

## **Thermal Characteristics in Initial Conditions (Natural State), Geothermal Field at South Sumatra – Indonesia**

Kris Pudyastuti<sup>1)</sup>, Jatmiko Prio Atmojo<sup>2)</sup>,  
Sugiatmo K.<sup>1)</sup>, Burhannuddinur M., Maman D.J.<sup>1)</sup>, Syarif Fadhlurrahman M<sup>1)</sup>

<sup>1)</sup>Universitas Trisakti , Jakarta- Indonesia

<sup>2)</sup>Upstream Technology Center, PT. Pertamina (Persero)

*Keywords: formation temperature, temperature distribution, pressure distribution, up flow zone, conceptual model, development well.*

This study on thermal characteristics was conducted at a geothermal prospect in South Sumatra - Indonesia, located at altitudes ranging from 980masl to 1800masl, where 26 wells have been drilled, and where development is planned for 2 x 55 MW electric power.

The research will include determining the temperature of the formation at each well, and then using the acquired information to map the temperature distribution under its natural conditions. Furthermore, natural temperature distribution information will be combined with additional information from geological analysis results and pressures distribution to determine the upflow and outflow zones.

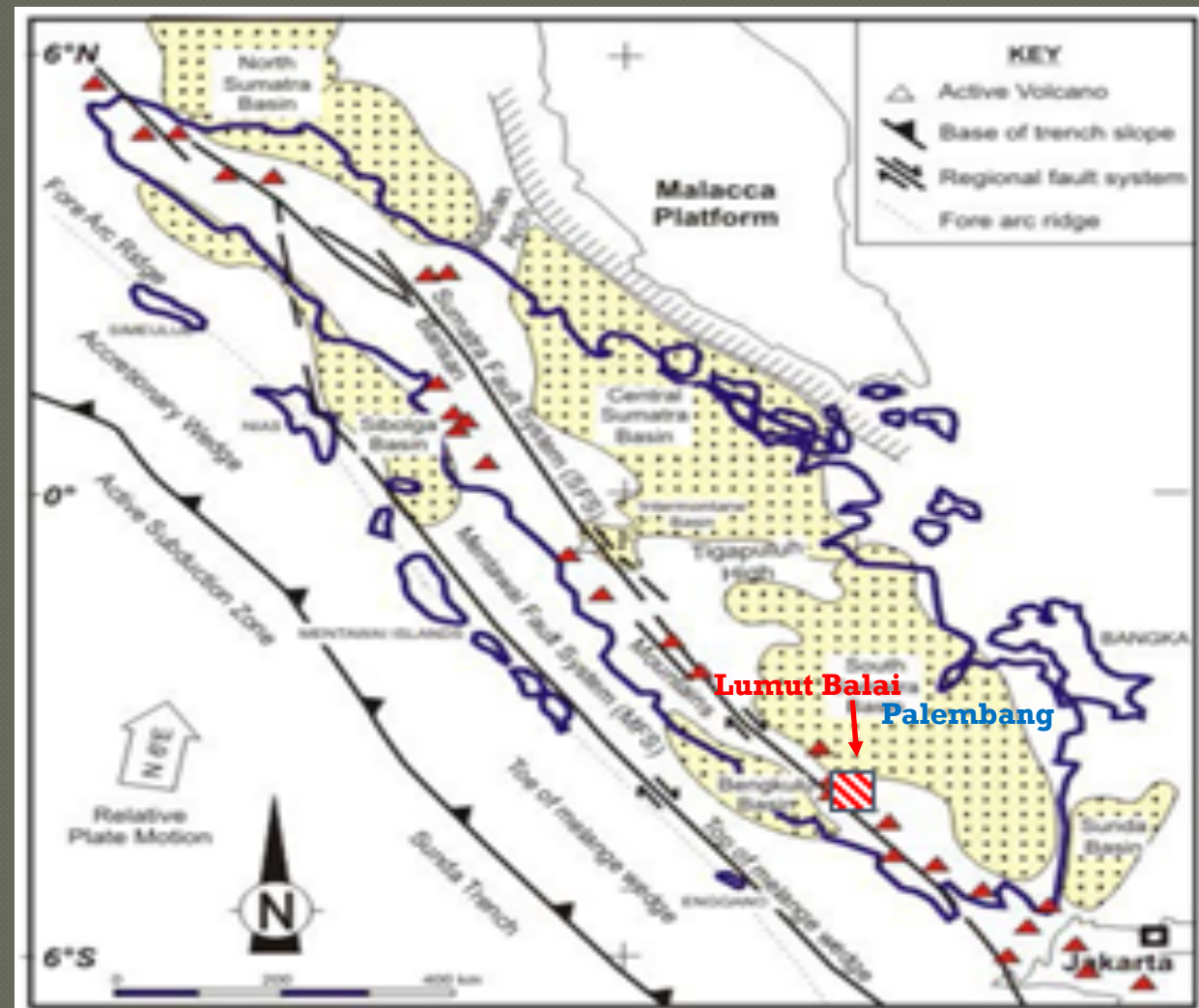
The results of research at this stage are expected to be followed up by a study for constructing a conceptual model in order to obtain a better understanding of reservoir characteristics whereby the cost-effectiveness of development wells can be achieved.



# Thermal Characteristics in Initial Conditions (Natural State), Geothermal Field at South Sumatra – Indonesia

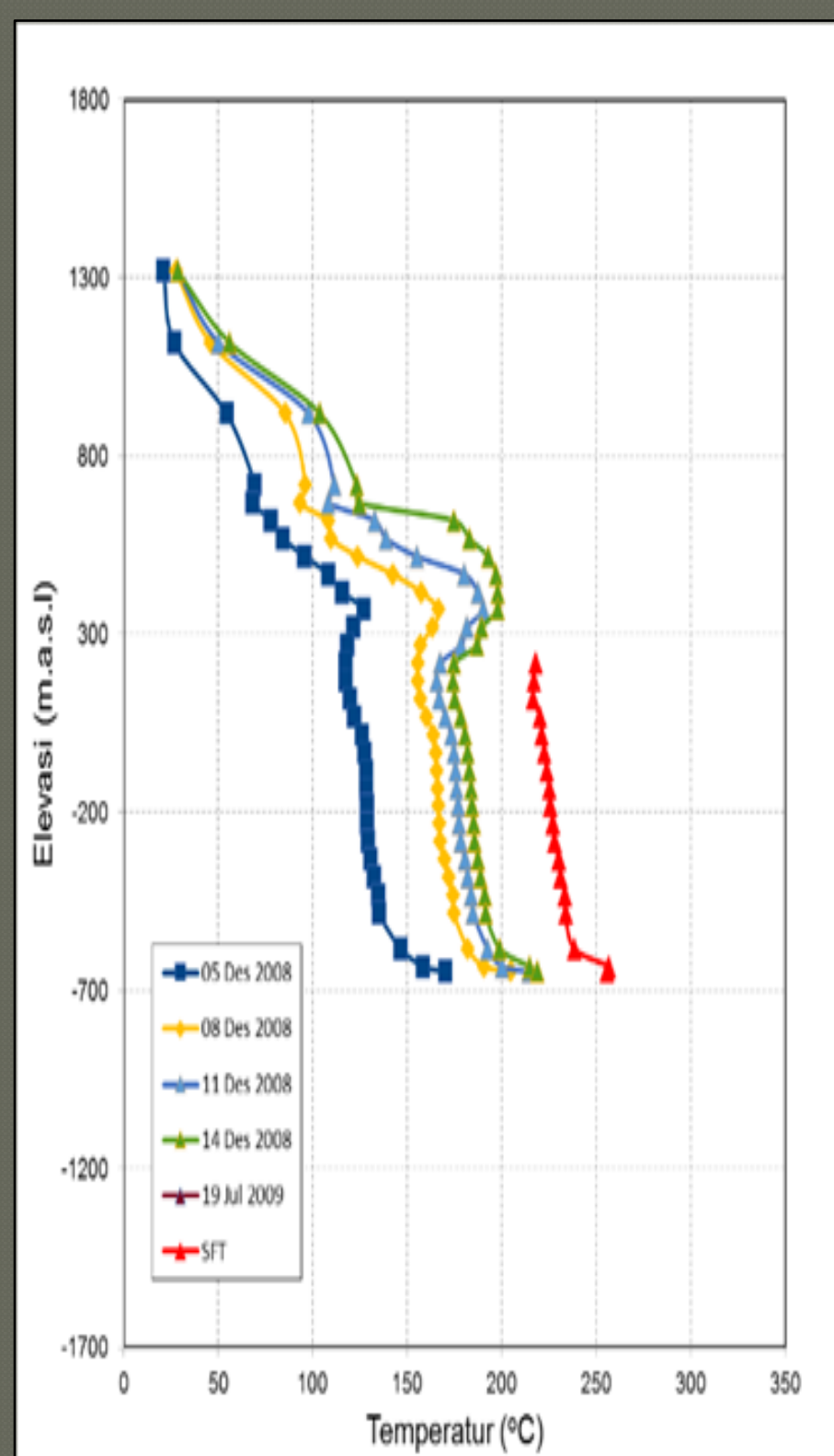
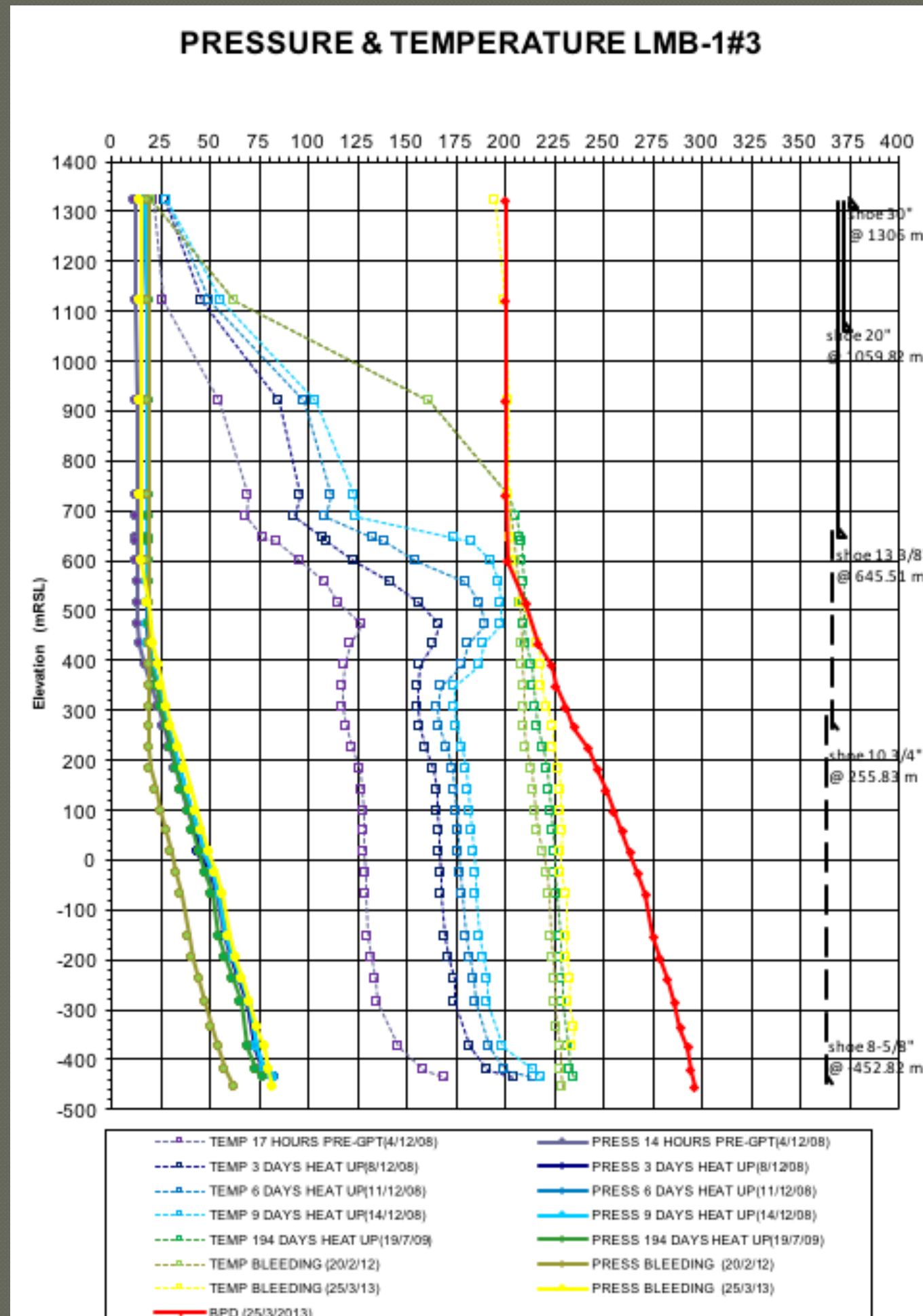
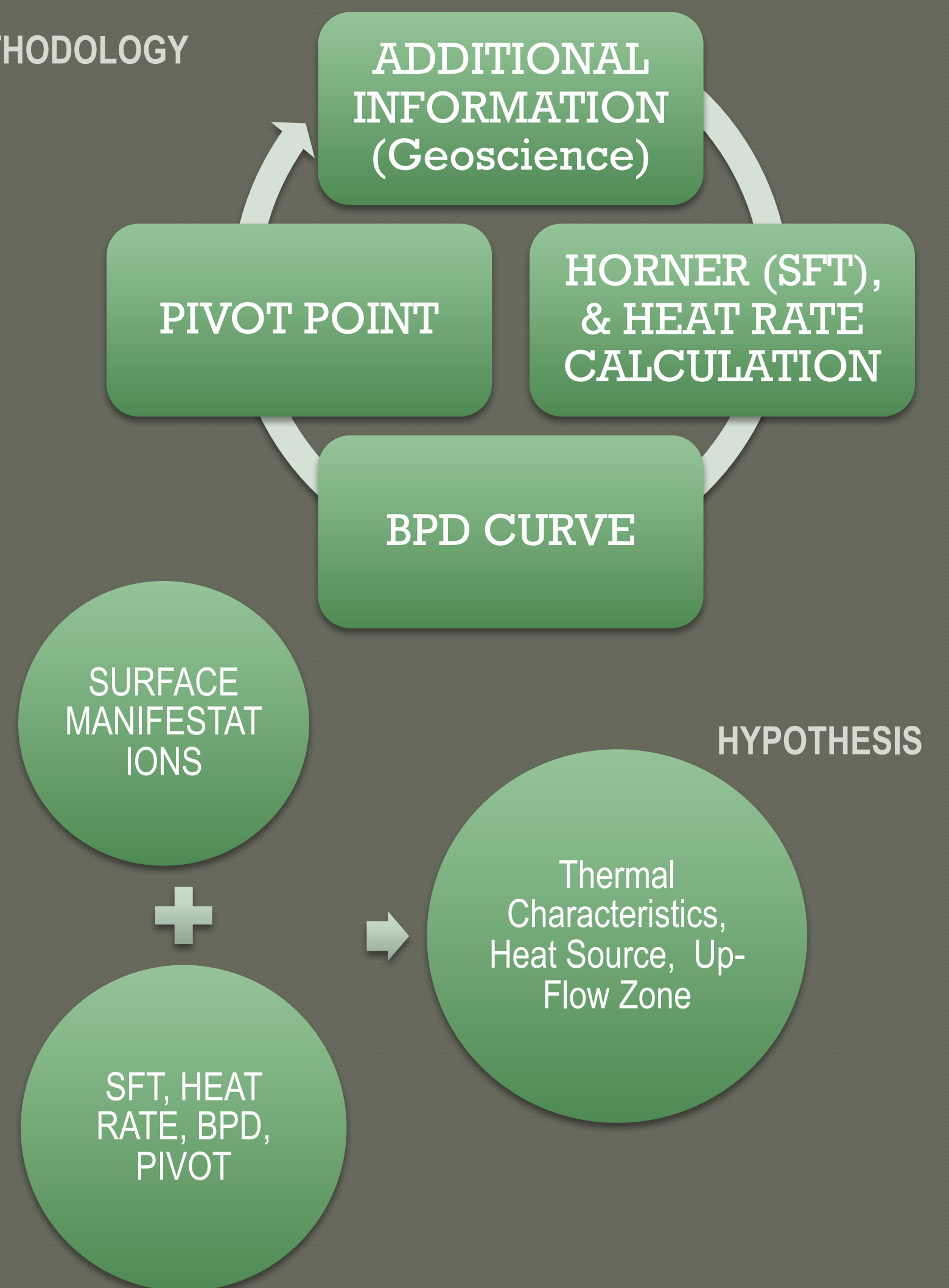
(presented in SMU Power Play Conference, 10-11 January 2018, Dallas)

Kris Pudyastuti<sup>1)</sup>, Jatmiko Prio Atmojo<sup>2)</sup>,  
 Sugiatmo K.<sup>1)</sup>, Burhannudinnur M., Maman Djumantara<sup>1)</sup>, Syarif Fadhlurrahman M<sup>1)</sup>

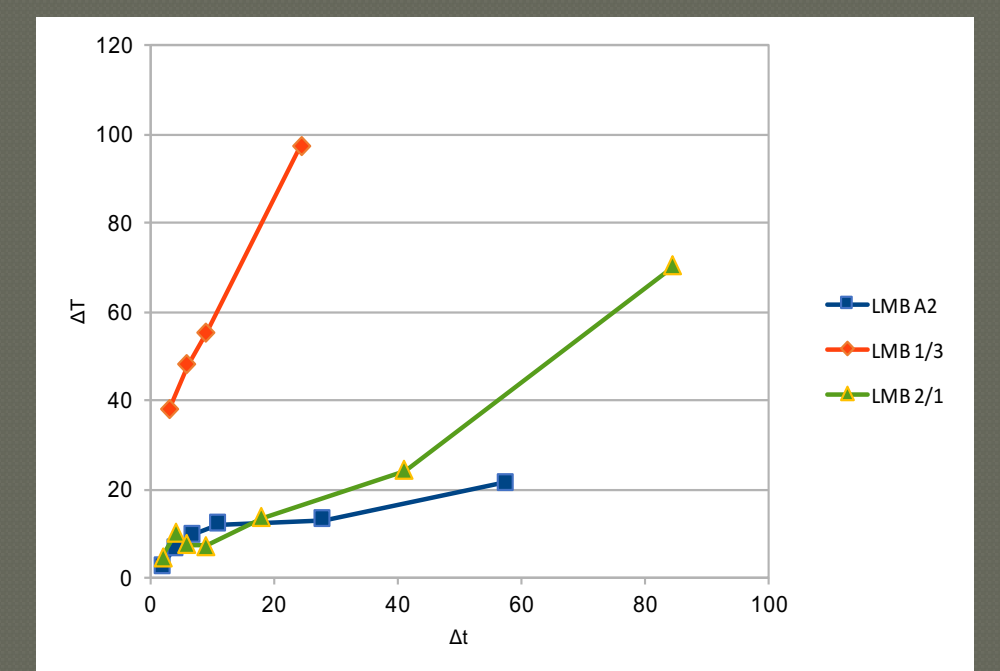


- Location : South Sumatra, 290 km from Palembang City
- First Plan of Development : 2 x 55 MW
- Existing Wells (2017): 26 Wells

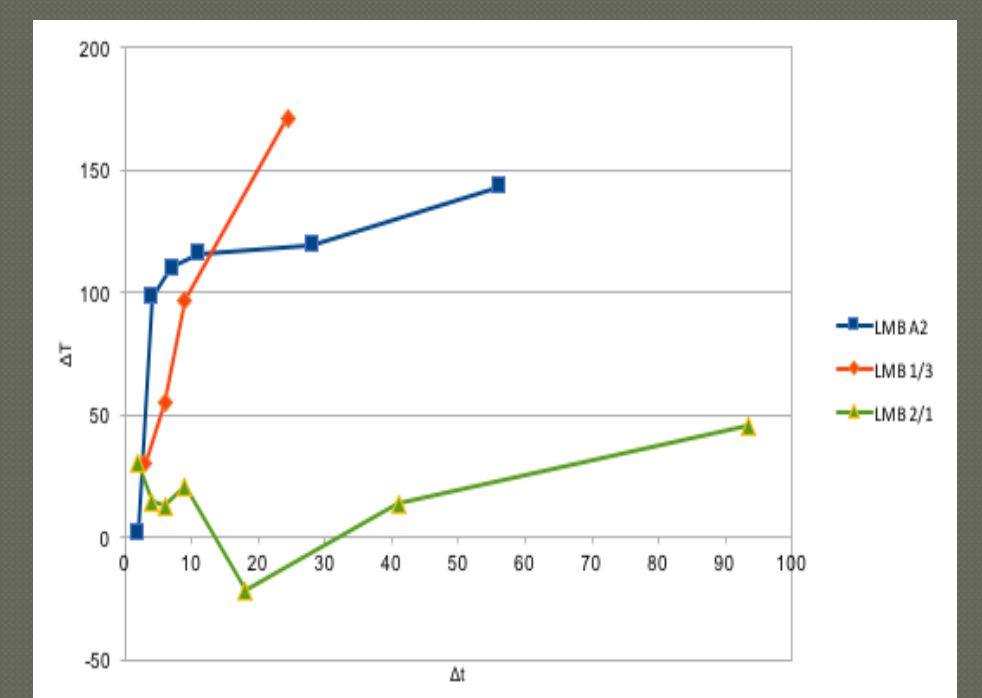
## METHODOLOGY



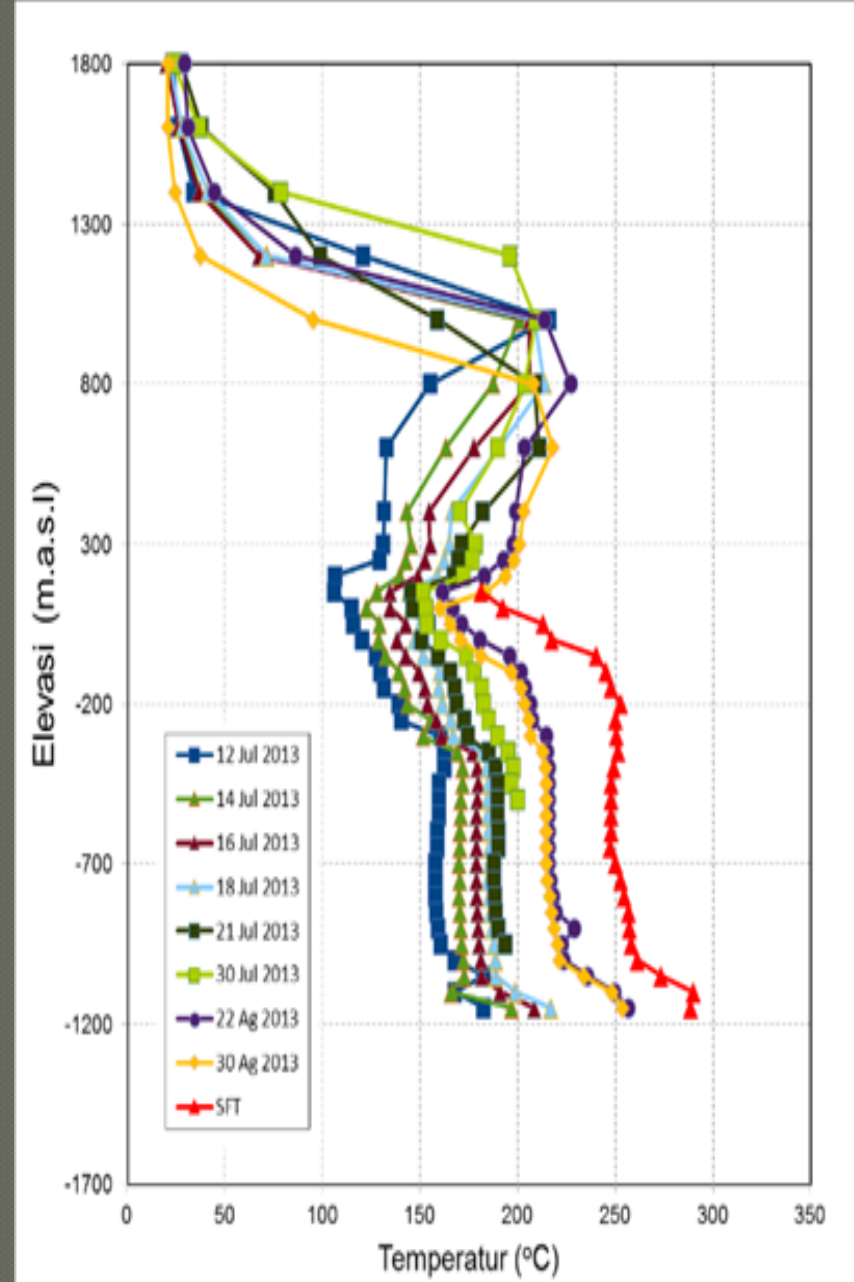
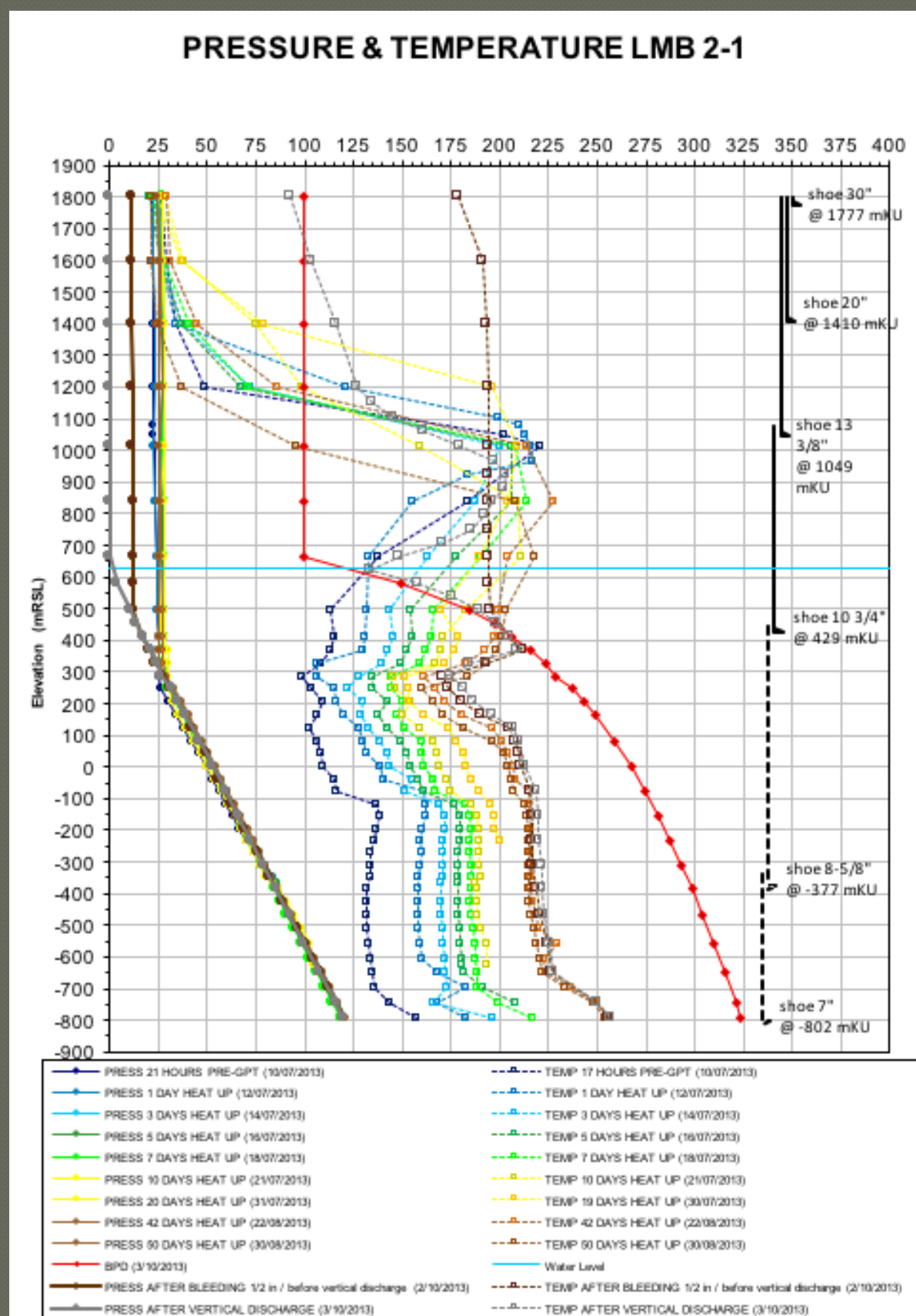
The static Formation Temperature (SFT) based on Horner method calculation, well LMB 1#3, Cluster 1.



Calculated heat rate @ Depth (-) 200 masl

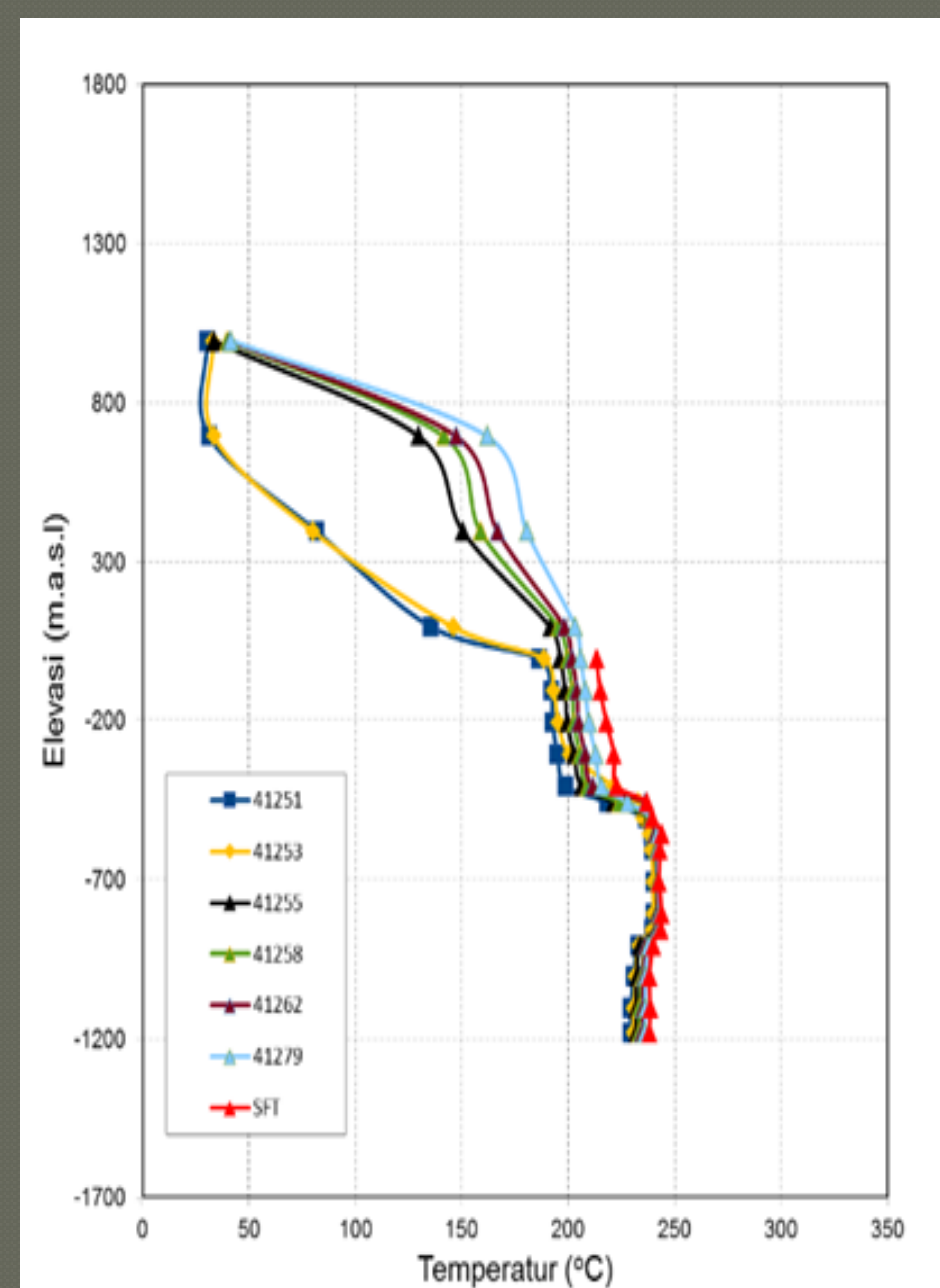
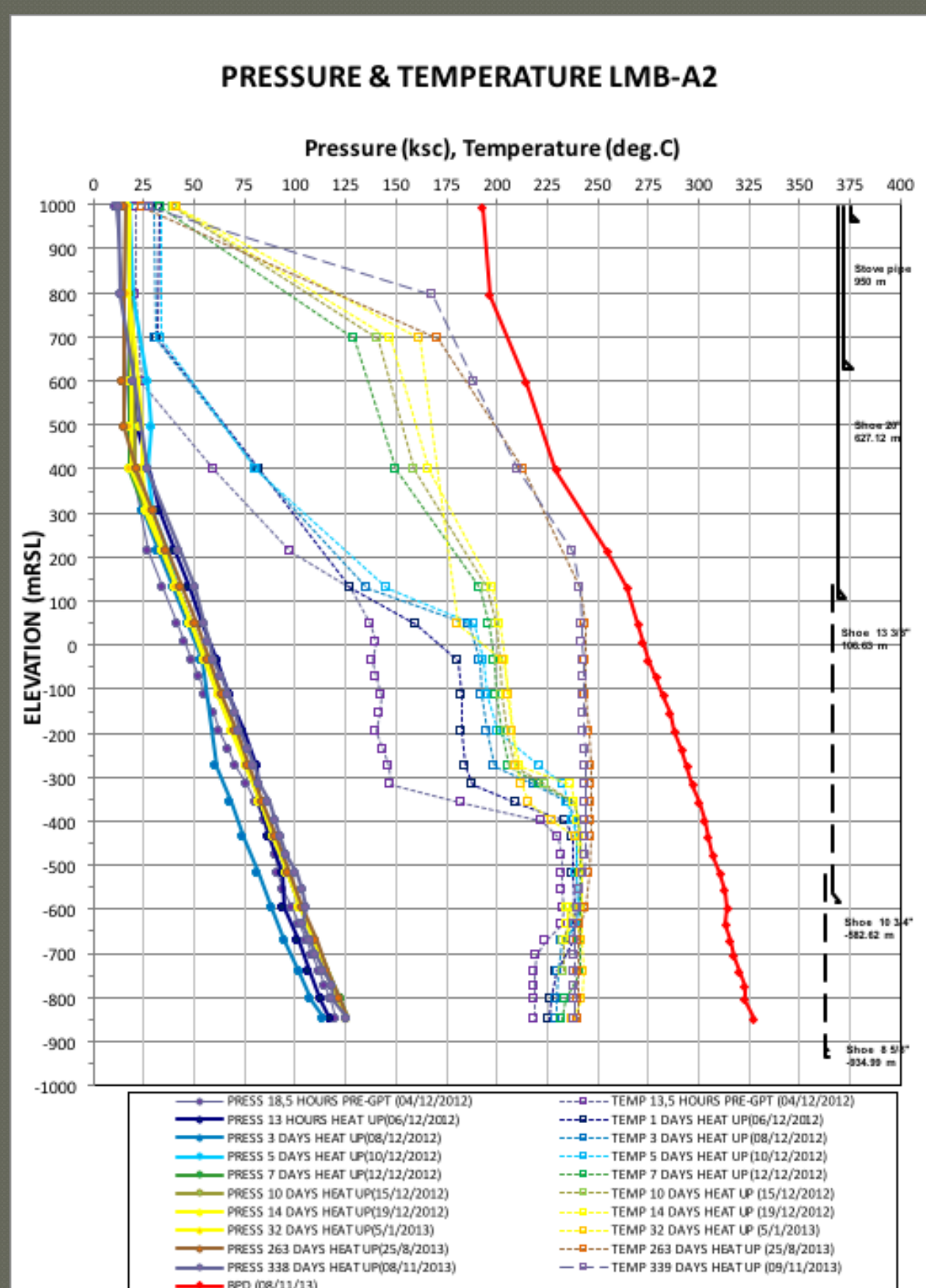


Calculated heat rate @ Depth (+) 700 masl



The static Formation Temperature (SFT) based on Horner method calculation, well LMB 2-1, Cluster 2.

According to Haffen et al., in order to identify the flow zones they compared the theoretical thermal gradients induced by the conductive flux against measured thermal gradients induced by conductive and convective transfer.<sup>6</sup> In this study, we compared the calculated and measured thermal gradient profiles--LMB1#3, LMB A-2 and LMB 2-1 – which revealed two cases. The first case of Well LMB A-2 shows measured gradient gave higher values than the calculated gradient which done by Homer method then leads one to suspect the presence of hot fluid circulation.



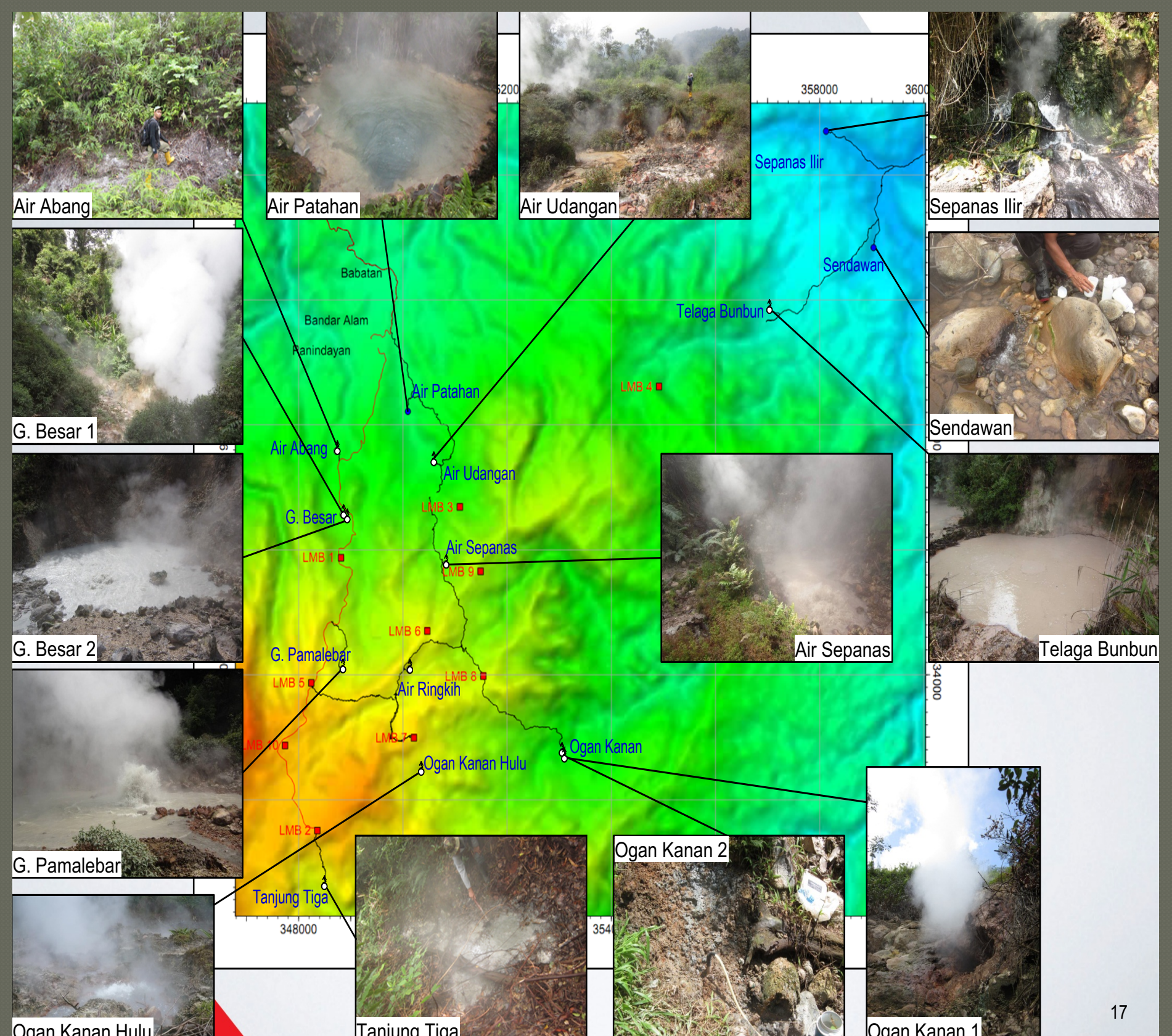
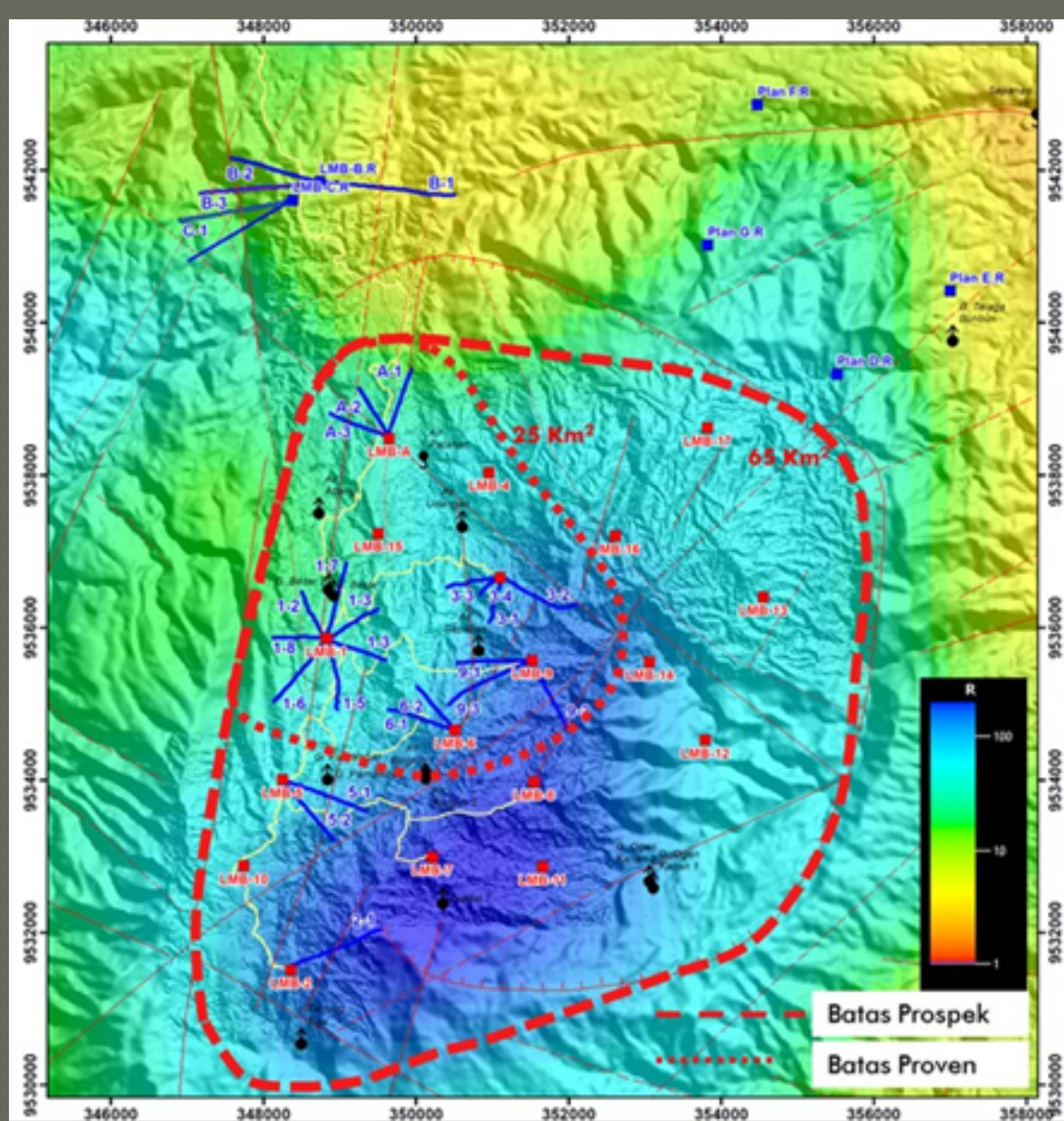
Static Formation Temperature (SFT) based on Horner method calculation, well LMB A-2, Cluster A.

Next, are well LMB 1#3 and Well 2-1 shows the values in the calculated and measured gradients are equal indicating the heat transfer is governed mainly by conduction.

Lumut Balai Reservoir could be classified as a liquid dominated, with temperature of 250 °C. By comparing calculated gradient and measured gradient in well LMB-A-2, the up-flow zone has been indicated in the north part of the field .

The heat rate calculated with conduction heat transfer approach shows that there is an area (represents by well LMB-1#3) with consistently high heat rate . That indicates the location of heat source, however this would need to be confirmed by a geoscience.

Geothermal surface manifestations at Lumut Balai field



The prospective area of 65 km<sup>2</sup> (the high-resistivity distribution at an elevation of -500 m.a.s.l.), based on MT survey (PGE, 2014)