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RESEARCH INTERESTS

Global methane cycle, greenhouse gases, remote sensing, land-atmospheric interaction, climate-carbon feedback, biogeochemical modeling, dynamic global vegetation models, atmospheric chemistry, forestry, geography

EDUCATION

Nanjing University, China	Geography	Ph.D. 2013
Nanjing Institute of Meteorology, China	Geography	B.Sc. 2006

POSITIONS HELD

Assistant Research Scientist 2021-present
Earth System Science Interdisciplinary Center
University of Maryland College Park, United States

Postdoctoral Researcher 2017-2021
Department of Geographical Sciences,
University of Maryland College Park, United States

Visiting Scientist 2017-present
Biospheric Sciences Laboratory
NASA Goddard Space Flight Center

Guest Scientist 2017-present
Dynamic Macroecology Group
Swiss Federal Research Institute WSL, Switzerland

Postdoctoral Scientist 2014-2017

Dynamic Macroecology Group
Swiss Federal Research Institute WSL, Switzerland

Affiliated Assistant Professor 2014-2017
Department of Ecology
Montana State University, United States

Research Faculty 2013-2014
Laboratory of Remote Sensing and Geospatial Science
Cold and Arid Regions Environmental and Engineering Research Institute
Chinese Academy of Science

Graduate Research Assistant 2009-2013
Department of Geography
Nanjing University, China

High Performance Cluster (HPC) Administrator 2009-2013
Department of Geography
Nanjing University, China

HONORS AND AWARDS

2021 Outstanding Postdoctoral Faculty Achievement, Department of Geographical Sciences, University of Maryland, 2021

PEER REVIEWED PUBLICATIONS

Manuscripts in pipeline

In review

4. **Zhang Z.**, Poulter, B., Knox S., Stavert A., McNicol G., Fluet-Chouinard E., Feinberg A., Zhao Y., Bousquet P., Canadell J.G., Ganesan A., Hugelius G., Hurtt G., Jackson R.B., Patra P.K., Saunois M., Höglund-Isaksson L., Huang C., Chatterjee A., Li X., Dominant role of anthropogenic emissions in the recent growth of atmospheric methane concentrations, National Science Review.

3. **Zhang Z.**, Chatterjee A., Ott L., Reichle R., Poulter P., Soil moisture controls on seasonal and interannual terrestrial carbon fluxes: Assimilation of SMAP soil moisture into a carbon cycle model, Journal of Geophysical Research: Biogeosciences.

Submitted

2. Yi X., Peng S., Ducharne A., Ciais P., Gumbricht T., Saunois M., Poulter B., **Zhang Z.**, Dynamics of global wetlands by TOPMODEL. Nature Scientific Data.

1. Liu J., Sleeter B., Zhu Z., Cochrane M., Yuan Q., Zhu Q., Hawbaker T., Wilson T., Sherba J., **Zhang Z.,** Lu X., Price D. T., Selmants P., Trends and vulnerability of ecosystem productivity as related to natural environmental drivers in the conterminous U.S. from 1971 to 2015. Environmental Research Letters.

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42. Stavert A., Canadell J. G., Saunois M., Bousquet P., Poulter B., Jackson R. B., Raymond P. A., Regnier P., Lauerwald R., Patra P. K., Allen G. H., Bergamaschi P., Ciais P., Chandra N., Ishizawa M., Ito A., Kleinen T., Maksyutov S., McNorton J., Gustafson A., Melton J. R., Müller J., Niwa Y., Peng S., Riley W. J., Segers A., Tian H., Tsuruta A., Yin Y., **Zhang Z.**, Zheng B., Zhuang Q., Regional trends and drivers of the 2000-2017 global methane budget. Global Change Biology (Accepted).

41. Gloor M., Gatti L., Wilson C., Parker R., Boesch H., Popa E., Chipperfield M., Poulter B., Basso L., Miller J., McNorton J., **Zhang Z.,** Interesting seasonality of Pantanal wetland methane emissions revealed by regularly measured lower troposphere CH_4 profiles. Global Biogeochemical Cycle (Accepted).

40. Weir B., Crisp D., O'Dell C., Basu S., Chatterjee A., Oda T., Ott L., Pawson S., Poulter B., **Zhang Z.,** Ciais P., Zhu L., Davis S., Monitoring the impacts of COVID-19 on carbon dioxide from space, Science Advances (Accepted).

39. Li X, Ma H, Ran Y, Wang X, Zhu G, Liu F, He H, **Zhang Z**, Huang C. 2021. Terrestrial carbon cycle model-data fusion: Progress and challenges.
Science China Earth Sciences, 64, https://doi.org/10.1007/s11430-020-9800-3.

38. Delwiche, K. B., Knox, S. H., Malhotra, A., Fluet-Chouinard, E., McNicol, G., Feron, S., Ouyang, Z., Papale, D., Trotta, C., Canfora, E., Cheah, Y.-W., Christianson, D., Alberto, M. C. R., Alekseychik, P., Aurela, M., Baldocchi, D., Bansal, S., Billesbach, D. P., Bohrer, G., Bracho, R., Buchmann, N., Campbell, D. I., Celis, G., Chen, J., Chen, W., Chu, H., Dalmagro, H. J., Dengel, S., Desai, A. R., Detto, M., Dolman, H., Eichelmann, E., Euskirchen, E., Famulari, D., Friborg, T., Fuchs, K., Goeckede, M., Gogo, S., Gondwe, M. J., Goodrich, J. P., Gottschalk, P., Graham, S. L., Heimann, M., Helbig, M., Helfter, C., Hemes, K. S., Hirano, T., Hollinger, D., Hörtnagl, L., Iwata, H., Jacotot, A., Jansen, J., Jurasinski, G., Kang, M., Kasak, K., King, J., Klatt, J., Koebsch, F., Krauss, K. W., Lai, D. Y. F.,

Mammarella, I., Manca, G., Marchesini, L. B., Matthes, J. H., Maximon, T., Merbold, L., Mitra, B., Morin, T. H., Nemitz, E., Nilsson, M. B., Niu, S., Oechel, W. C., Oikawa, P. Y., Ono, K., Peichl, M., Peltola, O., Reba, M. L., Richardson, A. D., Riley, W., Runkle, B. R. K., Ryu, Y., Sachs, T., Sakabe, A., Sanchez, C. R., Schuur, E. A., Schäfer, K. V. R., Sonnentag, O., Sparks, J. P., Stuart-Haëntjens, E., Sturtevant, C., Sullivan, R. C., Szutu, D. J., Thom, J. E., Torn, M. S., Tuittila, E.-S., Turner, J., Ueyama, M., Valach, A. C., Vargas, R., **Zhang Z.,** et al.: FLUXNET-CH4, 2021. A global, multi-ecosystem dataset and analysis of methane seasonality from freshwater wetlands, 1–111, Earth System Science Data Discussion, https://doi.org/10.5194/essd-2020-307.

37. Knox S., Bansal S., McNicol G., Schafer K., Sturtevant C., Ueyama M., Valach A. C., Baldocchi D., Delwiche K., Desai A. R., Euskirchen E., Liu J., Lohila A., Malhotra A., Melling L., Riley W. J., Runkle B. K., Turner J., Vargas R., Zhu Q., Aalto T., Fluet-Chouinard E., Göeckede M., Melton J. R., Sonnentag O., Vesala T., Ward E. J., **Zhang Z.,** Feron S., Ouyang Z., Alekseychik P., Aurela M., Bohrer G., Campbell D. I., Chen J., Chu H., Dalmagro H. J., Goodrich J. P., Gottschalk P. , Hirano T., Iwata H., Jurasinski G., Kang M., Koebsch F., Mammarella I., Nilsson M. B., Ono K., Peichl M., Peltola O., Ryu Y., Sachs T., Sakabe A., Sparks J., Tuittila E., Vourlitis G. L., Xhuan G., Jackson R. B. Environmental controls on global freshwater wetland CH_4 fluxes across diurnal to seasonal time scales. Global Change Biology. (Accepted)

36. **Zhang, Z.**, Poulter B., Fluet-Chouinard E., Jensen K., McDonald K., Hugelius G., Gumbricht T., Carroll M., Prigent C., Bartsch A., Poulter B., 2021. Development and evaluation of the global Wetland Area and Dynamics for Methane Modeling dataset (WAD2M). Earth System Science Data, 13, 2001-2023, doi: 10.5194/essd-2001-2021.

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2020

34. Poulter B., Fluet-Chouinard E., Hugelius G., Koven C., Fatoyinbo L., Page S., Rosentreter J., Smart L., Taillie P., Thomas N., **Zhang Z.**, Wijedasa L., 2020. A

review of global wetland carbon stocks and management challenges (Chapter 3), Wetland Carbon and Environmental Management. AGU Books (accepted).

33. Zhang X., Xu X., Jia G., Poulter B., **Zhang Z.**, 2020. Hiatus of wetland methane emissions associated with recent La Niña episodes in the Asian Monsoon region. Climate Dynamics. https://doi.org/10.1007/s00382-020-05219-0

32. Pandey, S., Houweling, S., Lorente, A., Borsdorff, T., Tsivlidou, M., Bloom, A. A., Poulter, B., **Zhang, Z.,** and Aben, I., 2020. Using satellite data to identify the methane emission controls of South Sudan's wetlands, Biogeosciences, https://doi.org/10.5194/bg-2020-251.

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30. Sweeney, C., Chatterjee, A., Wolter, S., McKain, K., Bogue, R., Newberger, T., Hu, L., Ott, L., Poulter, B., Schiferl, L., Weir, B., **Zhang, Z.** and Miller, C. E., 2020. Atmospheric carbon cycle dynamics over the ABoVE domain: an integrated analysis using aircraft observations (Arctic-CAP) and model simulations (GEOS), Atmospheric Chemistry and Physics, 1–30, doi: 10.5194/acp-2020-609,.

29. Tunnicliffe L. R., Ganesan L. A., Parker J. R., Boesch H., Gedney N., Poulter B., **Zhang Z.**, Lavric J., Walter D., Rigby M., Young D., O'Doherty S., 2020. Quantifying sources of Brazil's CH_4 emissions between 2010 and 2018 from satellite data, Atmospheric Chemistry and Physics, https://doi.org/10.5194/acp-2020-438.

28. Saunois, M., Stavert, A.R., Poulter, B., Bousquet, P., Canadell, J.G., Jackson, R.B., Raymond, P.A., Dlugokencky, E.J., Houweling, S., Patra, P.K., Ciais, P., Arora, V.K., Bastviken, D., Bergamaschi, P., Blake, D.R., Brailsford, G., Bruhwiler, L., Carlson, K.M., Carrol, M., Castaldi, S., Chandra, N., Crevoisier, C., Crill, P.M., Covey, K., Curry, C.L., Etiope, G., Frankenberg, C., Gedney, N., Hegglin, M.I., Höglund-Isakson, L., Hugelius, G., Ishizawa, M., Ito, A., Janssens-Maenhout, G., Jensen, K.M., Joos, F., Kleinen, T., Krummel, P.B., Langenfelds, R.L., Laruelle, G.G., Liu, L., Machida, T., Maksyutov, S., McDonald, K.C., McNorton, J., Miller, P.A., Melton, J.R., Morino, I., Müller, J., Murgia-Flores, F., Naik, V., Niwa, Y., Noce, S., O'Doherty, S., Parker, R.J., Peng, C., Peng, S., Peters, G.P., Prigent, C., Prinn, R., Ramonet, M., Regnier, P., Riley, W.J., Rosentreter, J.A., Segers, A., Simpson, I.J., Shi, H., Smith, S.J., Steele, P.L., Thornton, B.F., Tian, H., Tohjima, Y., Tubiello, F.N., Tsuruta, A., Viovy, N., Voulgarakis, A., Weber, T.S., Weele, M.

van, Werf, G.R. van der, Weiss, R.F., Worthy, D., Wunch, D., Yin, Y., Yoshida, Y., Zhang, W., **Zhang, Z.**, Zhao, Y., Zheng, B., Zhu, Qing, Zhu, Qiuan, Zhuang, Q., 2020. The Global Methane Budget 2000-2017. Earth System Science Data, 1–138. https://doi.org/10.5194/essd-2019-128.

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27. Natali, S.M., Watts, J.D., Rogers, B.M., Potter, S., Ludwig, S.M., Selbmann, A.-K., Sullivan, P.F., Abbott, B.W., Arndt, K.A., Birch, L., Björkman, M.P., Bloom, A.A., Celis, G., Christensen, T.R., Christiansen, C.T., Commane, R., Cooper, E.J., Crill, P., Czimczik, C., Davydov, S., Du, J., Egan, J.E., Elberling, B., Euskirchen, E.S., Friborg, T., Genet, H., Göckede, M., Goodrich, J.P., Grogan, P., Helbig, M., Jafarov, E.E., Jastrow, J.D., Kalhori, A.A.M., Kim, Y., Kimball, J.S., Kutzbach, L., Lara, M.J., Larsen, K.S., Lee, B.-Y., Liu, Z., Loranty, M.M., Lund, M., Lupascu, M., Madani, N., Malhotra, A., Matamala, R., McFarland, J., McGuire, A.D., Michelsen, A., Minions, C., Oechel, W.C., Olefeldt, D., Parmentier, F.-J.W., Pirk, N., Poulter, B., Quinton, W., Rezanezhad, F., Risk, D., Sachs, T., Schaefer, K., Schmidt, N.M., Schuur, E.A.G., Semenchuk, P.R., Shaver, G., Sonnentag, O., Starr, G., Treat, C.C., Waldrop, M.P., Wang, Y., Welker, J., Wille, C., Xu, X., **Zhang, Z.**, Zhuang, Q., Zona, D., 2019. Large loss of CO2 in winter observed across the northern permafrost region. Nature Climate Change 9, 852–857. https://doi.org/10.1038/s41558-019-0592-8

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2018

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driving 21st century climate change, Proceedings of the National Academy of Sciences, 114, 9647-9652.

16. Saunois, M., Bousquet, P., Poulter, B., Peregon, A., Ciais, P., Canadell, J. G., Dlugokencky, E. J., Etiope, G., Bastviken, D., Houweling, S., Janssens-Maenhout, G., Tubiello, F. N., Castaldi, S., Jackson, R. B., Alexe, M., Arora, V. K., Beerling, D. J., Bergamaschi, P., Blake, D. R., Brailsford, G., Bruhwiler, L., Crevoisier, C., Crill, P., Covey, K., Frankenberg, C., Gedney, N., Höglund-Isaksson, L., Ishizawa, M., Ito, A., Joos, F., Kim, H. S., Kleinen, T., Krummel, P., Lamarque, J. F., Langenfelds, R., Locatelli, R., Machida, T., Maksyutov, S., Melton, J. R., Morino, I., Naik, V., O'Doherty, S., Parmentier, F. J. W., Patra, P. K., Peng, C., Peng, S., Peters, G. P., Pison, I., Prinn, R., Ramonet, M., Riley, W. J., Saito, M., Santini, M., Schroeder, R., Simpson, I. J., Spahni, R., Takizawa, A., Thornton, B. F., Tian, H., Tohjima, Y., Viovy, N., Voulgarakis, A., Weiss, R., Wilton, D. J., Wiltshire, A., Worthy, D., Wunch, D., Xu, X., Yoshida, Y., Zhang, B., **Zhang, Z.**, and Zhu, Q., 2017. Variability and quasi-decadal changes in the methane budget over the period 2000–2012, Atmos. Chem. Phys., 17, 11135-11161, 2017.

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14. **Zhang, Z.**, Babst, F., Bellassen, V., Frank, D., Launois, T., Tan, K., Ciais, P., Poulter, B., 2017. Converging Climate Sensitivities of European Forests Between Observed Radial Tree Growth and Vegetation Models, Ecosystems.

13. Pandey, S., Houweling, S., Krol, M., Aben, I., Monteil, G., Nechita-Banda, N., Dlugokencky, E.J., Detmers, R., Hasekamp, O., Xu, X., Riley, W.J., Poulter, B., **Zhang, Z.**, McDonald, K.C., White, J.W.C., Bousquet, P., Röckmann, T., 2017. Enhanced methane emissions from tropical wetlands during the 2011 La Niña, Scientific Reports 7, 45759.

12. Jin, J., Wang, Y., **Zhang, Z.,** Magliulo V., Jiang, H. and Cheng, M., 2017. Phenology Plays an Important Role in the Regulation of Terrestrial Ecosystem Water-Use Efficiency in the Northern Hemisphere, Remote Sensing 9, 664.

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7. **Zhang, Z.**, Jiang, H., Liu, J., Zhang, X., Huang, C., Lu, X., Jin, J., Zhou, G., 2014. An analysis of the global spatial variability of column-averaged CO_2 from SCIAMACHY and its implications for CO_2 sources and sinks. International Journal of Remote Sensing 35, 2047-2066.

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5. **Zhang, Z.**, Jiang, H., Liu, J., Han, J., Zhu, Q., & Zhang, X., 2013. Implications of Future Water Use Efficiency for Ecohydrological Responses to Climate

Change and Spatial Heterogeneity of Atmospheric CO_2 in China. Terrestrial, Atmospheric & Oceanic Sciences, 24(3): 451-465.

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RESEARCH PROJECTS

- 2021-present NASA Cyclone Global Navigation Satellite System (CYGNSS) Project (20-CYGNSS20-0038) **Methane emissions from tropical wetlands: Charactering a critical terrestrial carbon cycle process using inundations extent and dynamics derived from CYGNSS (Role: Co-PI)**
- 2020-present NASA Research Grant (80NSSC20K0731) **Modeling Arctic Methane Emissions** (**Role: PI**)
- 2017-present **GEOS-5 Forecasting and Modeling in Support of ABoVE airborne research** funded by **NASA ABoVE** Phase II research: simulation, scaling and benchmarking for key indicators of Arctic-boreal ecosystem dynamics. (**Role: Co-PI**)
- 2014-present **Global Carbon Project Methane** funded by EU FP7 GEOCARBON Programme (283080). Bottoms-up estimates group using Land surface models. (**Role: Participant**)
- 2017-2019 **Quantifying Sources and Sinks in the Global Methane Cycle** funded by US Gordon and Betty Moore Foundation. This is an international collaborative project dedicating to investigate the role of methane in global

methane cycle and to estimate the methane source and sink with multiple model technologies. (**Role: Participant**)

- 2012-2017 **Modelling and experiments on land-surface interactions with atmospheric chemistry and climate II (MAIOLICA II)** funded by ETH-CCES Project (42-01). (**Role: Participant**)
- 2013-2016 **Joint estimation of states and parameters for simulated effect of heterogeneous rising atmospheric CO_2 on carbon budget of terrestrial ecosystems in China** funded by National Natural Science Foundation of China for Young Scientists (Y411391001). (**Role: PI**)
- 2010-2013 **Application of land cover map from remote sensing in land surface ecosystem modeling** funded by State High Technology Funds of China. (**Role: Participant**)
- 2009-2013 **Changing mechanisms and optimized computing research on the carbon sources and sink of global terrestrial ecosystems** funded by State Key Fundamental Science Funds of China. (**Role: Participant**)

TEACHING & PROFESSIONAL SERIVICE

- Referee for: Nature Climate Change, National Communications, Science Advances, Global Change Biology, Atmospheric Chemistry and Physics, Global Biogeochemical Cycles, Environmental Research Letter, Geoscientific Model Development, Biogeosciences, Journal of Geophysical Research-Biogeosciences, Geophysical Research Letters, Carbon Balance and Management, Global and Planetary Change, International Journal of Climatology, Sensors, Forests, PLOS ONE, Ecological Research, Ecological Indicators, China Science Bulletins
- Reviewer for: National Science Foundation 2021; Swiss National Supercomputing Centre (CSCS) 2021, National Natural Science Foundation of China (NSFC) (2017), NSFC 2016, NSFC 2015, NSFC 2014.
- Teaching:
  - Supervising graduate students at Swiss Federal Institute of Technology in Zurich (ETHZ) for course “Spatial Modeling from Climate & Land Use Change to Biodiversity Conservation”, Aug-Dec, 2016.
  - Teaching in a workshop ‘Macroecology, Species Distribution and Climate Change’ held in Peking University, China, 2016, June.
  - Supervising graduate students at Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences in 2013-2014

EXPERTISE&SKILLS

- Experience with software engineering, high performance computing and advanced statistical methods.
- Experience with Linux operating system, Git, Fortran, and C/C++
- Experience with land surface modeling, biogeochemical modeling, numerical modeling, and atmospheric chemistry modelling
- Experience with data file formats and conventions (e.g. Netcdf, HDF), large data manipulation and analysis packages (e.g. R, NCO, CDO, NCL, Matlab)

INVITED TALK& PUBLIC SERIVCE OUTREACH

Invited Talks

- Global Monitoring Laboratory Virtual Global Monitoring Annual Conference (eGMAC) on May 28th, 2021. Oral talk title "Nature or Humans? Scenarios for Constraining Why Atmospheric Methane Continues to Rise"
- North American Carbon Programs 7th virtual meeting on Mar 12th., 2021. Oral talk title "Dominant role of anthropogenic emission in driving the recent rise in atmospheric methane".
- Invited Reviewer for *Climate Feedback*, a global network platform dedicative to provide assessment of influential climate change media coverage.
- Our study "Emerging role of wetland methane emissions in driving 21st century climate change" was selected to exhibit at United Nations Climate Change Conference (COP23) in Bonn, Germany, 2017 by Center for Global Sustainability, University of Maryland.
- An interview by China Meteorological Newspaper (in Chinese) "Wetland could play an important role in future climate change" on Sep. 22nd 2017.
- Invited Research News by Chinese Academy of Sciences, "Radiative forcing feedback caused by wetland methane emissions could overwhelm anthropogenic counterpart in 21st century" on Aug 22nd 2017.
- Invited talk "Emerging role of wetland methane emissions in driving 21st century climate change" by NOAA Science Seminar Series, Sep 7th, 2017.

Conferences

- USGS Powell Center 2nd meeting on "Wetland FLUXNET synthesis for methane: understanding and predicting methane fluxes at daily to interannual timescales", Fort Collins, USA, 2020.
- American Geophysical Union Fall meeting 2019 as a co-convenor for the session "Understanding the Interactions Between Hydrological and

Biogeochemical Dynamics in Permafrost Environments with Observations and Models", San Francisco, USA, 2019.

- USGS Powell Center 1st meeting on "Wetland FLUXNET synthesis for methane: understanding and predicting methane fluxes at daily to interannual timescales", Fort Collins, USA, 2019.
- American Geophysical Union Fall meeting 2018, Poster presentation. Title: Reconciling conflicting estimates of the global methane budget during 1980-2012 using ensemble-based accounting, Washington DC, USA, 2018.
- OSPA Judge for American Geophysical Union Fall meeting 2018, Washington DC, USA.
- NASA ABoVE 1st STM meeting, Poster: A Biogeochemical Forecasting System for Arctic Wetland Methane Emissions, 2018, Seattle, USA.
- American Geophysical Union Fall meeting 2017, San Francisco, USA Poster presentation. Title: Enhanced response of global wetland methane emissions to the 2015-2016 El Niño-Southern Oscillation event
- International Workshop "Mapping the Global Extent and Dynamics of Freshwater Wetlands for methane emissions modeling", 2017, Washington DC, USA
- International Conference on Permafrost ICOP 2016, Potsdam, Germany. Oral presentation. Title: Role of wetlands in projected future permafrost carbon-climate feedbacks: A model analysis with land surface model LPJ-wsl.
- American Geophysical Union Fall meeting 2015, San Francisco, USA Poster presentation. Title: Modeling spatio-temporal dynamics of global wetlands: a TOPMODEL parameterization and uncertainties
- "Mining FLUXNET and other carbon data sources to inform earth system models", FLUXNET Workshop 2015, Beijing, China.
- American Geophysical Union Fall meeting 2014, San Francisco, USA