

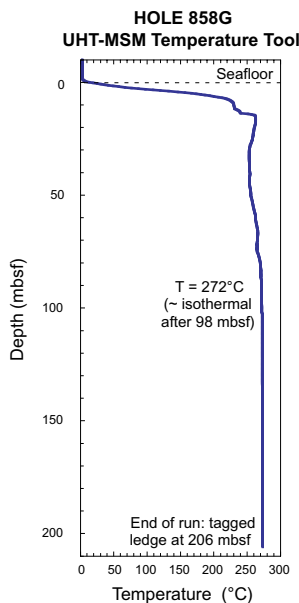
# Ultra-High Temperature Multi-Sensor Memory Tool

## Description

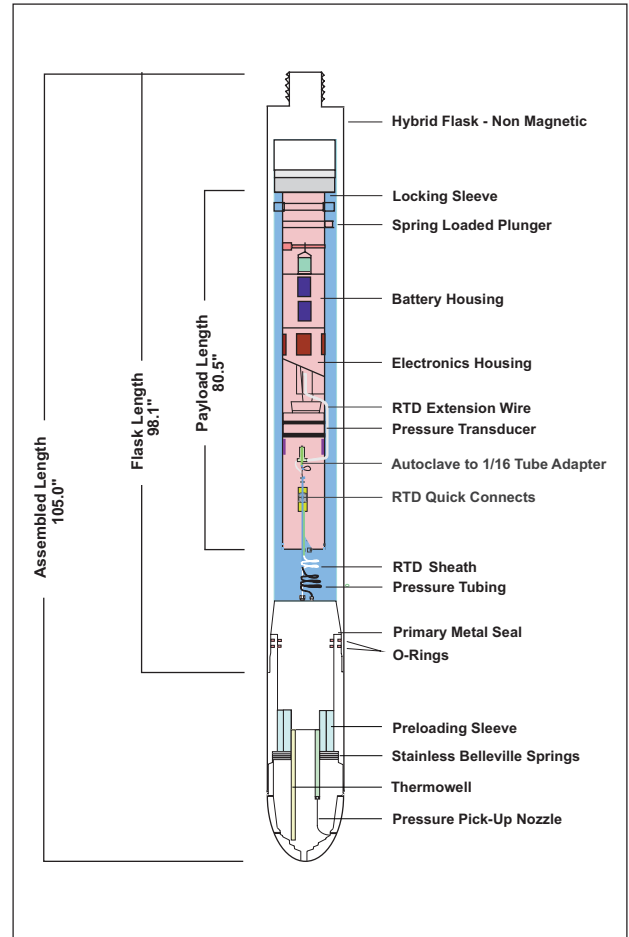
The Ultra-High Temperature Multi-Sensor Memory Tool (UHT-MSM), developed for the University of Miami by Geophysical Research Corporation, is a slim hole memory tool capable of measuring pressure and temperature in ultra-hot boreholes. It was deployed for the first time on ODP Leg 169. The UHT-MSM contains internal and ultra-high external temperature measuring devices, a pressure gauge, a multi-sensor memory unit, and a dewar flask that acts as an insulator to maintain a stable temperature and cool-down rate for the tool. The heat shield is aircraft-grade aluminum bound at both ends by brass heat sinks. The dewar flask can maintain an internal temperature suitable for tool operation for 4-5 hours at an external temperature of 400°C. Operations are possible for up to 10 hours if the average temperature does not exceed 232°C.

## Applications

- ◆ Hydrogeological analysis - identifying regions of fluid in/out flow
- ◆ Geothermics - estimating the vertical heat flow regime
- ◆ Safety - evaluating fluid temperature prior to deploying heat sensitive tools



Temperature log from ODP Hole 858G obtained with the UHT-MSM. A steep thermal gradient exists in the upper 10m of the hole, while conditions appear to be isothermal below the maximum observed temperature of 272°C at 98 mbsf.



Schematic illustration of the Ultra-High Temperature Multi-Sensor Memory Tool (not to scale).

## Specifications

Length:	8.75 ft (2.67m)
Weight:	~75 lbs (34 kg)
Diameter:	2.2 inches
Pressure range:	0 - 10,000 psi
Maximum operating temperature:	400° C for 4-5 hours
Sampling rate:	from 20 ms to 65 days, in 10 ms increments
Memory:	1 MB
Batteries:	Lithium
Battery run time:	> 8 hours



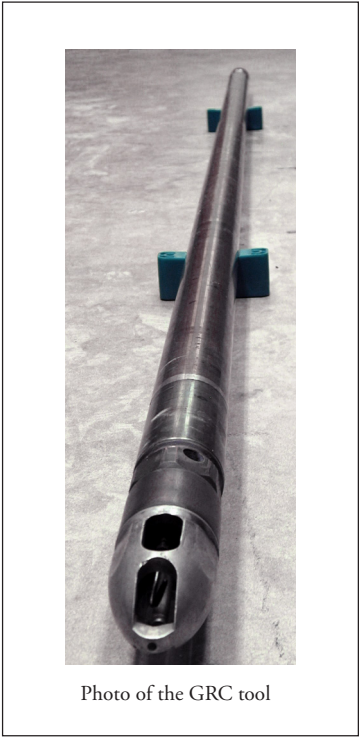
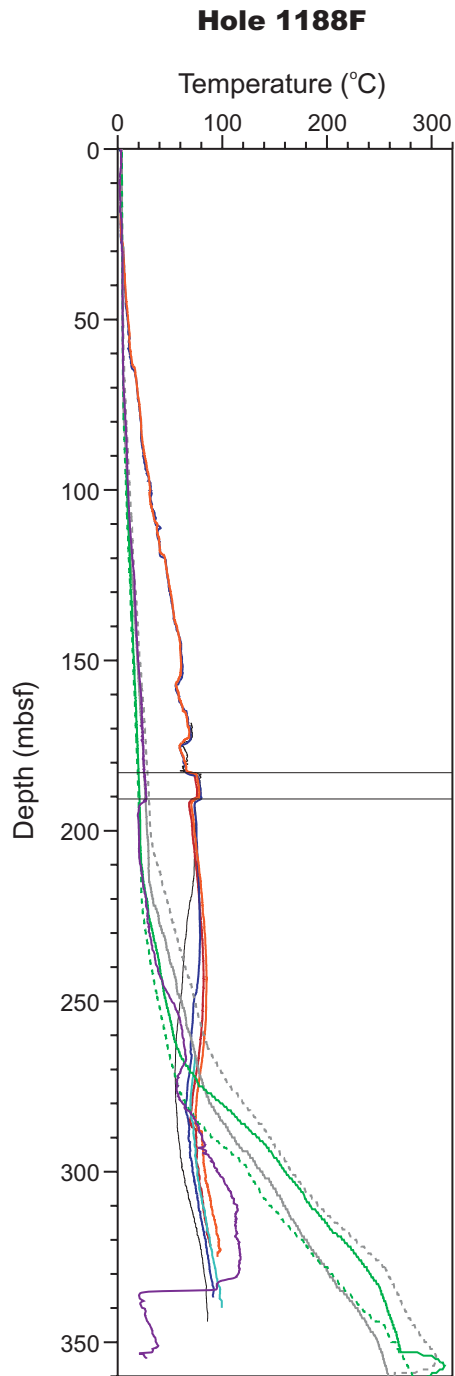


Photo of the GRC tool

Temperatures recorded in Hole 1188F during wireline logging operations and with the UHT-MSM temperature probe. Temperatures measured during wireline operations on December 21 and 22 show the immediate post-drilling disturbance of the temperature gradient with a maximum recorded at 99.6°C. Measurements with the UHT-MSM four and seven days later, respectively, show the changes in the temperature field while equilibrating. The maximum recorded temperature was 312°C. The December 26 measurements obtained with the MTEM sensor are lower toward the bottom of the hole because of the tool failure at higher temperatures.