

**PHYSICAL-MECHANICAL CHARACTERISTICS
OF LIMESTONE AND UNDERGROUND RIVERS
MAPPING TO SUPPORT THE DEVELOPMENT OF
MICRO-HYDRO INSTALLATION IN KARST
LANDFORMS, CASE STUDY: CAVE SEROPAN,
GUNUNGKIDUL, INDONESIA**

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WATER RESOURCES**

WATER IN KARST AREA

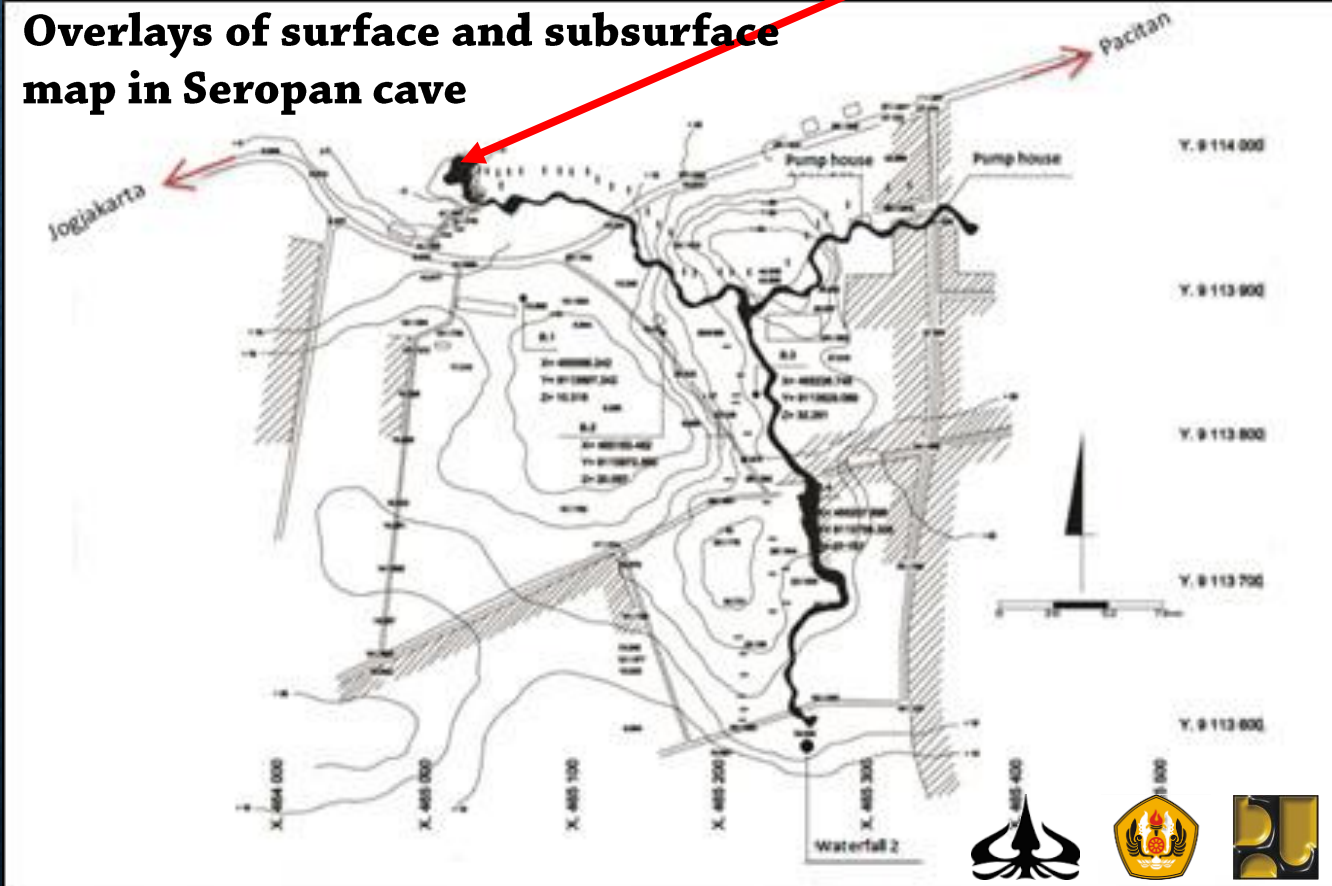
- At the area composed of limestone, especially in karst areas, water availability measily that is insufficient for the needs of everyday life.
- In karst areas, the conditions on the surface are generally very barren and dry, especially during the dry season.
- But nevertheless, under the surface actually stored plenty of water.



SEROPAN CAVE



- Seropan is a cave in Gunung Kidul Area, Yogyakarta Indonesia
- Seropan river flows inside the cave, with inclination around 5-10 Degree
- The water availability is approximately around 600 liter/s during dry and or wet season (not to mention flood condition)
- Inside the cave there are several chamber that can be used for infrastructure. (eg: Hydropower plant; Weir; etc)

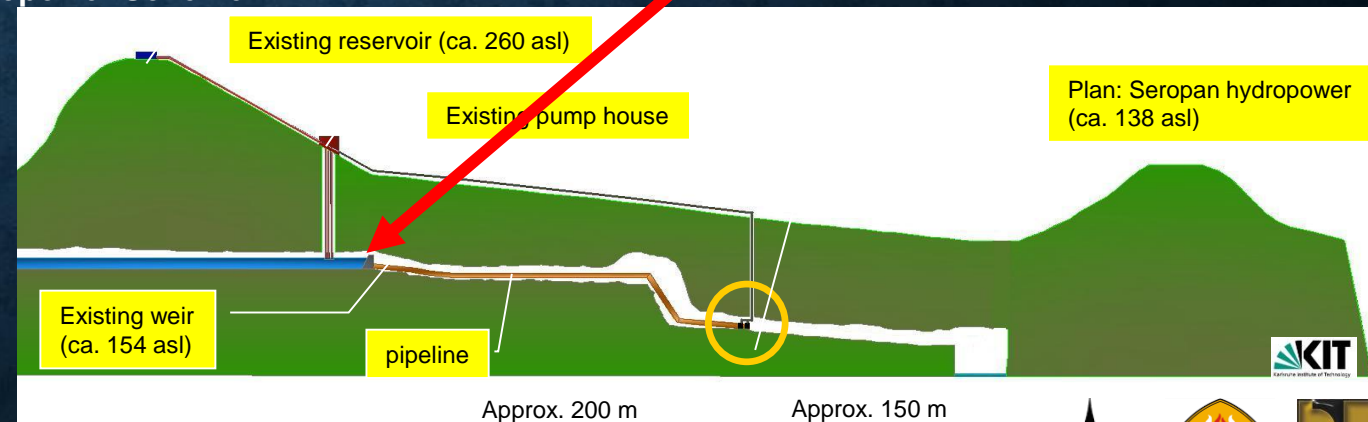


HYDROPOWER IN KARST

- Since the water resources fulfillment is very expensive, the cheaper method should be applied
- One of the method is Hydropower
- Hydropower use the potential energy from the water itself to generates power for pumping (***without converting to electricity***)
- The condition should be differences of water lever to create head

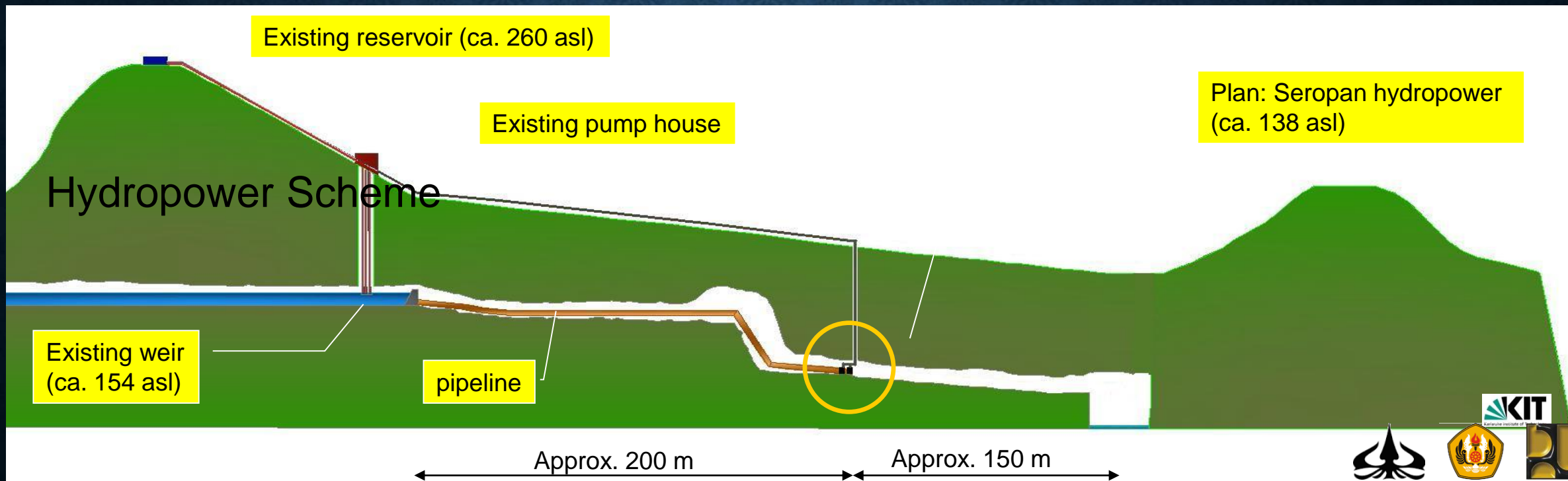


Hydropower Scheme



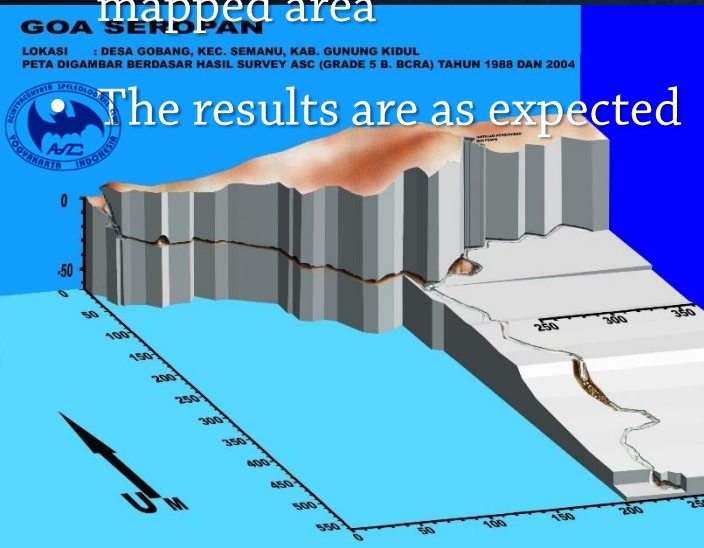
DETERMINING CAVES AND WATER HEAD

- Geoelectrical resistivity, can determine the cave and approximate depth for water head calculation
- Geoelectrical method can be applied in area that human cannot reach eg: Sump; small conduits

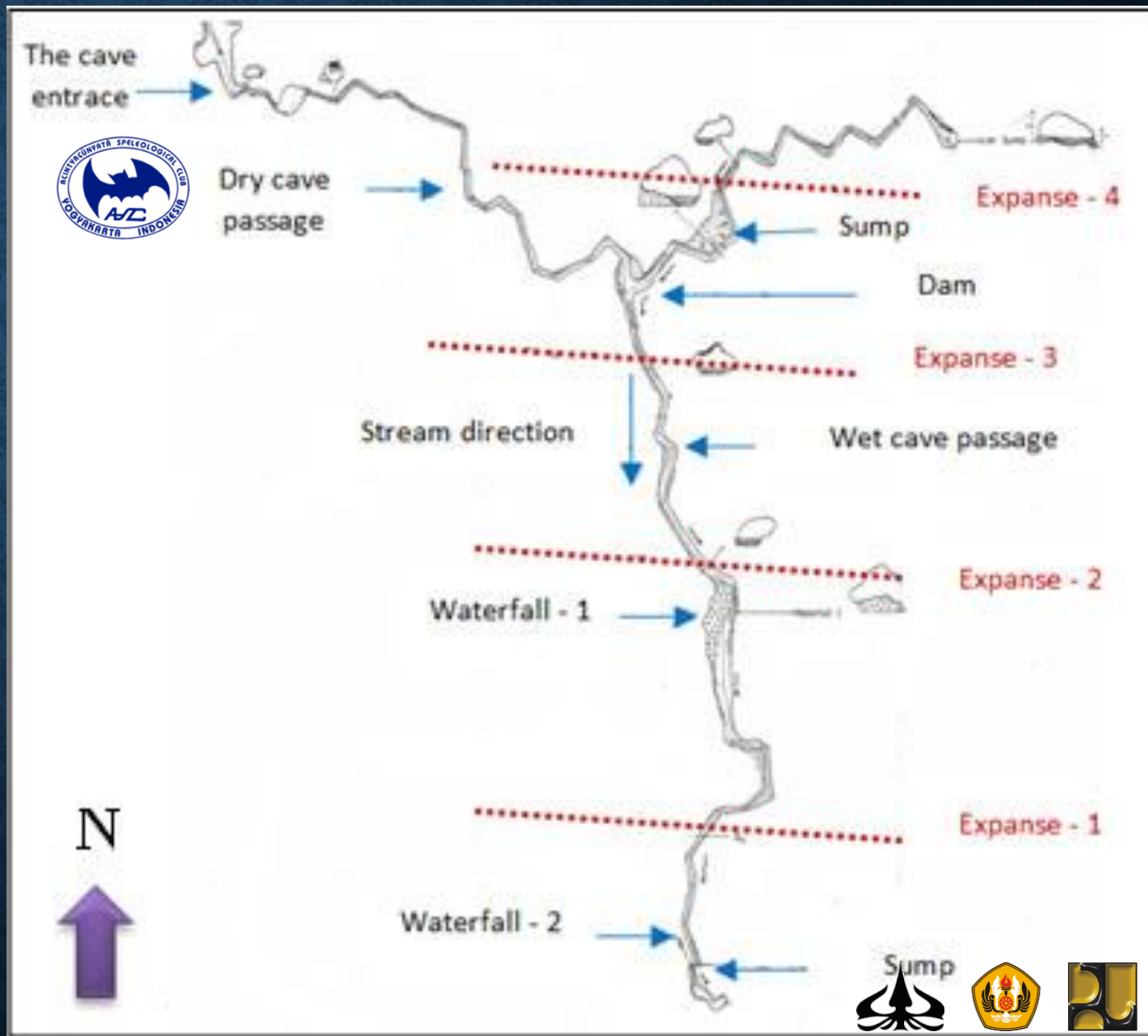


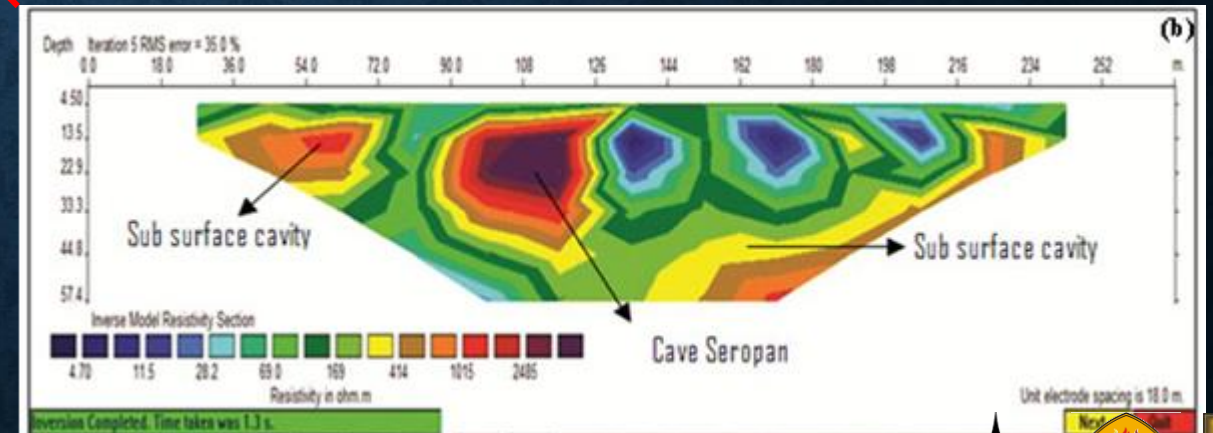
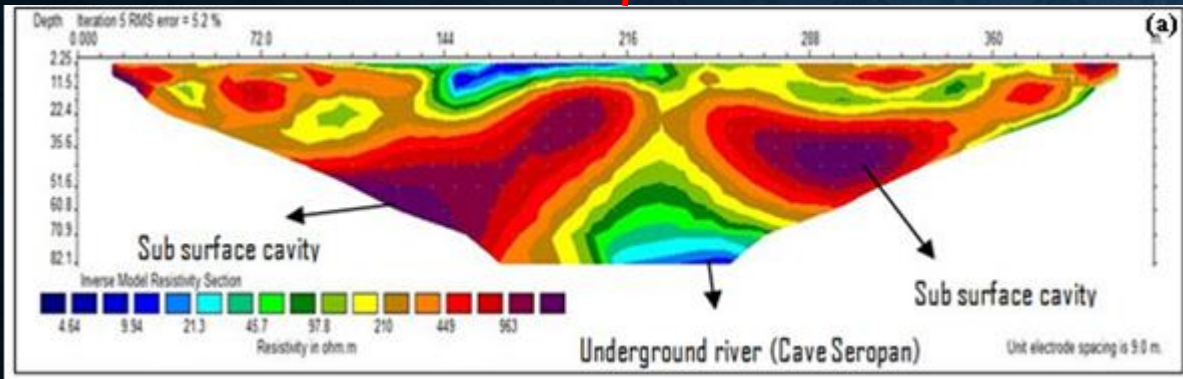
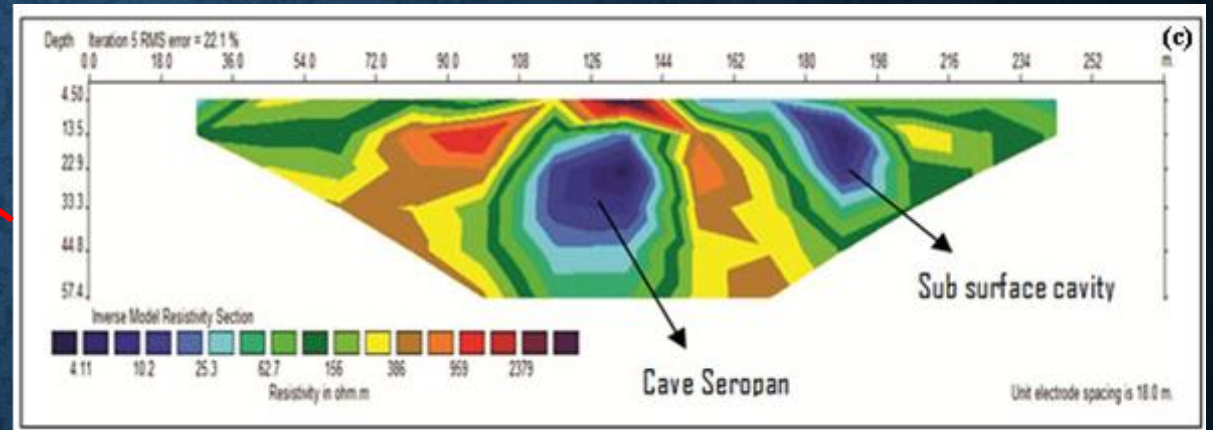
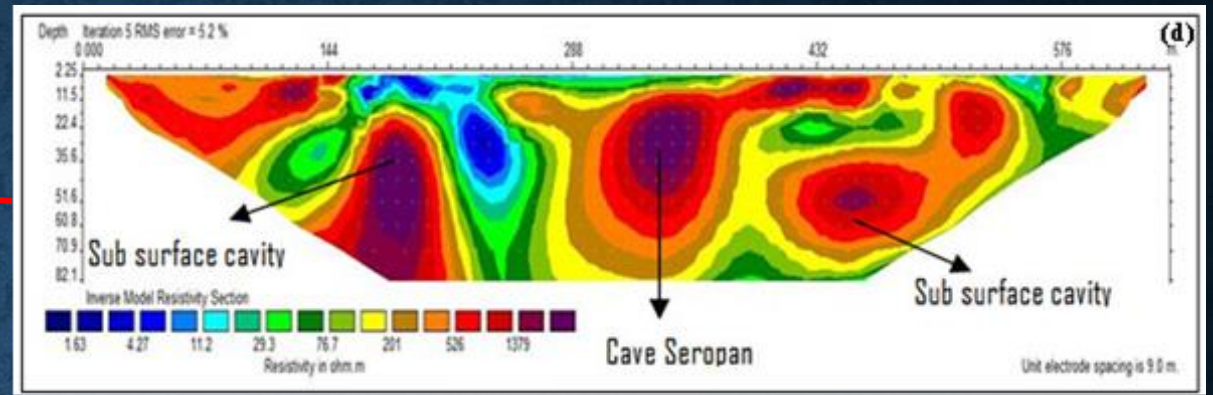
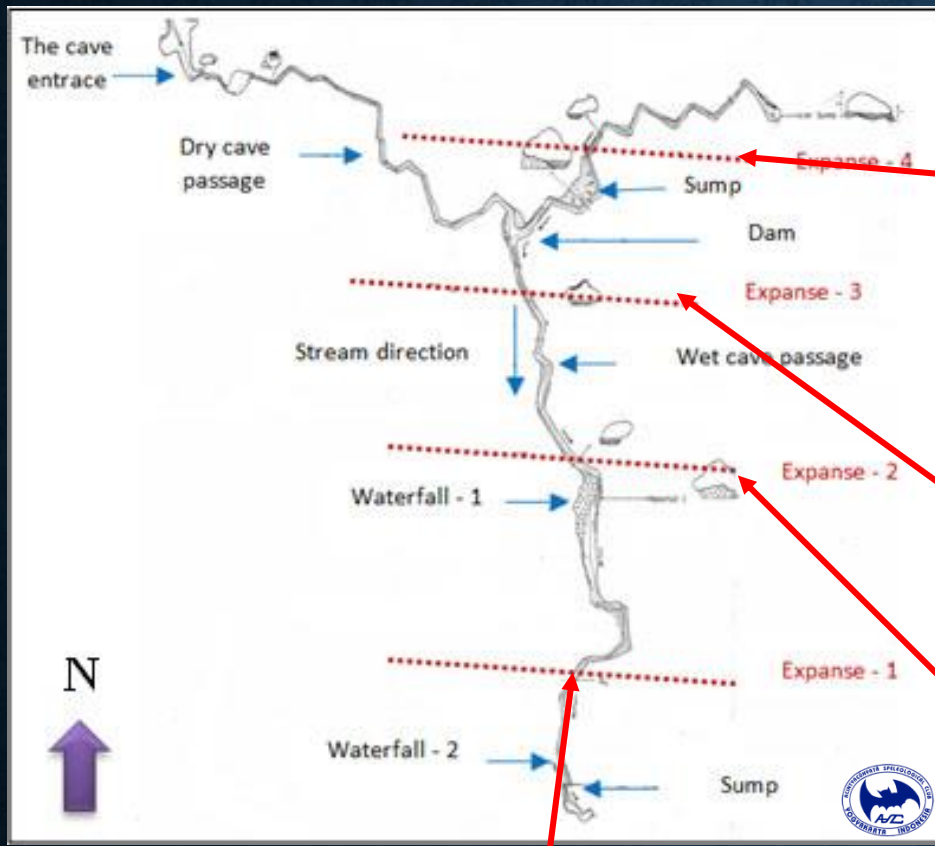
GEOELECTRICAL RESISTIVITY

- The 2D resistivity method applied to identify the caves
- This research meant to examine or verify whether the method is applicable in limestone
- The expanse for resistivity measurement took place in known and mapped area

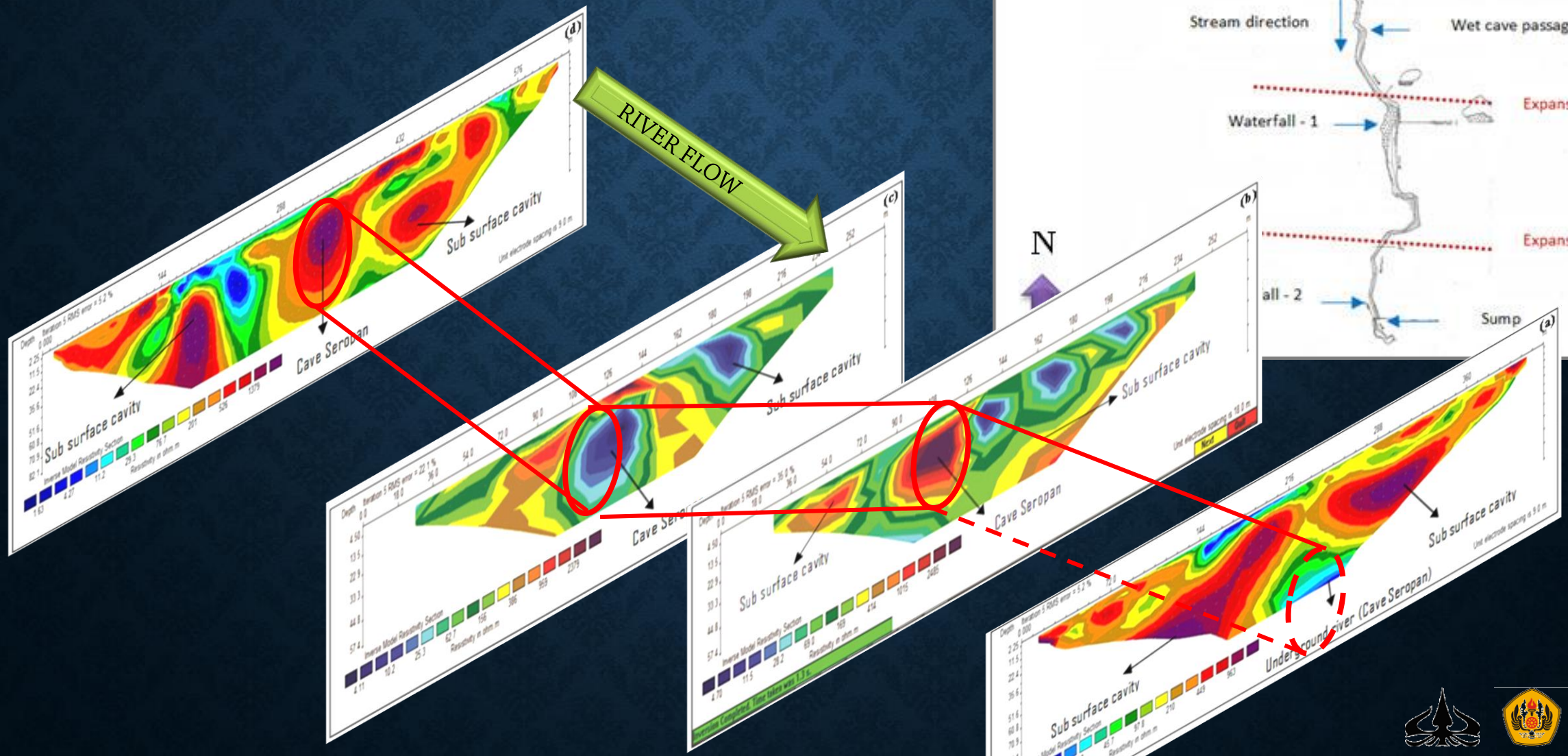


The results are as expected





GEOELECTRICAL RESISTIVITY



CONCLUSION

- The resistivity value of rock below the surface that is above the cave Seropan known to so varied.
- This shows that the condition of limestone that make up this region is very heterogeneous.
- Subsurface conditions at the top of the cave Seropan, generally not solid and massive but found the cavities beneath the surface.
- Resistivity value of the cavity turns out varying. If the cavity is filled with water, then the resistivity value is low.
- Likewise, Seropan cave with an underground river.
- Conversely, if the conditions are dry then the value of resistivity is high.
- Cavities are located at varying depths, with a distribution of about 10% to 15% of the total volume of rock.
- Geo-electric method with Schlumberger configuration besides being able be relied on to determine the existence of an underground cavity, it can also be used for mapping underground river.



THANK YOU

