RECUPERAÇÃO DO FURO DAS CANCELAS — HORTA

PROJETO GENESIS

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INTRODUÇÃO AO PROJETO GENESIS

Consórcio, objetivos e WP



OS DEMONSTRADORES DO PROJETO GENESIS

Nature Based Solutions e os vários demonstradores.



O DEMONSTRADOR D#7 FAIAL

Recuperação do furo das Cancelas



TRABALHOS EM CURSO

Análise da informação disponível (geologia, hidrogeologia, deteção remota) e reprocessamento de dados históricos (geoelétrica).



TRABALHOS EM PREPARAÇÃO

Eventual reprocessamento dos dados de gravimetria. Preparação de campanhas de geofísica e caderno de encargos para a realização dos furos.



O que é o projeto GENESIS

Acrónimo de:

Geologically Enhance	d NaturE-based	Solutions fo	r climate ch	hange resilienc	v of critical	water InfraStructure

Soluções geologicamente melhoradas baseadas na natureza para resiliência às alterações climáticas de

		.1.	1
infraestruturas	criticas	ae	agua
	011410010	0. 0	0.00.0.









Horta



CANARAGUA



- ☐ HORIZON Innovation Actions;
- ☐ 20 parceiros;
- 9 demonstrators, Açores, Madeira, Canárias, Cabo Verde);
- ☐ Início 1/9/24
- Duração 48 meses



TENISCA





















Laboratório Nacional de Energia e Geologia (LNEG);



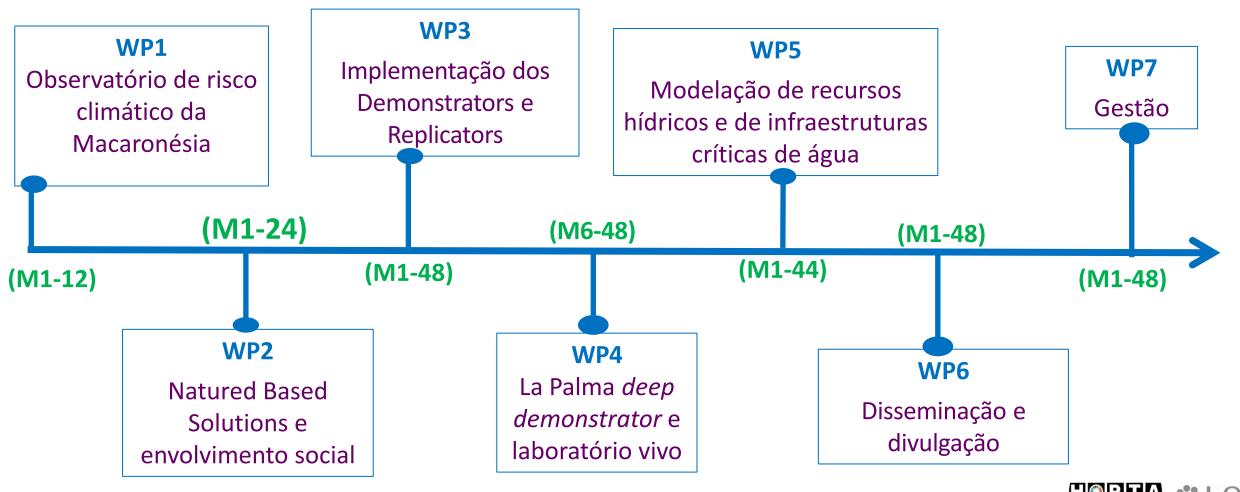






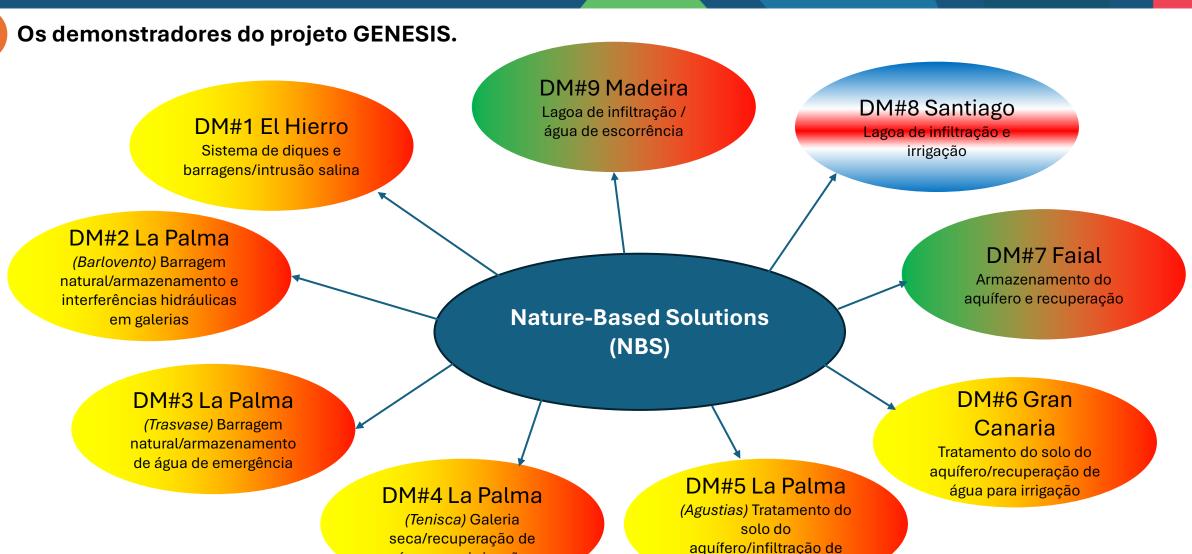


O que é o projeto GENESIS







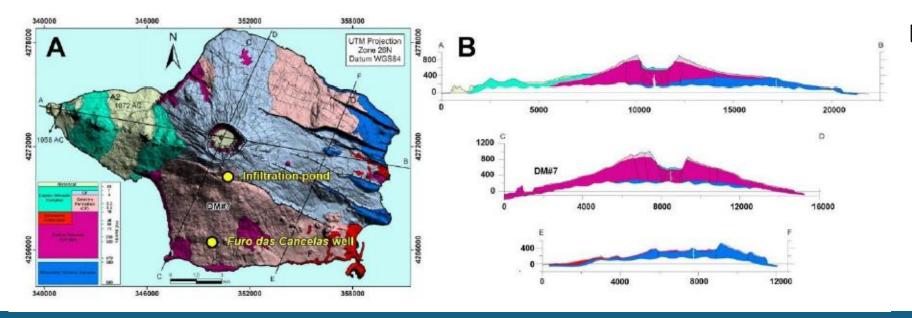


águas de escorrência

água para irrigação



- ☐ Utilização do excesso de água potável acumulada em barragens/lagoas de rega existentes a montante, para restabelecer a capacidade de abastecimento de água doce do Furo das Cancelas.
- ☐ O Furo das Cancelas tem uma produção de cerca de 50 m³/h, funcionando ininterruptamente 24 horas nos últimos 50 anos, e é a única fonte de água para uma população de cerca de 3000 habitantes.
- ☐ Infraestruturas importantes, como o aeroporto da Horta, um grande produtor de laticínios e um hotel, também dependem deste poço de água.



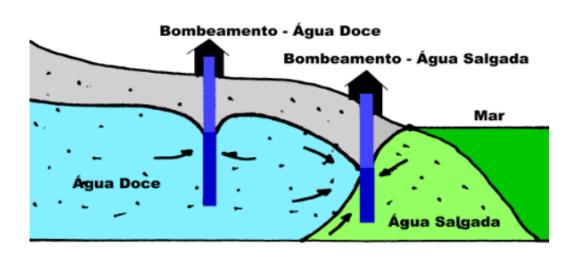
□ A conceção e construção deste sistema de armazenamento e recuperação de aquíferos seguirá a sequência metodológica aplicável a outros locais demonstradores.

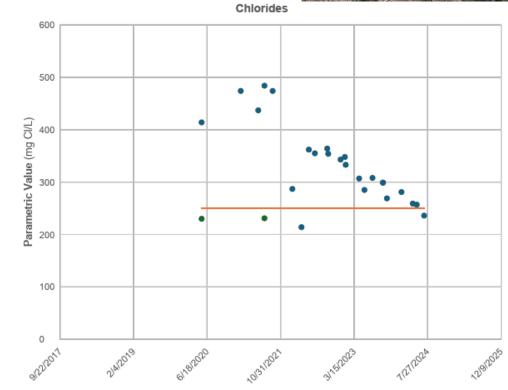


Furo das Cancelas

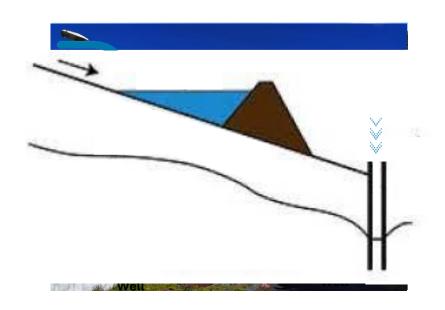
Problemas de intrusão salina

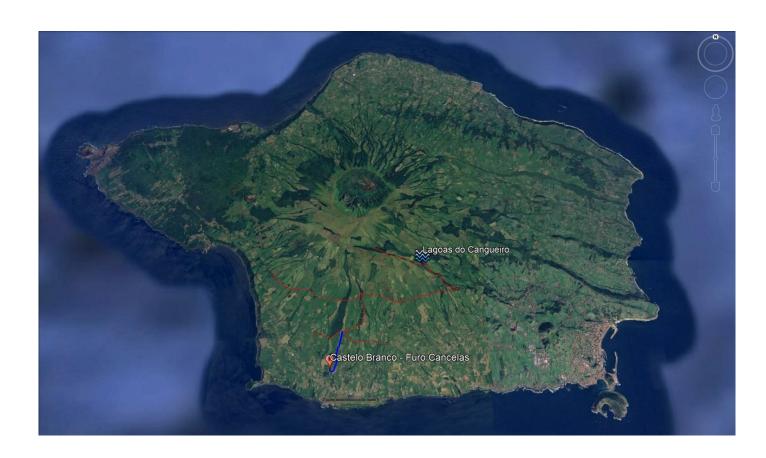
- Sobrexploração do aquífero
- Mudanças no uso do solo alterando a zonas de recarga
- Variações climáticas
- Flutuações no nível do mar



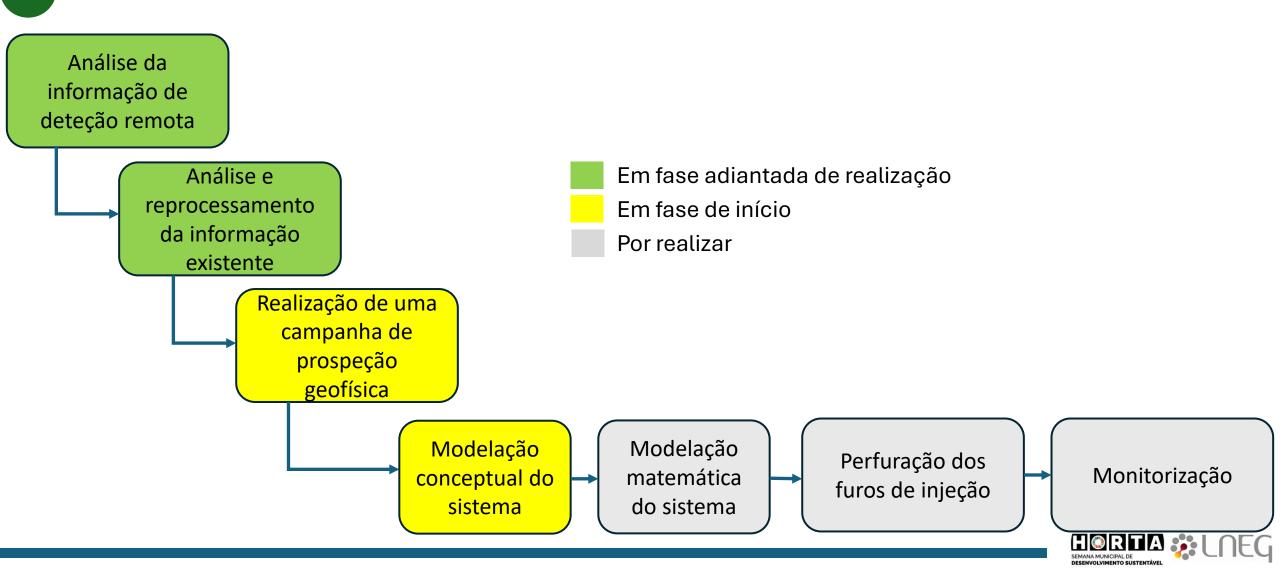


☐ Pretendem-se perfurar 2 a 4 poços de injeção para contrariar a intrusão de água salgada e melhorar a qualidade da água do Furo das Cancelas.









apoio aos trabalhos em curso.

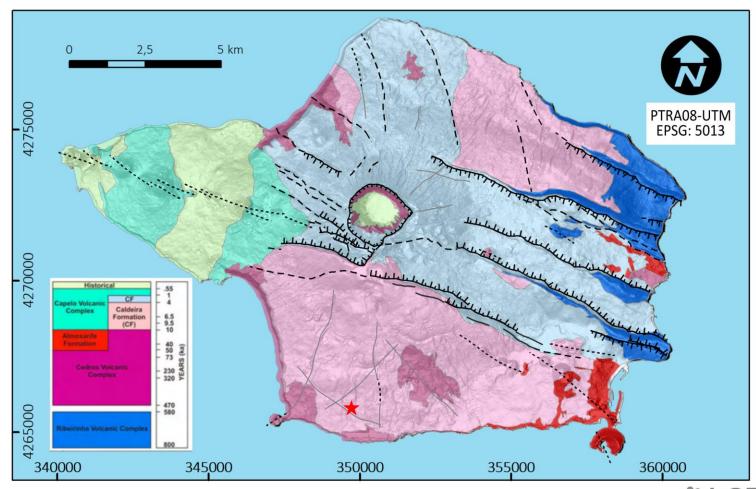
Trabalhos em curso

	☐ Dados topográficos;
	☐ Informação geológica e de utilização do solo;
	□ <i>Logs</i> de furos litológicos;
	🗖 Análises químicas da água;
<	☐ Níveis de água de furos;
l	☐ Caudais extraídos;
	☐ Processamento de dados geofísicos históricos (perfis de resistividade dipolo-dipolo,
	sondagens elétricas verticais (VES) e revisão da possibilidade de dados gravimétricos;
	☐ Deteção remota de dados de satélite;
	☐ Centralização da informação espacial na Geodatabase e geração de novas variáveis de



☐ Informação geológica Unidades vulcânicas e cartografia tectónica

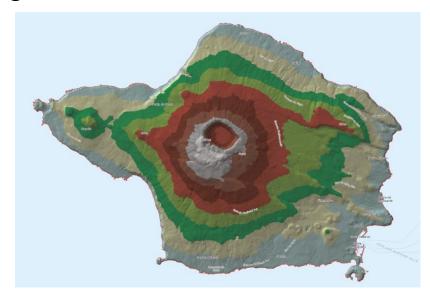
Adaptado de Serralheiro et al. (1987); Madeira (1998); Madeira & Brum da Silveira (2003); Madeira et al. (2013).

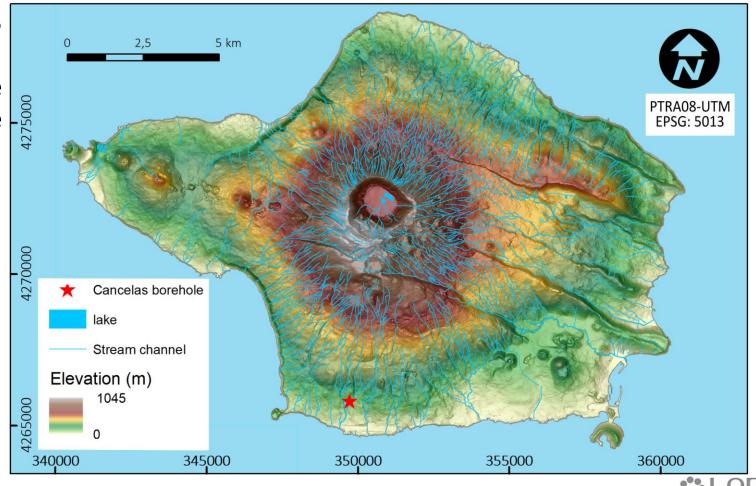


04

Trabalhos em curso

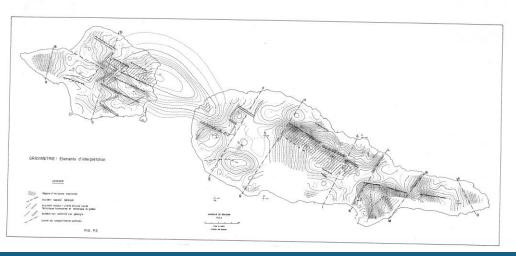
- Dados topográficos
- Revisão e correção do MDT disponível (5 m)
- Informação muito importante, caso se venha a encontrar a informação de gravimetria em falta.

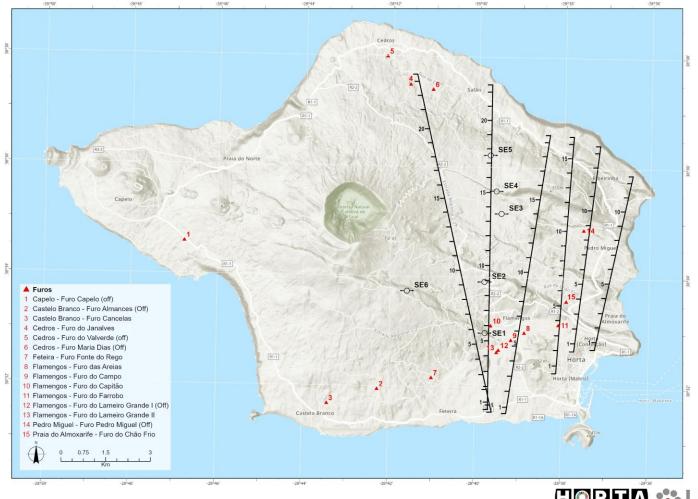




- ☐ Processamento de dados geofísicos históricos (prospeção geotérmica, 1982)
- perfis de resistividade dipolo-dipolo;
- sondagens elétricas verticais (VES);

gravimetria (?)





RECUPERAÇÃO DO FURO DAS CANCELAS – HORTA PROJETO GENESIS

04 Trabalhos em curso

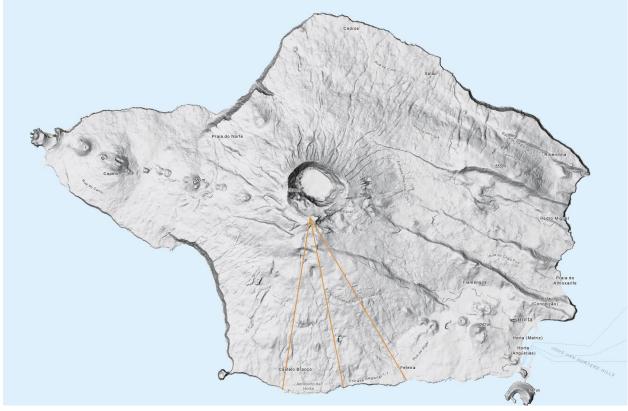


☐ Centralização da informação espacial em Geodatabase e geração de novas variáveis para apoio aos trabalhos em curso.

SOLOS - TIPOS E COBERTURAS

TOPONÍMIA

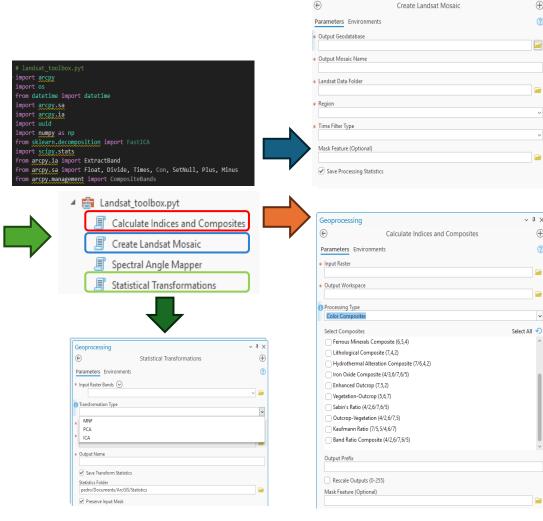




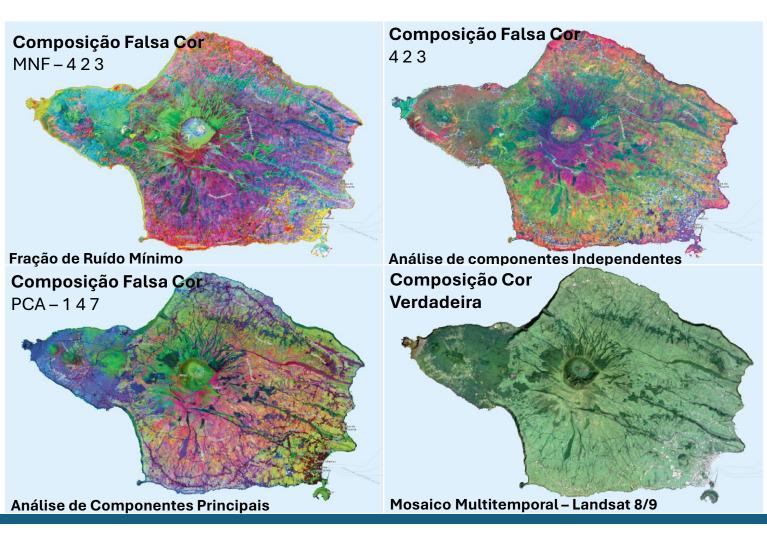


□ Desenvolvimento de ferramentas específicas para criação de mosaicos multitemporais, rácios entre bandas, composições coloridas e transformações estatísticas de dados Landsat (collection 2 level 2) e futuramente Sentinel 2 L2A.

```
from arcpy.ia import ExtractBand, TransposeBits, Clip, GeometricMedian
from arcpy.sa import PrincipalComponents, ExtractByMask, Times, Float, Divide
gdb = r"C:\Faial\Geodatabase\GENESIS.gdb
data_folder = r"C:\Faial\Descomprimido"
mask feature = r"C:\Faial\Mascara Faial\Faial 32626.shp"
md = os.path.join(gdb, name)
    """Check if a raster is valid""
    return raster is not None and arcpy.Exists(raster)
def find landsat folders(root dir):
     """Find all Landsat 8 and 9 folders"
    for dirpath, dirnames, filenames in os.walk(root dir)
            if file.lower().endswith('_mtl.txt') and ('LCO8' in file or 'LCO9' in file):
                landsat_folders.append((dirpath, 'Landsat 8' if 'LC08' in file else 'Landsat 9'))
    return landsat folders
def remove_cloud(item, current, total):
       print(f"\nProcessing item {current} of {total}")
        raster_item = item["Raster"]
        data_raster = ExtractBand(raster_item, [1, 2, 3, 4, 5, 6, 7])
        cloud_mask = TransposeBits(qa_raster, [0, 1, 2, 3, 4], [0, 1, 2, 3, 4], 0, None)
        clean raster = Clip(data raster, value mask)
        print(f"Cloud removal completed for item {current}")
        print(f"Error in cloud removal for item {current}: {str(e)}")
        return None
    """Part 1: Create mosaic dataset and process scenes""
```







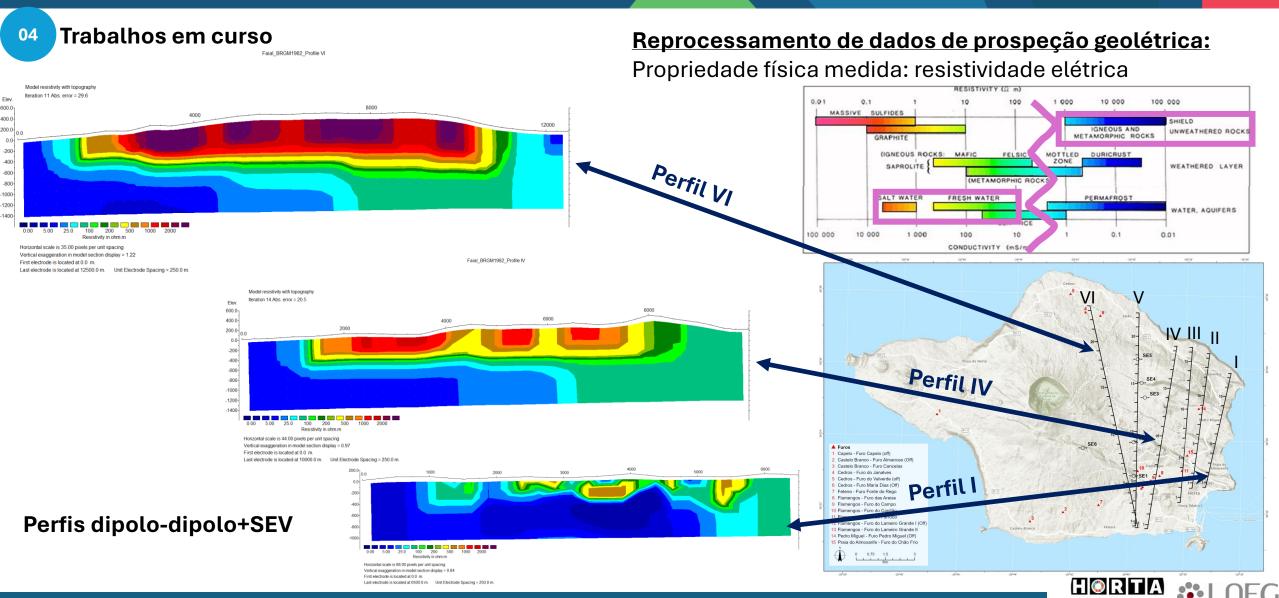
		produced by Prin	cipal Component	3				
٠	Inpu	t raster(s):						
ŧ			database2\Faial	_TESTESCRIPT.g	db\Faial_V4_Ma	sked		
# The number of components - 7								
	Outp	ut raster(s):						
		C:\Faial\Pro	ojeto\Genesis_Fa	ial\Default.gd	b\Princip_1			
		COMPT	NICE MATRIX					
	Layer	1	2	3	4	5	6	7

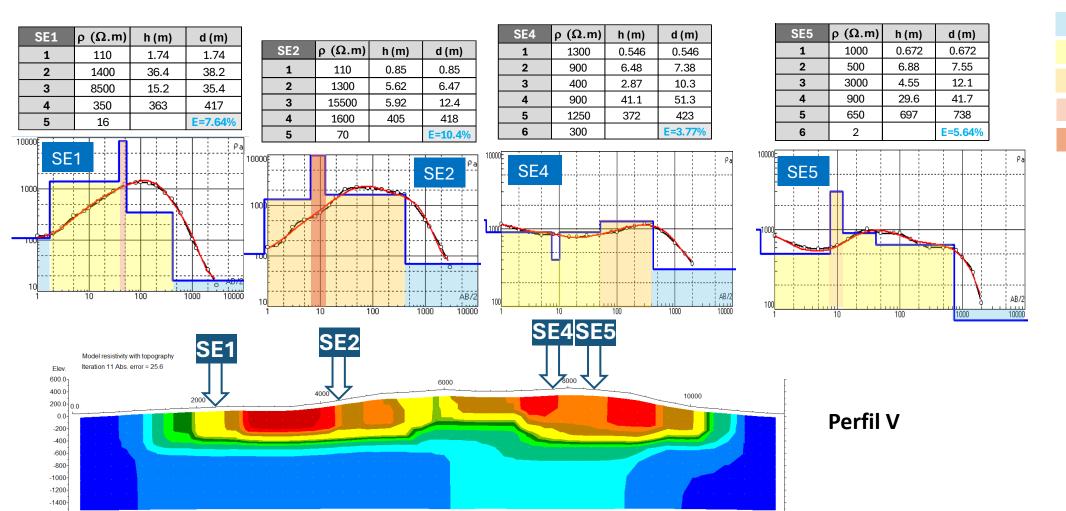
	1	1,064100e+05	1,154139e+05	1,432645e+05	1,669180e+05	1,37258Be+05	3,082525e+05	2,303633e+05
	2		1,275864e+05					
	3	1,432645e+05	1,623964e+05	2,470301e+05	2,540805e+05	5,520811e+05	6,194727e+05	3,932736e+05
	4		1,898300e+05					
	5	1 3775886+89	1,462677e+05	5.5208110+05	2 8185346485	5.443939e+86	2.2150970406	7 5186910485
	6	1 0825250+05	3,512017e+05	6 1947270+05	5 893667e+05	2 2150070+06	1 993821=+06	1 1250520+06
	7	2 3036330+05	2,623699e+05	3 932736#+95	4 442719e+85	7 518601e+85	1 1259520+06	7 5678670+05
		2,363633646.	2,0230990403	3,9327300903	4,442/190103	7,3100910403	1,1239320900	7,3070020903
		CORRELA	ATION MATRIX					
	Layer	1	2	3	4	5	6	7
	1	1,00000	0,99852	0,88363	0,91681	0,18834	0,66923	0,81177
	2	0,99852	1,00000	0,91474	0,95220	0,17551	0,69632	8,84436
	3	0,88363	0,91474	1,00000	0.91593	0,47607	0,88268	0,98956
	4	8.91681	8,95228	8,91593	1,00000	0.15501	0,74772	
	5	0.1803/	0.17551	0.47607	0.15501	1 00000	0,74772 0,67235 1,00000	0,37842
	6	0 66021	0 69632	0.88268	0.74772	0 67235	1 00000	8,91662
	7	0,0092.						
				0.00000	0.01503	0.33043	0.01663	1 00000
		0,81177	0,84436	0,91474 1,00000 0,91593 0,47607 0,88268 0,90956	0,91502	0,37842	0,91662	1,00000
		EIGENVALUE	S AND EIGENVECT	ORS		0,37842	0,91662	1,00000
	Number of	EIGENVALUE Input Layers	S AND EIGENVECT	ORS	t Layers			1,00000
	Number of	EIGENVALUE	ES AND EIGENVECT	ORS		e,37842 5	0,91662 6	1,00000
	Number of	EIGENVALUE Input Layers 7 1	S AND EIGENVECT Number of Prir 2	Conscipal Componer 7 3	t Layers	5	6	1,00000
	Number of PC Layer Eigenvalue	EIGENVALUE Input Layers 7 1	S AND EIGENVECT	Conscipal Componer 7 3	t Layers	5	6	1,00000
	Number of PC Layer Eigenvalue	EIGENVALUE Input Layers 7 1 1 6949909,45256	S AND EIGENVECT Number of Prir 2	Conscipal Componer 7 3	t Layers	5	6	1,00000
	Number of PC Layer Eigenvalue Eigenvecto Input Laye	EIGENVALUE Input Lauers 7 1 8 6949989,45256	Number of Prin 2 8 1878335,88307	ORS cipal Componer 7 3 123290,37461	4 19455,06084	5 11496,68175	6 4305,74622	1,00000 7 284,56320
	Number of PC Layer Eigenvalue	EIGENVALUE Input Layers 7 1 1 6949909,45256	Number of Prin 2 8 1878335,88307	ORS cipal Componer 7 3 123290,37461	4 19455,06084	5 11496,68175	6 4305,74622	1,00000 7 284,56320
	Number of PC Layer Eigenvalue Eigenvecto Input Laye	EIGENVALUE Input Lauers 7 1 8 6949989,45256	S AND EIGENVECT Number of Prin 2 8 1878335,88307	ORS cipal Componer 7 3 123290,37461	19455,06084 0,21487	5 11496,68175	6 4305,74622	1,00000 7 284,56320
	Number of PC Layer Eigenvalue Eigenvecto Input Laye	EIGENVALUE Input Laners 7 1 2 6949909,45256	28 1878335,88307 7 0,18822 6 0,20630 5 0,23650	ORS cipal Componer 7 3 123290,37461 0,42583 0,43479 0,33267	19455,06084 0,21487	5 11496,68175 8,61696 8,31744	6 4305,74622 -0,9983 -0,91758	7 284,56320 -0,58913 0,79022
	Number of PC Layer Eigenvecto Input Laye	EIGENVALUE Input Layers 7 1 2 6949909,45256 CS C 0,05600 0,12956	28 1878335,88307 7 0,18822 6 0,20630 5 0,23650	ORS cipal Componer 7 3 123290,37461 0,42583 0,43479 0,33267	19455,96684 0,21487 0,19882 0,30567	5 11496,68175 8,61696 8,31744 -8,48713	6 4305,74622 -0,09883 -0,01758 0,65420	7 284,56328 -0,58913 0,79022 -0,1481
	Number of PC Layer Eigenvelue Eigenvecto Input Laye	EIGENVALUE Type Laggers 1 6949909,45256 8,05608 9,12598 8,0800	ES AND EIGENVECT Number of Prir 2 8 1878335,88307 7 0,18022 6 0,20630 9 0,23667 6 0,33667	ORS 123290,37461 0,42583 0,43479 0,38261 0,4126	19455,06084 0,21487 0,1982 0,30567 0,27684	5 11496,68175 8,61696 8,31744 -8,48713 8,47348	6 4305,74622 -0,9983 -0,6175 0,65420 -0,626420	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832
	Number of PC Layer Figenvalue Figenvecto Input Laye 3 4 5	EIGENVALUE 7 1 2 6949909,45256 CS 0,05606 0,1299 0,0806 0,1899 0,8806	ES AND EIGENVECT Number of Print 2 8 1878335,88307 7 0,18822 9 ,28630 9 ,2366 9 ,3563 9 ,3563 9 ,4563 9 ,4563	ORS 123290,37461 0,42583 0,43479 9,38261 0,41219 0,15647	4 19455,86884 8,21887 9,39567 -0,27684 -0,12124	5 0,61696 0,31744 -0,48713 -0,4734 0,61438	6 4305,74622 -8,99883 -0,81758 8,65420 -0,62645 -0,62645	7 284,56320 -0,58913 0,79022 -0,14834 -0,07892 0,07892
	Number of PC Laver Eigenvalue Eigenverto Input Lave 2 3 4 5 6	EIGENVALUE Input Lawers 7 1 2 6949999,45256 6 0,85686 6,12599 0,8886 0,4668	8 AND EIGENVECT Bumber of Prin 2 8 1878335,88307 7 0,18022 5 0,20630 9,2365 0,35063 0,43505 0,43509 0,5100 0,43129 0,5100	ORS 123290,37461 0,42583 0,43479 9,38261 0,41219 0,15647 -0,52547	4 19455,96884 8,21487 8,19882 9,30567 -0,27684 -0,12124 9,4631	5 11496,68175 8,61696 8,31744 -8,48713 -8,47348 8,61438 -9,41438	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
	Number of PC Layer Figenvalue Figenvecto Input Laye 3 4 5	EIGENVALUE 7 1 2 6949909,45256 CS 0,05606 0,1299 0,0806 0,1899 0,8806	8 AND EIGENVECT Bumber of Prin 2 8 1878335,88307 7 0,18022 5 0,20630 9,2365 0,35063 0,43505 0,43509 0,5100 0,43129 0,5100	ORS 123290,37461 0,42583 0,43479 9,38261 0,41219 0,15647 -0,5253	4 19455,06084 8,21487 8,19882 9,30567 -0,27684 -0,12124 9,4631	5 11496,68175 8,61696 8,31744 -8,48713 -8,47348 8,61438 -9,41438	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
	Number of PC Laver Eigenvalue Eigenverto Input Lave 2 3 4 5 6	EIGENVALUE Input Lawers 7 1 2 6949999,45256 6 0,85686 6,12599 0,8886 0,4668	8 AND EIGENVECT Bumber of Prin 2 8 1878335,88307 7 0,18022 5 0,20630 9,2365 0,35063 0,43505 0,43509 0,5100 0,43129 0,5100	ORS 123290,37461 0,42583 0,43479 9,38261 0,41219 0,15647 -0,52547	4 19455,96884 8,21487 8,19882 9,30567 -0,27684 -0,12124 9,4631	5 11496,68175 8,61696 8,31744 -8,48713 -8,47348 8,61438 -9,41438	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
	Number of PC Laver Eigenvalue Eigenverto Input Lave 2 3 4 5 6	EIGENVALUE Input Lacers 7 1 2 6949999,45256 6 8,9560 8,12999 8,8800 8,4588 8,2050	8 AND EIGENVECT Bumber of Prin 2 8 1878335,88307 7 0,18022 5 0,20630 9,2365 0,35063 0,43505 0,43509 0,5100 0,43129 0,5100	70%S ccipal Componer 7 3 123290,37461 0,42583 0,43479 9,38261 0,41219 0,15647 -0,52533 -0,11352	4 19455,96884 8,21487 8,19882 9,30567 -0,27684 -0,12124 9,4631	5 11496,68175 8,61696 8,31744 -8,48713 -8,47348 8,61438 -9,41438	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
	Number of PC Layer Figenvalue Figenvecto Input Laye 1 2 3 4 5 6 7	EIGENVALUE Input Lacers 7 1 6949909,45256 6 6,9500 9,1299 9,8468 9,4688 9,2050 PERCENT AB EigenValue Ps	Bumber of Pris 2 9 1878335,88307 0 ,18022 0 ,26600 0 ,26600 0 ,06900 0 ,049329 0 ,499329 0 ,49941	ORS 123290,37461 0,42583 0,41479 0,38261 0,41210 0,15647 -0,52533 -0,11352 EEGENVALUES Accume	4 19455,06084 9,21487 9,19882 9,39567 9,172124 9,46311 -0,71767	5 11496,68175 0,61696 0,31744 -0,47340 0,0139 -0,01967 0,23849	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
	Number of PC Layer Figerwalue Figerwecto Input Laye 3 4 5 6 7 PC Layer 1 69	EIGENVALUE Input Layers 7 1 2 6949999,45256 C 0,0593 0,85600 0,1259 0,84680 0,4588 0,4588 0,2059 PERCENT AB EIGENVALUE EI	18 AND EIGENVECT Number of Prin 2 9 1878335,88397 7 0,18922 6 0,28690 6 0,25667 6 0,35667 7 0,51892 0 0,49911 D ACCUMULATIVE encent of Electron 77,3320	ORS rcipal Commoner 7 3 123290,37461 0,42583 0,43479 0,38261 0,41219 0,15647 -0,52533 -0,4258 EEGENVALUES FALUES	4 19455,06084 0,21487 0,19882 0,30567 -0,27668 0,46311 -0,71767	5 11496,68175 0,61696 0,31744 -0,47340 0,0139 -0,01967 0,23849	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
	Number of PC Laurer Figerwalue Fi	EIGENVALUE Input Layers 7 1 2 6949909,45256 C 0,0503 0,0500 0,12990 0,8880 0,4588 0,4588 0,2590 PERCENT AB EIGENVALUE E49909,45250 PERCENT AB	Bumber of Pris 2 9 1878335,88307 0 ,18022 0 ,26600 0 ,26600 0 ,06900 0 ,049329 0 ,499329 0 ,49941	ORS rcipal Commoner 7 3 123290,37461 0,42583 0,43479 0,38261 0,41219 0,15647 -0,52533 -0,4258 EEGENVALUES FALUES	4 19455,06084 9,21487 9,19882 9,39567 9,172124 9,46311 -0,71767	5 11496,68175 0,61696 0,31744 -0,47340 0,0139 -0,01967 0,23849	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
	Number of PC Laurer Figerwalue Fi	EIGENVALUE Input Layers 7 1 2 6949909,45256 C 0,0503 0,0500 0,12990 0,8880 0,4588 0,4588 0,2590 PERCENT AB EIGENVALUE E49909,45250 PERCENT AB	18 AND EIGENVECT Number of Prin 2 9 1878335,88397 7 0,18922 6 0,28690 6 0,25667 6 0,35667 7 0,51892 0 0,49911 D ACCUMULATIVE encent of Electron 77,3320	ORS Cipal Componer 7 3 123299,37461 0,42583 0,43479 9,38261 0,4219 0,15647 -0,52533 -0,11352 EEGENVALUES Accums 77 99	4 19455,06084 0,21487 0,19882 0,30567 -0,27668 0,46311 -0,71767	5 11496,68175 0,61696 0,31744 -0,47340 0,0139 -0,01967 0,23849	6 4385,74622 -8,89883 -8,81758 8,65429 -8,1229 -8,1229	7 284,56320 -0,58913 0,79022 -0,14834 -0,07832 0,00742
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	1 2	9.376051e+06	9.349479e+06	9.287279e+86	9.306019e+06	9.100106e+06	9.220095e+06	9.315792e+06	
	- 1	9.287279#+86	9.323427e+86 9.262425e+86	9.203244++05	9.2249150-06	9.854546**86	9.163779#+86	9.241832#+86	
	4	9.306019e+05	9.281418e+86	9.224915e+86	9.249286#+06	9.034499e+06	9.181534#+06	9.267784+05	
	5	9.100185#+05	9.876877#+06	9.054546e+06	9.034499e+06	9,3393586+06	9.114735e+06	9.081986#+06	
	6	9.220095e+06	9.198544e+86 9.292835e+86	9.1637790+06	9.181534e+06	9.1147350+06	9.227827e+06	9.244738e+86	
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	5	-9.385574e-04	4.141721e-04 8.887835e-04	-1.176447e-03	7.110336e-04	1,732922e-83	-1.369411e-03	7,653798e-84	
	2	-4-482789e-85	3.844542e-04	2.579209e-03	-5.621448e-81	7.653798e-86	-6.538748e-83	1.381639e-83	
		SIGNAL COV	MARIANCE MATRIX	(AFTER MHITEN	IZNG)				
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	1 2	5.005543e+01	2.978095e+01	2.705090e+01	1.704879e=01	-2.188507e+01	4.024522#+00	4.534859++00	
	2	2.9788936+81	4.842276e+81 4.318492e+81	4.3184926+01	2.9486346+81	-2.3351936+81	9.7866836+88	1.1921936+81	
	4								
	5	-2.180307e+01	-2.335193e+01	-2.126584e+01	-1.251641e+01	3.278595e+01	1.6510d6e-01		
	5	-2.188387e+01 4.024822e+00	-2.335193e+01 9.786683e+00	9.833442e+00	-1.251641e=01 7.057221e=00	3.278595e+01 1.651086e-01	1.651006e-01 1.235411e+01	-3,284071e+00 3.863995e+00	
	6 7	-2.188387e+01 4.024822e+00 4.534859e+00	1.192193e+01	1.226614e+81	8.6110194-00	-3.284871e+88	1.651006e-81 1.255411e+81 3.863998e+88	-3,284071e+00 3,863995e+00 7,971616e+00	
	6 7	4.534859e+00	1.192193e+01	1.226614e+01	8.6110194-00	-3.284871e+88	1.651886e-81 1.235411e-81 3.863998e+88	-3.284071e+00 3.863996e+00 7.971616e+00	
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	Mumber of Inc	4.534859e+00 SZGNAL-TO-NOI NAT LAYECS NA	1.192193e+01 ISE RATIOS (EIG UNDER OF PRIF CO	1.226614e-01 ENVALUES) Moonent Layers	8.611019e+00	-3.284871e+88	3.863998e+00	-3,284071e+00 3,363998e+00 7,971616e+00	
	Bumbec of Inc	4.534859e+00 SIGNAL-TO-MOI	1.192193e+01 ISE RATIOS (EIG UNDER OF PRIF CO	1.226614e-01 ENVALUES) Moonent Layers	8.611019e+00	-3.284871e+88	3.863998e+08	7.971616e+80	
	Mumber of Inc	4.534859e+00 SIGNAL-TO-MOI But Lavers &	1.192193e+01 ISE RATIOS (EIG ARDER OF PROF CO	1.226614e-01 ENWALUES) Moonent Layers	8.611019e+00	-3.284871e+88	3.863998e+08	7.971616e+00	
	6 7 Sumber of Inc. 7 PMF Lauer Eigenvalues	4.534859e+00 SIGNAL-TO-MOI But Lavers &	1.192193e+01 ISE RATIOS (EIG UNDER OF PRIF CO	1.226614e-01 ENWALUES) Moonent Layers	8.611019e+00	-3.284871e+88	3.863998e+08	7.971616e+00	
	Mumber of Inc PMF Laur Elementers Elementers Input Laur	4.534859±-00 SIGNAL-TO-MOI NVT LEXECS NA 148.08739	1.192193e+01 ISE RATIOS (EIG Amber of PMF Co 1 26.18820	1.226614e+81 ENWALUES) BOOMENT LAYERS 2 8,63821	8.611819e-08	-3.284871c+08	3.863998e+00 5 3.56924	7,971616e+00 6 3,21540	
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	Mumber of Inc PMF Laur Elementers Elementers Input Laur	4.534859±-00 SIGNAL-TO-MOI NVT LEXECS NA 148.08739	1.192193e+01 ISE RATIOS (EIG AMBER of PMF Co 1 26.18828 0.33360 -0.14321	1.226614e-01 ENVALUES) ROGRET LBURG 2 8.63821 0.69457 0.01287 -0.2179	7,78483 -0,33368 -0,12415 -0,0215	-3.284871e+08	3.863998e+08 5 3.56924 0.02640 0.50026	7,971616e+00 6 3,21540 -0,38187 0,55210	
	6 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4.534859e+00 SIGNAL-TO-MOI NUT Laxers No. 148.08739 -0.38219 -0.53416 -0.39310	1.192193e+01 ISE RATIOS (EIG ARBER OF PROF CO 26.10828 0.33300 -0.14321 -0.23701 -0.24907	1.226634e-01 ENVALUES) MODIFICIT LBURGS 2 8.63821 0.69457 0.01287 -0.22779 0.18196	7,78483 -0,33569 -0,12425 -0,06548	4.96915 0.85225 0.73219 0.73219	3.863998e+00 5 3.56924 0.2640 0.50026 -0.2467 -0.6613	7.971616e+00 6 3.21540 -0.30167 0.55216 0.0390 -0.13561	
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	Baster of Inc Translate Figure Lauer Timerunians Figure Lauer 1 2 2 3 4 5 5 5 7 7 This matrix 2 Cosponent	4.534659e-00 SIGNAL-TO-MOI 148.68739 -0.38229 -0.53390 -0.33565 -0.11864 COMPONENT COMMAND By Close 3	1.1921996-01 ISE RATIOS (EIG AMBER OF PRO CO 7 1 26.10820 0.33300 0.24321 0.24999 0.37670 0.37670 0.37670 0.37670 0.37670 0.37670 0.37670 0.37670 0.37670	1.226614c-01 ENWALUES) MOGRATI LAURCE 0.69457 0.02227 0.12364 0.13366 0.49865 X MARCELY (Gimpor	7.78483 -0.33569 -0.12420 -0.00014 -1.00000 -0.00000	4.56915 0.85225 0.31991 0.72219 0.90794 0.00794 0.00794	3.863998e+08 5 3.56924 8.82648 9.30826 -0.0467 -0.66326 8.56687	7,971516+00 6 3,21540 -0,38167 0,93216 -0,38167 -0,98169 -0,98149 -0,98149 -0,98149 -0,98149 -0,98149 -0,98149 -0,98149 -0,98149 -0,98149	7
	bashor of Inc PRO LANCE Timerovalues Figerovectors Input Laur 2 3 5 7 This matrix : Component	4.534659e-00 SIGNAL-TO-MOI 148.68739 -0.38229 -0.53390 -0.33565 -0.11864 COMPONENT COMMAND By Close 3	1.192199-01 SE RATIOS (EIG MIREC OF PRIF CO 7 1 26.18030 0.13300 0.13300 0.23701 0.23702 0.23702 0.23703 1.27030 1.27030 1.27030 1.27030 1.27030 1.27030 1.27030 0.27030 1.27030 0.270	1.226614c-01 ENWALUES) BROGGET LAURE C 8.63821 0.08227 0.08227 0.23779 0.18250 0.28805 0.28805 X X G.08000 0.08000 0.08000 1.000000 1.000000	7,78483 -0.33508 -0.12425 -0.06181 -0.06481 -0.12435 -0.12436 -0.12435 -0.06481	4.50915 0.05225 0.05225 0.05225 0.05925 0.05991 0.07941 0.05991	3.56998+00 3.56924 6.02640 6.02640 6.02640 6.05025 6.06025 6.0608 6.06	7,971516+00 6 3,21540 -0,38187 0,39210 -0,38187 -0,98000 -0,99000 -0,99000 -0,99000 -0,99000 -0,99000 -0,99000 -0,99000	7
	Manbor of Int	4.33485e-00 SEGNAL-10-NO3 SEGNAL-10-NO3 149,08739 -0.30329 -0.30329 -0.30329 -0.11104 -0.30329 -0.11106 -0.10000 -0.11106 -0.00000 -0.00000 -0.00000 -0.00000	1.192190-01 SSE RATIOS (EIGENEER OF PRIF CO. A. 1990-10 26.10820 0.33300-0.2321 0.48927 0.74351 0.74351 0.73570 0.7357	1.226614c-01 ENWALUES) BROGGET LAURES 0.63821 0.69437 0.62327 0.62327 0.18350 0.38835 X X 0.68836 0.68836 0.68836 0.68836 0.68836 0.68836 0.68836	7 7.76483 - 0.33568 - 0.33568 - 0.33568 - 0.33568 - 0.57622 - 0.77622 - 0.1233 - 0.7662 - 0.05668 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.0568	4,56915 0,65225 0,65225 0,65225 0,65225 0,65225 0,65225 0,6592	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39210 -0,38187 -0,98000 -0,99000 -0,99000 -0,99000 -0,99000 -0,99000 -0,99000 -0,99000	7
	Manbor of Int	4.33455e-00 STGMAL-10-MOI AUT_BURGE	1.192190-01 SSE RATIOS (EIGENEER OF PRIF CO. A. 1990-10 26.10820 0.33300-0.2321 0.48927 0.74351 0.74351 0.73570 0.7357	1.226614c-01 ENWALUES) BROGGET LAURES 0.63821 0.69437 0.62327 0.62327 0.18350 0.38835 X X 0.68836 0.68836 0.68836 0.68836 0.68836 0.68836 0.68836	7 7.76483 - 0.33568 - 0.33568 - 0.33568 - 0.33568 - 0.57622 - 0.77622 - 0.1233 - 0.7662 - 0.05668 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.0568	4,56915 0,65225 0,65225 0,65225 0,65225 0,65225 0,65225 0,6592	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7
	Manbor of Int	4.33485b-00 SIGNAL-10-NOIN ILABELES IN ILAB.08779 -0.33220 -0.3322	1.192190-01 SSE RATIOS (EIGENEER OF PRIF CO. A. 1990-10 26.10820 0.33300-0.2321 0.48927 0.74351 0.74351 0.73570 0.7357	1.226614c-01 ERWALUES) BOORDOT LAWECE 8.63821 0.69457 0.02237 0.22379 0.23796 0.49825 0.38860 0.49825 1.08080 0.00000 1.08080 0.08080 0.08080	7 7.76483 - 0.33568 - 0.33568 - 0.33568 - 0.33568 - 0.57622 - 0.77622 - 0.1233 - 0.7662 - 0.05668 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.05688 - 0.0568	4,56915 0,65225 0,65225 0,65225 0,65225 0,65225 0,65225 0,6592	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7
	Basher of Int PROF Lauer Tiserosises Tiserosises Tiserosises Tiserosises Trout lauer 1 2 3 4 5 6 7 This matrix 2 Component	4.334850+00 SIGNAL-10-NOI NOI NOI NOI NOI NOI NOI NOI NOI NOI	1.192195-01 SES RATIOS (EIG. 1.192195-01 26.18829 0.13360 0.13360 0.27931 0.78336 0.27931 0.78336 0.27931 0.27931 0.27931 0.27931 0.27931 0.27931 0.29931 0.2	1.226614c-01 ERWALUES) 8.63821 0.69457 0.02227 0.2227 0.2227 0.23080 0.49825 0.38080 0.00000 0.00000 0.00000 0.00000 0.000000	7 7.78453 -0.33569 -0.33569 -0.12420 -0.12420 -0.7622 -0.7622 -0.7622 -0.7622 -0.7622 -0.7622 -0.7622 -0.7622 -0.1233	4.96915 0.05125 0.05125 0.05125 0.05125 0.05125 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7
	Busber of Int PROF Laure Liseronium Liseroni	4.33455e-00 \$50481-70-MO1 149.68739 -0.38229 -0.55550 -0.38218 -0.55550 -0.38218 -0.55550 -0.38218 -0.55550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -0.38218 -0.5550 -	1.192195-01 SES RATIOS (EIGENISTE SERVICE) 1.1029 26.10629 0.33300 0.33300 0.10217 0.7	1.226614c-01 PRINTLUES) 0.63821 0.63827 0.82367 0.82367 0.18236 0.28836 0.28836 0.28836 0.28836 0.28836 0.888	7 7,76483 9,33568 9,33568 9,33568 9,33568 9,33568 9,33568 9,6468 9,0468	4.96915 0.05125 0.05125 0.05125 0.05125 0.05125 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7
	Bamber of International Property States Consequent 1 2 3 4 5 6 7 7 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	4.33485e-00 \$50481-70-MO1 149,68739 -0.35326	1.192195-01 SES RATIOS (EIG AMBEC OF PRIF Co. 26.18620 0.13360 -0.14321 -0.23761 -0.23761 -0.23761 -0.23997 -0.23767 -0.23998 -0.35670 -0.23910 -0.20900 -0.36900 -0.60000 -0.60000 -0.60000 -0.60000 -0.60000 -0.60000	1.226614c-01 PRINGLUES) BOCKELL ST. 0.65821 0.65827 0.62227 0.12227 0.12227 0.12227 0.12227 0.12227 0.12227 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000	7 7,70483 0,133569 0,12426 0,12426 0,0448 0,0448 0,12435 0,12435 0,0448	4.96915 0.05125 0.05125 0.05125 0.05125 0.05125 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7
	Busber of Int PROF Laure Liseronium Liseroni	4.33405e-00 SSGMALTO-MOD MARCE 149,08739 -0.9239 -0.9239 -0.9239 -0.9339 -0.9339 -0.9339 -0.9339 -0.9339 -0.9339 -0.9339 -0.9339 -0.93416 -0.9390 -0.9390 -0.9390 -0.9000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000 -0.90000	1.192195-01 SES RATIOS (EIGENISTE SERVICE) 1.1029 26.10629 0.33300 0.33300 0.10217 0.7	1.226614c-01 PRINALUES) BOORNILL LEVEL 0.69457 0.62227 0.62287 0.2237 0.2237 0.233805 0.38805 0.38805 0.38805 0.48805 0.48805 0.48805 0.68800	7 7.76453 -0.33566 -0.12426 -0.12426 -0.96126	4.96915 0.05125 0.05125 0.05125 0.05125 0.05125 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7
	Manther of Inc. Thankler of Inc. The Component of Section 1 of Secti	4.33485e-00 \$50481-70-003 \$149,68739 -0.3032-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0	1.192195-01 SE MATIOS (EIG. (1.226614c-01 PRINALUES) BOCKENT LEWEL 5 0.63821 0.63437 0.82227 0.82227 0.12227 0.12227 0.12227 0.12227 0.12227 0.12227 0.000000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000	7 7,76453 -0.131509 -0.12426 -0.12426 -0.06151 -0.06161 -0.06161 -0.06160 -0.12313 -0.06060 -0.12313 -0.06060 -0.06060 -0.06060 -0.06060 -0.06060 -0.06060 -0.06060 -0.06060 -0.06060	4.96915 0.05125 0.05125 0.05125 0.05125 0.05125 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7
	Bustler of Inf	4.334858-00 SSONAT-TO-NOTA 140.80739 140.80739 -0.3322 -0.3322 -0.3323 -0.1324	1.192195-01 SES MATICS (EIGENIA) 26.18639 0.33300 0.33300 0.43211 0.33300 0.43212 0.33300 0.43212 0.33300 0.43212 0.4	1.226614c-01 PRMALUES) BOORNILLES) 0.63821 0.63821 0.63827 0.62237 0.2237 0.2237 0.2237 0.2237 0.23808 0.48862 1.080808 0.48862 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080 0.08080	7 7.78453 -0.33568 -0.12430 -0.12430 -0.12430 -0.98126	4.96915 0.05125 0.05125 0.05125 0.05125 0.05125 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026 0.05026	3.85398e+00 5 3.56924 6.82648 0.50825 -0.68132 6.85687	7,971516+00 6 3,21540 -0,38187 0,39216 -0,38187 -0,70149 -0,70149 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,00000 -0,0000000 -0,000000 -0,000000 -0,0000000 -0,0000000 -0,0000000 -0,00000000	7

☐ Utilização de diferentes satélites e sensores para destacar diferentes características da geologia e do uso do solo na área de estudo.







≤300 Ω.m

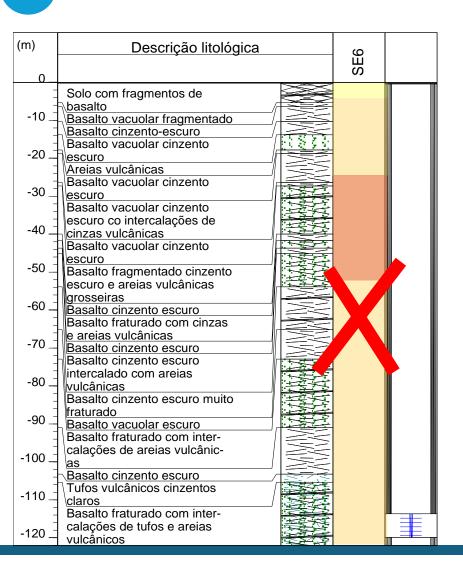
300-1000 Ω.m

1000-5000 Ω .m

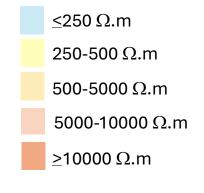
5000-10000 Ω.m

>10000 Ω.m



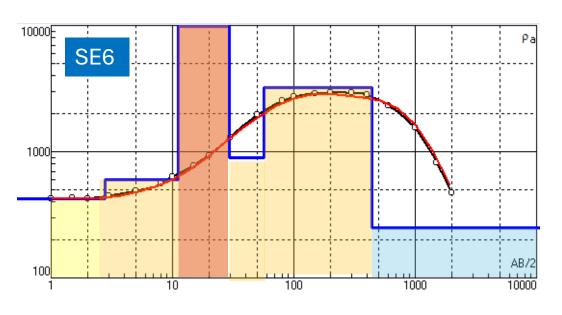


Camadas modeladas de resistividade elétrica da SEV SE6 e o furo das Furo das Cancelas



Modelação 1D da SEV SE6

SE6	ρ (Ω. m)	h (m)	d (m)
1	420	2.8	2.8
2	600	8.3	11.1
3	14000	18.1	29.2
4	900	27.6	56.8
5	3200	383	439
6	250		E=4.19%

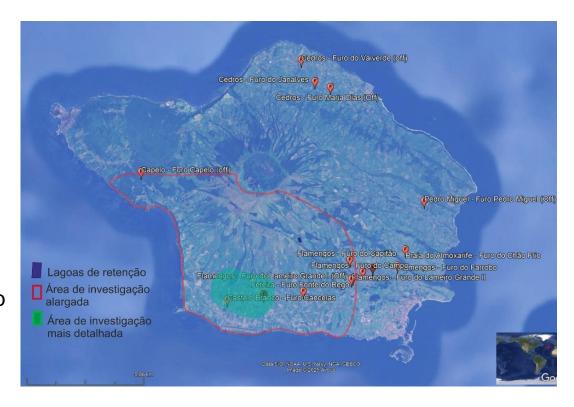




04

Trabalhos em preparação

- ☐ TDEM e/ou prospeção geoelétrica (ambas assentam na propriedade física resistividade elétrica) com densidade de amostragem diferente nas áreas delimitadas;
 - Trabalhos de campo mais expeditos;
 - Maior quantidade de pontos adquiridos em menos tempo;
 - Correlação com diagrafias elétricas e dados de SEV antigos.
- caso se encontre a informação necessária, fazer a modelação gravimétrica
- caderno de encargos para a realização dos furos.



Modelação conceptual do escoamento das águas subterrâneas e do sistema a implementar



Modelação matemática do escoamento das águas subterrâneas e do sistema a implementar e validação



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