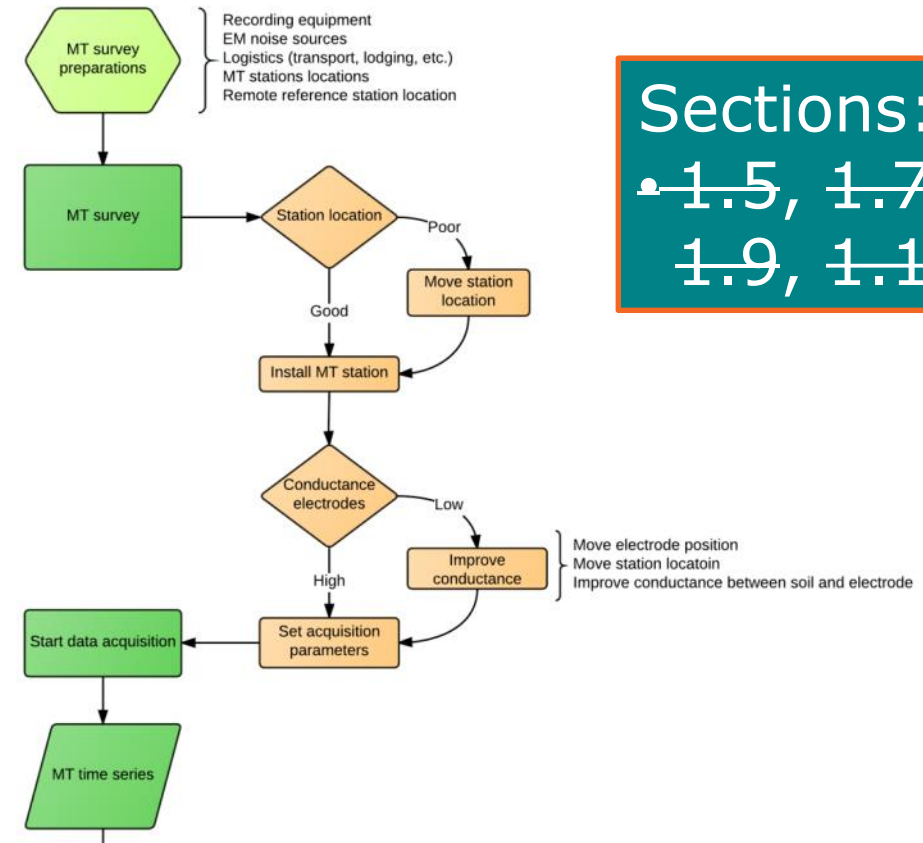
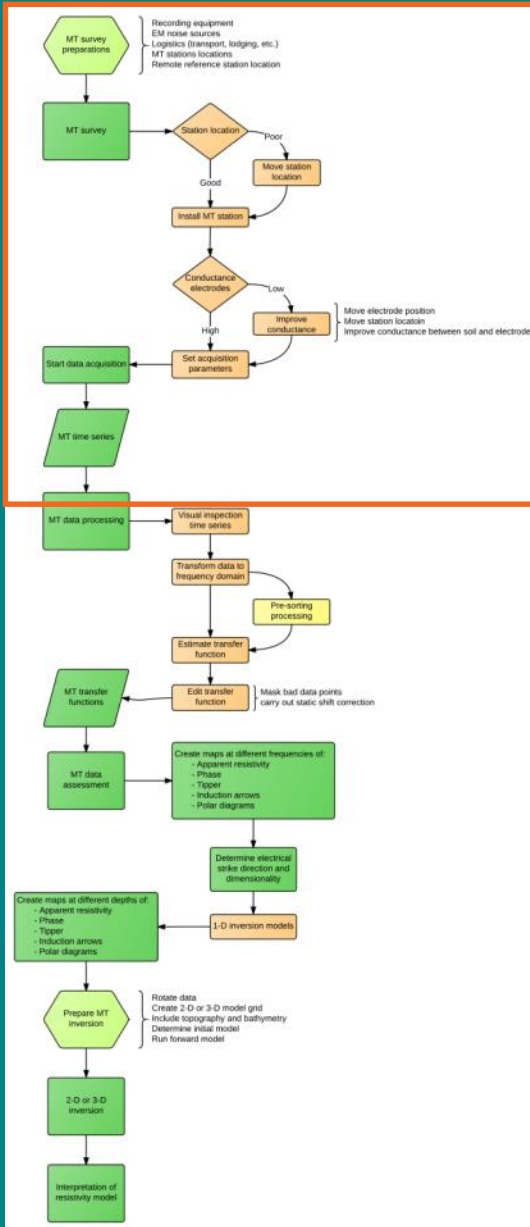


08_Data acquisition

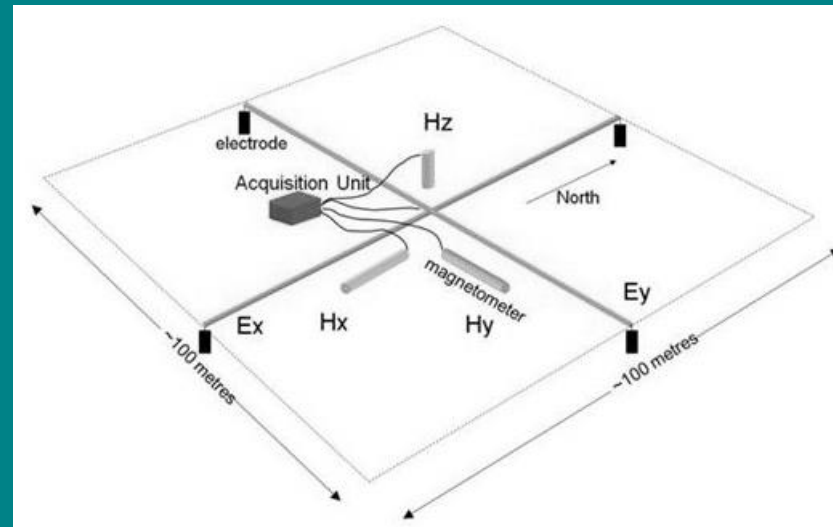
The MT process (1)



Sections:
1.5, 1.7, 1.8,
1.9, 1.10, 1.11

Components and site layout

- The 2 horizontal components of the E-field are measured with (polarized) electrodes in dipoles.
- The 3 components of the B-field are measured with magnetic coils.
- The 5 field components are recorded (in time) by a car battery powered data-logger.
- **Accurate** positioning is necessary for good quality measurements.
- Time synchronization using GPS-receiver



Data logger



21/01/2019

Electrodes

- Often orientated in two dipoles oriented N-S and E-W.
- Soil type controls conductance between electrode and subsurface. Be prepared:
 - Rocky soil is resistive
 - Muddy soil is conductive
 - Dry sandy soil is resistive
 - Clay is conductive
- Always use salty water to ensure good conductance. In resistive soil bentonite can be used.

Electrodes

- Ensure good conductance.
- Buried to eliminate day-night temperature variations.



Magnetometers

- Orientated N-S, E-W and vertical
- Buried to prevent external disturbances
- Cables secured to prevent disturbances from wind
- Accurate positioning is crucial.



Magnetometers



Survey preparations

- Arrange recording equipment
- Gather geological/geographical information of survey area
 - Type of soil
 - Ruggedness
 - Accessibility
 - Local communities
 - ...
- Identify EM noise sources in survey area
 - Use e.g. topographic maps and Google Earth to identify roads, houses, powerlines, wind turbines, etc.



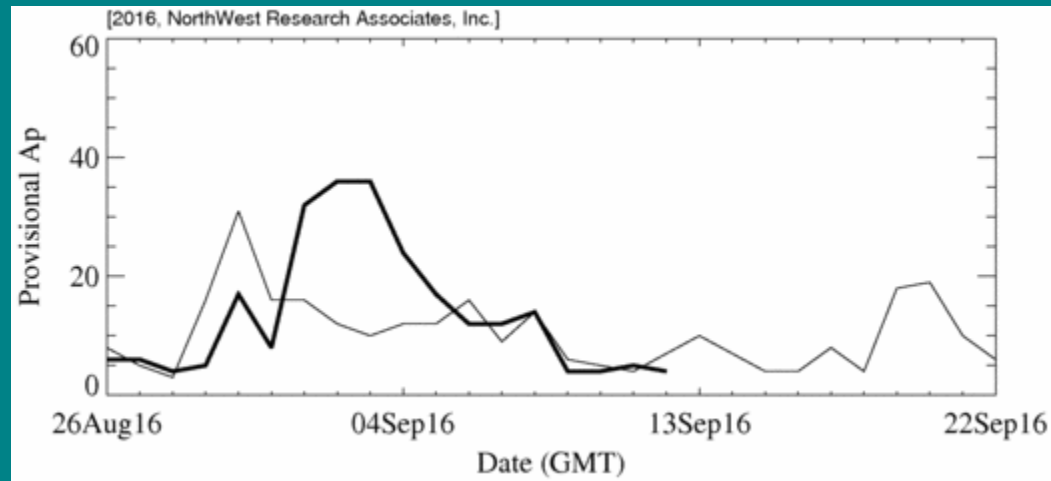
Survey preparations

- Organize logistics
 - Base camp
 - Transport of field crew and equipment
 - Local workers
 - Acquisition schedule and planning (Ap index)
 - Permitting and scouting
 - ...
- Pick location of remote reference station
 - Pre-select at least two potential suitable locations
 - Test these locations in the field
- Design survey layout considering:
 - Targeted geothermal reservoir (sounding period)
 - Desired model dimension(s)
 - Geological knowledge of the survey area
 - The locations of potential EM noise sources



Ap index

- The Ap index is a measure of the level of geomagnetic activity over the globe for a given day. The higher the AP index, the better quality data an MT station records.
- https://spawx.nwra.com/spawx/env_latest.html



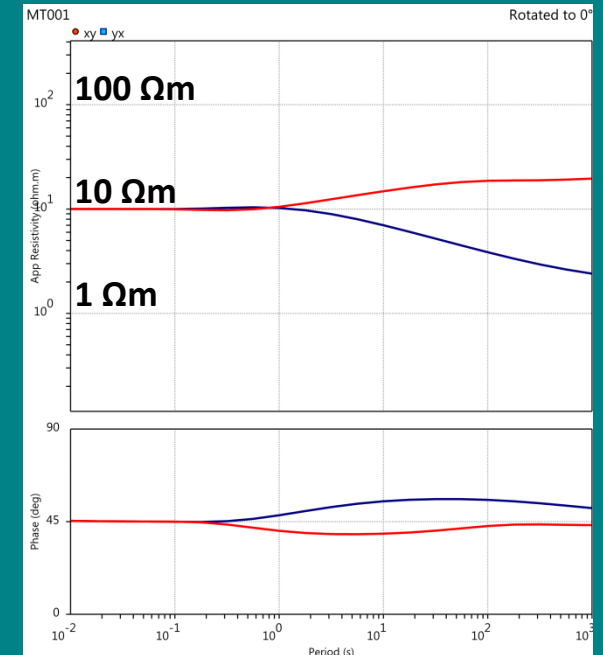
MT sounding period

- MT sounding period:

$$\rho(T) = 503\sqrt{(T\rho_a)}$$

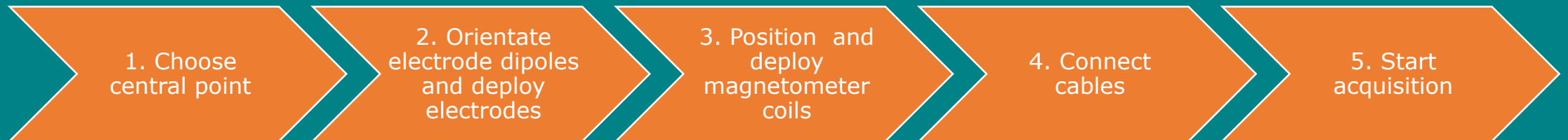
re-arranging gives:

$$T = \mu_0 \sigma \pi \rho^2$$



MT station installation

- At planned MT station location:
 - Visual check for potential EM noise sources, if necessary move station
 - Decide on center of MT station and layout MT station
 - Check conductance of electrodes and improve if too low
 - Set acquisition parameters and start acquisition
 - Check if instrument is recording



MT station installation

1. Choose central point

2. Orientate electrode dipoles and deploy electrodes

3. Position and deploy magnetometer coils

4. Connect and secure cables; protect data logger

5. Start acquisition



MT station retrieval

- QC the measured MT data:
 - Check # of records
 - Check # of bad (saturated) records
 - Visual inspection of time series
 - Quick transfer function estimation (without pre-processing)
- Retrieve station if quality of recorded data appears to be sufficient.

