


# **APPENDIX**

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# **APPENDIX 1**

## Outline of Field Observation

<b>Stop 1-1, Lomba Grande Quarry</b>						
DATE	LOCATION	COORDINATION			SAMPLE No.	ROCK
2001/09/04	Lomba Grande	EASTING	NORTHING		KN001 KN002	
11 : 00		22J	0,496,068	UTM	6,701,087	
<p>2001/09/04 Porto Alegre 9 : 45 start Lomba Grande arrived 11 : 00</p> <p>Lomba Grande Quarry The excavation almost finished. Most of Upper levels was disappeared by taking out last year. Depth of sill on the surface; 15 m * 5=80 m</p> <p>Two intrusions are at least observed. Lower has a thickness of 5 to 7 m, which contact on Palaeozoic red sandstone that is cropped out behind the maintenance house near entrance of the quarry.</p> <p>Lower first intrusion is dark gray glassy rock like aphyric (sample NK001). Second intrusion having chilled margin at bottom, consist of the picrite well-developing coarse columnar joints. The lower chilled margin has a thickness of 50 to 30 cm, with fine columnar jointing.</p> <p>The picrite is medium grained, and contains much of reddish brown olivine, and small amount of pyroxene</p> <div style="text-align: center; margin: 20px 0;">  </div> <p><b>Problem/Task</b> Is there change of litho facies? What does mean varieties of olivine crystal form presented by W. Wilson? According to the Field guide book; Olivine phenocrysts are inversely zoned, enriched in FeO at the center and MgO at the rim, suggesting its origin from a higher mafic source.</p> <p>Cylindrical form of the intrusion estimated by magnetic survey on the surface, may mean the intrusion as like lacolith or conolith. Why the form of the sills in Ponta Grossa area is widely spread and shows homogeneous thickness.</p>						



Stop -1-2, Brita Norte quarry, First Flow of basalt eruption in southern Parana basin							
DATE	LOCATION	COORDINATION				SAMPLE No.	ROCK
2001/ 09/04	Brita Norte quarry	EASTING		NORTHING		KN003	Gramado type basalt flow
		22J	0485,601	UTM	6,722,104		

Brita Norte quarry- Incopel Quarryer- near São Leopoldo and Estanci Velha, BR-116.

2 feeder dykes, width 2 meters

Thin platy joints well developed in the dykes, we can see also some fracture or fissure beside both of dyke boundaries.

The dykes has no vesiculation, just looks like compact afanitic basalt.

The lava flow lies on the red Aeolian sandstone (Botucatu Formation), and covered by the sandstone having same characters as bottom.

The basalt flow has a thickness of 40 meters, and has amygdaloidal parts at near bottom and other horizons also. It will be a kind of lava lake.

This intersection means the eruption happened during arid climate condition, and it has some breaking during the eruption but the evidence of time of breaking can not identified.

The flow has thin platy joint at the top and the bottom, and vertically jointed in the upper middle, and massive in the lower middle part respectively.

Direction of dykes is NS to NNE-SSW, which is concordant with the feeder dykes in the Etendeka region in south Africa, and also concordant with the dykes in Santa Catarina coastal region.

If the supposition that the flow is the first flow of the Parana volcanism, first eruption would have happened along NS to NNE-SSW direction, also near the center of Torres triple junction.

Photos: 115-124



Stop -1-5, Gramado type basalt flow							
DATE	LOCATION	COORDINATION				SAMPLE No.	ROCK
2001/09/05	Small river on the way between Caxias do Sul and Sao Marcos	EASTING		NORTHING		AS001	Gramado type basalt
10:03		22J	0,485,717	UTM	6,805,617	Height	318 m

05 September 2001  
Caxias do Sul to the direction for São Marcos

22J 0,485,717  
6,805,617 Height 318 m, near bridge, the road curved at the river. Sample AS001

Gramado type basalt flow

Platy joint having thickness of 50 cm developed. It may be center or near upper part of flow.

Gramado type has more than 19 flows and thickness of around 350 meter near Gramado. It flows 400 km to the west having 19 flow units.

What is the characteristics in naked eyes of Gramado type?

Photo:130



Problem/Task : one grain of native copper is observed in this Gramado type basalt.



Stop 1-6, Parana Panema- Pittanga type basalt							
DATE	LOCATION	COORDINATION				SAMPLE No.	ROCK
2001/09/05	Quarry of basalt near Vacaria	EASTING		NORTHING		KN005	Parana Panema-Pittanga type basalt
11 : 50		22J	0,504,469	UTM	6,843,617	Height	936 m
		W 50 57 17.0		S28 32 04.9			876

11:50

22J 0,504,469

6,843,617 height= 936m sample: KN005

quarry of basalt near Vacaria

looks like acidic rock

hard, gray basalt, partly reddish colored by oxidation having irregular shaped of maximum 30 cm in size. this feature is characteristic in this type of flows.

They call this as **Paranapanema- Pittanga type**.

Parana Panema is just on the chemical composition different from Pittanga type. They have 15 flows and have interfinger relation together.

What is nomenclature of Parana Panema and Pittanga type?

Usually Parana Panema-type basalt flow produces amethyst, and acidic flow produces agate.

Photos:130-131



Problem/Task



**Stop 1-9, Carijo type acidic flow**

DATE	LOCATION	COORDINATION				SAMPLE No.	ROCK
		EASTING		NORTHING			
2001/09/06	boarder to Santa Catarina					KN007	Carijo type acidic flow (a kind of Caxias type)
10:10		22J	0,452,494	UTM	6,945,027	Height	668 m

06 September, 2001  
 22J 0,452,494  
 UTM 6,945,027 ; height= 668 m , sample: KN007  
 near quarry, only sound.  
 Carijo type acidic flow (a kind of Caxias type)

gray colored acidic rock containing plagioclase and augite.  
 Other Caxias type contains augite and pigeonite.  
 porphyritic and medium grained, thickness around 70 to 80 meters. massive, minor vertical joint developed. pale greenish gray to pale brownish gray, alteration; some calcite and chlorite along joint.

If Carijo type acid flows cover the Esmeralda, the stratigraphy of the area is strange.

**stratigraphy around here;**

