



Instituto do Petróleo e Geologia – Instituto Público
(IPG)

4th IPG International Geosciences Conference on

Timor-Leste Geological Data and Information for Economic Diversification and Development

Dili 23-26 October 2018

Note Taker's Document

Date: 25/10/18

Time: 09:20 – 09:45

Conference Day: 3

Venue: CCD

Conference Speaker: Nicole Cox (Federation University Australia)

Presentation Title/Topic: Quaternary Uplift and Deformation as Recorded by The Timor Leste North Coast Baucau Limestone.

Presentation Notes	Q&A
<p>Quaternary Uplift and Deformation as Recorded by the Timor-Leste North Coast Baucau Limestone</p> <ul style="list-style-type: none"> • Outline Banda Orogen uplift, Baucau Limestone terraces, distribution and uplift rates along the north coast, Terrace deformation and potential interpretations. • Subduction to Arc Continent Collision Arc-continent collision is one of the most fundamental tectonic processes for the formation of new “land”. • History of Uplift 9-5.5Ma - Initial collision and associated shortening 4.5-3Ma - Central Timor eventually emerges above sea level 3-2Ma - Uplift by isostatic rebound and extension 2Ma – Present, still in a question mark (natural hazard, landslide and etc.) • Quaternary Uplift Emergent Pleistocene coral reef terraces are found throughout the Banda Orogen • How do they form? - Coral Growth 10-12 millimeters a year vertical growth for Pacific fringing reefs. Different species grow in-place at different depths, though the most prolific is less than 15 m depth. 	<p>N/A:</p>



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- Sea-level Change

Regression exposes the reef to erosion. A new reef can grow when sea-level stabilizes at lower depth.

Transgression results in cliff retreat of previous reef exposures and deposition of a new reef.

Landward “inner margins” are considered good indicators of paleo sea levels but interpreting the age can be complicated by offlapping coral stratigraphy.

- Measuring Uplift

Uplift rate = (altitude – Δ sea-level)/age of terrace = m/ka

- Investigating the pattern of uplift throughout the Banda Orogen provides a way to test fundamental questions about the geodynamics of collisions.

Broad wavelength = lithospheric processes

Narrow wavelength = crustal processes

- Banda Orogen Quaternary Uplift

Warping and No warping at the eastern part of Timor

- Baucau Limestone Marine Terraces

Hard, vuggy coralline rudstone to framestone, commonly capped by a carbonate beachrock.

Can form karst features and a terra rossa soil.

Other lithologies include calcarenite, sands and gravels forming the “Laga Sand Member (Audley-Charles, 1968). It also found the Massive fringing reef.

- Terrace Distribution and Uplift rates

Subaun, Manatutu, Ponte Liarua, Binagua Lagaa, Ililai, Buiomau, Lautem, Com, Ponte Tei



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- The uplift rate in Subaun is 0.08-0.14m/ka, for the Manatuto Profile the uplift rate is 0.45mm/yr, the Baucau Plateau is approximately 42 km² at 530m but goes as high as 650m. The Laga profile looking to the east is grow steeper to the east, has uplift rate of 0.53m/ka, the Ililai profile has the uplift rate of 1.0m/ka, the Buiomau profile has the uplift rate of 1.5. The Lautem platform, has approximately 30 km² at 550-580m, 1.5° tilt to the NNE, the Lautem profile has the uplift rate of 0.5m/ka in Holocene, the Com profile has the uplift rate of 0.6m/ka in Holocene. Tei platform has approximately 1 km² at 600m and 5° tilt to the S – SE.
- Results
A base 0.5 m/ka uplift rate seems to be most likely, though, rates vary between 0.03 to 1.5 mm/yr for the last last 150 ka.
The anomalous high region may be associated with active fault movement? Compression or Extension?
Big Picture Terrace Deformation: Could the tilting of high elevation terraces be highlighting a gentle 50-80 km fold?
- Conclusions
I'd suggest that lithospheric processes are the dominate mechanisms of Quaternary uplift, however, there is plenty of gravitational collapse that deforms the terraces on smaller scales.
- This is a very PRILIMINARY study. We need to:
Work on more detailed stratigraphic records for the Baucau Limestone, including the “Laga Sand Member” to better constrain the relative changes in sea level.
Explore other techniques for dating the Baucau Limestone.
Continue mapping fractures and landslides, to which the LIDAR data would be necessary.



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Date: 25/10/18

Time: 09:50-10:05

Conference Day: 3

Venue: CCD

Conference Speaker: Luis Teofilo da Costa (IPG)

Presentation Title/Topic: Tectonic Setting of Timor Region Derived from Seismological (A preliminary study)

Presentation Notes	Q&A
<p style="text-align: center;">TECTONIC SETTING OF TIMOR REGION DERIVED FROM SEISMOLOGICAL STUDY (A preliminary study)</p> <ul style="list-style-type: none"> • Introduction Timor Island is part of outer Banda Arc which is in the northwest of Australia and in the southeast of Indonesia. Timor Island is one of an active seismicity. This presentation is focused on the seismicity for analyzing tectonic setting of the region. • Regional Tectonic Setting of Timor Region Timor Island is a separated with Australia continent by linear depression of Timor trough in the south coast. In the north part of the Island is separated with the Inner Banda Arc. Timor Region is meeting three major active plates (Australian, Eurasia and Pacific. Hamilton, 1979) these plates forming as a horseshoe and known as Banda Suture (Hall & Wilson, 2000). Timor Island is formed from the collision of west part of Australian Continental Plate with the Banda Arc where Australian continental plate is subducted to the Banda Arc with the northeast direction. • Regional Structural Geology of Timor Region Timor trough, Wetar thrust, Flores thrust, Savu Thrust, Roti Thrust, Savu Basin. • The Cross-Section Timor Region Tectonic Model 	<p>N/A:</p>



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Based on Audley Charles, 2011 Showing the Australian Lithosphere subduction

- Seismic Stations Distribution in Timor-Leste (USC & IPG).
Showing the seismic stations distribution map in Timor-Leste. Instruments were installed by IPG cooperate with the University of Southern California (USC) to study seismicity of Banda Arc.
- Seismicity of Timor Region
Earthquake Depth (km), Red dot is shallow (<17), Yellow dot is intermediate (17-300), Green dot is deeper.
- Seismicity of Timor Island
Most deeper depth of earthquakes are in the south part of the Island.
- Detail Seismicity of Timor and Surrounding Islands (Shallow Depth Profile) showing several results from modelling using the earthquake data gathered by IPG. Also showing the 3D model of tectonic setting of Timor Region.
- Earthquake Focal Mechanisms of Timor and Surrounding Areas
Showing the shallow thrust earthquake along the southern part of Timor.
- Historical Earthquake Events of Timor and Surrounding Areas.
- Timor-Leste and Surrounding Areas Seismicity
Where: Timor-Leste's seismicity pattern shows high seismicity in Oecusse and Atauro regions.
- Conclusion
Timor Region is categorized as an active seismicity.
The study shows that the subduction zone model is almost vertical.
Timor-Leste seismicity shows that Oecusse and Atauro regions are high seismicity.
The focal mechanisms of earthquakes along Timor Region were mostly



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thrust.

The magnitude of earthquakes around Timor Region can reach more than Mw 7.0



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Date: 25 /10 / 2018

Time: 10:35-10:55

Conference Day: 3

Venue: CCD

Conference Speaker: Job Brites dos Santos (IPG)

Presentation Title/Topic: Geology and Preliminary Mineral Prospecting in Atauro Island, Timor-Leste

Presentation Notes	Q&A
<ul style="list-style-type: none"> • Atauro is a volcanic island which is interesting to study. • Since 1956 geologists from some country have been conducted their geological research with various topic which is starting from the study of petrography, rock geochemistry and tectonic evolution. However, no one has talked about the relationship of these with mineral resources. *This is the main reason that motivated me to do the research with a focus on the relationship between geological characteristics with mineral resources on the island. • The research conducted by IPG in 2016 is considered enough to explain the geological conditions on the island. A geological map with a scale of 1: 50,000 is produced through this research. However, to find out more detail about the relationship between geological conditions and the availability of mineral deposits on this island, we must conduct further study such as conducting detailed geological mapping in order to produce a geological map with a scale of 1: 25,000, where the distribution of altered rocks and quartz veins can be observed. Another important thing to do in order to find out the out the mineral deposit existence on this island is to do detailed mineral prospecting such as collect stream sediment samples which later to be used to analyze the mineral grains and geochemical analysis. Other laboratory analyzes required are XRD analysis, geochronology and mineral fluid inclusion analysis. Through all of this, we expect to be able to find out the favorable area of mineral deposit on this island. This work is a part of 	<p>Name :-</p> <p>Institution : DIT</p> <p>Questions: As you explain that you found volcanic rock in Atauro, however as we know there's no volcanic activity in Timor Island so how to explain the presence of volcanic rock in Atauro island?</p> <p>Answer: Volcanic rock in Atauro was produced by volcanic activity which is happen in 3.5ma to form the Atauro Island. Presently there is no activity anymore because it was stopped 3ma due to the slab tear of the lithosphere beneath Timor Island.</p>



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my PhD project.	
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Date: 25/10/18

Time: 10:55-11:10

Conference Day: 3

Venue: CCD

Conference Speaker: Frederico Carlos Maria dos Santos (IPG)

Presentation Title/Topic: Geology and Mineral Resources in Citrana Area, Oecusse Timor Leste.

Presentation Notes	Q&A
<p style="text-align: center;">GEOLOGY AND MINERAL RESOURCES IN CITRANA AREA, OECUSSE, TIMOR-LESTE</p> <ul style="list-style-type: none"> • Introduction <ul style="list-style-type: none"> - Study Area Location and Access: Located in Citrana area, Beneufe Village, Nitibe Administrative Post, Special Administrative Region of Oecusse-Ambeno. Access to the study area: Dili – Oecusse – Citrana (by car) ± 10 hours driving. Dili – Oecusse (by plane) ± 45 minutes, followed by 1,5 hour driving to Citrana. Dili – Oecusse (by ferry) ± 12 hours, followed by 1,5 hour driving to Citrana. • Objectives <ul style="list-style-type: none"> To describe rock formations and its stratigraphic position; To record the distribution of rock units and produce a semi-detailed geology map (1:50,000); To identify existing geological resources for future mineral prospection. • Previous Study/ Literature Review <ul style="list-style-type: none"> Gageonnet & Lemoine (1958) --- Scale 1:100,000 J. de Azeredo Leme and A.V. Pinto Coelho (1960) --- Scale 1:100,000 Suwitodirdjo and Tjokrosapoetro (1996) --- Scale 1:250,000 	<p>N/A:</p>



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- Regional Geology: There are 3 Major Tectonic plate interactions Based on Harris, 2006
Pacific plate – westward moving
Indo-Australian plate – northward moving
SE Asian plate – SSE moving
- Stratigraphy of the study area based on the Harris and Standley (2009)
- Mineral Resources occurrences in Oecusse based on (UN-ESCAP, 2003), which consist of copper, gravel, gypsum, limestone, and bentonite
- The Study Methodologies
Preparation Phase → Observation and Data Collection Phase → Data Processing Phase → Final Report Composition
- Geology of The Study Area Consists of: Evaporite Deposits, Maubisse Formation, Aitutu Formation, Babulu Formation, Lolotoe Complex, Diorite Units, Manamas Formation, Dacite Units, Suai Formation, and Alluvial Deposits.
- The Results and Discussion based on the Petrographic Analysis of several samples in Lolotoe Complex consist dominantly with Olivine Orthopyroxenite and Harzburgite. For Diorite Units Sample, consists dominantly with Tonalite and Monzogranite and Granodiorite, for the Dacite unit samples, consist mostly of dacite.
- In Remote Sensing Analysis it uses the Mirror Stereoscope Interpretation, Satellite Image Interpretation.
- In the discussion part:
 - The geology of study area can be group into: Gondwana Megasequence, Banda Terrane and Syn-Orogenic Megasequence.
 - The Mineral Resources observed in the study area, consists of:



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Diorite and basalt rocks for dimension stone, Ultrabasic rocks for decorative stone, Limestone for ornamental stone, Sand and gravel for construction aggregates, Sulphide mineralization in the diorite & mica schist - metallic mineral

- In Conclusion:

Nine rock formations were mapped: 1) Evaporite Deposit, 2) Maubisse Formation, 3) Aitutu Formation, 4) Babulu Formation, 5) Lolotoe Complex, 6) Diorite Unit, 7) Manamas Formation, 8) Dacite Unit, and 9) Suai Formation and 10) Alluvial Deposit;

Petrographic analysis for ultrabasic came out Olivine Orthopyroxenite and Harzburgite; for diorite and granodiorite, the results indicate Tonalite and Monzogranite or Granodiorite rocks;

Satellite image interpretation tells us that the alteration process might occurs in SE part of the study area.

- There is also future works:

Further detail investigation related the structure geology in the western part of Oecusse to reveal the deformation events in the region;
Further detail investigation to the sulphide-bearing rocks for mineral purposes;

Age analysis determination for Evaporite Deposit;

Future geological campaigns need to be well-equipped with geochemistry, geochronology and biostratigraphy data are needed.



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Barrigue, unidade Gabro, formasaun Manamas no kompleksu Bobonaru, formasaun Viqueque, formasaun Baucau, formasaun Suai no depositu Alluvial.	
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Note Taker's Document

Date: 25 /10 / 2018

Time:10:35-14:00

Conference Day: 3

Venue: CCD

Conference Speaker: Fabie Reza (Peak Everest Mining)

Presentation Title/Topic: Manganes exploration in Timor Island

Presentation Notes	Q&A
<ul style="list-style-type: none"> • Peak Everest mining hanesan kompanha minas ida iha Timor Leste nebe hetan ona aprovasaun husi VII governu konstitusional atu halo explorasaun ba mineral manganes iha municipio Oecuse no agora dadaun eksplorasaun sei hahu lao ona. • Manganes hanesan element metaliku nebe frajil no toos. • Iha tinan 2017, eksplorasaun manganes to'o 20,1 milaun tonelada no 90% manganes uja ba baja tamba importante tebes atu halo mihis vidru sira, atu halo adubus, keramika no espesial ba industria baterai. • Depositu manganes bele akontese hanesan: hidrotermal, sedimentasaun, marine-nodul, laterit no aluvial. • Iha Timor manganes nee forma iha tasi okos mak hit sae ba leten (uplift) tamba prosesu kolisaun tektonika. • Manganes iha Timor iha variedade no ho kor oioin hanesan <i>mixed clay</i> no <i>colour muds</i> nebe maka hetan iha kompleksu Bobonaro nia laran. • Bazeia ba tipu manganes, iha tipu tolu mak idetifika ona iha ilha Timor mak hanesan manganes layar, manganes nodul no manganes boulder. • Eksplorasaun ba manganes liu husi faze hirak maka hanesan: mapamentu geolojia, test pit & trenching no observasaun outcrop iha kampu. • Manganes iha Timor nee mosu esporadicamente ka iha fatin deit no la kontinua ba fatin sira seluk. 	<p>Name: Flavio Institution: Secretario Estadu do Meio Ambiente Question/Clarification: Oinsa kona ba kualidade no kuantidade magnese iha ilha Timor Leste? Answer: Kona ba kualidade manganes iha ilha Timor leste nee kualidade diak liu no daruhak iha mundu no interesante tebes atu atria negociante sira no persija halo tan estudu barak atu bele hatene kuantidade manganes refere..</p>



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Date: 25/10/2018

Time: 14:05-14:20

Conference Day: 3

Venue: CCD

Conference Speaker: Brendan Duffy (University of Melbourne Australia)

Presentation Title/Topic: The Structural Position of the Lolotoi Metamorphic Complex

Presentation Notes	Q&A
<p>A knowledge: special thanks to IPG family including Helio, Jorge, Elyas, Eugenio, Marcal, Lourenco, Paulo, UniMelb – Mike Sandiford, Mark Quigley, Barry Kohn, Roland Maas, students UWA – David, Myra, Aaron University of Canterbury – Louise, Kari, International – Ron Harris, Douwe van Hinsbergen, Many others!</p> <p>In this slide I will talk about: location, synorogenic source area of synorogenic rock, structural style in th south coast of the country, and the last is ideas about the Lolotoi Metamorphic Complex.</p> <p>The southern Banda Arc Extinct arc north of Timor-Leste Extensively uplifted outer southern Banda Arc Uplifted forearc onshore Sumba, continental basement in the Savu Sea Uplifted Australian continental rocks onshore Savu-Rote-Timor Seismology and seismic reflection suggests incipient southward subduction</p> <p>If we look at the tectonic model of Timor, What about out-of-plane movement? The tectonic model for assembly of Timor has been strongly debated for decades. Southern Banda Arch extinct arch of Timor Extensively When you look to Sumba something very much similar to what is in Timor banda Terrane.</p>	<p>Name: Amandio da Silva Institution: UNTL Question/Clarification: Please explain to me, how to interpret Lolotoi complex!</p> <p>Answer: In my point of view is to look at the fragility things and the contacts between rock formation.</p> <p>Name: EDWIN MANDELA Institution: UNTL Question/Clarification: How those two folding you have mention to interpret the structure of Lolotoi Complex?</p> <p>Answer: For me, the key thing is that, in south coast of Timor there is model structure that suggest to me that the Lolotoi Metamorphic Complex that, may have relabeling. Make sure that you can trace down the valley. The boundary that you have seen is reliability.</p>



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Sabu continanetal basement: savu sea intergraded seismic data, Sabu sea is flor by continental crust. You come to east of that, Timor Island. Timor thrugh is decreasing actively.

- Lolotoi Metamorphic Complex has many features that are not consistent with the Australian Passive Margin – Fossils, igneous events, metamorphism, high and Low temperature thermochronology
- So, bearing in mind strike slip movement, what is the structural position of the Lolotoi Metamorphic Complex
- Early sediment shed into the marly component of the Batu Putih was geochemically similar to Australian shales, not Lolotoi Metamorphics
- REE profiles flat relative to PAAS
- Epsilon Nd trends towards Lolotoi, from shale starting point

So we all pretty much agree that there are Gondwanan rocks over the top of Lolotoi Metamorphics But if that was the case in Lacro, what bits are overthrust?

- Looking at the Gondwanan rocks that overlie the Lolotoi rocks: Lots of north-vergent structure
- At least 2 phases of folding
- 2nd phase is thicker skinned, accentuates some and unfolds others

Burial of Gondwanan sedimentary rocks: Most rocks are barely lithified, barely in the oil window – and yet there are seeps. I think this is little more than burial by passive margin and synorogenic sediments

- Conclusions: Vast expanse of Gondwanan rocks that have not had Lolotoi thrust sheet over the top of them
- Extends all the way to north coast....
- Gas is presumably coming from several km depth
- Is it possible that much of the immature sediment is part of the upper plate?

Name: SOLANGIA RAMOS

Institution: CSIL

Question/Clarification: Does the drilling activity will affect to the tectonic movement or not?

Answer: No they cannot. One of the problem is the we have the mud volcano. Therefore, we should be carefully when run the drilling activities in the future.



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| <ul style="list-style-type: none">• Possibility for petroleum systems further north?• Seismic in the Maliana graben, Manatuto? | |
|---|--|



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Date: 25/10/2018

Time: 14:25-14:50

Conference Day: 3

Venue: CCD

Conference Speaker: Dionesio Martins (ANPM)

Presentation Title/Topic: ANPM ICT for Petroleum and Mineral Data

Presentation Notes	Q&A
<ul style="list-style-type: none"> • Apresentasaun ida ne'e Hau sei koalia liu kona ba oinsa ita bele prepara ita nia aan hodi hare ou buka dadus espesialmente dadus jeolojia ba petroleo no dadus jeolojia ba minerais. • Timor Leste hanesan nasaun foun, Ita koko atu dezenvolve sistema hotu espesialmente ICT ho dadus hirak ne'ebe ita hetan kada loron ba loron liu-liu dadus ne'ebe relevante ho dadus tekniku, dadus ne'ebe bele uja ba negosio, no mos dadus non tekniku sira seluk. • Atu aseguira dadus hirak ne'e ANPM liu husi departamentu ICT kria sistema hodi aseguira, kontrola, <i>update</i>, no maneija dadus inklui dadus esplorasau no mos dadus produsaun. • IT-ANPM iha sentru ba base de dadus, nebe'e lokalija ida iha Edifisiu Ministerio das Finansas ne'ebe relevante ho siguransa no ida iha edifisiu ANPM rasik hodi aseguira dadus ne'ebe relevante ho dadus petroleo no minerais. • ANPM iha mos <i>data user</i> managmentu 2 mak hanesan : tekniku ho pursetu 52 no Non-tekniku ho pursetu 48. • ANPM mos iha <i>server</i> balun ne'ebe utilija ba nesesidade ANPM nian mak hanesan : <i>Server</i> ida utilija ba rai dadus ne'e rasik ou <i>storage</i> no <i>server</i> ida utilija ba <i>back up</i> dadus. • Hanesan hau dehan ona Ita laiha <i>back up</i> dadus iha rai liur, ita so iha deit <i>back up</i> dadus iha ita nia <i>server</i> (Internal) rasik. • ANPM mos iha espasu ou fatin ba esplorasau ,iha fatin ida ne'e ita bele asesu no hare direita dadus ne'ebe relevante ho dadus esplorasau 	<p>Name: AUGUSTO DE JESUS Institution: DIT Question/Clarification: Iha Ita nia esplikaun Ita koalia kona ba Data. No data ne'ebe ita iha barak liu mak data <i>offshore</i>, Oinsa ho data <i>Onshore</i> ne'e rasik, relasiona ho posu abandona ne'ebe iha ?</p> <p>Answer : Sim, data ne'ebe ANPM iha agora dadauk barak liu mak data <i>offshore</i>. No agora dadaun ANPM servisu hamutuk ho Timor Resources halo hela levantamentu dadus iha <i>onshore</i>, no espera katak iha tempo badak ANPM bele iha mos data <i>onshore</i>.</p>



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no produsaun.

- Alende ne'e ANPM mos iha *software* ne'ebe utilija ba prosesamentu dadus ne'ebe relevante mak hanesan :
 1. *Pertel*
 2. *Avocet*
 3. *Kingdom for Petroleum and Production*
 4. *ArGis* utilija hodi halo interpretasaun



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Date: 25/10/2018

Time: 14:45-15:00

Conference Day: 3

Venue: CCD

Conference Speaker: Jose Joanico Freija de Jesus Soares (ANPM)

Presentation Title/Topic: Utilization of Drone Technology for Stockpiles Volumetric Calculation. A case study for Raiketan Production Site.

Presentation Notes	Q&A
<ul style="list-style-type: none"> • Molok hakat ba topiku apresentasaun uluk nanain hau hakarak fo informasaun oituan kona ba ANPM. • ANPM hanesan Instituisaun ida ne'ebe tutela ba Ministerio Petroleo no Rekursu Minerais, inklui TimorGap no Instituto do Petroleo e Geologia (IPG). • ANPM nia papel sai hanesan autoridade ida ne'ebe mak responsavel no regula ba atividade explorasaun • Iha apresentasaun ida ne'e hau sei koalia liu kona ba parte Rekursu Minerais nian liu husi peskija ou drone survey iha area Raiketan, Municipiu Covalima. • Atu maneija material konstrusaun sira ne'e ami fahe material sira ne'e ba regiaun balun, bazeia ba diploma Ministerial. Regiaun ne'ebe material konstrusaun barak liu mak regiaun 2 no regiaun 3. • Agora dadaun ANPM utilija teknolojia drone hodi promove siguransa, eficiente, akurasaun no halo estimasaun ba volume stockpiles ho diak. • Saida mak drone? Drone ne'e hanesan aviaun kiik ida ne'ebe semo hodi halo kontrola ba area ne'ebe sai hanesan ita nia targetu no bele halo gravasaun ba area ne'ebe ita ema labele asesu. Drone ne'e rasik bele semo ho posisaun metro 100. No atu kontrola drone ne'e rasik ita uja GPS. • Objetivu husi projeitu ida ne'e mak atu apoio konstrusaun local sira wainhira uja material sira ne'e. 	<p>Name: LUIS THEOFILO Institution: IPG Question/Clarification: Bele ka lae ho dadus husi drone survey ne'e bele kalkula reserve Minerais ?</p> <p>Answer: *Sim, Bele. Drone bele halo, mas ita tenke iha uluk dadus baseline ne'ebe hanesan molok halo aprovasaun ba area ne'e. * Dadus baseline ne'e tenke foti ho linha paramentru hanesan uja drone e depois it abele calcula ninia diferensia entre sedauk halo eskavasaun VS no halo ona eskavasaun VS. Maibe ita mos tenke halo ninia asumption ba tebal hosi Top soil.</p> <p>Name: DIVA CABRAL Institution: IPG Question/Clarification: Drone is great technology, it does not require much human energy to going out to the field, saving money, time etc. However I am pretty sure this technology</p>



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- Survey husi drone ida ne'e foka liu ba setor mineru no nia apliksaun bele utilija ba iha setor Industria, Agrikultura, Investigasaun Foresick, Bombeiros, Planiamentu no seluk-seluk tan.

has limitations and disadvantages, what effort will you take when wild animal attacks like eagle capture drone?

Answer :

Yes, if the animal like eagle catch the drone, that is the problem. The other problems that you could not run the drone at night of even rainy season with heavy cloudy. But, more advantage of using drone will be helpfully otherwise we need to upload the software. The other problems is you have to run the drone just in locally, meaning that it depend on the signal. But I know that, the better control of quarry is now drone pretty much better.



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Dili 23-26 October 2018

Note Taker's Document

Date: 25/10/2018

Time: 15:25-15:40

Conference Day: 3

Venue: CCD

Conference Speaker: Moises Soares (IPG)

Presentation Title/Topic: Integrating Geophysical Airborne and Geological Data to Characterize Karst Aquifer at Baucau Plateau-Baucau Municipality Timor Leste.

Presentation Notes	Q&A
<ul style="list-style-type: none"> • Integrasaun dados geologia no geofizika aero atu karakteriza sistema akuiferu karstiku iha Baucau. • Main flow groundwater ba iha Watabou, Boucoli, no Wailili. • Valor resistividade aas interpreta hanesan baucau limestone, no valor resistividade kik interpreta hanesan arjila husi formasaun viqueque. • Husi dados magnetiku revela iha estrutura falha ida iha parte norte ho ninia diresaun NE-SW. • Limestone ho karst mahar iha parte norte no mihis iha parte sul. Modelu inversaun resistividade kontrola husi dados posu no ground TDEM. • Husi rezultadu rekomenda halo estudu geofizika klean liu tan ho metodu mak hanesan : Resistividade iha parte norte. 	<p>Name: Amelia Matos Institution: FETO ENGINARIA</p> <p>Question/Clarification: Entre aquifer norte ho sul ida nebe mk kuantidade be barak?</p> <p>Answer: Husi dados magnetiku indika iha strutura iha parte norte ho diresaun NE-SW, strutura ida ne izola tiha be rai okos neduni be hirak ne sulin ba liu hotu area Baucau no Uatabo. Neduni parte norte hetan deit seasonal spring (be matan mosu iha tempu udan deit) no parte sul mak main underground drainage. Interpretasaun kuantitativu katak be iha parte sul barak liu parte norte.</p> <p>Name: Domingos Mendonca Institution: UNTL Question/Clarification: Tesi ai fo impaktu ba be glae? Fatuk Baucau rasik fo impaktu ba be ga lae?</p>



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	<p>Answer: Ai nudar media ida importante tebes atu akumulula be rai okos, tamba ai horis rai rezerva ba barak. Kuandu ai horis la iha udan ben monu ba rai sulin ba liu mota no kontinua ba tasi. Neduni tesi hotu ai fo impaktu negativu ba be rai okos. Hare fila fali ba fatuk, iha Baucau rasik be iha karstiku. Neduni kuantidade be rai okos iha karstiku depende ba disolusaun ba karst ne rasik. Wainhira iha konduitu barak sei akumulula be barak, konduitu uitoan be uitoan.</p> <p>Name: Gilson Institution: NZ STUDENT Question/Clarification: Timor Leste iha ona lei regula esplorasau be rai okos?</p> <p>Answer: Lei esplorasau be rai okos sei draft hela. Atu hatene krize be ou lae presija halo estudu detalyu liu tan hanesan nia recharge area (Marcal Ximenes)</p>
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Date: 25/10/2018

Time: 15:45-16:00

Conference Day: 3

Venue: CCD

Conference Speaker: Joantina Belo Ornai (UNTL)

Presentation Title/Topic: Geological Mapping and Groundwater Quality Analysis of Karst Aquifer in Baucau Municipality

Presentation Notes	Q&A
<ul style="list-style-type: none"> • The great concern of the geological resources in Baucau Municipality is a water resource essentially in Baucau village. • The purpose of this research are : <ol style="list-style-type: none"> 1. Understand the geological framework of the research area 2. To characterize the hydrogeology condition on the research area 3. To distinctly analyse the water quality as well identify the type of water contamination and its sources. • The Research Methodology consist of : Literature review, Data collection, Data Processing, Interpretation and Analyses and Evaluation and presentation. • There are four lithostratigraphic units : clay complex unit, white shale unit, coral limestone unit and alluvium. • Hydrogeology condition The drainage of subsurface water at low elevation is called by spring. The spring is one of the hydrogeological conditions that exists in the research area. There are two main springs type such as Uailili's and Uaimorimata's spring consist by bedding's spring that occurs due to the lithology contact of limestone and white shale. Caibada Uaimua's and Uailia's spring consist by fracture's spring that occurs due to fracture zone of the limestone or dissolution area. Coral limestone is a permeable rocks that makes it easy to dissolve when contact directly with water and it will create its own flow and 	<p>Name: Gaspar Institution: Ministerio Saude Question/Clarification: Iha Ita bo'ot sira nia rezultadu peskija, ita bo'ot sira hetan bee matan balun iha kontamina no ita bo'ot sira rekomenda ona ba ministerio relevante k oinsa?</p> <p>Answer : Ami nia estudu ida ne'ebe foin hare liu ba parte akademiku no sei halo peskija detailu liu tan no husi peskija ne'e mak sei rekomenda ba suco sira atu prevene no proteje, no husi Ministerio saude mos fahe ona kartopiru hodi proteje kontamina ne'e rasik.</p> <p>Name: Domingos Mendonca Institution: UNDIL Question/Clarification: Bee matan ne'ebe kontamina ne'e sei iha tan seluk ou mak ida temi ne'e deit?</p> <p>Answer : Bee matan iha pontu 4 mak identifika baseia ba dadus jeolojia nian.</p> <p>Name: Gilson</p>



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well store the water. However, coral limestone is a one of Karst Aquifer.

- Discussion:

Based on the geological condition of the research area in geological map, it shows fourth lithostratigraphic units: clay complex unit, white shale unit, coral limestone unit and Alluvium. The observation point is limestone unit because it is a permeable layer and it is possibility of being the karstic aquifer.

The aquifer system of Baucau region was indicated on the hydrogeological map, is covered by karst aquifer with its distribution to about 121.52 Km² of area. On the other side, there is also the intergranular and localized aquifer. The intergranular aquifer is located along the NE coast covered by the alluvium and the localized aquifer is located along the NE coast and SE coast covered by a clay unit and a white shale unit.

- Groundwater Flow Direction of the research area by aerial photo observation:

The groundwater flow line of the karst aquifer in research area shows that the zone A and Zone B flow line interpretation very different of each other.

Zone A, it has dye tracing methods (*Australia Geoscience, 2012*) for water flow direction which indicate by two colors of green and pink, where the green color is a fluorescein and pink color is a Rodhamine WT. This dye tracing methods indicates to Ualili and Uaimorimata springs shown that the spring source's comes from Uailiabere and Uailiamata spring where those springs are located in SW of the area.

Zone B, there is no any indication of dye tracing methods results of these two color of fluorescein and Rodhamine WT, that's means the

Institution: NZ Student

Question/Clarification: Timor Leste iha ona lei regula esplorasauun be'e rai okos klae?

Answer : Hau ladun hatene klaru kona ba asuntu ne'e, karik ida ne'e diresauun nasional de Agua no saniamentu mak servisu ba ida ne'e.



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water flow comes from circulation of meteoric water.

- Source of groundwater contamination of Baucau karstic aquifer :
In the research area there are two sources of contamination: Punctual and Diffuse contamination.
According to the result of the laboratory test of water quality by the water sample of those springs. On the North coast was affected by more contamination from: New Baucau referral Hospital for its remnants septic tank. Oil storage tank there are three oil tank points. Infrastructures: buildings and so many shops and others.
While on the SE coast and E also consists of less than contamination point's but are dominating of diffuse contamination due to the existence of much agricultural activity in that area.
- Conclusion
The Research area is located along the East coast the Timor Island stands out at Baucau Village of the Baucau Municipality.
This project is composed of various Sucos such as Bahu, Buibau, Caibada, Gairuai, Tirilolo, Triloca and Uailili its about 8 x 15 km².
There are four lithostratigraphic units: clay complex unit, white shale unit, coral limestone unit and alluvium.
Owing to the geological condition it is classified in three types of aquifers, intergranular aquifer, karstic aquifer and localized aquifer.
Owing to the geological condition it is classified in three types of aquifers, intergranular aquifer, karstic aquifer and localized aquifer.
According to the laboratory test result the quality of groundwater by those springs indicate the physical, chemical properties are normal while the bacteriological property is enormous of microbe of Coliforms and E. coli. With the existence of microbial in the composition of water will affect the quality of groundwater and influence the degree of



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contamination in drinking water.	
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Note Taker's Document

Date: 25/10/18

Time: 16:00-16:15

Conference Day: 3

Venue: CCD

Conference Speaker: Nazario Gomes (DIT)

Presentation Title/Topic: Alteration of Mineralization due to Hydrothermal Processes in Aileu Formation

Presentation Notes	Q&A
<ul style="list-style-type: none"> • Research objective Alteration, mineralization in Aileu formation, which is based on field studies and laboratory analysis. • Research methodology The methodology used to collect data that is both primary and secondary as much as possible relating to the structure and mineralizes with geological mapping and analyzing laboratory scale: Geomorphic Unit Analysis Geological Structure Analysis Petrographic Analysis XRD analysis (analytical spectral device) AAS analysis (Atomic Absorption Spectrophotometry) Fluid Inclusion Analysis • Geology of research areas Geomorphology - based contour patterns, the study area can be divided into 4 units of geomorphology, the unit corrugated weak, strong corrugated unit, mountain range and Alluvial deposition unit (Van Zuidam, 1983). Stratigraphy - The Research Area is existing of rock units from young to old. The unit is; Alluvial (Qal) deposits, Ainaro Formation (Qpa), Aileu Formation/metamorphic (gabbro, ultrabasic, plagiogranite, intrusion, and Dunit). Structure of Geology - The geological structure that developed in the study area are fracture (joint) and fault, these happened the litology 	<p>N/A:</p>



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have low elasticity and brittle, so it tends to be flat and folded land.

- Hydrothermal Alteration Research Area
Argilic Alteration Fatuahi, Silicification Alteration, Dili,
It also found several minerals such as: Pyrite Mineral, Quartz Pyrite,
Argilic Alteration, Silicification alteration, Prophylic alteration,
Pyrite.
It also analyzes the Fluid Inclusion; Temperature Homogenization
(Fluid Current Conditions) From Based on These Data (psg bandung).
- Determination of Rock Age research area of the Gabbro intrusion,
diorite unconformity with schist, near Fatukahi, Dili, where gabbro
present as intrusion rock, it analyzes using the AAS and XRF.
The result also shows, the Alteration and Mineralization Map of Study
Area.
- Conclusion
The structure that control in the research area are related to regional
tectonics. The structure formed in the study area are fracture and fault.
Alterations that occur in the study area and its surroundings are divided
into three types, namely: argillic type, silicification type, propylitic
type epidote alteration, chlorite and quartz vein.
The research area mineralization is mostly found in schist and
filamentous metamorphic rocks, and igneous rocks, gabbro, diorite
with coarse sand size material to lumps. Alteration characteristics and
mineralization in the study area and its surroundings can be grouped
into the type of low sulfidation epithermal mineralization.
The results of microtermometry shows homogenization temperature
(conditions at fluid concatenation) from 164.2 ° -201.7 ° C, with a
depth calculation of 28.32-116.23m, and a pressure of 4.62-11.50 bar.
Based on these data, it is estimated that quartz-carrying fluid minerals



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formed and grew in the Epithermal.	
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