000

Special Invited Lecture: "Neural network solutions for remote sensing problems" at 7th International Meeting on Statistical Climatology, Whistler, Canada, May 25_29, 1998

CURRENT RESEARCH INTERESTS/ACTIVITIES

- Neural network applications to atmospheric and oceanic modeling
- Neural network applications to satellite meteorology, satellite image analysis, statistical data analysis and data mining
- Inverse and forward problems in space-borne remote sensing
- Assimilation of satellite data into numerical models

RECENT NEW RESULTS

- Neural network method for developing fast physical parameterizations in atmospheric models: long and short wave radiations
- Neural network method for developing fast physical parameterizations in oceanic and wave models
- Neural network method for developing stochastic physical parameterizations in atmospheric models
- Neural network approach to develop fast forward models for direct assimilation of satellite data
- Neural network approach to develop satellite multi-parameter retrieval algorithms

SELECTED REFEREED PUBLICATIONS (the total of one book, two book chapters, over 50 papers in refereed scientific journals and over 70 technical and conference papers):

Books and Book Chapters:

V. Krasnopolsky, 2013, "The Application of Neural Networks in the Earth System Sciences. Neural Network Emulations for Complex Multidimensional Mappings", in press

V. Krasnopolsky, 2008, "Neural Network Applications to Solving Forward and Inverse Problems in Atmospheric and Oceanic Satellite Remote Sensing", a book chapter in "Artificial Intelligence in Environmental Sciences", ed. by S.E. Haupt, A. Pasini, and C. Marzban, Springer, 375 pp

V. Krasnopolsky, 2008, "Neural Network Applications to Developing Hybrid Atmospheric and Oceanic Numerical Models", a book chapter in "Artificial Intelligence in Environmental Sciences", ed. by S.E. Haupt, A. Pasini, and C. Marzban, Springer, 375 pp.

Kukulin, V.I., V.M. Krasnopolsky, and J. Horacek, "Theory of resonances. Principles and applications." Kluwer Academic Publisher, Dordrecht/Boston/London, 1989

Papers:

- V. M. Krasnopolsky and Y. Lin**, 2012: "A Neural Network Nonlinear Multimodel Ensemble to Improve Precipitation Forecasts over Continental US", *Advances in Meteorology*, Volume 2012, Article ID 649450, 11 pages, doi:10.1155/2012/649450
- Krasnopolsky, V., M. Fox-Rabinovitz, and A. Belochitski**, 2012: "Development of neural network convection parameterizations for climate and NWP models using Cloud Resolving Model simulations", *Advances in Artificial Neural Networks*, submitted
- A. Belochitski, P. Binev, R. DeVore, M. Fox-Rabinovitz, V.Krasnopolsky, P. Lamby**, 2011: "Tree Approximation of the Long Wave Radiation Parameterization in the NCAR CAM Global Climate Model", *Journal of Computational and Applied Mathematics*, v. 236, pp. 447-460, doi: 10.1016/j.cam.2011.07.013
- V. M. Krasnopolsky, M.S. Fox-Rabinovitz, Y. T. Hou, S. J. Lord, and A. A. Belochitski**, 2010: "Accurate and Fast Neural Network Emulations of Model Radiation for the NCEP Coupled Climate Forecast System: Climate Simulations and Seasonal Predictions", *Monthly Weather Review*, v.138, pp. 1822-1842, DOI: 10.1175/2009MWR3149.1
- V. M. Krasnopolsky, M.S. Fox-Rabinovitz, and A. A. Belochitski**, 2008: "Decadal Climate Simulations Using Accurate and Fast Neural Network Emulation of Full, Long- and Short Wave, Radiation.", *Monthly Weather Review*, 136, 3683–3695, doi: 10.1175/2008MWR2385.1.
- V. M. Krasnopolsky, M.S. Fox-Rabinovitz, H.L. Tolman, and A. A. Belochitski**, 2008: "Neural network approach for robust and fast calculation of physical processes in numerical environmental models: Compound parameterization with a quality control of larger errors.", *Neural Networks*, 21, 535–543; doi:10.1016/j.neunet.2007.12.019
- V.M. Krasnopolsky**, 2007: "Neural Network Emulations for Complex Multidimensional Geophysical Mappings: Applications of Neural Network Techniques to Atmospheric and Oceanic Satellite Retrievals and Numerical Modeling", *Reviews of Geophysics*, 45, RG3009, doi:10.1029/2006RG000200.
- V.M. Krasnopolsky**, 2007: "Reducing Uncertainties in Neural Network Jacobians and Improving Accuracy of Neural Network Emulations with NN Ensemble Approaches", *Neural Networks*, 20, pp. 454–461
- V.M. Krasnopolsky and M.S. Fox-Rabinovitz**, 2006: "Complex Hybrid Models Combining Deterministic and Machine Learning Components for Numerical Climate Modeling and Weather Prediction", *Neural Networks*, 19, 122-134
- V. Cherkassky, V. Krasnopolsky, D.P. Solomatine, and J. Valdes**, 2006: "Computational intelligence in earth sciences and environmental applications: Issues and challenges", *Neural Networks*, 19, 113-121
- V.M. Krasnopolsky and M.S. Fox-Rabinovitz**, 2006: "A New Synergetic Paradigm in Environmental Numerical Modeling: Hybrid Models Combining Deterministic and Machine Learning Components", *Ecological Modelling*, 191, 5-18
- V.M. Krasnopolsky, M.S. Fox-Rabinovitz, and D.V. Chalikov**, 2005: "New Approach to Calculation of Atmospheric Model Physics: Accurate and Fast Neural Network Emulation of Long Wave Radiation in a Climate Model", *Monthly Weather Review*, v.

133, No. 5, 1370-1383

H. Tolman, V. M. Krasnopolsky, and D. Chalikov, 2005: "Neural Network Approximations for Nonlinear Interactions in Wind Wave Spectra: Direct Mapping for Wind Seas in Deep Water", *Ocean Modelling*, v. 8, issue 3, 253-278

Krasnopolsky, V.M. and H. Schiller, 2003: "Some Neural Network Applications in Environmental Sciences. Part I: Forward and Inverse Problems in Geophysical Remote Measurements", *Neural Networks*, v. 16, pp. 321-334

Krasnopolsky, V. M. and F. Chevallier, 2003: "Some Neural Network Applications in Environmental Sciences. Part II: Advancing Computational Efficiency of Environmental Numerical Models", *Neural Networks*, v. 16, pp. 335-348

Krasnopolsky, V. M. , D. V. Chalikov, and H. L. Tolman, 2002: "A Neural Network Technique to Improve Computational Efficiency of Numerical Oceanic Models", *Ocean Modelling*, v. 4, 363-383

Li, X., W. Pichel, P. Clemente-Colon, V. Krasnopolsky, and J. Sapper, 2001: "Validation of Coastal Sea and Lake Surface Temperature Measurements Derived from NOAA/AVHRR Data", *Int. J. Remote Sensing*, v. 22. 1285-1303

Krasnopolsky, V.M., W.H. Gemmill, and L.C. Breaker, 2000: "A neural network multi-parameter algorithm for SSM/I ocean retrievals: comparisons and validations", *Remote Sensing of Environment*, Vol. 73, pp. 133-142

Breaker L. C. , V. M. Krasnopolsky, and E. M. Maturi, 2000, "GOES-8 imagery as a new source of data to conduct ocean feature tracking", *Remote Sensing of Environment*, Vol. 73, pp. 198-206

Krasnopolsky, V.M., W.H. Gemmill, and L.C. Breaker, 1999: "A Multi-parameter Empirical Ocean Algorithm for SSM/I Retrievals", *Canadian J. Remote Sensing*, Vol. 25, No. 5, pp. 486-503

Gemmill, W.H. and V.M. Krasnopolsky, 1999: "The use of SSM/I data in operational marine analysis", *Weather and Forecasting*, Vol. 14, No.5, pp. 789-800

Chalikov, D., L. C. Breaker, V. Krasnopolsky, and D. Rao, 1998: "Revisiting the Question of Assimilating Temperature alone into a Full Equation of State Ocean Model", *Ocean Modeling*, Issue 116, p. 13-14

Breaker, L.C., W.H. Gemmill, and V.M. Krasnopolsky, 1995: "Surface Wind Speeds over the Ocean Inferred from Brightness Temperatures Acquired from the Special Sensor Microwave Imager (SSM/I)" , *Backscatter*, v. 6, No. 3, pp. 8,15

Krasnopolsky, V.M., L.C. Breaker, and W.H. Gemmill, 1995: "A Neural Network as a Nonlinear Transfer Function Model for Retrieving Surface Wind Speeds from the Special Sensor Microwave Imager.", *J. Geophys. Res.*, v. 100, No. C6, pp. 11,033-11,045

Breaker, L.C. , V.M. Krasnopolsky, D.B. Rao, and X.-H. Yan, 1994: "The Feasibility of Estimating Ocean Surface Currents on an Operational Basis Using Satellite Feature Tracking.", *Bull. of AMS*, v. 75, No. 11, pp.2085-2095

Krasnopolsky, V. M., and L.C. Breaker, 1994: "The Problem of Navigation of AVHRR Images Revisited.", *Int. J. Remote Sensing*, v.15, No.5, 979-1008

Krasnopolsky, V.M., V.I. Kukulkin, E. Kusnetzova, J. Horacek and N.M. Queen, 1991: "Energy-dependent phase-shift analysis of $^2\text{H}+^4\text{He}$ scattering in the energy range $0.87 < E_d < 5.24$ MeV." *Phys.Rev.* v. C2, pp. 822-834

V. Voronchev, V. Krasnopolsky, V. Kukulkin, Y. Nakao, and K. Kudo. "Nuclear-physical aspects of controlled thermonuclear fusion. Dynamic multicluster model of light

nuclei and its application for studying thermonuclear reactions." *Memoirs of the Faculty of Engineering, Kyushu University*, v. 51 (1991) 63-80

Krasnopolsky, V.M., V.I. Kukulin, and J. Horacek, "Pade approximant technology for treating scattering data. I. Theory, models, and parametrization of scattering data." *Czech. J. Phys.*, v. B39, pp. 593-613, 1989

Krasnopolsky, V.M., V.I. Kukulin, and V.T. Voronchev, "On the ignition of the thermonuclear process in DD plasma by injecting $T^6\text{Li}$ pellets." *Nuclear Fusion* v. 28, pp. 2135-40, 1988

Krasnopolsky, V.M., V.I. Kukulin, and V.T. Voronchev, "The feasibility of measuring of nuclear cross sections in subbarrier region from pressure of laser targets." *Laser and Particle Beams*, v. 5, pp. 898-901, 1987.

Bok J., J. Horacek, V. Krasnopolsky, and V. Kukulin, "Determination of the deuteron asymptotic D- to S-state ratio by a Pade approximant technique.", *Phys. Lett.*, v. 172B, pp. 1-4, 1986

Kukulin V., V. Krasnopolsky, P. Sazonov, and V. Voronchev, "Detailed study of the cluster structure of light nuclei in a three-body model. II. The spectrum of low-lying states of nuclei with $A=6$.", *Nucl. Phys.*, v. A453, pp. 365-88, 1986

Krasnopolsky, V.M., V. Kukulin, V. Pomerantzev, and P. Sazonov, "Deuteron structure and NN-phase shifts for realistic local super deep NN-potential with extra state", *Phys. Lett.*, v. 165B, pp. 7-12, 1985

Krasnopolsky V.M., V.I. Kukulin, and J. Horacek, "Construction of S-matrix from scattering data", *Czech. J. Phys.*, v. 35B, pp. 805-19, 1985

Krasnopolsky, V.M., V.I. Kukulin, and V.T. Voronchev, "Study of the kinetics of the nuclear processes in the hot DD and $D^6\text{Li}$ plasmas.", *Nuclear Fusion*, v. 24, pp. 1117-28, 1984

Krasnopolsky, V., V. Kukulin, and V. Voronchev, "On the extrapolation of the low-energy cross-section of the nuclear reactions in the $d + ^6\text{Li}$ system.", *J. Phys. G: Nucl. Phys.*, v. 10, pp. L213-9, 1984

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Kukulin, V., V. Krasnopolsky, V. Pomerantzev, and P. Sazonov, "The NN-potential with forbidden state suggested from a six-quark model with one-pion exchange.", *Phys. Lett.*, v. 135B, pp. 20-5, 1984

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Krasnopolsky, V., V. Kukulin, and V. Voronchev, "A variational study of the ground and excited states of light nuclei in a three-body model on the complete basis. I. General formalism. *J. Phys. G: Nucl. Phys.*, v. 8, pp. 667-78, 1982

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Krasnopolsky, V., and V. Kukulin, "The Pade approximant method for finding the Hilbert-Schmidt eigenvalues and eigenfunctions in the two- and three-body problem.",

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Krasnopolsky, V., and V. Kukulin, "A new method to describe the stripping to unbound state and other reactions with unstable particles.", *Phys. Lett.*, v. 96B, pp. 4-6, 1980

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Krasnopolsky, V., and V. Kukulin, "A stochastic variational method for the few-body systems.", *J. Phys. G: Nucl. Phys.*, v. 3, pp. 795-807, 1977

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