

Hao Hu, Ph. D.

Department of Earth and Atmospheric Sciences, University of Houston
Science & Research Building 1, Houston, TX, 77204.

Email: hhu5@central.uh.edu; Website: sites.google.com/view/hao-hu

Research Interests

- Exploration of unconventional/conventional resources, e.g., geothermal/fossil resources, CO₂ geological storage, using seismic methods.
- Understanding the subsurface structures, from shallow to deep, using seismic signals, e.g., high-resolution seismic imaging and inversion;
- Fundamental studies of seismic wave propagation, imaging and inversion.

Expertises**Algorithm developments/applications**

- Geothermal/fossil/CO₂-storage reservoir characterization
- 3D Seismic imaging: marine and land
- Seismic signal processing and inversion
- Proprietary surface wave separation/removal
- Machine learning in seismic studies

Fundamental Research

- 3D seismic wave modeling and high-resolution imaging
- HPC using large-scale GPU/CPU
- Nonlinear signal processing
- Stochastic inversion of heterogeneity
- Planetary seismology (Mars)

Education**2009 – 2015 Ph. D. in Geophysics**

Thesis: Seismic Prestack Depth Migration: Reverse Time Migration and Gaussian Beam Migration.

Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China.

2005 – 2009 B. S. in Geophysics

Yunnan University, Kunming, China.

Professional Appointments

Apr, 2015 - Present: **Postdoctoral Research Fellow**
University of Houston

Jun, 2013 - Aug, 2013: **Internship**
Statoil (Beijing) Technology Service Co., Ltd

Awards and Honors

2019. Postdoctoral travel award

2014. “Excellent Graduate student award” in the Institute of Geology and Geophysics, Chinese Academy of Sciences.

2013. “Excellent paper award” in the 29th Chinese Geophysics annual meeting.

Professional Societies

SEG (Society of Exploration Geophysicists)

AGU (American Geophysical Union)

Professional services

I served as an external reviewer for over 60 manuscripts in multiple professional journals, including: Geophysics, Geophysics prospecting, Interpretation, Journal of Applied Geophysics, IEEE TGRS, IEEE GRSL, Geothermics, JGR Planets.

Currently, I serve as a guest associate editor for the Journal of Frontiers in Earth Science.

Patents

- Patent (with Yingcai Zheng) “Nonlinear signal comparison and high-resolution measurement of seismic or acoustic wave dispersion”. *One commercial license has been authorized by an industry company.*
- Patent (With Yingcai Zheng) “Surface wave prediction and removal from seismic data”.
- Patent (With Yike Liu) “Seismic prestack migration imaging method”, CN102944894B.

Grants

- 2021- pending, Heterogeneity Signatures of Mantle Phase Changes and their Implications for Thermochemical Mixing of Earth's Interior, from NSF, PI: Vernon Cormier (University of Connecticut), CoPI: Hao Hu, Jin Zhang (University of New Mexico), Lars Stixrude (UCLA), Carolina Lithgow-Bertelloni (UCLA). This proposal is actively prepared with a total budget of \$900k. I am the CoPI (\$160k) for 3D seismic elastic modeling and seismic stochastic measurement and inversion of heterogeneity.
- 2021- \$1.01m, Seismic elastic double-beam characterization of faults and fractures for CO2 storage site selection, from DOE, PI: Yingcai Zheng, CoPI, Lianjie Huang (Los Alamos National Lab), I am the principal attendee in UH.
- 2021- \$1.12m, Detecting and characterizing fracture zones using convolutional neural network, Phase II, from DOE, PI: Yingcai Zheng, CoPI, Lianjie Huang (Los Alamos National Lab), I am the principal attendee in UH.
- 2020- \$314k, Verification of predicated shear wave splitting due to strong seismic anisotropy in subducting slabs, from NSF, PI: Yingcai Zheng, I am the principal attendee.
- 2019- \$625k, Detecting and characterizing fracture zones using convolutional neural network, from DOE, PI: Yingcai Zheng, CoPI: Lianjie Huang (Los Alamos National Lab), I am the principal attendee in UH.
- 2019: \$1200, Postdoc travel grant, UH.
- 2019: \$51k, Independent review of Brazilian seismic activity and subsidence – Phase 1. From Braskem, PI (Aibing Li), CoPI (Yingcai Zheng), I am the CoPI for Geomechanics modeling.
- 2018-2019: \$460k, Development of Fracture characterization, From Aramco Services Company Houston, PI: Yingcai Zheng, I am the principal attendee.
- 2017-2018: \$49.6k, Super-resolution subsurface and medical imaging, Technology GAP Fund, to commercialize our surface wave patents, from UH.
- 2016-2017: \$87k, High resolution geophysical imaging of subsurface Fractures. 20-20 Reservoirs, PI: Yingcai Zheng, I am the principal attendee.
- 2015-2016: \$59k, Seismic Inversion of Fracture Parameters Using Multiply Scattered Waves. From Sinopec Tech Houston, PI: Yingcai Zheng, I am the principal attendee.
- 2013-2014: \$101k, Microseismic monitoring in Shengli oil/field, China. From Shengli oil field research center. PI: Yike Liu, I am the principal attendee for the whole project.
- 2011-2013: \$370k, Suppression of surface-related multiples and seismic response of the reservoir in China, South sea. From China National Science Foundation, PI: Yike Liu, I am the principal attendee for marine seismic imaging.

Papers in Peer-reviewed Journals (* corresponding author).

Under review/in preparation

42. Gao, K., L. Huang, R. Lin, **H. Hu**, Y. Zheng, and T. Cladouhos, Unraveling faults on seismic images using a multiscale connection-fusion convolutional neural network, **Geophysics**, minor revision.
41. Zhang Y., A. Li, **H. Hu**, Mode Separation of Love Wave Waveforms Using a Stacking-Stripping Method: one example of USArray TA data, **Journal of Geophysical**

Research: Solid Earth, under review.

40. **Hu H.**, Y. Zheng, and L. Huang, Imaging of vertical faults using multi-component seismic data, in preparation.
39. **Hu H.**, J. Li, J. Zhang, Y. Zheng, V. Cormier, Amount of Subducted Basaltic Crust at the Core-Mantle Boundary Beneath Japan Revealed by PKPdf and PKPbc Waves, in preparation.
38. **Hu H.**, Y. Zheng, and O. Yilmaz, NLSC-PAS: a robust novel data-driven surface wave separation method, **The Leading Edge**, in preparation.
37. Tang S., Y. Zheng, H.W Zhou, **H. Hu**, J. Li, and Y. Gan, Earthquake stress drop in an anisotropic medium, in preparation.
36. **Hu H.**, V. F. Cormier, J. Chew, Y. Zheng, Observations of near-vertical PKiKP-PKIIKP reflection pairs for probing the inner core, in preparation.

2021

35. **Hu H.**, Alali M. A., Almomin A., and Y. Zheng, 2021, 3D Seismic Characterization of Fractures Using Elastic P-to-S Double-Beams, **Geophysics**, 86(6): 1-51. [Link](#), [PDF](#)
34. Ding Y., **H. Hu***, A. Malallah, M. C. Fehler, L. Huang, and Y. Zheng, Mapping subsurface karsts and voids using directional elastic wave packets, **Geophysics**, 86(6): 1-67. [Link](#), [PDF](#)
33. Lin, R., **H. Hu**, Y. Ding, L. Huang, K. Gao, and Y. Zheng, Improving subsalt sediment imaging and high angle faults using secondary scattered seismic waves, **Pure and Applied Geophysics**, 178(5):1-15, 10.1007/s00024-021-02741-y. [Link](#), [PDF](#)
32. Wo Y., J. Zong, **H. Hu**, H.W. Zhou and R. Stewart, Velocity model building for a single-offset VSP data via deformable-layer tomography: A Texas salt dome example, **Geophysics**, 86(4): 1-44. [Link](#), [PDF](#)
31. Yi J., Y. Liu, **H. Hu**, Y. Zhang and Z. Yang, High-resolution multimode surface-wave dispersion spectrum imaging with a multichannel signal comparison method. **Chinese Journal of Geophysics**. 64(5): 1710-1720, doi: 10.6038/cjg202100184. [Link](#), [PDF](#)

2020

30. **Hu H.**, and Y. Zheng, 2020, Stochastic inversion of Gaussian random media using transverse coherence functions for reflected waves, **Journal of Geophysical Research: Solid Earth**, 125(12), <https://doi.org/10.1029/2020JB020385>. [Link](#), [PDF](#)
29. Thongsang P., **H. Hu***, H.W. Zhou and A. Lau, 2020, Imaging enhancement in angle-domain common-image-gathers using the connected-component labeling method, **Pure and Applied Geophysics**, 177: 4897–4912. [Link](#), [PDF](#)
28. Li, D., X. Tian, **H. Hu**, X. Tang, X. Fang and Y. Zheng, 2020, Gaussian beam imaging of fractures near the wellbore using sonic logging tools after removing dispersive borehole waves, **Geophysics**, 85(4): 1-47. [Link](#), [PDF](#)
27. Wo Y., H.W. Zhou, **H. Hu**, Y. Ding and J. Zong, 2020, A Layer-cell Tomography Method for Near-surface Velocity Model Building Using First Arrivals, **Pure and Applied Geophysics**, 1-15. [Link](#), [PDF](#)
26. **Hu H.**, K. Xia, F. Hilterman, Y. Zhang, 2020, Amplitude-versus-angle analysis of local angle-domain common image gathers with prestack Gaussian beam migration of Seismic data, **IEEE, Transactions on Geoscience and Remote Sensing**, 58(8): 5969-5975. [Link](#), [PDF](#)

2019

25. **Hu H.** and Y. Zheng, 2019, Data-driven dispersive surface-wave prediction and mode separation using high-resolution dispersion estimation, **Journal of Applied Geophysics**, 171: 1-10. [Link](#), [PDF](#)
24. Li L., Y. Chen, Y. Zheng, **H. Hu** and J. Wu, 2019, Seismic Evidence for Plume-Slab Interaction by High-resolution Imaging of the 410-km Discontinuity Under Tonga, **Geophysical Research Letters**, 46(23): 13687-13694. [Link](#), [PDF](#)

23. Driel M., S. Ceylan, J. F. Clinton, D. Giardini, R. Weber, P. Lognonné, B. Banerdt, M. Drilleau, N. Murdoch, M. Panning, R. Garcia, D. Mimoun, M. Golombek, J. Tromp, M. Bösel, I. Daubar, B. Kenda, A. Khan, L. Perrin, A. Spiga, M. S. Boxberg, M. Parath, M. Ditz, A. Lamert, T. Möller, S. Zhang, D. Ambrois, J. Chèze, F. Peix, H. Alemany, D. Mercerat, J. Balestra, A. Deschamp, C. Twardzik, L. Rolland, S. Mader, L. Marten, C. Schröer, D. Becker, T. Casademont, F. Dethof, D. Essing, K. Grunert, C. Hadziioannou, G. Hein, I. Hochfeld, T. Kilchling, F. Mehrkens, P. Neumann, R. Neurath, R. Steinmann, N. Trumpik, P. Werdenbach-Jarklowski, **H. Hu**, J. Li, Y. Zheng, E. Stutzmann, M. Schimmel, C. Hammer, B. Knapmeyer-Endrun, S. C. Stähler, N. Brinkman, S. Kedar, F. Euchner, B. Fernando, M. Tsekhmistrenko, K. Hosseini, C. Haindl, H. Godwin, A. Szenicer, T. Garth, and A. Allam. 2019, Preparing for InSight: Evaluation of the Blind Test for Martian Seismicity, **Seismology Research Letters**, 90(4): 1518-1534. [Link](#), [PDF](#)
22. Wei Z., **H. Hu***, A. Lau and H. W. Zhou, 2019, Characterizing the rock facies using convolutional neural network with feature engineering and a data padding strategy, **Pure and Applied Geophysics**, 176(8): 3593-3605. [Link](#), [PDF](#)
21. Zhang Y., A. Li and **H. Hu**, 2019, Crustal structure in Alaska from receiver function analysis, **Geophysical Research Letters**, 46(3): 1284-1292. [Link](#), [PDF](#)
20. **Hu H.**, M. Senkaya and Y. Zheng, 2019, A novel measurement of the surface wave dispersion with high and adjustable resolution: Multi-channel nonlinear signal comparison, **Journal of Applied Geophysics**, 160: 236-241. [Link](#), [PDF](#)

2018

19. Xia K., F. Hilterman and **H. Hu**, 2018, Unsupervised Machine Learning Algorithm for Detecting and Outlining Surface Waves, **Journal of Applied Geophysics**, 157, 73-86. [Link](#), [PDF](#)
18. **Hu H.**, Y. Zheng, X. Fang and M. C. Fehler, 2018, 3D Seismic characterization of fractures with Random spacing Using the Double-Beam Method, **Geophysics**, 83(5): M63-M74. [Link](#), [PDF](#)
17. Eftekhari R., **H. Hu*** and Y. Zheng, 2018, Convergence acceleration in scattering series and seismic waveform inversion using nonlinear Shanks transformation, **Geophysical Journal International**, 214(3): 1732-1743. [Link](#), [PDF](#)
16. Zhou. H. W., **H. Hu**, Z. Zou, Y. Wo and O. Youn, 2018, Reverse time migration: A prospect of seismic imaging, **Earth-Science Reviews**, 179: 207-227. [Link](#), [PDF](#)
15. **Hu H.** and Y. Zheng, 2018, 3D Seismic Characterization of Fractures in a Dipping Layer Using the Double-beam Method, **Geophysics**, 83(2): V123-V134. [Link](#), [PDF](#)

2017

14. Ding, Y., Zheng, Y., Zhou, H. W., Howell, M., **Hu, H.** and Zhang, Y., 2017. Propagation of Gaussian Wave Packets in complex media and application to fracture characterization. **Geophysical Journal International**, 210(2): 1244-1251. [Link](#), [PDF](#)
13. Zheng Y. and **H. Hu**, 2017, Nonlinear signal comparison and high-resolution measurement of surface wave dispersion, **Bulletin of the Seismological Society of America**, 107(3):1551-1556. [Link](#), [PDF](#)
12. Liu X., Y. Liu, H. Lu and **H. Hu**, 2017, Prestack correlative least-squares reverse time migration, **Geophysics**, 82(2): S159-S172. [Link](#), [PDF](#)

2016

11. Liu X., Y. Liu, **H. Hu**, Peng Li and M. Khan; 2016, Imaging of first-order surface-related multiples by reverse-time migration. **Geophysical Journal International**, 208(2): 1077-1087. [Link](#), [PDF](#).
10. Liu Y., X. Liu, A. Osen, Y. Shao, **H. Hu** and Y. Zheng, 2016, Least-squares reverse time migration using controlled order multiples reflections. **Geophysics**, 81(5): S347-S357. [Link](#), [PDF](#).

9. **Hu H.**, Y. Liu, Y. Zheng, X. Liu and H. Lu, 2016, Least-squares Gaussian beam migration. **Geophysics**, 81(3), S87-S100. [Link](#), [PDF](#)
8. Zheng Y., A. H. Malallah, M. C. Fehler and **H. Hu**, 2016, 2D full-waveform modeling of seismic waves in layered karstic media. **Geophysics**, 81, T19-T28. [Link](#), [PDF](#)

2015

7. **Hu H.**, Y. Liu, A. Osen and Y. Zheng, 2015, Compression of local slant stacks by the estimation of multiple local slopes and the matching pursuit decomposition. **Geophysics**, 80, WD175-187. [Link](#), [PDF](#)
6. Y. Liu, **H. Hu**, X. Xie and Y. Zheng, 2015, Reverse time migration of internal multiples for subsalt imaging. **Geophysics**, 80, S175-S185. [Link](#), [PDF](#)
5. **Hu H.**, Y. Wang and X. Chang, 2015, Migration of free-surface-related multiples: removing artefacts using a water-layer model, **Journal of Applied Geophysics**, 112, 147-156. [Link](#), [PDF](#)
4. Liu Y., W. Zhu, L. Mi, J. Zhou and **H. Hu**, 2015, Migration of multiples from the South China sea. **Science China**, 45(2), 482-490. [Link](#), [PDF](#)
3. Liu X., Y. Liu, **H. Hu** and S. Xie, 2015, Focal transformation imaging of first-order multiples. **Chinese Journal of Geophysics**, 58(6), 1985-1997. [Link](#), [PDF](#)

Before 2015

2. Wang Y., X. Chang and **H. Hu**, 2014, Simultaneous reverse time migration of primaries and free-surface related multiples without multiple prediction. **Geophysics**, 79, S1-S9. [Link](#), [PDF](#)
1. **Hu H.**, Y. Liu, X. Chang, Y. Wang, X. Du and R. Yang, 2013, Analysis and application on boundary treatment for the computation of reverse-time migration: **Chinese Journal of Geophysics**, 2033-2042. [Link](#), [PDF](#)

Expanded Abstracts in Professional Meetings:

43. **Hu, H.**, Y. Zheng and L. Huang, Multicomponent imaging of vertical faults using multiple seismic scattering, Geothermal Rising Conference 2021.
42. Zheng, Y., J. Li, **H. Hu**, K. Gao, L. Huang and T. Cladouhos (2021). Seismic Double-beam Neural Network Approach to Characterizing Small-Scale Fractures in Geothermal Fields, Geothermal Rising Conference 2021.
41. Zheng Y., J. Li, R. Lin, **H. Hu**, K. Gao and L. Huang, 2021, Physics-Guided Machine Learning Approach to Characterizing Small-Scale Fractures in Geothermal Fields, 46th Workshop on Geothermal Reservoir Engineering, Proceedings, Stanford.
40. Gao K., L. Huang, R. Lin, **H. Hu**, Y. Zheng and T. Cladouhos, 2021, Delineating Faults in the Soda Lake Geothermal Field Using Machine Learning, 46th Workshop on Geothermal Reservoir Engineering, Proceedings, Stanford.
39. Zhang Y., A. Li and **H. Hu.**, 2020, Separation of Multi-Mode Waveforms for Love Waves Using a Stacking-and-Stripping Technique, AGU, Expanded abstracts.
38. **Hu H.** and Y. Zheng, 2020, Inversion of random heterogeneity power spectrum using the transverse coherence functions of reflected waves, AGU, Expanded abstracts.
37. Lin R., **H. Hu**, Y. Ding, L. Huang, K. Gao, and Y. Zheng, 2020, Improving subsalt sediment imaging and high angle faults using secondary scattered seismic waves, SEG, Expanded abstracts.
36. Lin R., **H. Hu** and Y. Zheng, 2020, Seismic imaging with weighted stacking of common-image gathers, SEG, Expanded abstracts.
35. **Hu H.**, Y. Zheng and V. F. Cormier, 2019, Probing the Inner Core using near-vertical PKIKP and frequency dependent amplitude ratio of PKiKP/PcP, AGU, Expanded abstracts.
34. Zheng Y., P. Given, **H. Hu** and J. Li, 2019, Non-double-couple mechanisms of deep earthquakes and anisotropic rock fabrics of subducting slabs, AGU, Expanded abstracts.

33. Zhang Y., A. Li and **H. Hu.**, 2019, Data-driven Mode Separation of Love Wave from a 2D Seismic Network, AGU, Expanded abstracts.
32. Li J., **H. Hu** and Y. Zheng, 2019, Physics-guided machine learning identification of discrete fractures from double beam images, SEG, Expanded abstracts.
31. **Hu H.** and Y. Zheng, 2019, Data-driven dispersive surface-wave separation using high-resolution dispersion estimation, SEG Near Surface Modeling and Imaging Workshop in Manama, Bahrain.
30. **Hu H.** and Y. Zheng, 2018, Date-driven Prediction and Separation of Surface Waves into Fundamental Mode and Overtones Based on the Nonlinear Dispersion Measurement, AGU, Expanded abstracts.
29. Zhou, H. W, **H. Hu**, Z. Zou and J. Suppe, 2018, Improving the fidelity of seismic imaging in deep Earth exploration, Deep Earth 2018 Symposium, Beijing.
28. Li X., Y. Zheng and **H. Hu**, 2018, Convergence Acceleration of 2D Multiple Scattering Series Using Shanks Transformation, AGU, Expanded abstracts.
27. Zheng Y., **H. Hu**, X. Fang and R. Stewart, 2018, Novel 3-D Field-scale Characterization of Reservoir Fractures Using Surface Seismic Data by the Double-Beam Method and Field Applications, Unconventional Resources Technology Conference (URTeC) in Houston, Expanded abstracts.
26. **Hu H.**, Y. Zheng, X. Fang and M. C. Fehler, 2018, 3D Seismic Characterization of Irregularly Distributed Fractures in Unconventional Reservoirs, SEG, Expanded abstracts.
25. Li D., X. Tian, **H. Hu**, X. Tang and Y. Zheng, 2018, Removal of dispersive borehole waves and beam imaging of fractures around the wellbore using sonic logging data, SEG Expanded abstracts.
24. Wo Y., H. W. Zhou and **H. Hu**, 2018, Tomographic velocity model building for complex near surface and its impact on depth imaging, SEG, Expanded abstracts.
23. Thongsang P., **H. Hu**, A. Lau and H. W. Zhou, 2018, Imaging improvement in angle-domain common-image-gathers by a local stack utilizing segmentation method, SEG, Expanded abstracts.
22. **Hu H.** and Y. Zheng, 2018, Prediction and Separation of Surface Waves into Fundamental Mode and Overtones Based on the Nonlinear Dispersion Measurement, SSA, Expanded abstracts.
21. Y. Zheng, **H. Hu**, X. Fang and M. C. Fehler, 2018, Seismic characterization of reservoir fractures by double beams and inference of reservoir transport properties, CPS/SEG Beijing 2018, Expanded abstracts.
20. **Hu H.** and Y. Zheng, 2017, High-resolution measurement of surface wave dispersion by nonlinear signal comparison. AGU, Expanded abstracts.
19. Chew J., **H. Hu** and Y. Zheng, 2017, Earth inner core anisotropy using PKiKP and PKIIKP reflection pairs. AGU, Expanded abstracts.
18. **Hu H.** and Y. Zheng, 2017, 3D Seismic Characterization of Fractures in a Dipping Reservoir Layer by Double Beams, SEG, Expanded abstracts.
17. Thongsang P., **H. Hu**, H. W. Zhou and A. Lau., 2017, Relaxed flatness-constraint of angle-domain-common-image-gathers generating by Poynting vectors via concurrent vector-median-filter, SEG, Expanded abstracts.
16. Liu, X., Y. Liu., **H. Hu** and P. Li., 2017, Reverse time migration of isolated first-order multiples, SEG, Expanded abstracts.
15. Wei, Z., **H. Hu**, A. Lau, Y. Zheng and H.W. Zhou, 2016. Joint inversion for microseismic event positions and velocity structures by combining multi-scale deformable-layer tomography and master station earthquake location method, SEG, Expanded Abstracts.
14. Li, L., **H. Hu**, X. Li and Y. Zheng, 2016. Understanding slab-mantle interaction by 3D seismic imaging of reflectivity in the mantle wedge, Fall AGU.
13. Ding, Y., Y. Zheng, H.W. Zhou, M. Howell and **H. Hu**, 2016. Propagation of Gaussian Wave Packets in heterogeneous media and the application to fracture characterization,

- Fall AGU.
12. Ding, Y., Y. Zheng, H.W. Zhou, Y. Zhang and **H. Hu**, 2016. Seismic characterization of fractures using exact localized waves: Gaussian wave packet, SEG expanded abstract.
 11. Thongsang, P., H.W. Zhou and **H. Hu**, 2016. Analysis of oscillational behaviors of waves in gas-pocket reservoirs via decoupling wavefields, SEG expanded abstract.
 10. Liu Y., X. Liu, Y. Shao, A. Osen, Y. Zheng and **H. Hu**, 2016, Least-squares reverse time migration of controlled order multiples, SEG expanded abstract.
 9. Liu, Y., X. Liu, A. Osen, Y. Shao, **H. Hu** and Y. Zheng, 2016 Least-squares Reverse Time Migration Using Controlled Order Multiples, EAGE Conference and Exhibition, expanded abstract.
 8. Liu X., Y. Liu, H. Lu and **H. Hu**, 2016, Prestack-image based correlative least-squares reverse time migration, SEG expanded abstract.
 7. **Hu H.**, Y. Liu, Y. Zheng, X. Liu and H. Liu, 2015, Least-squares Gaussian beam migration. 85th Annual International Meeting, SEG, Expanded Abstracts.
 6. Liu Y., **H. Hu**, X. Xie and Y. Zheng, 2015, Reverse time migration of internal multiples. 85th Annual International Meeting, SEG, Expanded Abstracts.
 5. Liu, Y., **H. Hu**, H. Lu and X. Xie, 2014, Simultaneous estimation of hypocenter and velocity in microseismic monitoring: A case study at Shengli Oilfield, China, AGU, Expanded abstracts.
 4. **Hu H.**, Y. Liu and A. Osen, 2014, The application of compression of local slant stacks by local slopes estimation and matching pursuit decomposition, 1st Chinese Geoscience Union Annual Meeting, Expanded Abstract, 1202. (In Chinese)
 3. **Hu H.**, Y. Liu, X. Chang and Y. Wang, 2013, The application of seismic prestack Gaussian beam migration, 29th Chinese Geophysics Annual Meeting, Expanded Abstract, 914. (In Chinese)
 2. **Hu H.**, Y. Liu, X. Chang and Y. Wang, 2013, A study of pre-stack Gaussian beam migration. International Conference on 3-D Wave Propagation and Imaging Through the Earth's Interior, Expanded Abstract, 86-89.
 1. **Hu H.**, Y. Liu and Y. Wang, 2011, Study of different boundary treatments in pre-stack reverse-time migration, 27th Chinese Geophysics Annual Meeting, Expanded Abstract, 750. (In Chinese)