Maosi Chen
Curriculum Vitae
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EDUCATION

Ph.D., Ecology   12/2015
Colorado State University, Fort Collins, Colorado

M.S., Cartography and Geographical Information System   07/2009
Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing, China

B.S., Information Management and Information System   07/2006
China Agricultural University, Beijing, China

CERTIFICATES

Google Cloud Certified - Professional Machine Learning Engineer

EMPLOYMENT HISTORY

USDA UV-B Monitoring and Research Program, Natural Resource Ecology Laboratory,
Colorado State University, Fort Collins, Colorado

Research Scientist I	06/2021-present
Postdoctoral Research Fellow	01/2016-05/2021

PUBLICATIONS

Refereed Articles

- Hartman, M D, Parton W J, Derner J D, Schulte D K, Smith W K, Peck D E, Day K A, Del Grosso S J, Lutz S, Fuchs B A, **Chen M**, Gao W (2020). Seasonal grassland productivity forecast for the U.S. Great Plains using Grass-Cast. *Ecosphere*, 11(11), e03280. doi: 10.1002/ecs2.3280
- **Chen M**, Sun Z, Newell B H, Corr C A, Gao W (2020). Missing Pixel Reconstruction on Landsat 8 Analysis Ready Data Land Surface Temperature Image Patches Using Source-Augmented Partial Convolution. *Remote Sensing*. 12, 3143. doi: 10.3390/rs12193143
- Chen Z, Gao W, Reddy K R, **Chen M**, Taduri S, Meyers S L, Shankle M W (2020). Ultraviolet (UV) B effects on growth and yield of three contrasting sweet potato cultivars. *Photosynthetica*, 58(1), 37-44. doi: 10.32615/ps.2019.137
- **Chen M,** Parton W J, Hartman M D, Del Grosso S J, Smith W K, Knapp A K, Lutz S, Derner J D, Tucker C J, Ojima D S, Volesky J D, Stephenson M B, Schacht W H, Gao W (2019). Assessing precipitation, evapotranspiration, and NDVI as controls of U.S. Great Plains plant production. *Ecosphere*. (accepted)
- **Chen M**, Sun Z, Davis J M, Liu Y-A, Corr C A, Gao W (2019). Improving the mean and uncertainty of ultraviolet multi-filter rotating shadowband radiometer in situ calibration factors: utilizing Gaussian process regression with a new method to estimate dynamic input uncertainty. *Atmospheric Measurement Techniques*. 12, 935-953. doi: 10.5194/amt-12-935-2019
- Liu Y-A, Sun Z, **Chen M**, Huang H-L A, Gao W (2018). Assimilation of atmospheric infrared sounder radiances with WRF-GSI for improving typhoon forecast. *Frontiers of Earth Science*. 12(3), 457-467. doi: 10.1007/s11707-018-0728-6

- Asao S, Parton W J, **Chen M**, Gao W (2018). Photodegradation accelerates ecosystem N cycling in a simulated California grassland. *Ecosphere*. 9(8): e02370. doi: 10.1002/ecs2.2370
- Del Grosso S J, Parton W J, Derner J D, **Chen M**, Tucker C J (2018). Simple models to predict grassland ecosystem C exchange and actual evapotranspiration using NDVI and environmental variables. *Agricultural and Forest Meteorology*. 249, 1-10. doi: 10.1016/j.agrformet.2017.11.007
- **Chen M**, Parton W J, Del Grosso S J, Hartman M D, Day K A, Tucker C J, Derner J D, Knapp A K, Smith W K, Ojima D S, Gao W (2017). The signature of sea surface temperature anomalies on the dynamics of semiarid grassland productivity. *Ecosphere*. 8(12): e02069. doi: 10.1002/ecs2.2069
- **Chen M**, Parton W J, Adair E C, Asao S, Hartman M D, Gao W (2016). Simulation of the effects of photodecay on long-term litter decay using DayCent. *Ecosphere*. 7(12): e01631. doi: 10.1002/ecs2.1631
- **Chen M**, Davis J, Gao W (2014), A New Cloud Screening Algorithm for Ground-Based Direct-Beam Solar Radiation. *Journal of Atmospheric and Oceanic Technology*. 31(12): 2591-2605. doi: 10.1175/JTECH-D-14-00095.1
- Liu C, **Chen M**, Shi R, Gao W (2014), Retrievals of aerosol optical depth and total column ozone from Ultraviolet Multifilter Rotating Shadowband Radiometer measurements based on an optimal estimation technique. *Frontiers of Earth Science*. 8(4): 610-624. doi: 10.1007/s11707-014-0455-6
- **Chen M**, Davis J, Tang H, Ownby C, Gao W (2013), The calibration methods for Multi-Filter Rotating Shadowband Radiometer: a review. *Frontiers of Earth Science*. 7(3): 257-270. doi: 10.1007/s11707-013-0368-9
- Tang H, **Chen M**, Davis J, Gao W (2013), Comparison of aerosol optical depth of UV-B monitoring and research program (UVMRP), AERONET and MODIS over continental United States. *Frontiers of Earth Science*. 7(2): 129-140. doi: 10.1007/s11707-013-0376-9
- Wu D, **Chen M**, Wang Q, Gao W (2013), Algae (Microcystis and Scenedesmus) absorption spectra and its application on Chlorophyll a retrieval. *Frontiers of Earth Science*. 7(4), 522-530. doi: 10.1007/s11707-013-0373-z
- Zhao C, Bao Y, **Chen M**, Huang W, Liu L (2012), Use of Landsat TM and EOS MODIS imaging technologies for estimation of winter wheat yield in the North China Plain. *International Journal of Remote Sensing*. 33(4): 1029-1041. doi: 10.1080/01431161.2010.549849

Proceedings Articles (selected)

- **Chen M**, Newell B H, Sun Z, Corr C A, Gao W (2019). Reconstruct missing pixels of Landsat land surface temperature product using a CNN with partial convolution. *Proceedings of SPIE, Applications of Machine Learning.* 11139. (accepted)
- **Chen M**, Sun Z, Davis J M, Liu C, Gao W (2018). Spatial interpolation of surface ozone observations using deep learning. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XV*. 10767, 107670C. doi: 10.1117/12.2320755
- **Chen M**, Davis J M, Liu C, Sun Z, Zempila M-M, Gao W (2017). Using Deep Recurrent Neural Network for direct beam solar irradiance cloud screening. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIV*. 10405, 1040502. doi: 10.1117/12.2273364
- Sun Z, Chang N B, Gao W, **Chen M**, Zempila M (2017). Using input feature information to improve ultraviolet retrieval in neural networks. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIV*. 10405, 1040506. doi: 10.1117/12.2274522
- Zempila M, FragKos K, Davis J, Sun Z, **Chen M**, Gao W (2017). Total ozone column retrieval from UV-MFRSR irradiance measurements: evaluation at Mauna Loa station. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIV*. 10405, 1040507. doi: 10.1117/12.2274565
- Zempila M, Davis J, Janson G, Olson B, **Chen M**, Durham B, Simpson S, Straube J, Sun Z, Gao W (2017). Quality assurance of the UV irradiances of the UV-B Monitoring and Research Program: the Mauna Loa test case. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIV*. 10405, 104050A. doi: 10.1117/12.2274525

- **Chen M**, Zempila M, Davis J M, King R W, Gao W (2016). In-situ calibration of the water vapor channel for multi-filter rotating shadowband radiometer using collocated GPS, AERONET and meteorology data. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIII*. 9975, 99750E. doi:10.1117/12.2236572
- Li Z, Shi R, Liu C, **Chen M** (2016). An integrated image processing platform designed for Chinese GF-1 wide field view data. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIII*. 9975, 99750S. doi: 10.1117/12.2237116
- Kan Z, Liu C, Qiao F, Gao W, **Chen M** (2016). Monitoring the changes of water storage over the Huang-huai-hai plain based on the GRACE satellite. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIII*. 9975, 99750G. doi: 10.1117/12.2237333
- Zeng Y, Shi R, Liu P, Zhang C, Wang J, Liu C, **Chen M** (2016). Estimation of chlorophyll content of Phragmites australis based on PROSPECT and DART models in the saltmarsh of Yangtze Estuary. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XIII*. 9975, 99750X. doi: 10.1117/12.2239922
- **Chen M**, Davis J, Sun Z, Gao W (2015), Two-stage reference channel calibration for collocated UV and VIS Multi-Filter Rotating Shadowband Radiometers. *Proceeding SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability XII*. 9610, 96100L. doi:10.1117/12.2185500
- Liu C, **Chen M**, Gao W (2013), Validation of aerosol optical depth and total ozone column in the ultraviolet retrieved from multifilter rotating shadowband radiometer. *Proceeding SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability X*. 8869, 886918. doi: 10.1117/12.2021709
- **Chen M**, Davis J, Tang H, Gao Z, Gao W (2012), A multi-channel calibration method for multi-filter rotating shadow-band radiometer. *Proc SPIE. Remote Sensing and Modeling of Ecosystems for Sustainability, IX*. 8513, 851305. doi:10.1117/12.929454
- Yi W, Gao Z, Li Z, **Chen M** (2012), Land-use and land-cover sceneries in China: an application of Dinamica EGO model. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability IX*. 8513, 85130I. doi:10.1117/12.927782
- Yi W, Gao Z, **Chen M** (2012), Dynamic modelling of future land-use change: a comparison between CLUE-S and Dinamica EGO models. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability IX*. 8513, 85130H. doi:10.1117/12.927781
- **Chen M**, Gao Z, Gao W (2009), Crop classification using MODIS EVI series in North China. *Proceedings of SPIE, Remote Sensing and Modeling of Ecosystems for Sustainability VI*. 7454, 74541D. doi: 10.1117/12.825795

RESEARCH EXPERIENCE

Deep Learning

- Developing an end-to-end ML pipeline for detecting abnormal measurements of a ground-based radiometer (Tensorflow, TFX, Dataflow, BigQuery, Vertex AI, Kubeflow Pipelines SDK, Python) (ongoing);
- Reconstructing missing pixels in Landsat land surface temperature images by developing the Source-Augmented Partial Convolution model and achieving a MSE 7-59% lower than all four benchmark models (TensorFlow, Python, Docker, Google Cloud Platform, TPU, Javascript, Google Earth Engine);
- Retrieving 55-layer atmospheric temperature profiles from 1245-band hyperspectral radiation measurements using AutoEncoder and Self-Normalizing Neural Network and achieving a 11.5% improvement in RMSE with respect to the official retrieval product (NUCAPS) (TensorFlow, Python);
- Retrieving surface ozone concentration from multi-wavelength solar UV radiation measurements (under clear-sky conditions) using Self-Normalizing NN and achieving a 1.3-1.6 ppb MAE of ozone (TensorFlow, Python);

- Comparing three types of deep neural networks [i.e. Graph Convolution Neural Network (Chebnet), Mixture Model Network (MoNet), and Bi-LSTM] on interpolation of distributed US EPA surface ozone measurements and found that Bi-LSTM has 16% and 34% lower MAE than MoNet and Chebnet (TensorFlow, Python);
- Building a cloud screening classifier for time series of ground solar radiation measurements with a 3-layer dynamic bidirectional LSTM and achieving the overall test accuracy at 97.87%. (TensorFlow, Python);

Ecology

- Estimating growing season aboveground NPP in the U.S. Great Plains using a grassland productivity forecast system (Grass-Cast);
- Correlating various precipitation related variables (e.g., AET, PET, Transpiration) with plant production or its surrogate (e.g., NDVI) at both site and county scales reveals their spatially-explicit patterns across the U.S. Great Plains. (DayCent);
- Building regression models to explore the long-term relationship between sea surface temperature anomalies [SSTAs, such as Pacific Decadal Oscillation (PDO) and El Niño–Southern Oscillation (ENSO or NINO-3)] and grassland's plant production and growing season actual evapotranspiration in the US Great Plains. The biogeochemical model, DayCent, was used to simulate AET values from the daily precipitation and temperature data. (DayCent, C/FORTRAN, PERL);
- Incorporating the solar UV litter decomposition module into the DayCent biogeochemical model, where three mechanisms (1) direct photolysis, (2) facilitation of microbial decomposition via converting photodecay products to labile materials, and (3) microbial inhibition effects were implemented and validated against the Long-Term Intersite Decomposition Experiment (LIDET) observations. (DayCent, C/C++/FORTRAN, PERL);
- Developing a global optimization algorithm combining the scatter search framework and the trust region non-linear local optimizer for the DayCent model (C++ and PERL);

Atmospheric Radiation and Remote Sensing

- Combining a new dynamic uncertainty estimation method with Gaussian Process Regression (GP) to estimate the mean and uncertainty functions of the UV-MFRSR Vo time series (Python);
- Developing an in-situ calibration algorithm for the 940 nm channel of MFRSR with water vapor retrieved from a set of remotely distributed GPS stations (GAMIT, IDL);
- Developing a two-stage reference spectral channel calibration method for pairs of collocated UV-MFRSR and MFRSR instruments (IDL);
- Developing a global pairing cloud screening algorithm for direct normal measurements (IDL);
- Detecting the performance abnormality of the Langley and Lamp calibrated irradiance using the MODTRAN radiative transfer model (IDL);
- Creating a wrapper for a time zone identifying function of GDAL (Geospatial Data Abstraction Library) for IDL access (C);
- Creating an OpenMP wrapper for the kernel of the TUV radiation transfer model in the spectral dimension to accelerate the optimization process (C++ and FORTRAN);
- Developing a crop classification algorithm in the North China Plain using MODIS EVI time series data (IDL/ENVI);
- Writing scripts for automatic TM/ETM+ image cropping near over 100 observation sites (EML, ERDAS Macro Language); and
- Appling a mono-window algorithm to retrieve the land surface temperature from Landsat TM data (AML, ARC Macro Language).

CONFERENCE PRESENTATIONS

- **Chen M**, Newell B H, Sun Z, Corr C A, Gao W. 2019-2020. Reconstruct missing pixels of Landsat land surface temperature product using a CNN with partial convolution. Oral presentation at USGS AmericaView Monthly Meeting (July 2020, GoToMeeting). Oral presentation at the Conference of Applications of Machine Learning, as Part of International Symposium on Optical Science and Technology, San Diego, CA (August 13, 2019). Poster [IN51D-0674] presentation at AGU Fall Meeting, San Francisco, CA (December 13, 2019)
- **Chen M**, Gao W. 2019. ColoradoView USGS Lightning Presentation. Oral presentation at the USGS AmericaView 2019 Winter Business Meeting.
- **Chen M**, Liu C, Sun Z, Gao W. 2018. Retrieving temperature and relative humidity profiles from hyperspectral radiations via deep learning. Poster [A31G-2917] presented at AGU Fall Meeting, Washington, D.C. (10-14 December, 2018).
- **Chen M**, Sun Z, Davis J M, Liu C, Gao W. 2018. Spatial interpolation of surface ozone observations using deep learning. Oral Presentation at the Conference of Remote Sensing and Modeling of Ecosystems for Sustainability XV, as Part of International Symposium on Optical Science and Technology (22 August, 2018).
- **Chen M**, Sun Z, Davis J M, Zempila M, Liu C, Gao W. 2017. Retrieval of Surface Ozone from UV-MFRSR Irradiances using Deep Learning, Poster [H31G-1590] presented at AGU Fall Meeting, New Orleans, LA (11-15 December, 2017).
- **Chen M**, Davis J M, Liu C, Sun Z, Zempila M, Gao W. 2017. Using deep recurrent neural network for direct beam solar irradiance cloud screening. Oral Presentation at the Conference of Remote Sensing and Modeling of Ecosystems for Sustainability XIV, as Part of International Symposium on Optical Science and Technology (9 August, 2017)
- **Chen M**, Zempila M, Davis J M, King R W, Gao W (2016). In-situ calibration of the water vapor channel for multi-filter rotating shadowband radiometer using collocated GPS, AERONET and meteorology data. Oral Presentation at the Conference of Remote Sensing and Modeling of Ecosystems for Sustainability XIII, as Part of International Symposium on Optical Science and Technology (28 August – 1 September, 2016)
- Parton W J, Smith W K, Derner J D, Del Grosso S, **Chen M**, Silver W L. 2015. Observed Global Historical Changes in Soil Decomposition Rates (1900-2011) and Plant Production (1981-2011), Abstract [A32E-05] presented at AGU Fall Meeting, San Francisco, CA (14-18 December, 2015).
- **Chen M**, Davis J, Sun Z, Gao W (2015), Two-stage reference channel calibration for collocated UV and VIS Multi-Filter Rotating Shadowband Radiometers. Oral Presentation at the Conference of Remote Sensing and Modeling of Ecosystems for Sustainability XII, as Part of International Symposium on Optical Science and Technology (10-13 August, 2015).
- **Chen M**, Davis J, Tang H, Gao Z, Gao W (2012), A multi-channel calibration method for multi-filter rotating shadow-band radiometer. Oral Presentation at the Conference of Remote Sensing and Modeling of Ecosystems for Sustainability IX, as Part of International Symposium on Optical Science and Technology (12-16 August, 2012).
- **Chen M**, Gao Z, Gao W (2009), Crop classification using MODIS EVI series in North China. Poster Presentation at the Conference of Remote Sensing and Modeling of Ecosystems for Sustainability VI, as Part of International Symposium on Optical Science and Technology (2-6 August, 2009).

COMPUTING SKILLS

- Python (TensorFlow, Keras, TFX, Numpy, Pandas), MySQL, GIT
- PERL, C/C++, IDL, Java, Matlab, FORTRAN
- Google Cloud Platform (DataFlow, Vertex AI, Kubeflow Pipelines, Compute Engine VM with GPU/TPU, AI Platform)

- Google Earth Engine (Python and Javascript API), ArcGIS, ENVI
- PyCharm, Jupyter Notebook, Google Colab, Visual Studio Code, Visual Studio, NetBeans, Eclipse
- Docker, Windows (wsl2), Linux (Debian)

GRANTS

• ColoradoView – part of USGS nationwide program, AmericaView (Co-PI)	$94,000	09/2018-present
• Google Cloud Platform Research Grants Program (PI)	$15,000	12/2018-04/2021

PROFESSIONAL SERVICE

Manuscript Refereeing:
- Referee scientific papers for journals:

Atmosphere	Climate
Energies	Engineering
Global Change Biology	International Journal of Environmental Research and Public Health
PLOS ONE	Plant and Soil
Remote Sensing	Sensors

Grant Refereeing:
- Referee four StateViews' Request for Continued Assistance (RCA) for USGS AmericaView

TEACHING EXPERIENCE

- Deliver lectures on Google Earth (Colorado State University, Fall 2020, Fall 2021)

MENTORING EXPERIENCE

- Mentor 10 student interns for the ColoradoView projects (Spring, 2019 - Fall, 2021)

PROFESSIONAL MEMBERSHIPS

- American Geophysical Union

WORKSHOPS

- "The Understanding and Exploring LANDSAT 8 in ENVI workshop" sponsored by Exelis in Denver, Colorado on September 25, 2013 (as a teaching assistant)
- "The Atmospheric Radiation Science Workshop" by National Center for Atmospheric Research (NCAR) and University of Colorado in Boulder, Colorado on March 8-11, 2016
- "The DSSAT 2016 International Training Program" by DSSAT Foundation, Washington State University, International Fertilizer Development Center, University of Georgia, and University of Florida in Griffin, Georgia between May 16 and 21, 2016

- "The 2017 Regional Climate Tutorial" at National Center for Atmospheric Research (NCAR) in Boulder, Colorado between July 10 and 12, 2017
- "The Grant Writing Workshop" at Natural and Environmental Sciences Building (NESB), Colorado State University in Fort Collins, Colorado on February 24 and March 3, 2018
- "The Tensorflow Dev Summit 2018" at Computer History Museum in Mountain View, California on March 30, 2018