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# New heat flow measurements in Oman in the Arabian plate

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Precambrian shields are viewed as low heat flow provinces but detailed studies in Canada, South Africa and India shields demonstrate that large heat flow differences exist between them and within a single province, related to differences of crustal structures. Very few heat flow measurements are available on the Arabian shield and its thermal structure is poorly constrained. Heat flow reported for the Arabian Shield and its immediate platform (36-88 mWm$^{-2}$) is broad. Thermal regime has a control on rheology and on deformation and the Arabian shield is of particular interest because it was affected by geodynamic processes such as the Red Sea and Gulf of Aden riftings starting around 30 Ma ago and the formation of the Dead Sea Transform fault starting at about 20 Ma. In December 2006, a marine heat-flow survey in the Gulf of Aden provided 169 new heat-flow measurements along multi-channel seismic profiles. One of the main results is that the high heat-flow ($\sim$120 mWm$^{-2}$), characteristic of oceanic domains, extends into the deep continental margin and switches abruptly in the proximal margin to a low value ($\sim$40 mWm$^{-2}$) typical of stable Precambrian domain. These low values have been confirmed by estimates derived from oil exploration data in few locations south of Oman. These data indicate a strong contrast of thermal regimes within the continental margin. Recent tomography studies on Arabia in Oman show that the lithosphere is significantly affected within Arabia in the vicinity of the Red Sea and the Gulf of Aden. This pattern is apparently different from the observed heat-flow pattern, which needs to be confirmed and extended into the Arabian platform. The survey we conducted in October 2008 was to evaluate the thermal regime in the onshore domains of Oman. We measured the temperature gradient in 9 water wells in Dhofar south of Oman and in 8 mining wells in northern Oman in the ophiolite belt. The goal is to investigate the thermal structure of the Arabian plate and to study its variations within different geological contexts. Measurements in water wells depend strongly on how the reservoirs interact with the thermal regime and water circulations perturbed some wells. Others show a stable temperature gradient (14-28 mKm$^{-1}$) leading to a surface heat flow in the range of 35-56 mWm$^{-2}$ if we assume a conductivity of 2 Wm$^{-1}$K$^{-1}$ based on oil exploration wells. A more detailed analysis of the lithology is still needed. Measurements in mining wells in northern Dhofar give low gradients (7- 22 mKm$^{-1}$). The thermal conductivity of basalts, in the range 1.5-2.5 Wm$^{-1}$K$^{-1}$, leads to a heat flow lower than 50 mWm$^{-2}$. Thermal conductivities of rock samples will be measured but the overall trend seems to indicate a low heat flow for the Arabian shield.