SimSrc, Sparseness and Compressive Sensing: a confluence of ideas

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Recently, seemingly unrelated topics such as high-productivity source acquisition, sparse seismic data representations and computational simultaneous sources have been understood to be intimately related. In acquisition, SimSrc (originally for simultaneous sources), a technique which allows many sources to be active at the same time, has proven beneficial in land acquisition and is being studied for OBC, marine, VSP and other types of data acquisition. Introduced in the late 1990s, shots are typically encoded with a randomized relative timing to aid in discrimination between the interfering shots. In the last decade, similar techniques have been used to computational advantage by handling more than one shot at the same time in the same processing domain. Similarly, the inherent sparseness of the seismic data has motivated compressive data representations that have been used extensively in seismic data manipulations for some time. Most recently, outside the geophysics domain, techniques known as Compressive Sensing have emerged in mathematics and engineering that bear similarities to these geophysical applications. In this workshop, we explore these methods to arrive at a better understanding of the relationships.

Among the questions to be discussed are:

1. How best to represent seismic data?
2. What are the advantages and pitfalls?
3. How to best handle SimSrc data – to separate or not to separate?
4. What level of shot overlap can be tolerated and how much information can be packed?
5. What are the limits?
6. How best to handle illumination?
7. How might compressive sensing leverage geophysical understanding and vice-versa?
8. What is the way forward?

These and other relevant questions will be discussed in a open and collaborative environment in this important workshop that stands at the confluence of these related topics.