3-D Seismic Imaging
Geophysics 280 – MWF 10:00 – 10:50

3 units with labs: 35% final, 35% quizzes, 30% labs - Letter grade or instructor consent for CR/NC
2 units without labs: 50% final, 50% quizzes - Letter grade or CR/NC

Professor: Biondo Biondi – biondo@stanford.edu - ESMB 369
TA: Yunyue (Elita) Li – yunyue@sep.stanford.edu - ESMB 407

Lecture Schedule

4/1  Introduction  (Introduction)
    - Lab 1 online
4/3  3D Geometries  (Chapter 1)
4/5  Sep3D software  (Appendix 1)

4/8  Kirchhoff prestack migration  (Chapter 2)
4/10 Kirchhoff prestack migration (isotropy vs anisotropy)  class handout
    - Lab 1 due; Lab 2 online
4/12 NMO+DMO+AMO and prestack partial migration  (Chapter 3)

4/15 Wavefield-continuation migration  (Chapter 4)
4/17 Numerical methods for wavefield-continuation - two way wave equation  Notes
4/19 Numerical methods for downward continuation - one way wave equation  (Chapter 5)
    - Lab 2 due; Lab 3 online

4/22 Numerical methods for downward continuation (isotropic and anisotropic)  (Chapter 5 + Notes)
4/24 Wavefield-continuation migration as adjoint of wavefield modeling (Notes)
4/26 Common image gathers in offsets and angles  (Chapter 6)

4/29 Gaussian Beam migration  (Chapter 6)
5/1  Plane-wave and phase encoding migration  (Chapter 7)
    - Lab 3 due; Lab 4 online
5/3  Plane-wave and phase encoding migration  (Chapter 7)

5/6  3D marine wave-equation migration methods  (Chapter 7)
5/8  Imaging and aliasing  (Elita teaches)  (Chapter 8)
5/10 Imaging and irregular geometries  (Chapter 9)
5/13  Imaging and irregular illumination + linearized Inversion  (Chapter 9)
5/15  Linearized inversion and least-squares reverse time migration  (Notes)
      - Lab 4 due; Lab 5 online
5/17  Stacking velocity, Dix inversion, and traveltime tomography  (Chapter 10)
5/20  Inversion of stacking velocities (Chapter 10) and time migration velocity analysis  (Chapter 11)
5/22  Residual moveout analysis and residual migration  (Chapter 11)
5/24  Vertical and tomographic velocity updating  (Chapter 11)
      - Lab 5 due; Lab 6 online
5/27  Memorial Day, No class
5/29  Tomographic velocity updating  (Chapter 11)
5/31  Wave equation migration velocity analysis  (Chapter 12)
6/3   Principles of full-waveform inversion and its limitation  (notes)
      - Lab 6 due
6/5   Review and Q&A