

## Tabernas Fieldtrip

**Small radius, coarse grained submarine fan aprons dominated by supercritical flow bedforms (Late Miocene, Tabernas and Sorbas Basins, SE Spain).** Fieldtrip leaders: *Kick Kleverlaan, George Postma, Gustavo Lobato.*

During this 3-day fieldtrip we will examine time slices of canyon to lobe environments of mixed sand-mud and sand-rich turbidite aprons of Late Miocene (Tortonian) age. Excellent exposures in the Tabernas and Sorbas Basin allow complete traverses to be made through each of the fan apron complexes, from distal lobe to proximal feeder channel and to canyon. Turbidite facies is shown and discussed in stratigraphic and paleo-environmental context and includes various types of large scale bedforms such as dunes, antidunes and cyclic steps. Classical outcrops will be visited including Solitary channel complex, Buho Canyon, Gordo megabed and Mizala channel-lobe complex.

**Day 1 –** Introduction to Tortonian stratigraphy of the intermontane Tabernas Basin and a traverse through the mixed mud-sand turbidite apron up to the Buho Canyon. Going upslope we will study the tabular turbidite beds in the sandy lobes, the pebbly sands with supercritical flow bedforms in the channel-lobe-transition-zone and in the canyon fill. Basin wide marker beds, such as the up to 60 m thick ‘Gordo’ mega bed (Kleverlaan, 1987, *Sedimentary Geology*) will be shown, and new work on the Buho canyon from Lobato et al. (PhD and in press).

**Day 2 –** New insights into flow characteristics of supercritical, high-density turbidity currents initiated renewed interest in a sand-rich lobe complex near the hamlet of Mizala in the Sorbas Basin (Postma & Kleverlaan, 2018, *Sedimentary Geology*). The studied lobe systems show a consistent built-up of lobe elements of 1.5-2.0 m thick, which form the building ‘blocks’ of the lobe system. The stacking of lobe elements shows lateral shift and compensational relief infill. Three stages of fan lobe development will be shown and discussed: I. an early aggradational stage with lobe elements characterized by antidune and traction-carpet bedforms and burrowed mud intervals (here called ‘distal fan’ deposits); II. a progradational stage, where the distal fan deposits are truncated by lobe elements of amalgamated sandy to gravelly units characterized by cyclic step bedform facies (designated as ‘supra fan’ deposits). The supra fan is much more channelized and scoured and of higher flow energy than the distal-fan. Aggradation of the supra-fan is terminated by a ‘pappy’ pebbly sandstone and by substrate liquefaction, ‘pappy’ referring to a typical, porridge-like texture indicating rapid deposition under conditions of little-to-no shear; III. a backfilling stage, characterized by backfilling of the remaining relief with progressively thinning and fining of turbidite beds and eventually with mud. The three-stage development for fan-lobe building is deduced from reoccurring architectural and facies characteristics in a three successive fan-lobes.

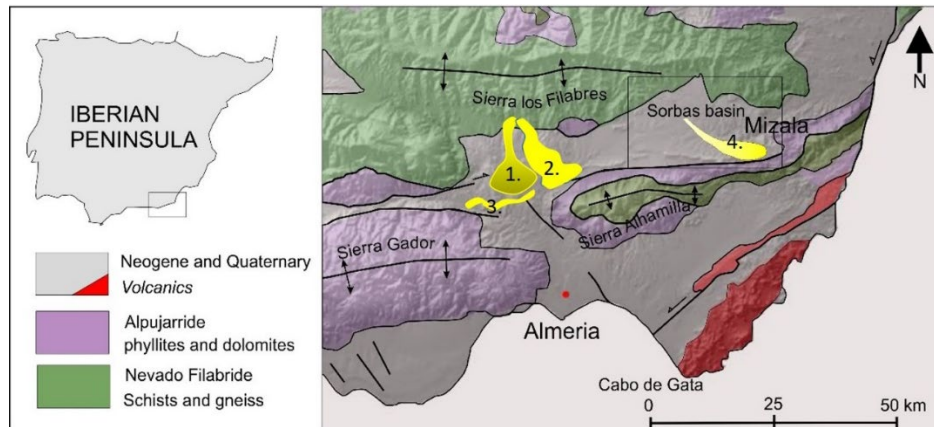


Fig. 1. The Tabernas and the Sorbas intermontane basins, with in the Tabernas Basin 1) mixed sand-mud fan, 2) sand rich system and 3) the Solitary channel complex (Kleverlaan, 1988, *Sedimentology*). In the Sorbas basin we will visit the Mizala submarine fan complex (Postma and Kleverlaan, 2018 *Sedimentary Geology*).

**Day 3 –** Sand-rich system and associated channel complex in the Tabernas Basin is stratigraphically below the mixed sand-mud turbidite complex of day 1. Main features of the sandy to gravelly lobes are 1) large scours, 2) abundance of mud intraclasts; 3) syn-sedimentary faulting; 4) abrupt terminations (top) and pinch outs (lateral); 5) various types of traction carpets. In the same stratigraphic interval slope channels embedded in mud are found. One of the best exposed examples is the Solitary Channel Complex that we will visit in the afternoon. The outcrops allow reconstruction of 3D architecture and gives insight into the channel dimensions and its fill. The channel fill has been drilled by ExxonMobil and studied by Matteis et al. 2016 (abstract) from Barcelona University. There is pre-conference core workshop that highlights facies from the Solitary Channel complex.