Class 6: Geostatistics
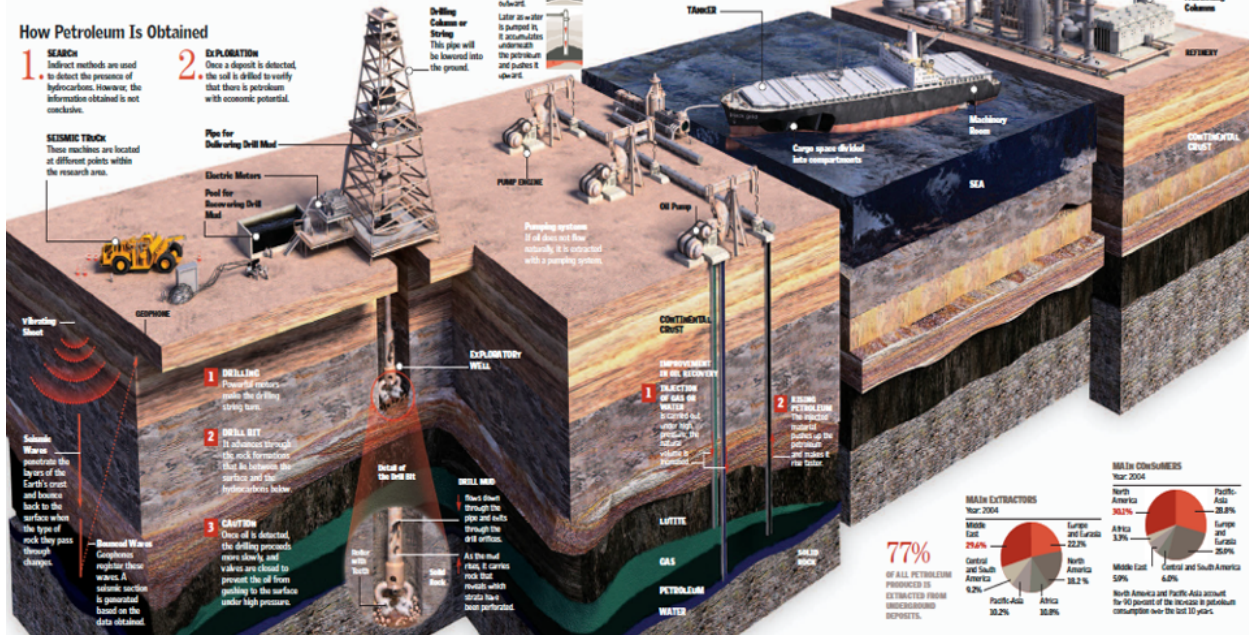
1. Introduction
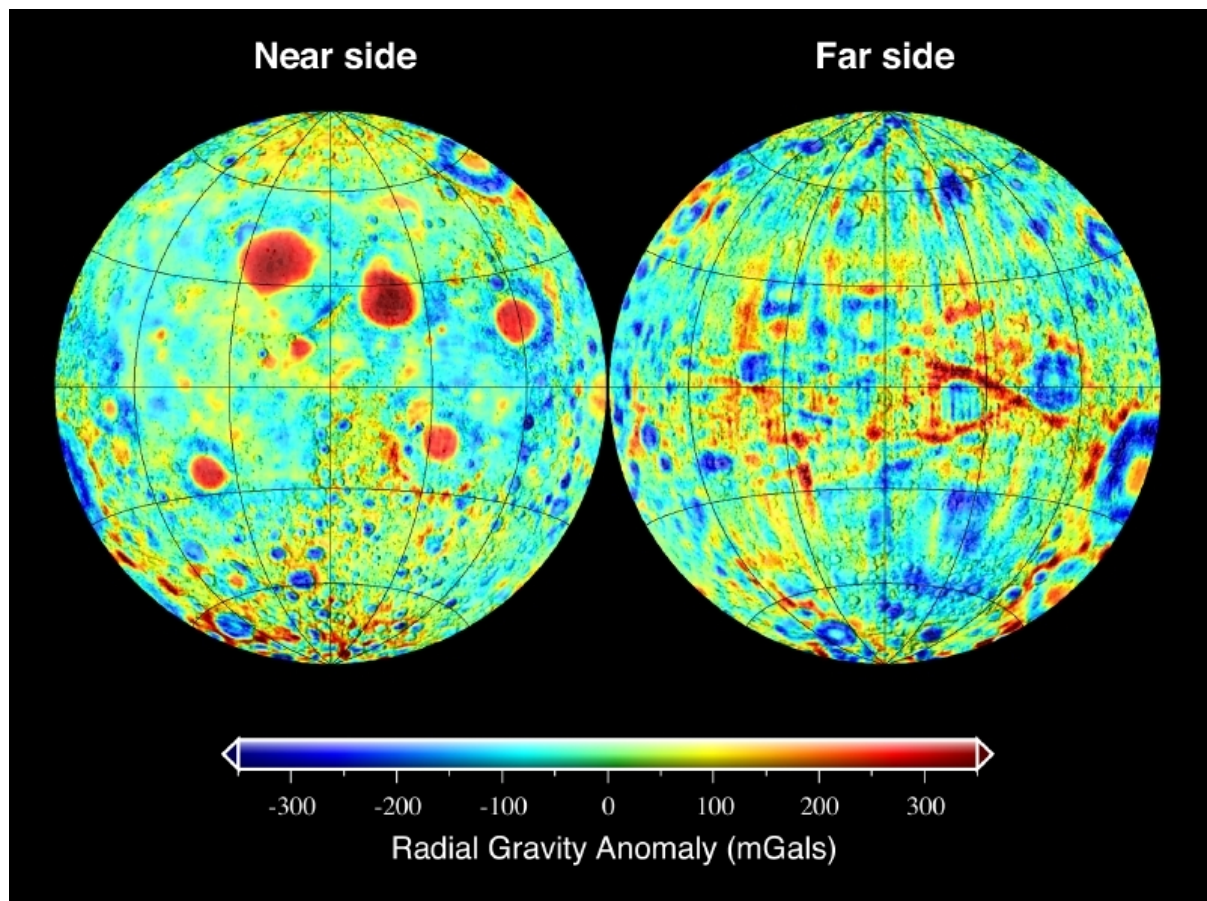   - What is geostatistics?
   - Typical Questions
   - Examples (Mining/Drilling; Seafloor topography – GeoMapAPP; lunar gravity)
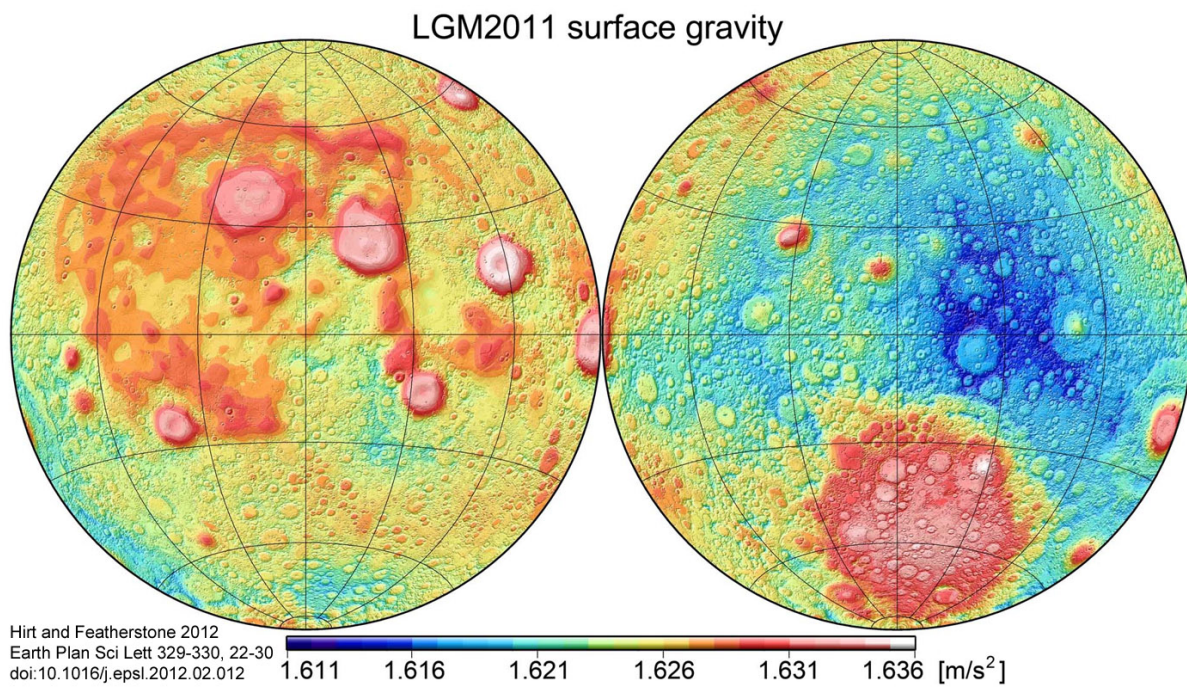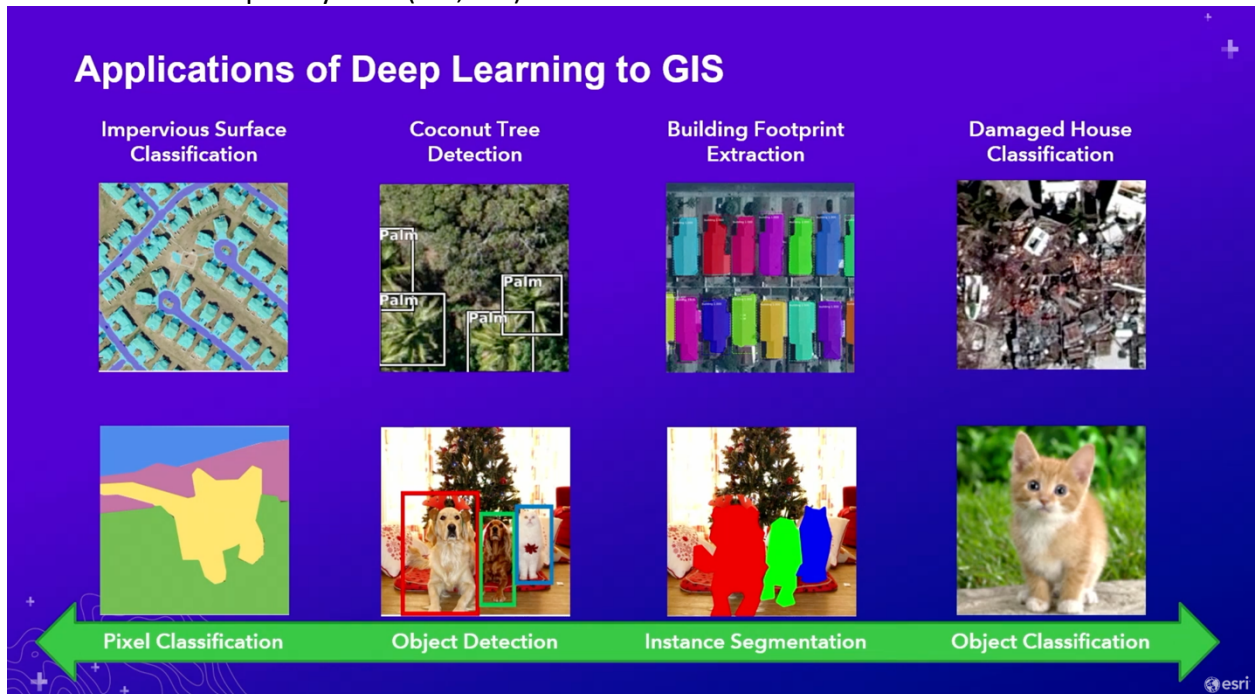
Mining

Lunar gravity field based on Lunar Prospector (no farside data).

Lunar gravity field based on GRAIL mission.

2. Spatial Variability Sources and Spatial Prediction Model
- Deterministic (Mechanical) model
- Statistical model (i.e., kriging)
- Data-driven expert system (ML, NN)

3. Deterministic Method
- Inverse Distance Weighted Interpolation
- Natural Neighbor Interpolation
- Spline Interpolation (e.g., Spherical Abel-Poisson)

4. Geostatistical Model (i.e., Kriging)
- Ordinary Kriging
  - Variogram Modeling
  - Variable prediction (minimum variance unbiased estimator)
  - Kriging variance
  - Isotropy
- Moving window
  - Example (RBA)
- Regression Kriging

5. Kriging in the Bayesian inference framework

References:
1. Cressie, Statistics for Spatial Data
2. Tomislav Hengl, A Practical Guide to Geostatistical Mapping
3. Geostat 2014 Bergen Workshop:
https://www.youtube.com/playlist?list=PLxVwQCAyQyxxdtkkjayMNV479UBPhls5z

4. https://wiki.52north.org/AI_GEOSTATS/SoftwareGeostatistical (including Vesper that I have tried: https://precision-agriculture.sydney.edu.au/resources/software/)

6. GeoENV Conference: https://2020.geoenvia.org/#important-dates

7. GEOSTAS Conference: http://www.geostats2020.com/home.html