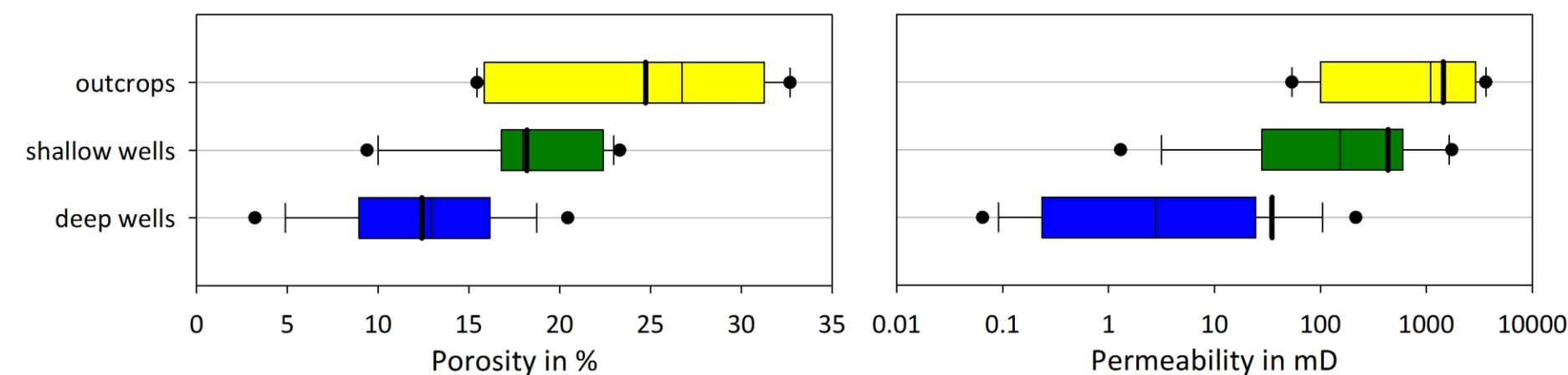


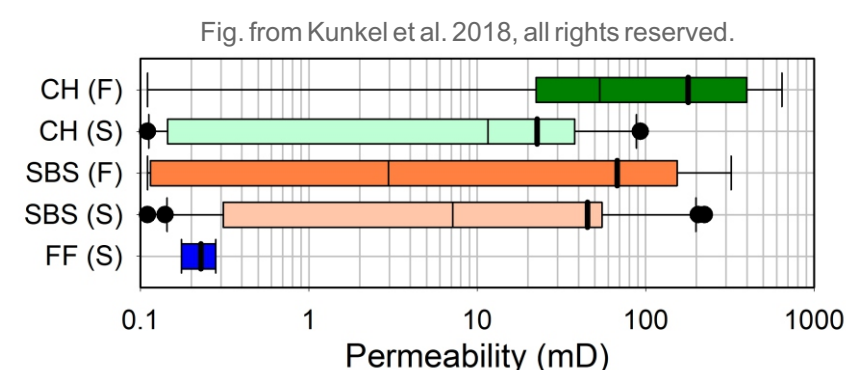
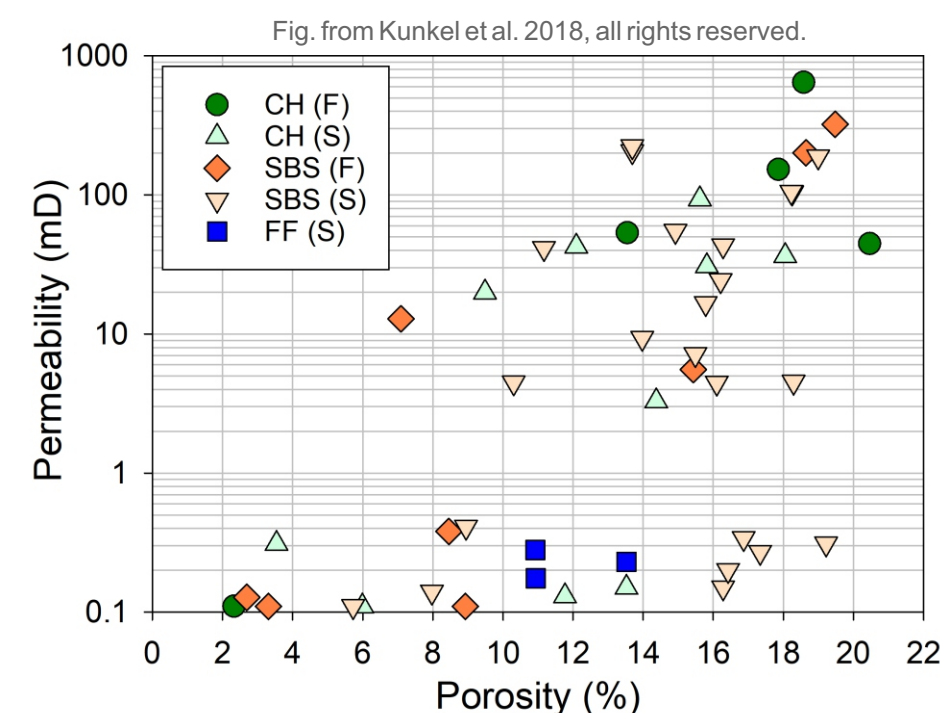
Relationship of hydraulic parameters with diagenetic evolution and depositional preconditions (Buntsandstein, Central Germany)

The study area is the Thuringian Syncline, which is a small sub-basin of the North German Basin located at its southern margin. One of its major aquifers is built from siliciclastic sediments of the Buntsandstein, which are characterized by rapid changes of depositional environments from channel to sandflat to lacustrine depositions resulting in large heterogeneities at a relatively small scale (few to some hundred meters).



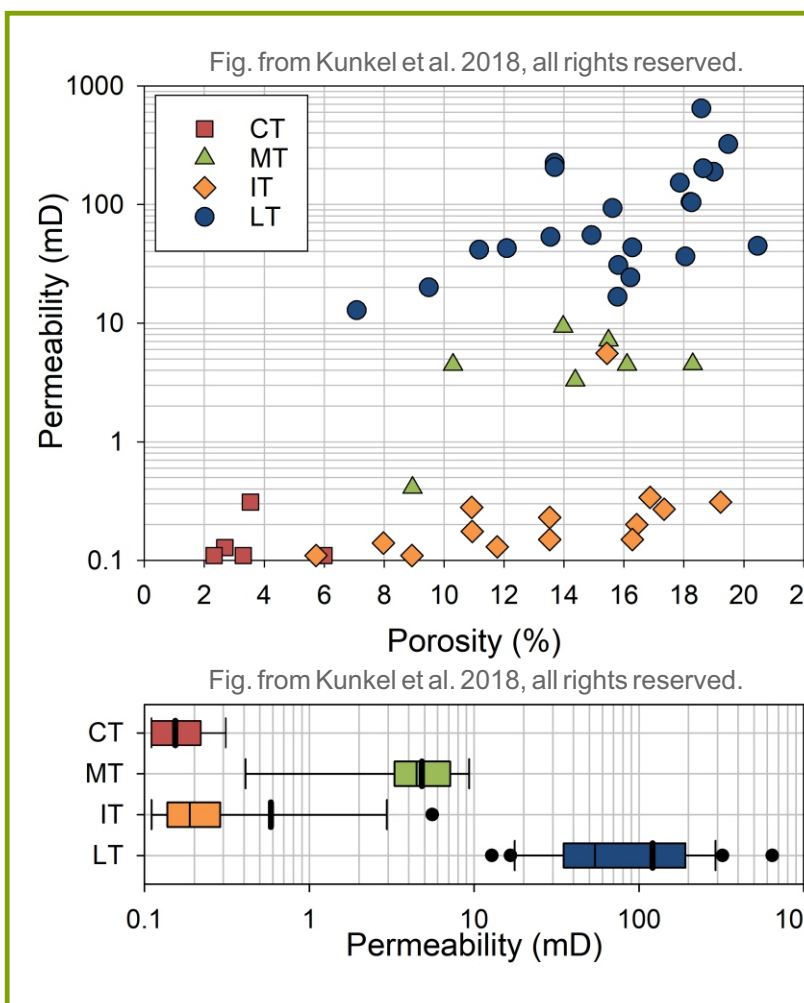
1: (above) Porosity and permeability strongly depend on depth, pointing to secondary enhancement of aquifer quality during uplift and subsequent weathering. (Thin line in the boxes gives the median and the thick line the mean values).

2: (below) Highest porosity and permeability values were measured in the fluvial channel facies association (CH), with a median value that is about 18 times higher than in sandsheet sandstones (SBS). Data of the floodplain fines (FF) shows very poor aquifer potential (Kunkel et al. 2018). (CH = channels, SBS = sandsheets, FF = floodplain fines, (F) = fluvial, (S) = sandflat. Thin line in the boxes gives the median and the thick line the mean values).



3: (right) Relationships between petrophysical properties and diagenesis are evident. Cementation dominated types (CT) reveal low porosities and permeabilities, whereas leaching types (LT) cluster at high values. Illite dominated sandstones (IT) exhibit almost uniformly low permeabilities but moderate to high porosities. Values of porosity and permeability of the mixing type (MT) sandstones are intermediate between all others types (Kunkel et al. 2018).

(Thin line in the boxes gives the median and the thick line the mean values).



4: Leaching types (LT) and cementation types (CT) are common in medium-grained, fluvial and sandflat sandstones. Illite types (IT) are linked with finer grained sandstones of sandsheets and floodplain heteroliths. preferentially in the sandflat environment. Mixed types (MT) relate mostly to floodplain heteroliths (Kunkel et al. 2018).

Major pathways for fluid flow are not solely controlled by sedimentary facies, but also by present-day cement dissolution and mineral alteration, especially in the vadose zone.