FIELD TRIP REPORT AND USAGE OF STEWART WALLACE FUNDS BY THE SEG STUDENT CHAPTER UNIVERSIDADE FEDERAL DO CEARÁ (UFC)

COMMITTEE: Maria Eduarda Didoné, President; Rafael Nascimento Paula, Vice-President; Larissa Barreto da Silva, Secretary (inative); Sarah Correia de Sousa, Treasurer.

GEOLOGY OF THE PALLADIUM, PLATINUM AND CUPPER DEPOSIT AND SURROUNDINGS, CEARÁ, BRAZIL

September 03 – 04, 2019

In brief: UFC SEG SC received $500 funding from SEG in the second application round of 2018. The funds were used to sponsor part of the costs of a 2-day excursion exploring the geology and mineral deposit of Palladium, Platinum and Cupper in the Pedra Branca municipality, Ceará, northeast Brazil. The field trip included visits of Cruzeta Complex and Madalena Suite.

PARTICIPANTS:

Field Trip Leaders	
Christiano Magini	Professor, UFC
Students	
Franscisco Wesley da Silva de Nojosa	Bachelor Student
Israel Salles Nogueira	Bachelor Student
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Mateus de Paula Miranda	Master Student
Rayssa Magdyelli Nogueira da Silva	Master Student

DETAILS:

Funding: This trip was funded by the SEG Foundation (Stewart Wallace Fund).

Timing: The excursion took place over 2 days from 03-04 September 2019.

Transportation and logistics: It was funded by the SEG Foundation (Stewart Wallace Fund).

Accommodation and food: Accommodation was organized in hotel throughout the trip (typically ~30 BRL /person/night). Breakfasts were provided by the hotel and dinners were organized in affordable restaurants. The lunch was funded partially by the students.

PROGRAM

Day	From	To	Activity
09/03/2019	Fortaleza (CE)	Pedra Branca(CE)	Paleoproterozoic and Archean outcrops
09/04/2019	Pedra Branca(CE)	Fortaleza(CE)	Visit Pedra Branca do Brasil Mineração Ltda. and trip back to Fortaleza

Itinerary from 3-4/09/2019

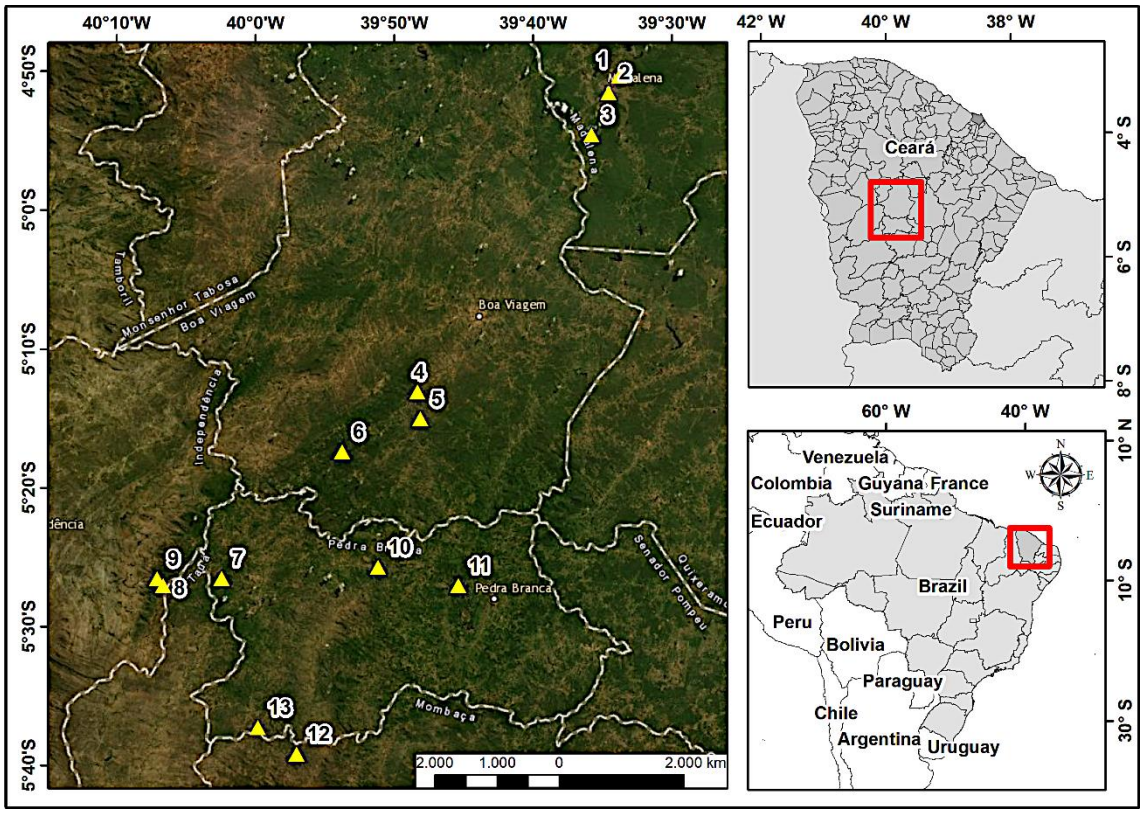

Figure 1: location map.

DETAILED REPORT

Tuesday, September 3rd

The excursion departed from UFC campus at 8AM to Pedra Branca-CE, where we spent the overnight. Along the road, we could observe many outcrops of the following lithologies:

The Madalena Suíte consists of a quartz-diorite batholithic ensemble, intrusive at Cruzeta Complex, and clipped by sin-plutonic dykes. These rocks shown a localized deformation, having no evidence of migmatization, suggesting that they intruded the Cruzeta Complex after its major deformation and metamorphism.

Figure 2: Granodiorite being intruded by dioritic dyke belonging to the Madalena Suite.

The Cruzeta Complex consists of three Archean units' rocks reworked in the Proterozoic: Mombaça, Pedra Branca and Tróia units. The Mombaça Unit was not visited in this field trip, so it will not be described. The Pedra Branca Unit consists of a heterogeneous gneissic-migmatitic association, composed mainly by orthognaisses, partly migmatites, with presence of trondhjemits, which are the host for the Tróia unit lithotypes, dykes, mafic sills and pegmatitic leucogranite sheets. The Tróia Unit consists of a mafic-ultramafic plutonic association, consisting of meta-gabbros, meta-diorites, tonalities and

meta-ultramafics (hornblendites, serpentinites, chromitites and cumulates ultramafics); an intermediate association composed by meta-tonalites and meta-granodiorites with mafic enclaves; and remains of a metavulcan sedimentary sequence, consisting by meta-basalts, meta-ultramafics meta ultramáficas serpentinized, mafic schists, paragneisses, feldspathic gneisses, calc-silicate rocks, limestones and quartzites. Structurally, the Troia and Pedra Branca units are affected by tangential deformation associated with nappe tectonics. With regard to stretch lineations, the Cruzeta Complex exhibits a pattern compatible with a transcurrent tectonic, with northeast preferred direction and smooth dip.

Figure 3: Gneiss belonging to the Pedra Branca Unit of the Cruzeta Complex.

Figure 4: Amphibolite belonging to the Tróia Unit of the Cruzeta Complex.

Figure 5: Leukocratic and melanocratic banded gneiss presenting tangential deformation belonging to the Cruzeta Complex.

The Serra das pipocas Greenstone Belt is metavolcanic-sedimentary sequence composed of metasedimentary rocks, marly psammite-pelite, containing alternation of maficultramafic volcanic floods, tholeiitic and komatiitic, respectively, and meta-acidic rocks. The komatiitic meta-ultramafic floods are composed of chlorite-anthophyllite-actinolite-tremolite schist. The tholeiitic metamafic rocks are mainly represented by garnet amphibolites. Basic and acidic metatuffs, metacherts, and banded iron formation are alternated with amphibolites, which sometimes are deeply hydrotermalized. These lithotypes are cutted off by mafic-ultramafic intrusions, metagranodiorites and metabasic dykes.

Regarding the structural geology, the area is caracterized by penetrative polyphasic strain, occurred during Brasiliano, with tight, isoclinal and recumbent folds, in addition to thrust faults and shear zones. The thrust faults are best recognized, especially, in the contact between the metavolcanic-sedimentary sequence and granite-gneiss-migmatite of Cruzeta Complex;There are deeply hydrotemalized rocks, displaying silicification, potassification, chloritization, and carbonation, sulphidation is also present, and they may contain some mineralisation such as copper-gold Volcanic-hosted Massive Sulfide or auriferous lodes, because this association occurs near the silicified zones and also in shear zones.

Figure 6: Vulcanosedimentary rock belonging to Serra das Pipocas.

Wednesday, September 4th

Departure from Pedra Branca to visit the Platinum and Cupper deposit in Cruzeta Complex.

First, we had the opportunity to observe the local where drilled holes to estudy the potential underground ore grades. There was presence of amphibolite composed dominantly of hornblende. That is an indication that metamorphism may affected a basaltic magma. This rocks presents inclusions of chrome.

Then we went to the company facilities to check out the drillholes containing the ore and surrounding features. Through the detailing these rocks, was possible found palladium and platinum, besides chrome. This information made it, the exploration, possible.

Figure 7: The group of students noting the several cores from boreholes, which comprise host rocks and ores.

Figure 8: The host rock with the inclusions of chrome.

STEWART R. WALLACE FUND 2017 SPENDING

The SEG Student Chapter UFC was awarded 500 USD (1.780,00 BRL when awarded) from the SEG through the Stewart R. Wallace grant.

The funds have been used to cover the costs on 2-day field trip the Palladium, Platinum and Cupper Deposit, northest Brazil. The Wallace Fund was used to cover all the accommodation in Pedra Branca city, the transport and food expenses.

A detailed summary of the expenses can the checked on the table below.

	BRL	**USD**
Transportation Fortaleza-Pedra Branca-Fortaleza	152	36,51
Fuel costs	306	73,49
Hotel in Pedra Branca	320	76,86
Food expenses	190	45,63
Total	968	232,29

The remaining of the fund will be applied on the III Week of Economic Geology and Mineral Exploration that will occur on the second semester of 2019.

ACKNOWLEDGMENTS

The 2018-2019 SEG-UFC of Fortaleza committee wishes to thank the SEG for their financial participation allowing us to organize excursions affordable for students with very little income. A special thanks to Diego who have received us on the facilities of the Pedra Branca do Brasil Mineração Ltda.