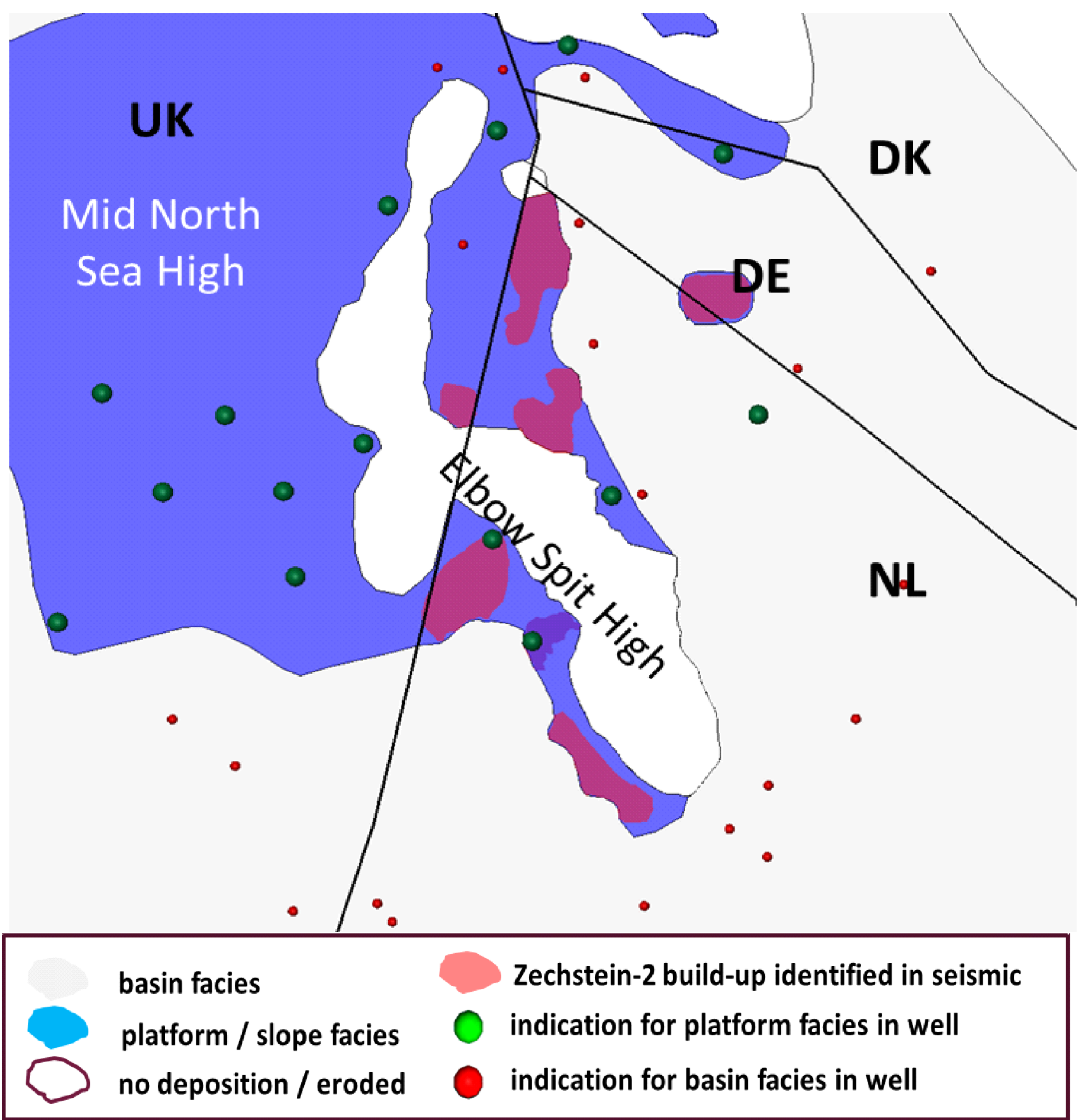


# Zechstein Carbonates revisited



Present-day facies distribution map for Zechstein-2 carbonates, modified from Geluk, 2007

## Onshore Netherlands, Germany, Poland and southern fringe of SPB

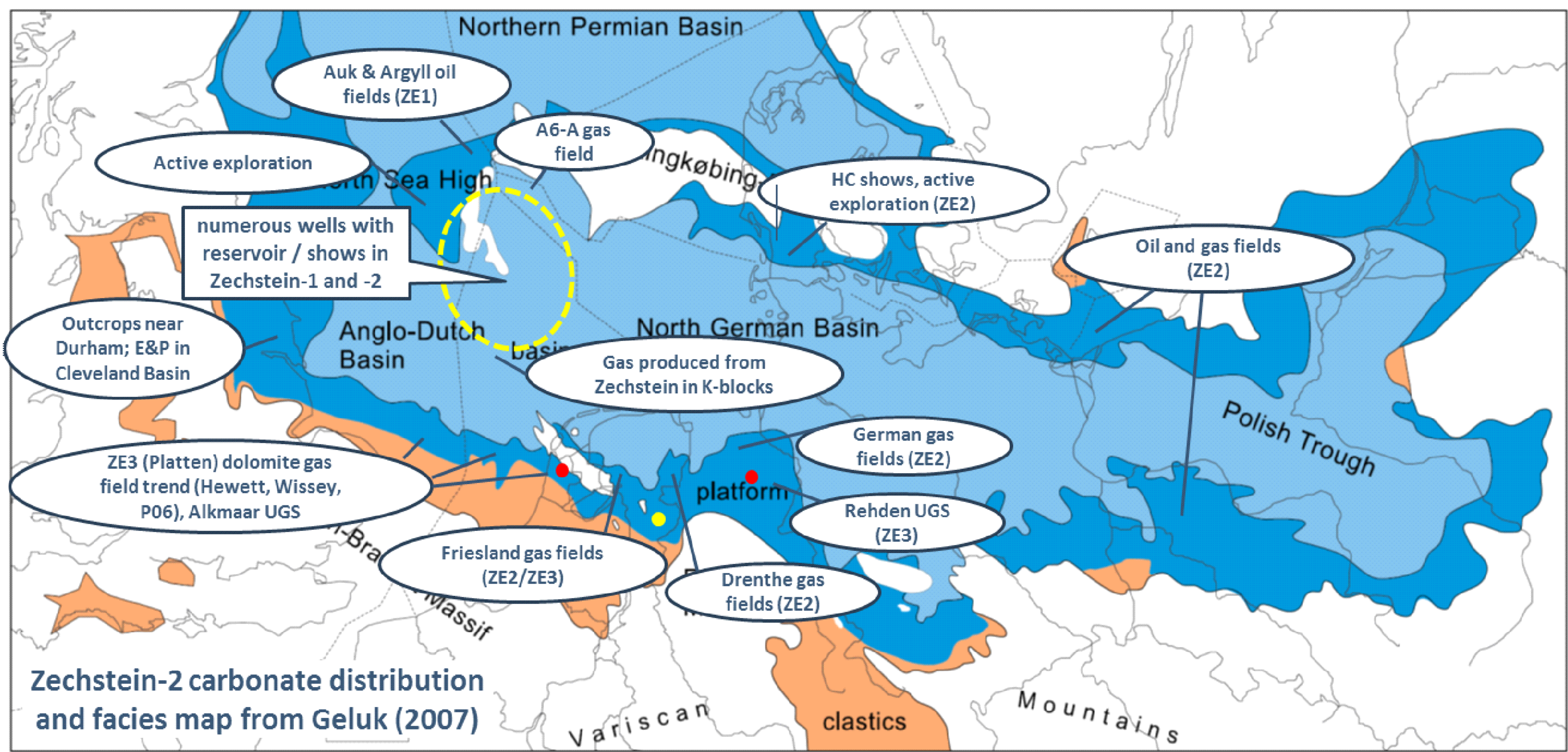
Trap	Carbonate platform/ slope & fault-dip closures
Source	(karstified/ fractured) limestone – Zechstein-2
Reservoir	Overlying Zechstein salts/clays
Seal	Zechstein intra-platform (condensate, lateral migration) Upper Carboniferous coals (gas, vertical migration)

## Offshore Netherlands, Mid North Sea area at northern fringe of SPB

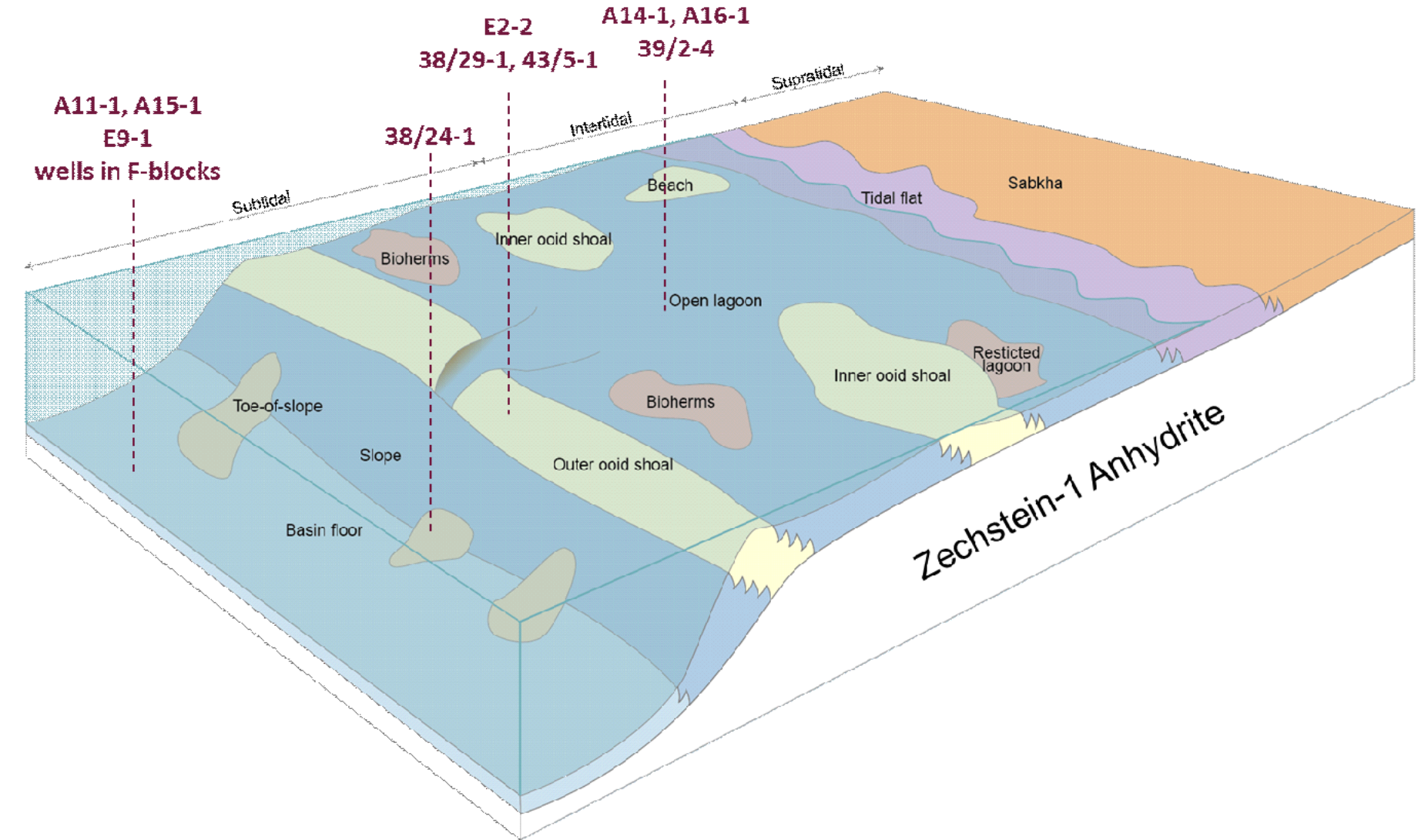
Trap	Carbonate platform/ slope
Source	(karstified/ fractured) limestone – Zechstein-2 (and -1)
Reservoir	Overlying Zechstein salts/clays Overlying Cretaceous – Jurassic shales, tight Chalk
Seal	Zechstein intra-platform (oil/ condensate, lateral migration) Lower Carboniferous strata (gas/ oil, vertical migration)

## New insights and new chances for an old play

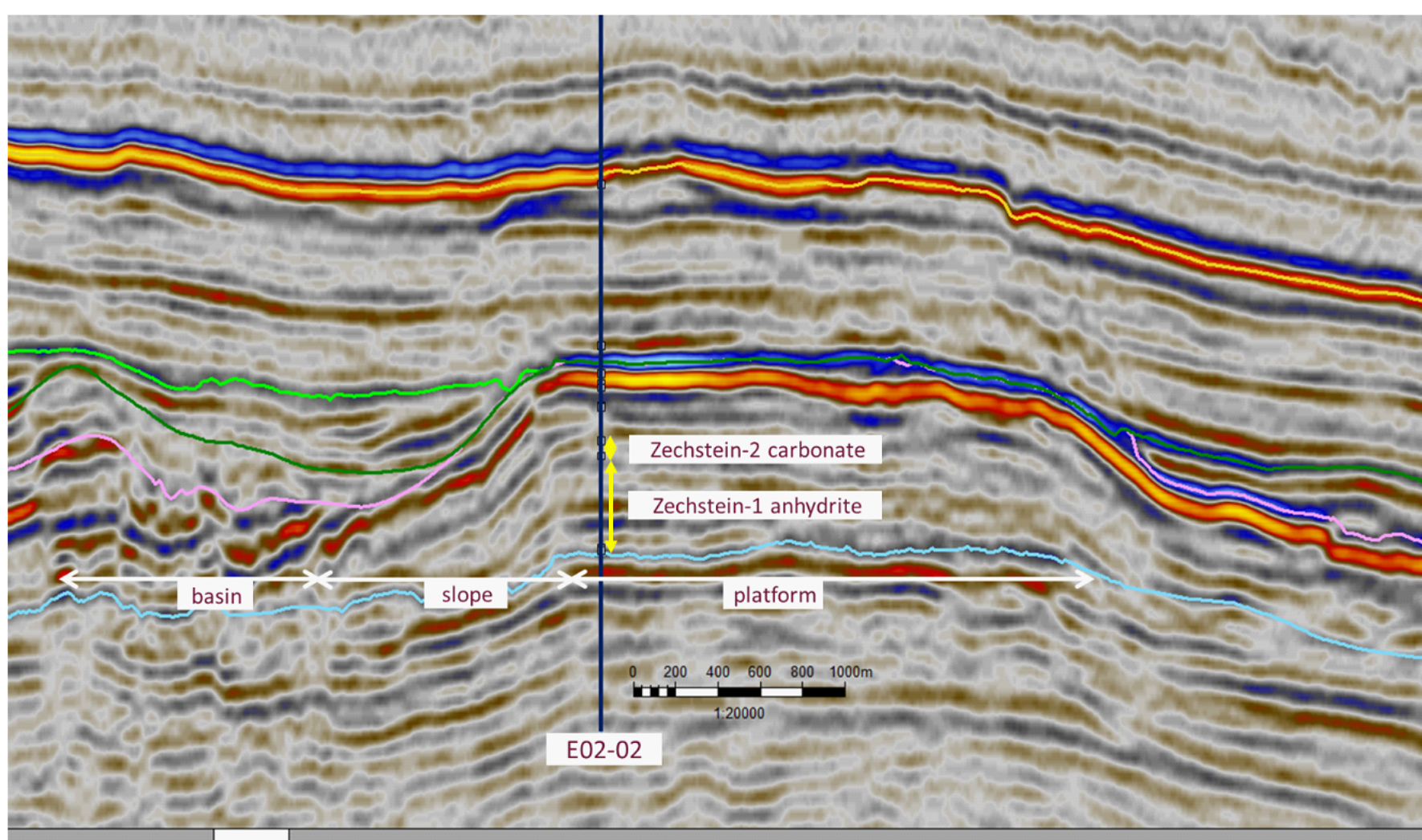
- Established petroleum play in NW Europe including NL
- A new Zechstein-2 carbonate distribution and facies map for the Dutch northern offshore has resulted from thorough review of well and seismic data
- Several undrilled Zechstein buildups have been identified with GIIP ~1-10 BCM. These could be combined with other targets
- There are positive indications for the presence of mature source rocks in Zechstein and below
- Analysing outcrops in UK and NL production data helps in predicting reservoir quality and productivity



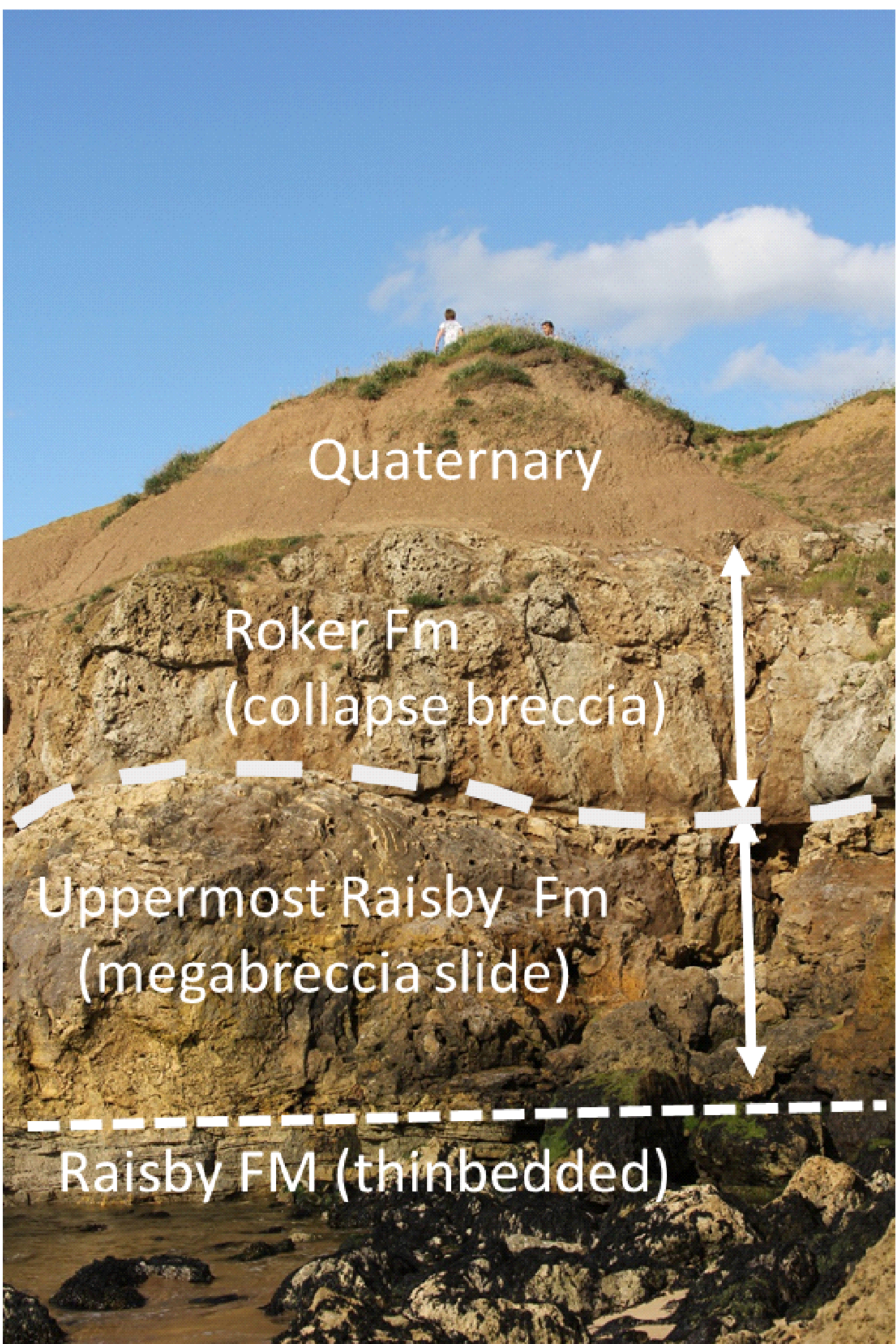
E&P and UGS in Zechstein carbonates across the SPB



Zechstein-2 carbonates depositional model: wells and seismic indicate presence of carbonate buildup in larger part of study area. DEF seismic courtesy Spectrum SA



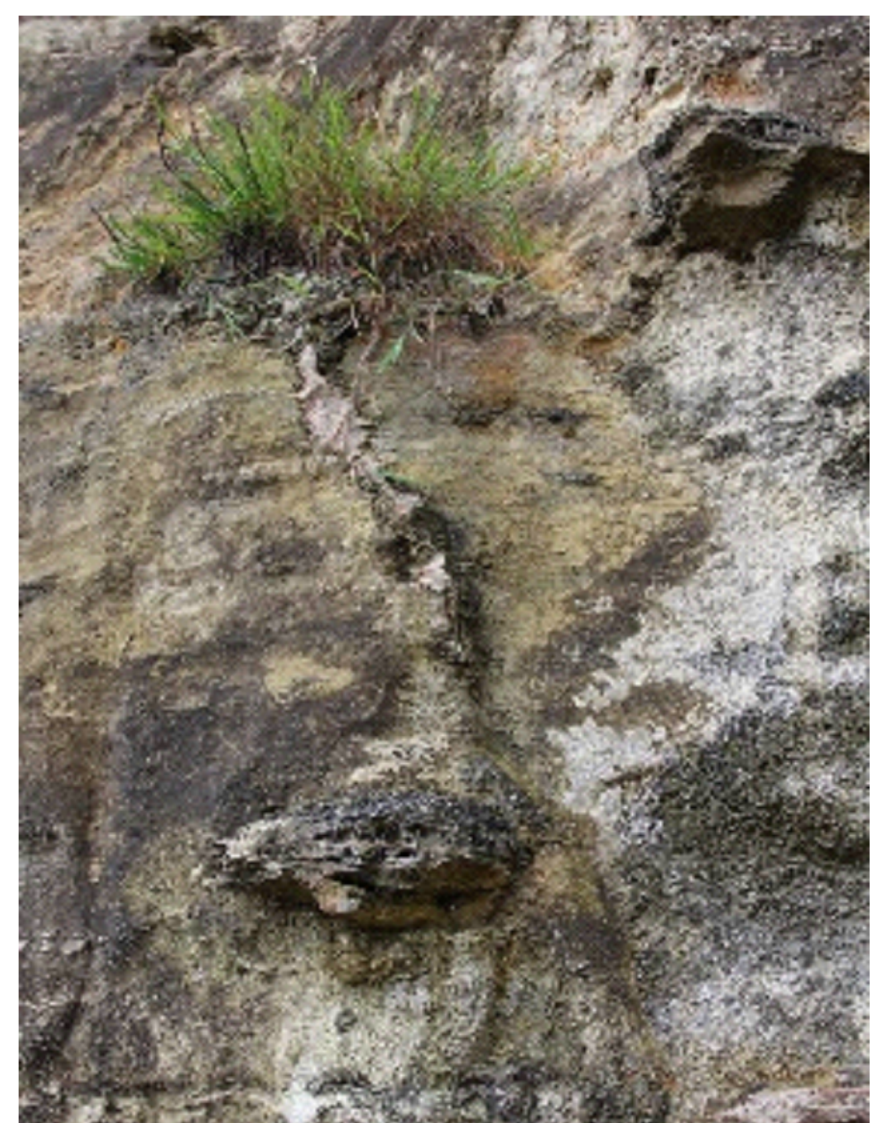
## Analysing outcrops in UK to predict reservoir quality in undrilled structures and understand production behaviour in fields



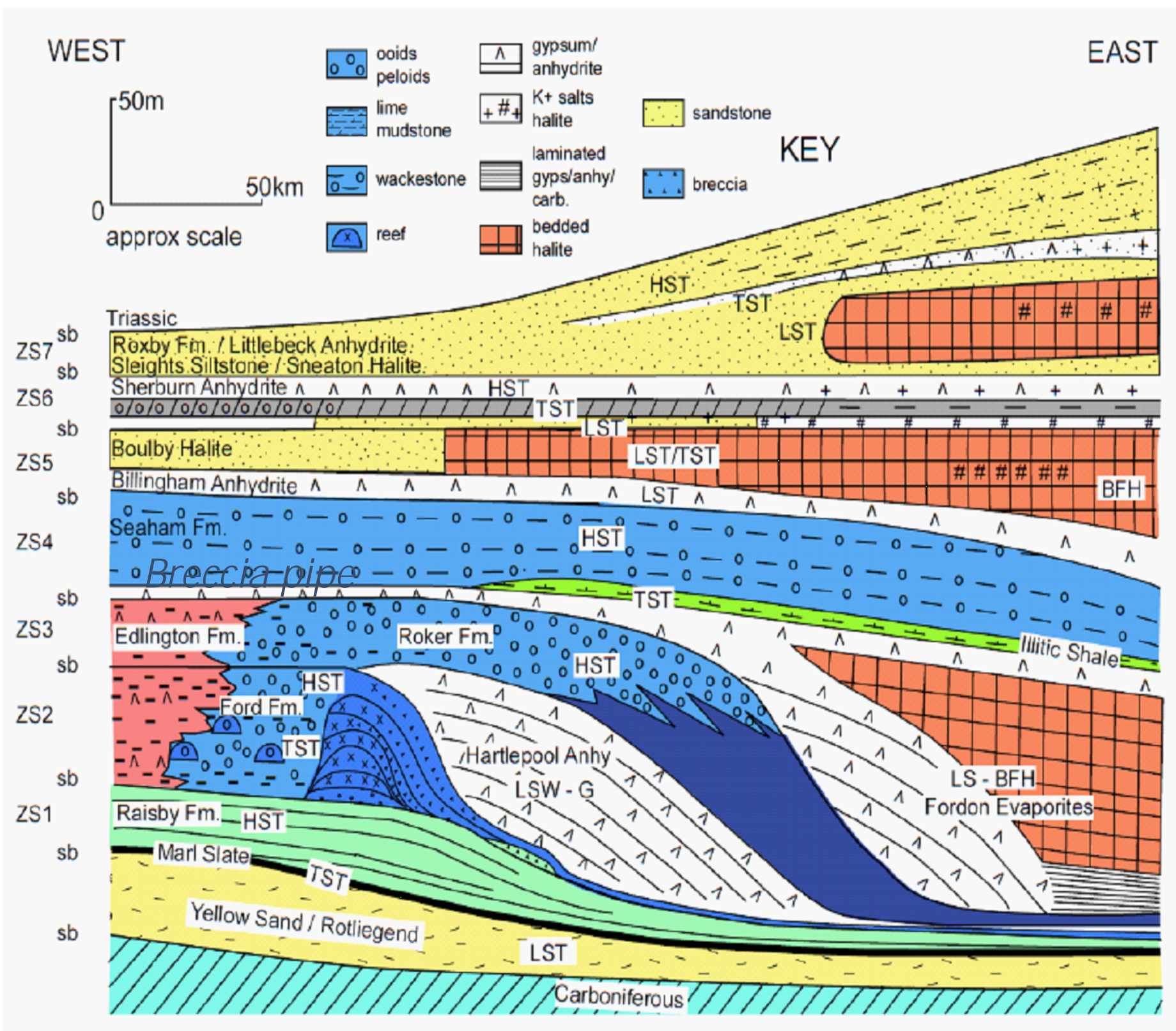
Dissolution of Hartlepool anhydrite (dashed white line) caused collapse of overlying Roker Fm



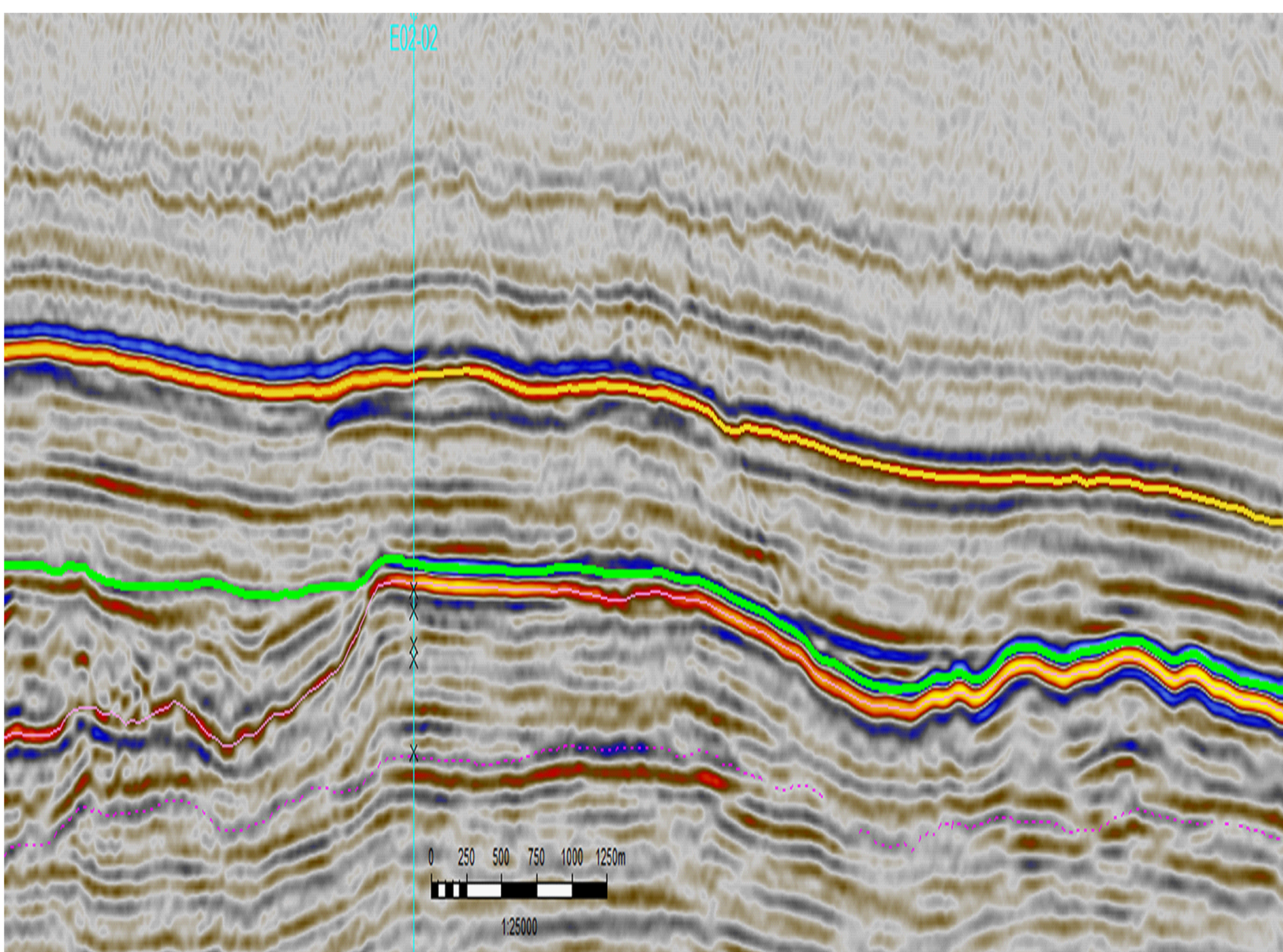
Breccia pipe forming high permeability streak



De-dolomitised limestone forming permeability barriers



Zechstein lithostratigraphy and depositional sequences for Durham Province, from Catuneanu et al. (2011), after Tucker (1991)



Seismic section through E02-02 build-up – mirror of outcrops in NE England? DEF seismic courtesy Spectrum SA