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Expert and novice gaze in seismic interpretation, implications for colour palette choice and learning.

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Remotely sensed seismic images are our main window into sub-surface geology and are used extensively in industries that explore or exploit the sub-surface and its geo-resources. Seismic image data are made by bouncing sound waves off sub-surface rock layers to build a picture of the geology. Seismic imagery, has an inherent uncertainty derived from image resolution, processing and acquisition workflows; the interpreting geologist therefore has a crucial role in using information in the image to produce a realistic geological model on which multi-billion dollar and key environmental decisions can be made. Research has shown that experts look at such imagery differently to novices and that colour presentation and other factors influence response to an image. Here we investigate how such factors influence a geologists' interpreting a seismic image, and consider if we can use our findings to improve future seismic image interpretation through expert learning and potential image enhancement.

Eye movements offer a valuable, unbiased, research method, to reveal not only an individual's interests and priorities when viewing an image, but also their expertise. In other disciplines eye movements of experts have been used to improve skill and enhance training of novices. Here we use eye-tracking to capture where geologists' look on a seismic image to investigate whether: 1) colour palette choice for image presentation can affect image perception and influence gaze and 2) if expert and novice gaze patterns are different. In our experiments we have considered multiple colour palettes for a range of seismic imagery containing structural and sedimentological features. We show that expert and novice gaze is different, particularly in the initial phase of image exposure and that colour palettes have a significant impact on gaze and attention of all participants. Ultimately the objective is to see if we can learn from expert gaze to help improve the seismic interpretation skills of novices through image enhancement, and ultimately image interpretation outcome.