

# Two Candidate Sites in Japan

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# Tunnels

$\Phi$  5m / L 30km  $\Rightarrow \gg$  50km

# Detector Hall

100m(L) x 25m(w) x 40m(H)





# Seikan Tunnel

## 53.85km

1988~



Wikipedia

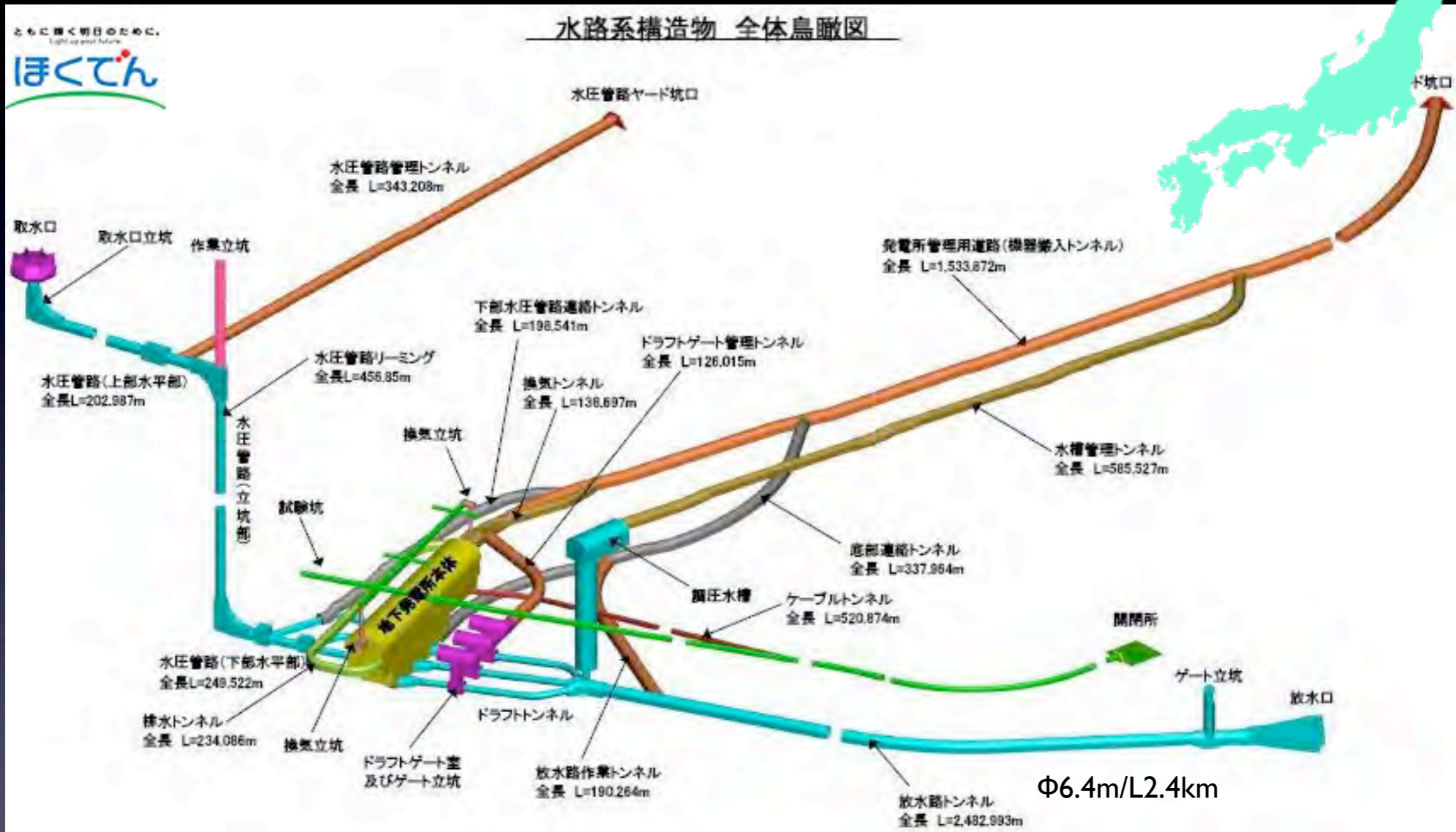




# KYOGOKU Pumped-storage hydroelectricity facility



上ダム

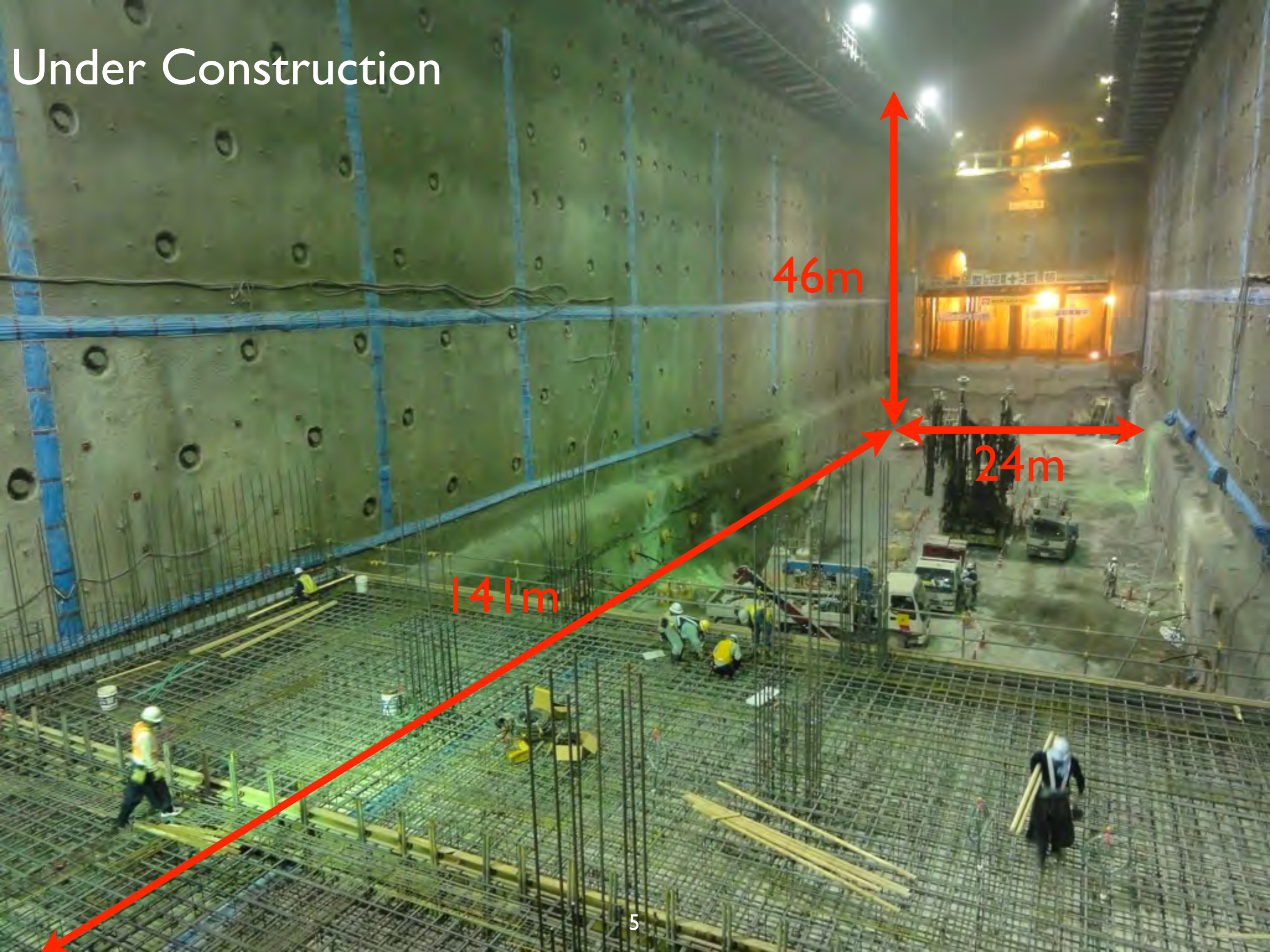


下ダム

141.0m(L) x 24.0m(w) x 46.3m(H)



Under Construction



46m

24m

141m



# Access Tunnel





Tunnel & Cavern are NOT special.

We can build them.

We have to select nice candidate sites.

construction cost, construction period,  
safety, security, environment, ...

# Site Studies in Japan



# GLC Project

KEK Report 2003-7

Gray : soft rocks

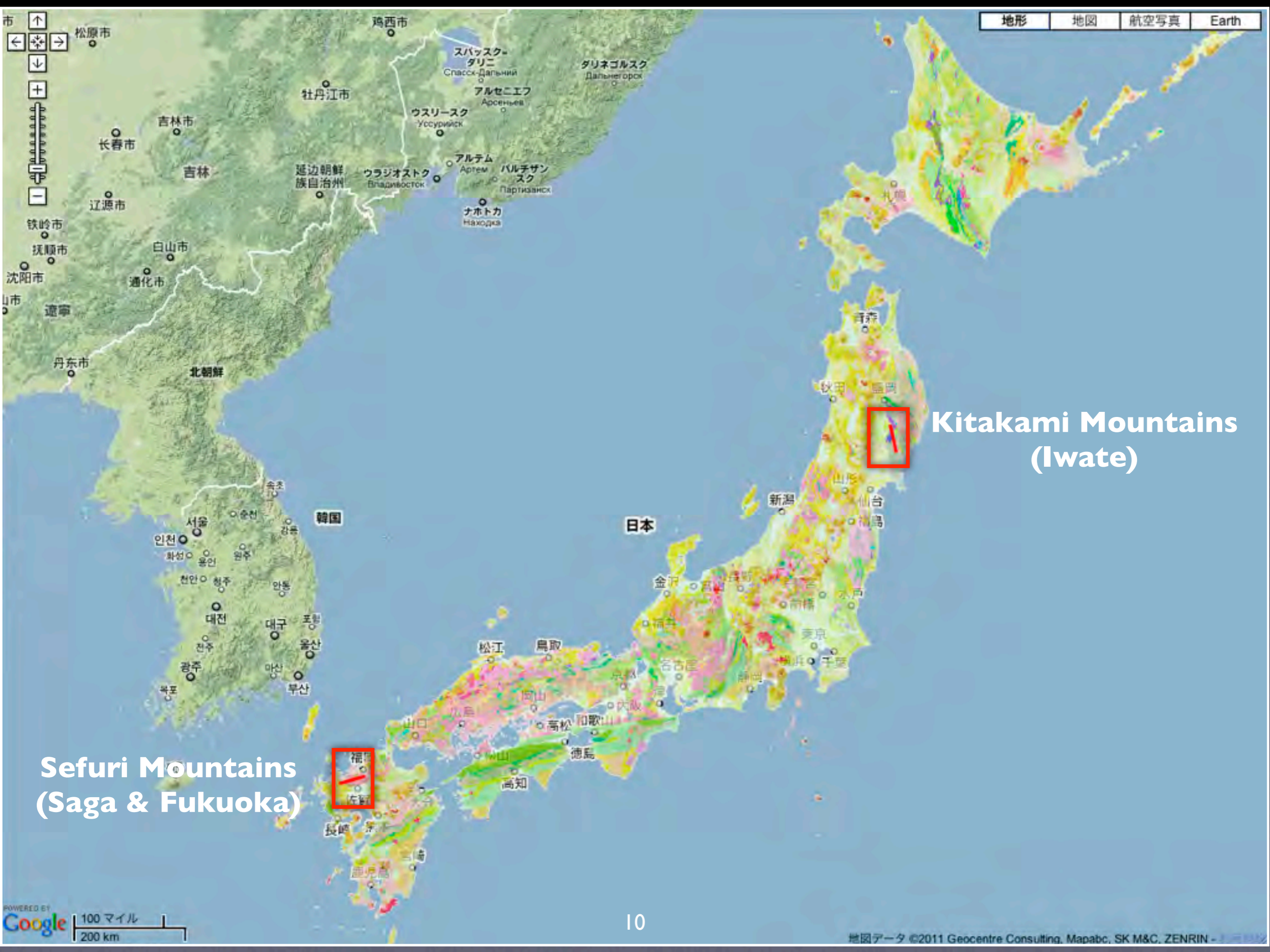
Red : zones of active fault

Green : highland > 1000m a.s.l.

White : required to be investigated for site candidates.





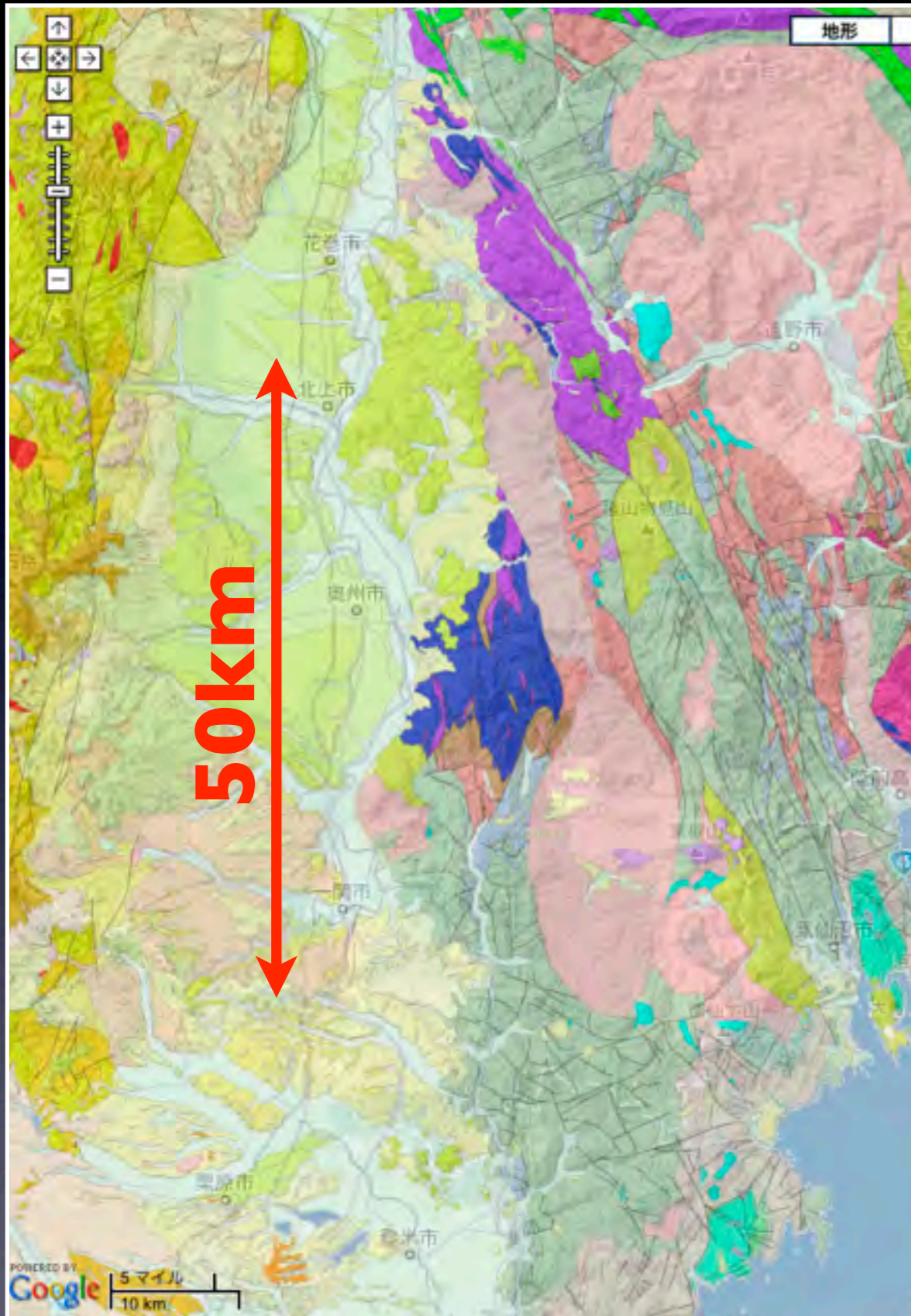


**Kitakami Mountains (Iwate)**

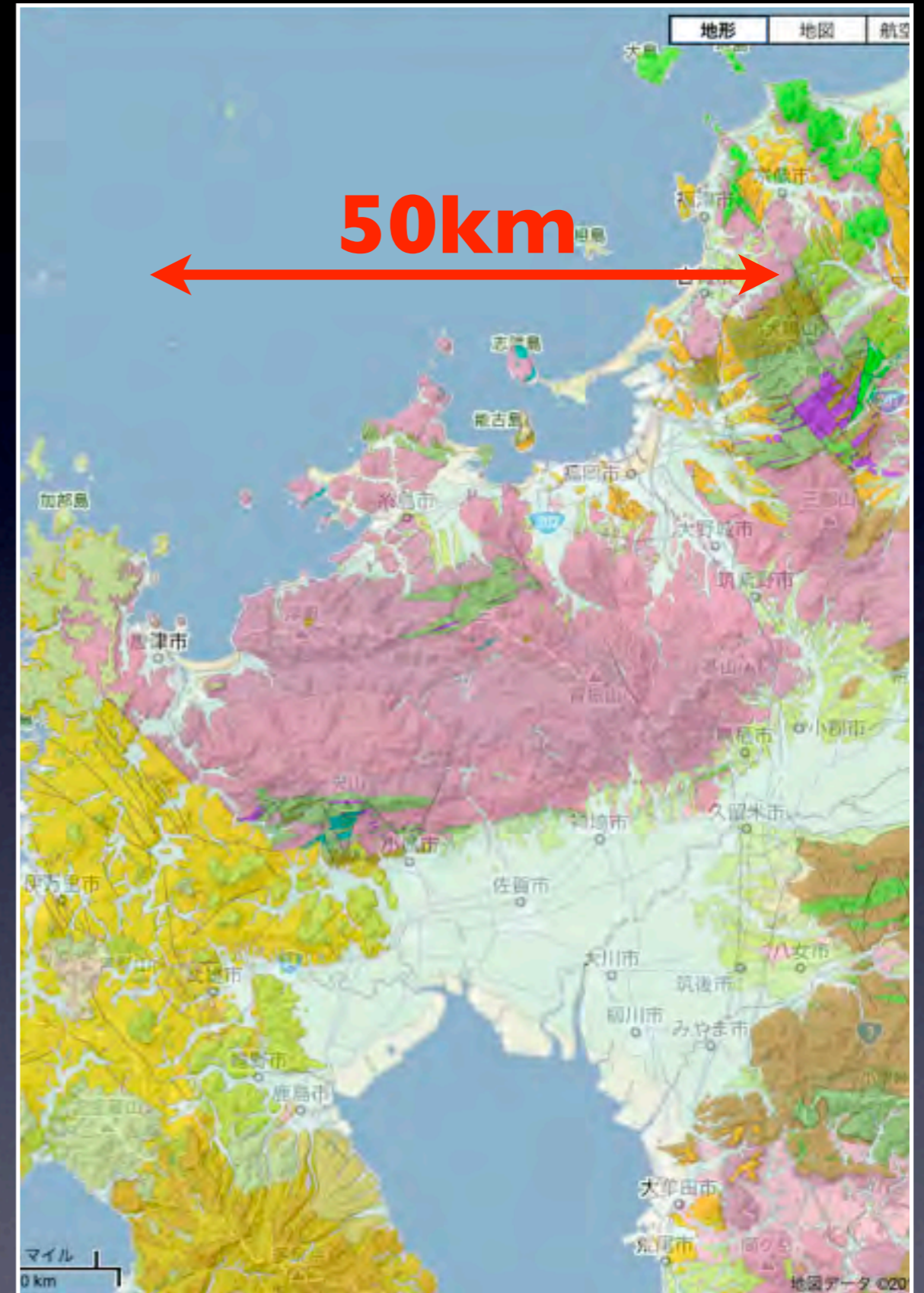
**Sefuri Mountains (Saga & Fukuoka)**



# Kitakami



# Sefuri



Granite



# Granite

Granite is an igneous rock and is formed from magma. It was formed around hundred million years ago.





# ~~Mountain~~ Site



Hilly Site

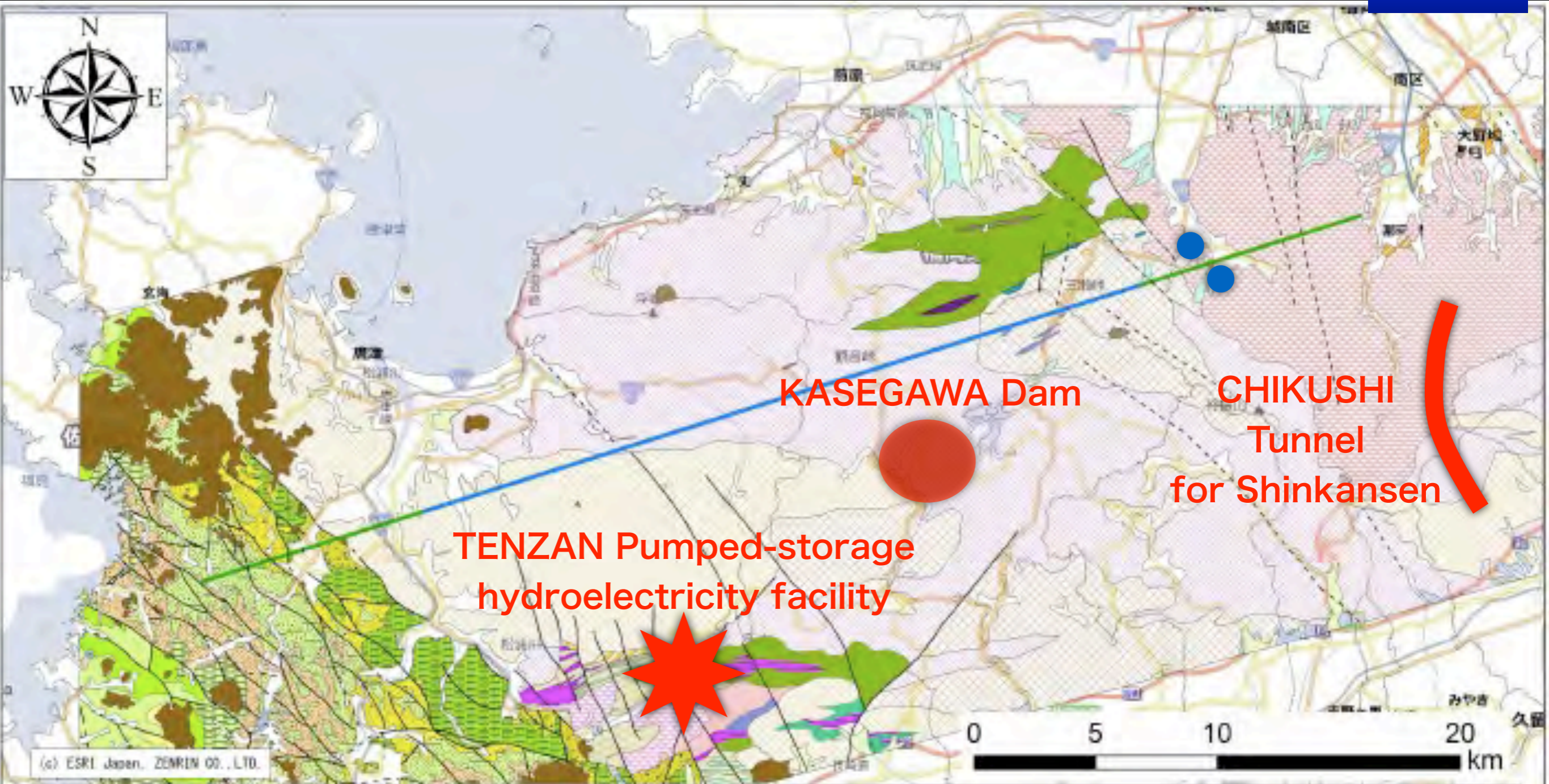


Mountain Site



# Status





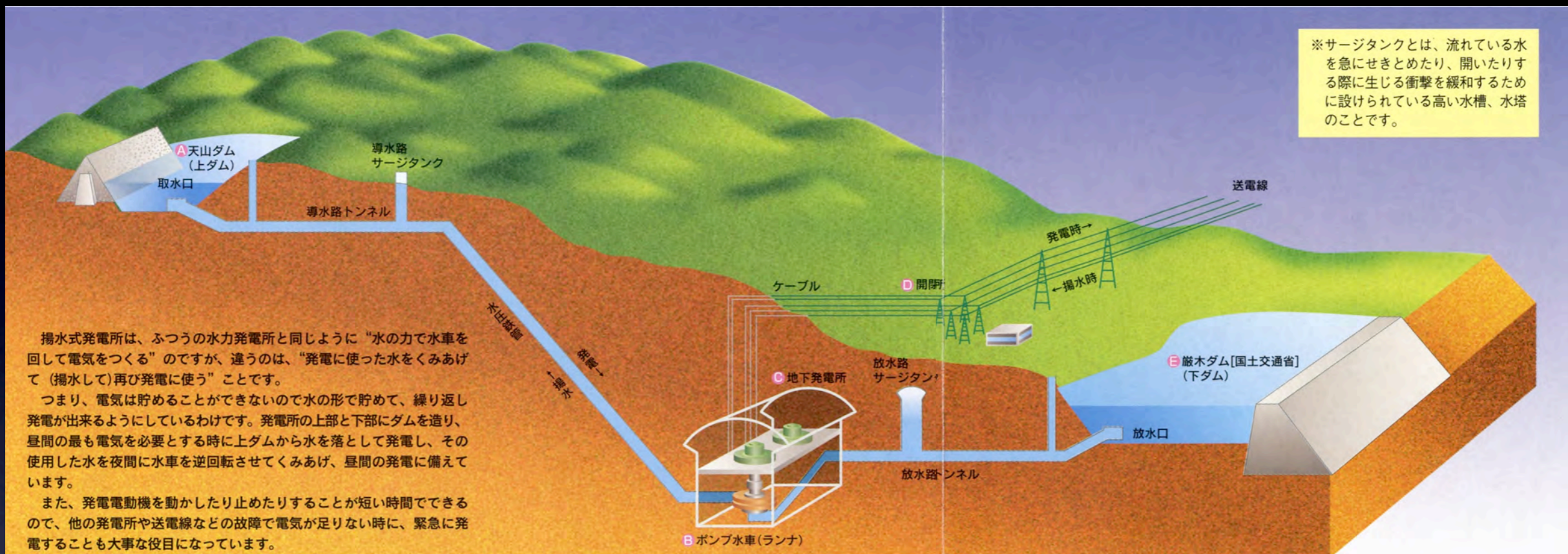
(c) ESRI Japan, ZENRIN CO., LTD.

凡 例				
1. 沖積層	9. 相浦層下部	17. 早良花崗岩	25. 泥質片岩	33. 角閃石石英片岩
2. 低位段丘堆積物	10. 畑津頁岩層	18. 深江花崗岩	26. 超苦鉄質岩類	34. 石墨黒雲母片岩
3. 阿蘇-4火砕流堆積物	11. 畑津砂岩層	19. 朝倉花崗閃緑岩	27. 石英片岩	35. 綠泥綠簾陽起石角閃片岩
4. 中位段丘堆積物	12. 行合野-駒鳴砂岩層	20. 糸島花崗閃緑岩	28. 角閃石斑れい岩	36. 結晶質石灰岩
6. 高位段丘堆積物	13. 佐里砂岩層	21. 石英閃緑岩	29. 蛇紋岩	— 断層
6. 玄武岩類	14. 芳谷層	22. 角閃石斑れい岩	30. 角閃岩	- - - 推定断層
7. 相浦層上部	15. 蔽木層	23. 石灰質片岩	31. 角閃石綠泥片岩	— 加速器トンネル(I期)
8. 相浦層中部	16. 佐賀花崗岩	24. 苦鉄質片岩	32. 綠簾石石英角閃片岩	— 加速器トンネル(II期)

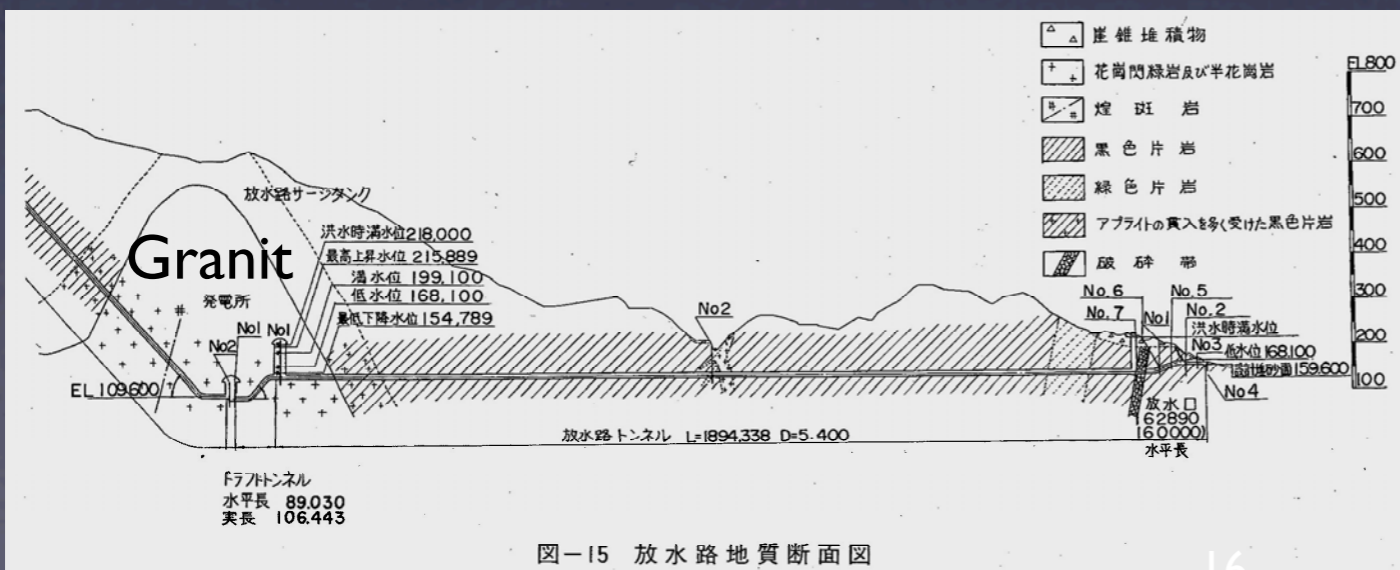


# TENZAN Pumped-storage hydroelectricity facility

1986~

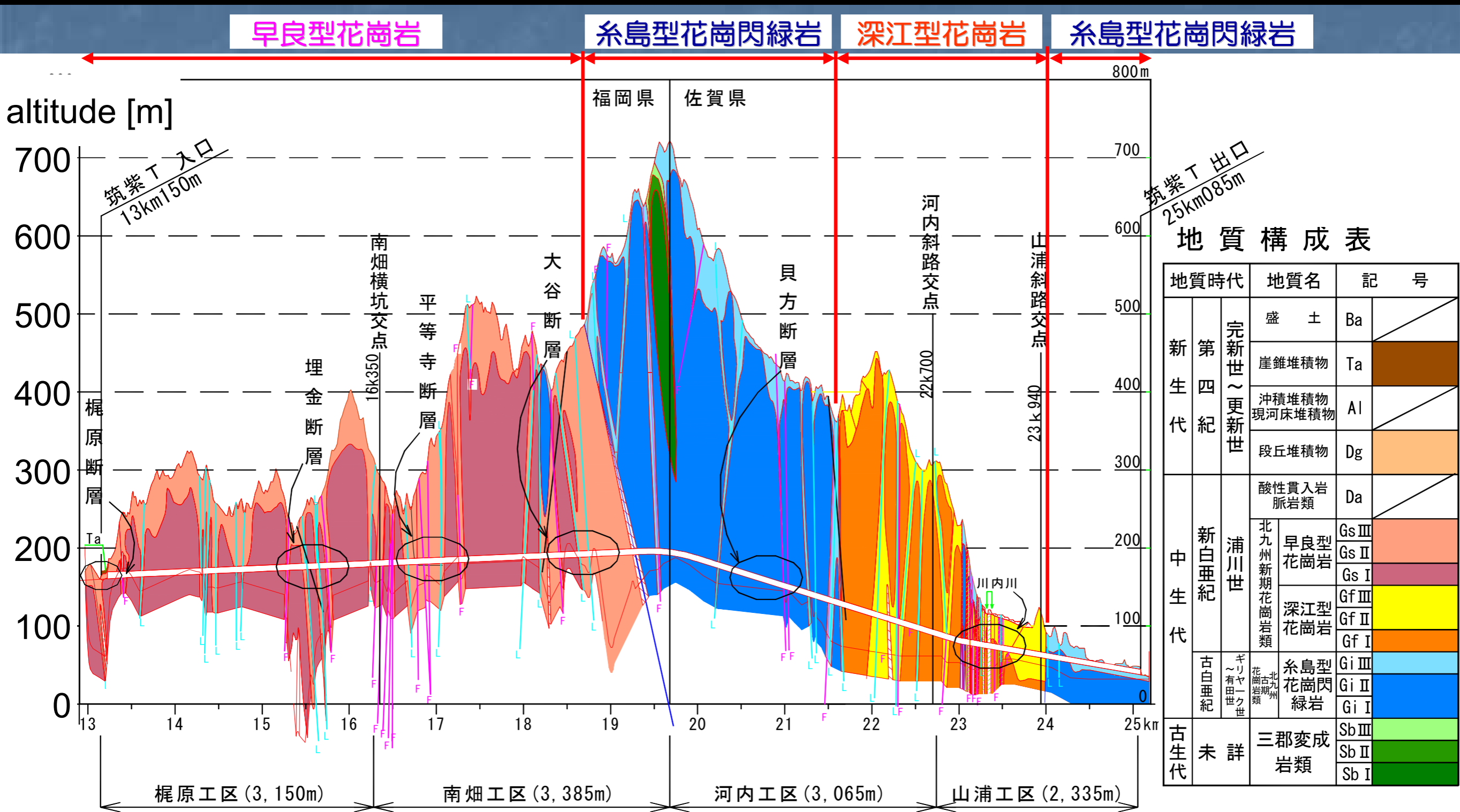


89m(L) x 24m(w) x 48m(H)





# CHIKUSHI Tunnel



地質構成表

地質時代		地質名	記号			
新生代	第四紀	完新世~更新世	盛土	Ba		
			崖錐堆積物	Ta		
			沖積堆積物 現河床堆積物	Al		
			段丘堆積物	Dg		
中生代	新白堊紀	浦川世	酸性貫入岩 脈岩類	Da		
			北九州新期花崗岩類	早良型花崗岩	Gs III	
					Gs II	
					Gs I	
			深江型花崗岩		Gf III	
					Gf II	
	Gf I					
古白堊紀	ギリヤーク世 花崗岩類	糸島型花崗閃綠岩	糸島型花崗閃綠岩	Gi III		
				Gi II		
				Gi I		
古生代	未詳	三郡変成岩類		Sb III		
				Sb II		
				Sb I		



# Boring : Core sample

North

Near IP

South

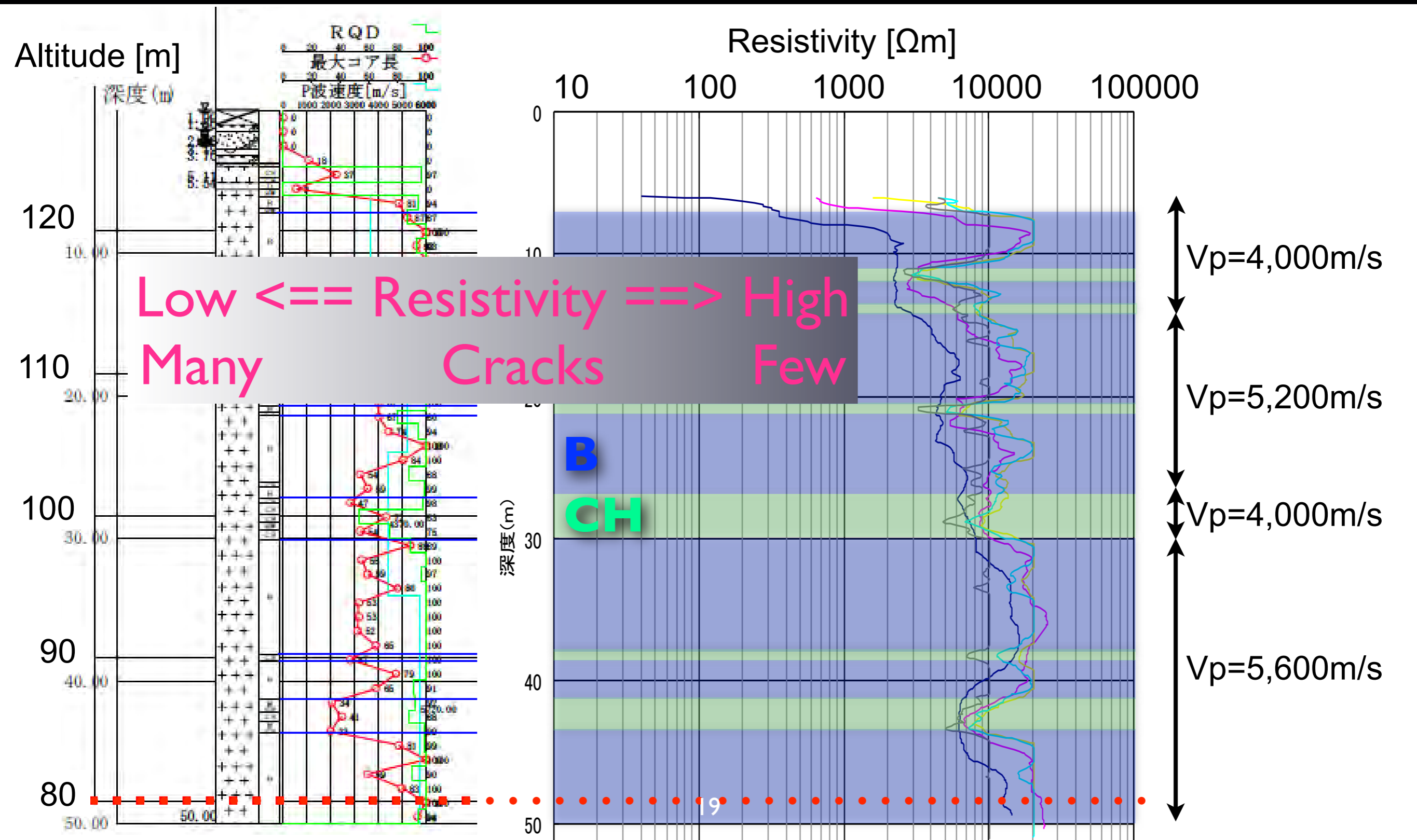


80m a.s.l.  
Assumed-tunnel altitude

“Fresh & healthy” granite

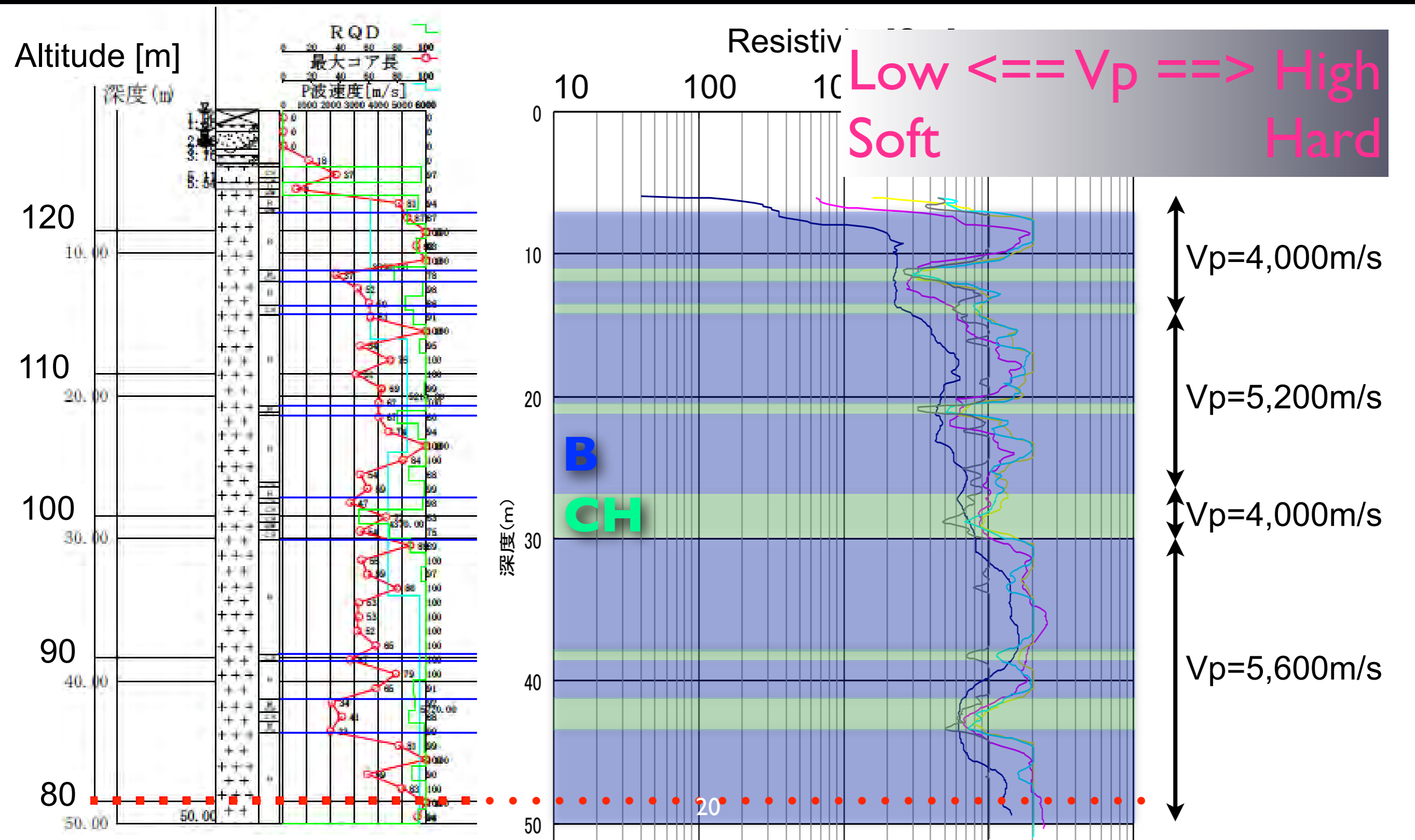


# Electrical- & Seismic- logging





# Electrical- & Seismic- logging





# RQD

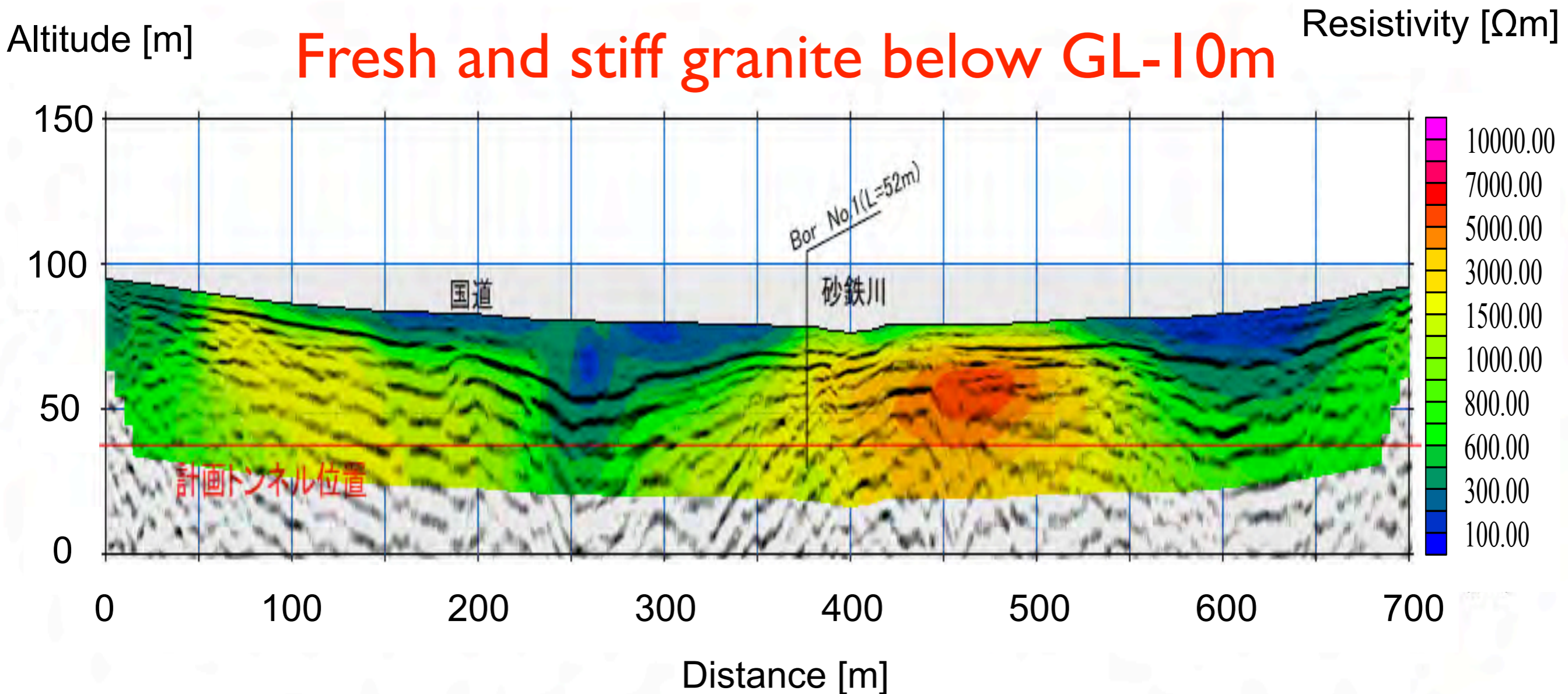
Rock Quality Designation

Condition	RQD
Very poor	0 - 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90
Excellent	90 - 100

$$\text{RQD} = \frac{\sum \text{Length of core pieces} > 10\text{cm length}}{\text{Total length of core run}} \times 100$$



# Electrical resistivity- & Seismic- tomography





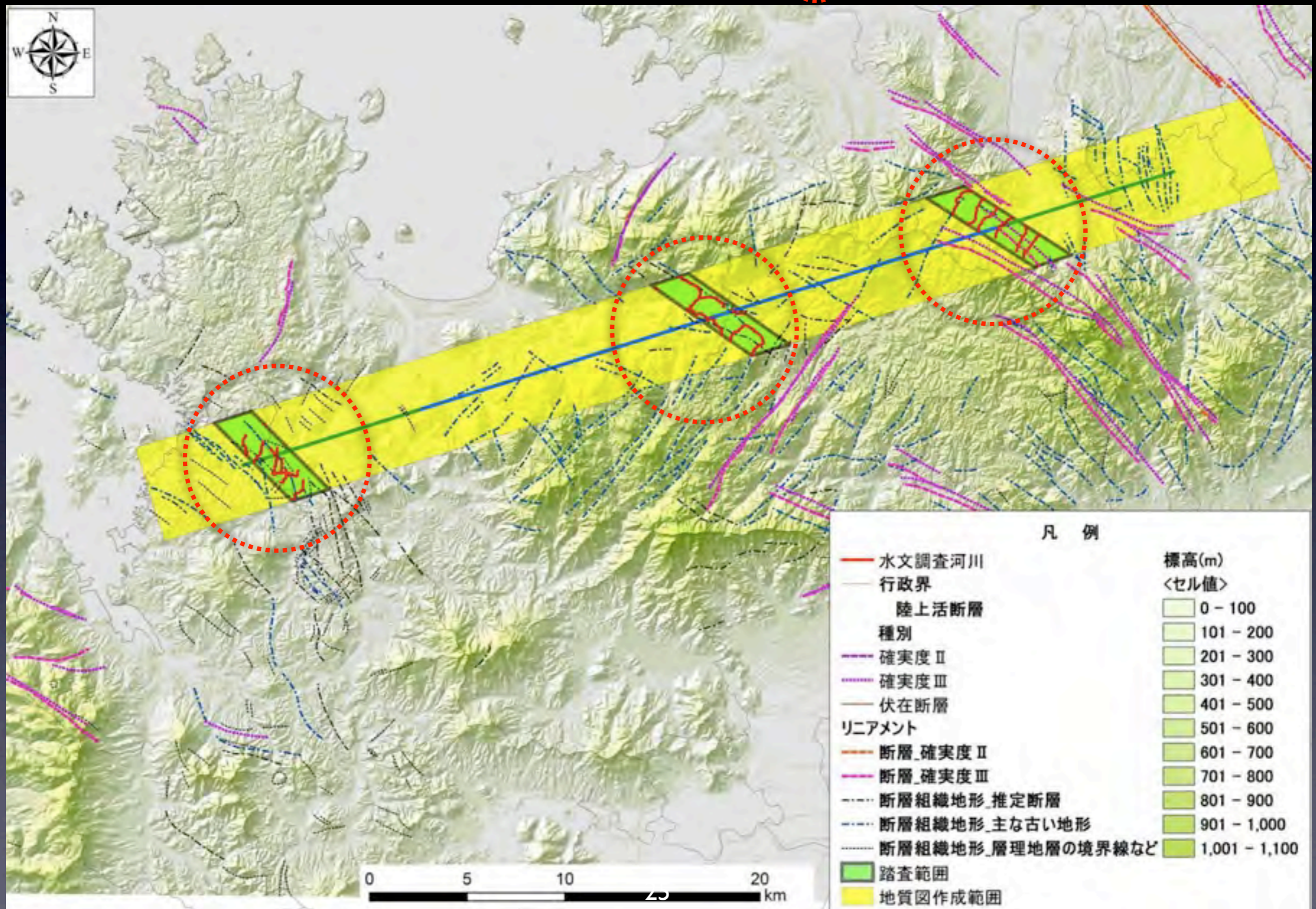
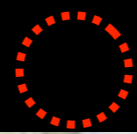
Both two candidate sites (Kitakami and Sefuri) have a good geology for ILC; they can support the extension to the 1 TeV center-of-mass machine.



# Toward TDR



aerial photo survey along the tunnel route with 5km wide (yellow region)  
lineament, fault  
Surface survey & water budget measurement





Surface (geological) survey had carried out by ~30 people x ~10 days  
remarkable systematic survey

(geological survey around Nuclear Power plant  
usually assign a few people )

survey @ daytime

Obtained data is analyzed and  
summarized soon

discussion @ evening





# Re-layout tunnels

- For site-dependent designs to be described in TDR
- Re-locate Main tunnel, Access tunnel, Detector hall, Entrance of access tunnels on a basis of geological survey and topography.



# Summary

- Both two candidate sites (Kitakami and Sefuri) have a good geology for ILC
- Site-dependent design for TDR is in progress