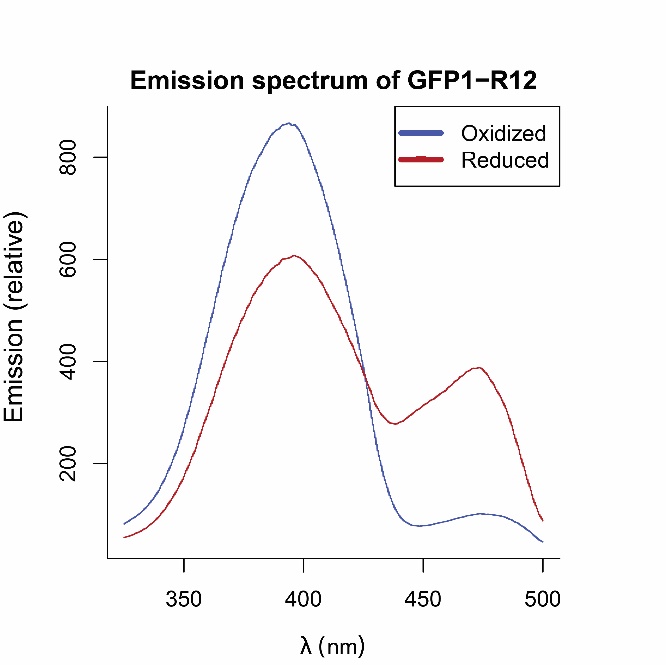
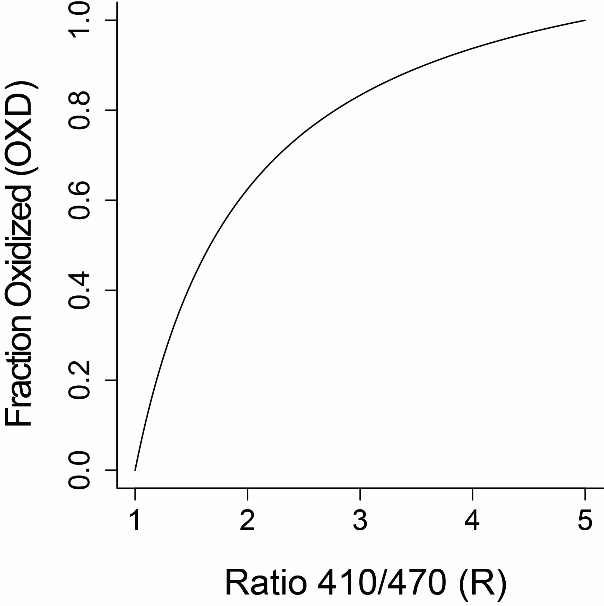
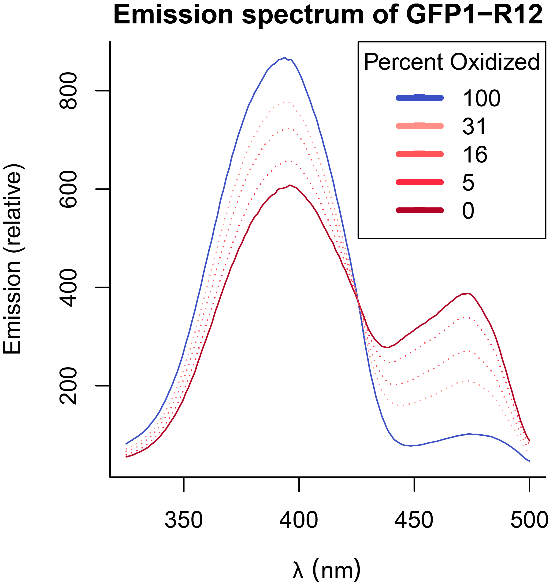
# We hold the following concepts (truths?) to be (self?) evident (from the data presented):

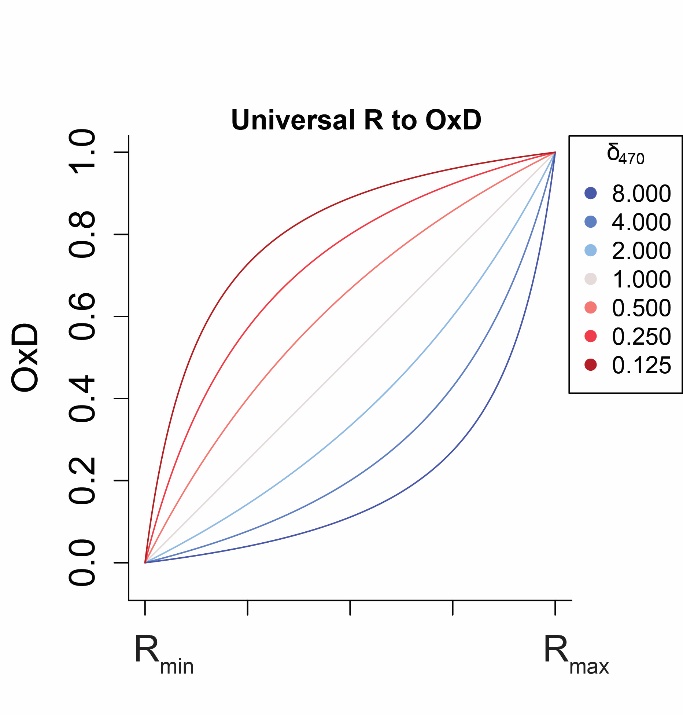
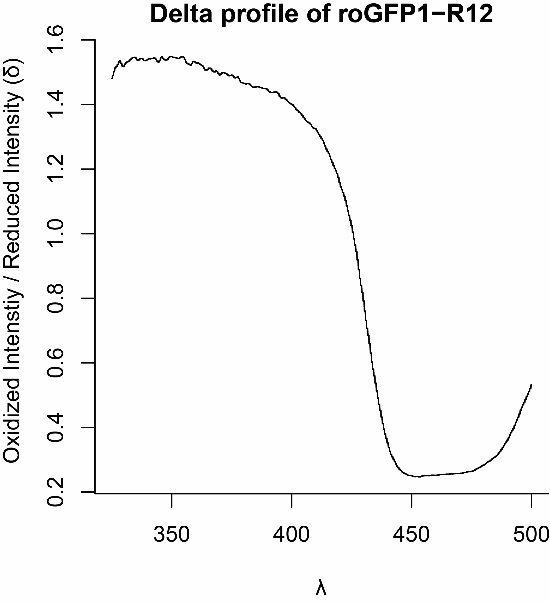
**Concept 1:** If we have many redox-sensitive GFP proteins in a cell, we understand how to use the protein’s excitation-emission pattern to estimate the cell’s redox state. (7 graphs, 4 chunks)



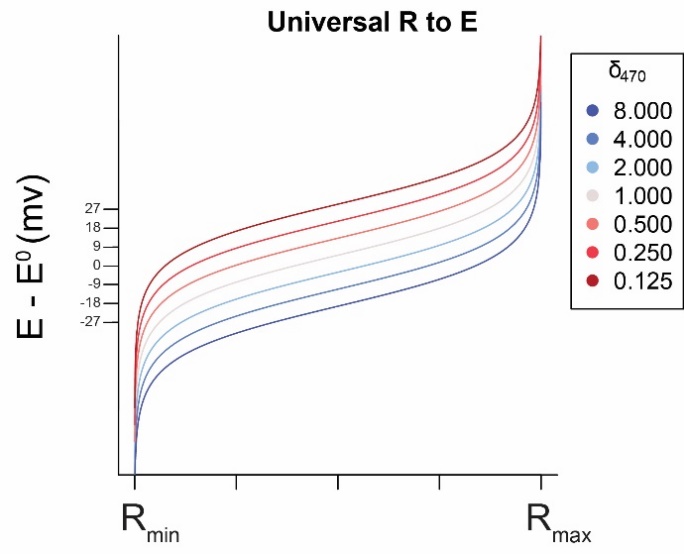
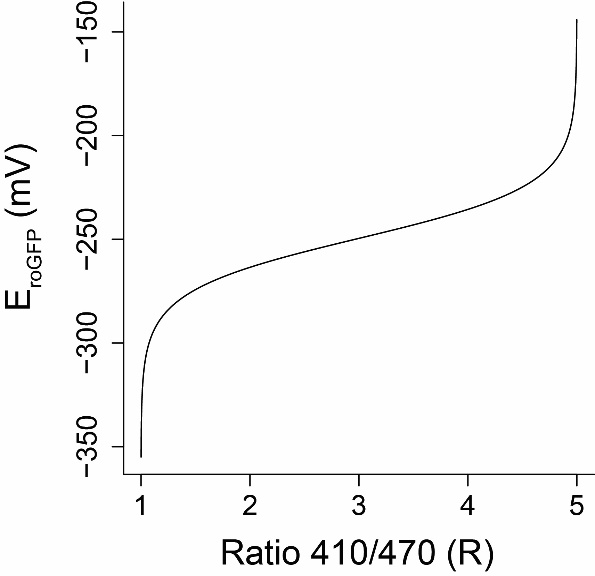
**Graph 1-1.** A redox sensor can be oxidized or reduced, and each sensor has a characteristic excitation-emission pattern.



**Graphs 1-2 and 1-3.** In a population of sensors, the ratiometric emission can be used to determine the fraction of sensors that are oxidized.

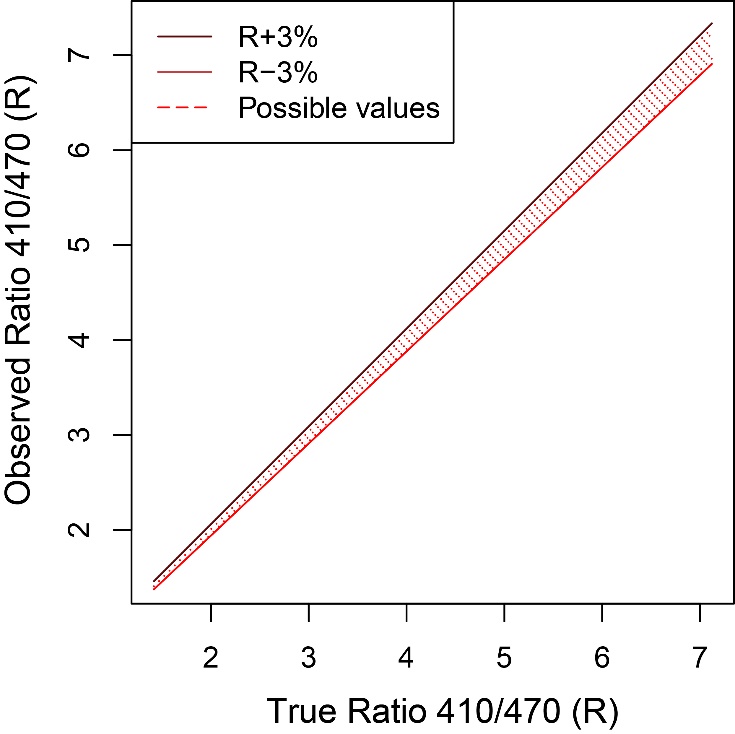


**Graphs 1-4 and 1-5.** When we excite a sensor at a certain wavelength, we define a value called , which is the ratio between the oxidized and reduced emissions at that wavelength. The value at one wavelength determines how quickly ratiometric emission increases when more sensors are oxidized.

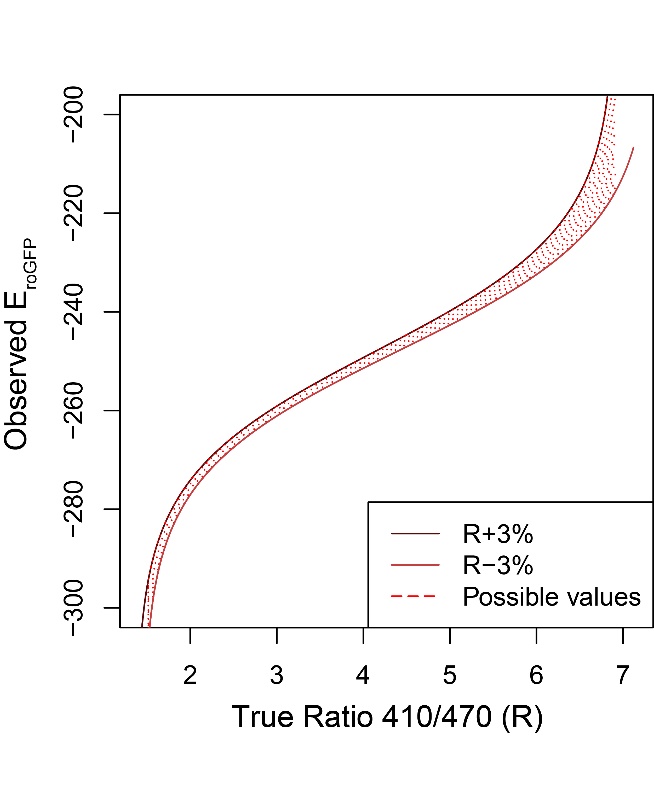
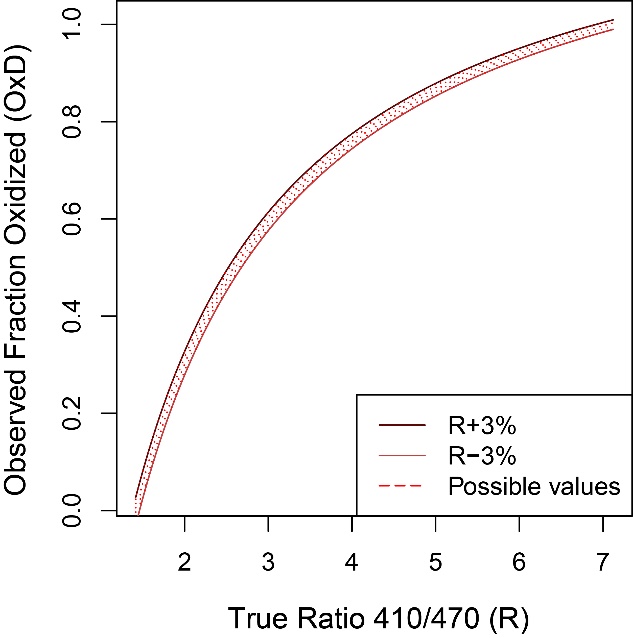


**Graphs 1-6 and 1-7.** In a population of sensors, the ratiometric emission can also be used to determine the redox potential of the sensors. The ratio between the oxidized and reduced emissions at one wavelength ( just translates the entire distribution upwards or downwards by a constant value.

**Concept 2:** Our measurement of ratiometric emission has limited precision and we understand how that lack of precision alters the accuracy of interpretation of the redox state.

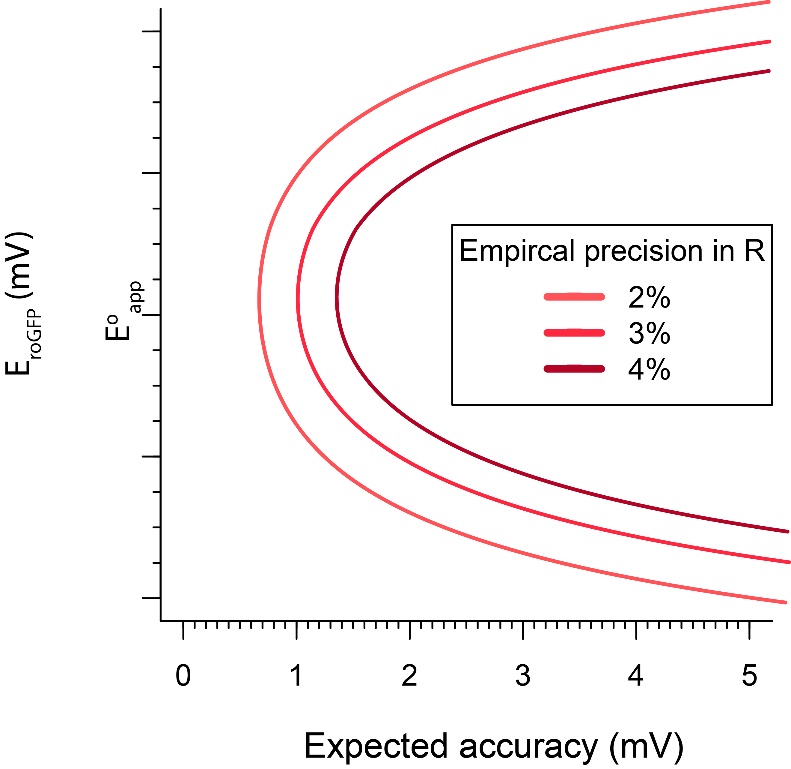


**Graph 2-1.** Empirically, we observe a precision in the ratiometric emission of around 3%. Given that precision, there is a small range of emission values that we could observe for any true emission value.

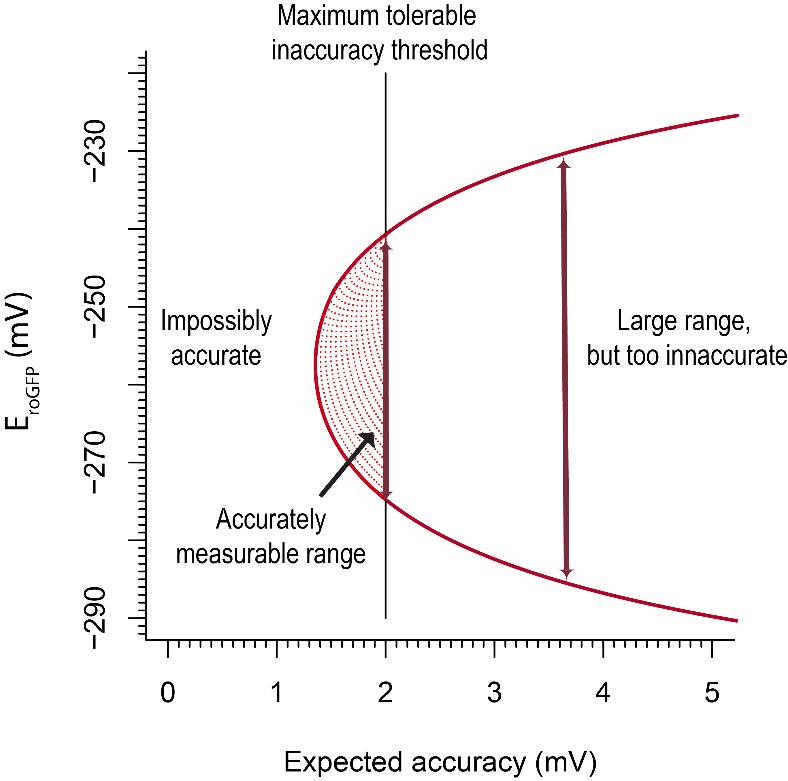


**Graphs 2-2 and 2-3.** Since we know the range of ratiometric emission values we would expect to see with a precision of 3%, we can also determine the range of values we could predict for the fraction of sensors that are oxidized and the associated redox potential.

**Concept 3:** For any set of sensor measurements with a known precision, we can predict the ranges of redox potentials that the sensor can accurately measure.

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**Graph 3-1.** The more precisely we are able to measure the ratiometric emission, the more accurately we can measure a wider range of redox potentials.



**Graph 3-2.** At some empirical level of precision in ratiometric emission, we can find the range of redox potentials that a sensor can measure accurately.