



## Thermal CO<sub>2</sub>-rich water in Bad Bellingen

Bad Bellingen (southwest Germany, close to the French and Swiss borders) was officially recognized 'Heillbad'-city in 1961, i.e. as one of the youngest in Germany.

### Anomalies

In Bad Bellingen, several boreholes were drilled to exploit two aquifers; the mittler Muschelkalk [1] (~1200 m depth) and the Hauptrogenstein [2] (~650 m depth). Observed water temperatures vary between 36.6 to 39.2 °C for the Hauptrogenstein aquifer, but reach up to 56.5 °C in the deeper mittler Muschelkalk aquifer (Käβ and Käβ, 2008). This corresponds roughly with a positive temperature anomaly of 6 to 11 °C, assuming a geothermal gradient of 10 °C + 30 °C/km. In addition, compared to the reference value of 250 mg/l (Weertz and Weertz, 2007), an enriched CO<sub>2</sub>-signature of > 900 mg/l is observed for the Markusquelle (Käβ and Käβ, 2008).

Even though thermal, CO<sub>2</sub>-rich water occurs abundantly in the Upper Rhine Graben, it is unlikely that these geomanifestations are related to the >15 Ma Kaiserstuhl-volcanism. Rather, the elevated temperatures are explained by water inflow from below the aquifers it is extracted from. The water chemistry indicates it concerns connate seawater which underwent fluid-rock interactions with the carbonate rocks to gain its current composition (Käβ and Käβ, 2008).

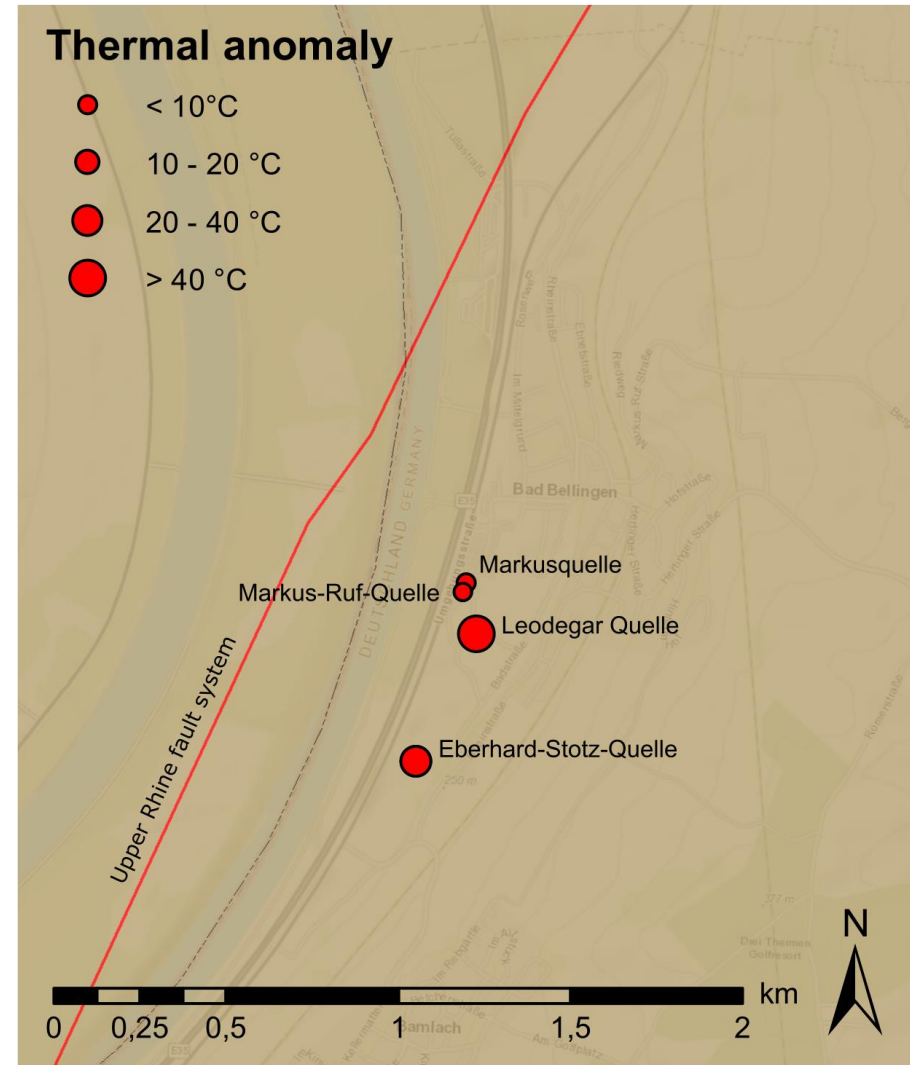
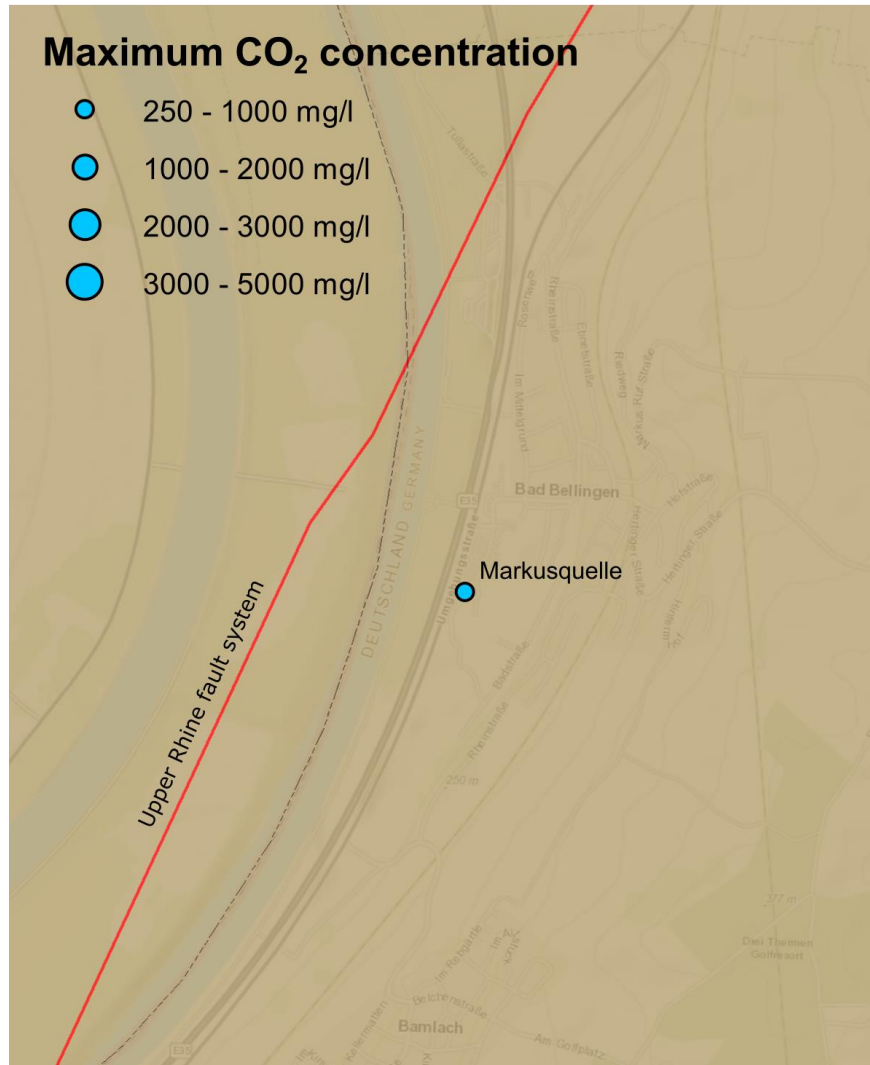


Figure 1: Thermal CO<sub>2</sub>-rich water in Bad Bellingen



## Data

ID	Coordinates	T	Depth	TDS°	Cl	Na	SO <sub>4</sub>	Free CO <sub>2</sub>	He	<sup>3</sup> He/ <sup>4</sup> He	Analysis year	References
		°C	m	g/l	mg/l	mg/l	mg/l	mg/l	ppmv			
Markusquelle [2]	47°43'45" North 07°33'04" East	38	643	4.25				905			1956	Käβ and Käβ (2008)
		36.6		4.55	1950	1025	207	956		1991		
		37			1971	1004	201	992			<1992	Griesshaber et al. (1992)
Markusquelle [1]									0.43	1992		
Markus-Ruf-Quelle [2]	47°43'46" North 07°33'05" East	39.2	660								2007	Käβ and Käβ (2008)
Leodegar Quelle [2]	47°43'29" North 07°32'58" East	37.9									1963	Käβ and Käβ (2008)
Eberhard-Stotz-Quelle [2]	47°43'41" North 07°33'06" East	35									1967	Käβ and Käβ (2008)
										0.42	1992	Griesshaber et al. (1992)
Eberhard-Stotz-Quelle [1]	07°33'06" East	56.5		2.91	245	93	1468	139			1973	Käβ and Käβ (2008)
										0.46	1992	Griesshaber et al. (1992)

° TDS = Total Dissolved Solids

## References

- Griesshaber, E., O'Nions, R.K., Oxburg, E.R., 1992. Helium and carbon isotope systematics in crustal fluids from the Eifel, the Rhine Graben and Black Forest, F.R.G. *Chemical Geology* 99, 213-235.
- Käβ, W., Käβ, H., 2008. *Deutsches Baderbuch*, 2 ed. Vereinigung für Bäder- und Klimakunde e.V., Stuttgart.
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## Cite this source

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