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# Fractured crystalline reservoir: a power law over 8 orders of magnitude on length distribution but a size control on the connectivity. A field analog analysis: Tamariu's granite (Catalonian costal ranges).

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The matrix permeability in fractured reservoir is generally low, and therefore the fluid flow is mostly governed by the fracture network. At depth, the investigation of such reservoir is mostly limited on boreholes and geological data like seismic, gravimetry, magnetism... Those methods are investigating different scales and dimensions: seismic is in 3D and mostly between the hectometric to plurikilometric scale whereas boreholes are 1D and at metric and lower scale. The study of outcropping analogs of buried reservoirs is a key tool for the characterization of the fracture network between the two scales which is the reservoir scale. Tamariu's granite, which outcrops on the Catalonian Coastal Ranges has been studied with the aim to characterize the fractures from the centimetric to the kilometric scale. With the help of the previous regional and outcrop studies (LeGarzic 2010, Place 2010), we could interest on the fracture network over 8 orders of magnitudes. We used 1D scan lines and 2D fracture mapping on outcrop pictures to precisely define the fracture network. Despite the complex history of the granite, we have shown a power law distribution of the fractures and faults lengths between the centimeter scale and the hundred kilometer scale. This homogenous length distribution over a large range of scales contrasts with the fracture orientation distribution that highly depends on the scale observation and on location of our fracture maps. Moreover, at the different scales investigated, we have observed important differences in the fractures connectivity. Fractures mostly unconnected at a metric scale are in fact connected by numerous short fractures at the centimetric scale. Finally, we could compare 2D measurement method with the maps and 1D method with the scan lines. The main orientation of the fracture pattern is the same for a sampling in one or two dimensions, but "shapes" of the orientation distribution are quite different. The scale independent size distribution and the scale dependent orientation distribution and connectivity of the fracture network define on Tamariu's granite could be important parameters to modelize the comprehension of flow in buried fractured granite reservoirs.