

Bjarni Kristinss.  
BK-81/01



ORKUSTOFNUN  
Vatnsorkudeild

OR  
GRI  
VATNS  
SATHUGANIR

GRUNNVATNSATHUGANIR Á SVÆÐI SULTARTANGAVIRKJUNAR

Bjarni Kristinsson

BK-81/01

Júní 1981



**ORKUSTOFNUN**  
GRENSÁSVEGI 9, 108 REYKJAVÍK

GREINARGERÐ

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1981-06-04

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## 1 TILGANGUR RANNSÓKNANNA

Tilgangur grunnvatnsrannsókna á Sultartangasvæðinu, er að fá fram mynd af grunnvatnskerfum og -straumum einkum með tilliti til þeirra breytinga, sem þar verða við tilkomu Sultartangalóns. Einnig var aflað gagna fyrir reiknilíkan það sem unnið er að á Straumfræðistöð Orkustofnunar fyrir grunnvatnsrennsli á Búðarháls-Búrfellssvæði. Einnig er forvitnilegt að vita hitann í hugsanlegum jarðgangabilum í Sandafelli og Búðarhálsi vegna vals á gangaleiðum og hönnun.

## 2 RANNSÓKNARÆFERÐIR

Mælt var í öllum þeim holum, sem gagn var talið að, þ.e. kjarnaholum, loftborsholum og fylltum gryfjum með mæliröri í. Hæð vatnsborðs var mæld með A-OTT mæli, en vatnshitinn með viðnámsmæli, smíðuðum á Jarðeðlisfræðistofu Orkustofnunar.

## 3 ALMENNT

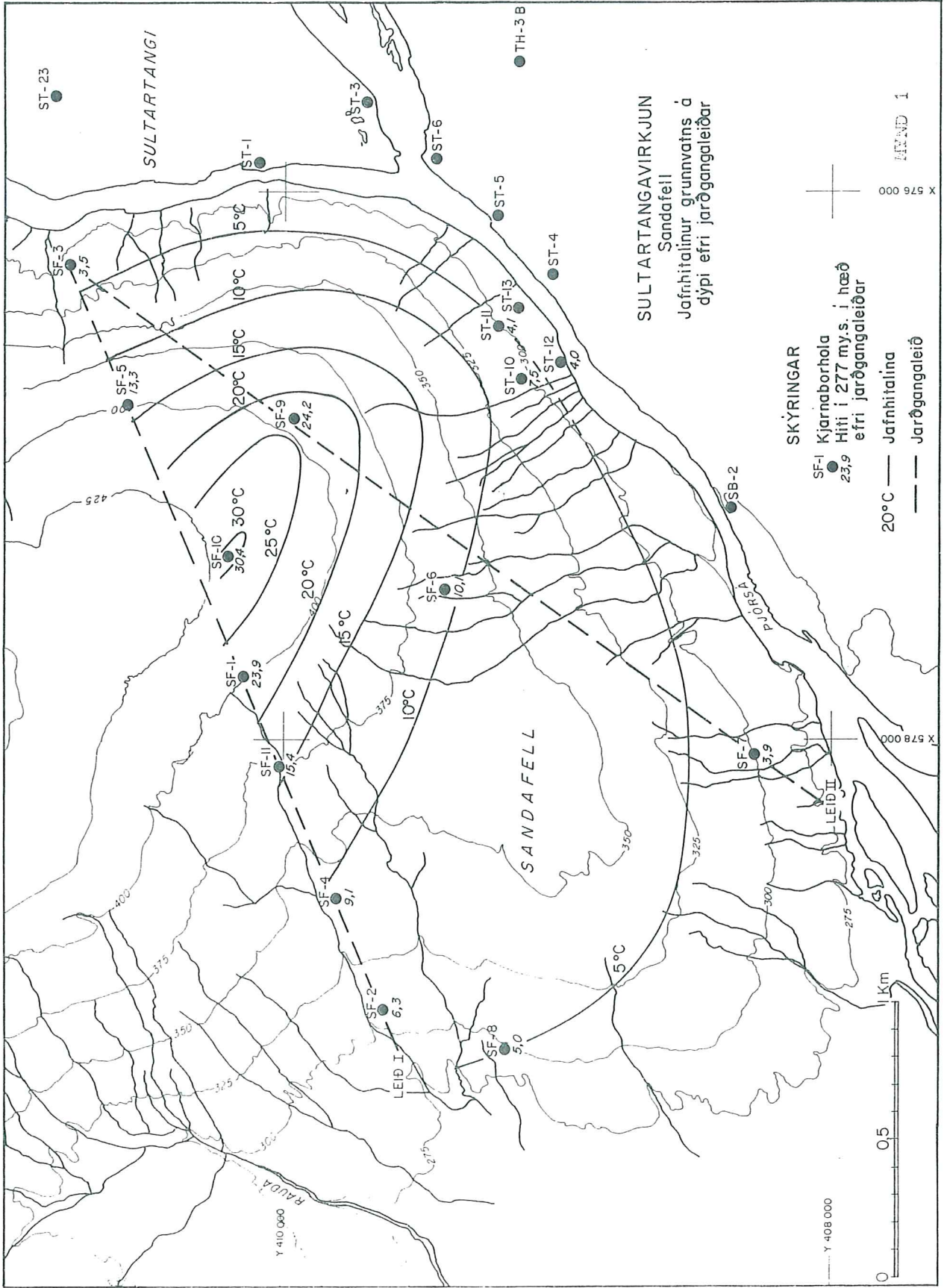
Sumarið 1980 var mælt grunnvatn í um 100 borholum á svæðinu Hrauneyjafell-Sultartangi-Búrfell. Þar af í um 45 holum af þeim sem boraðar voru í Sandafelli og á stíflustæðinu árið 1980 til jarðfræðilegra athugana og grunnvatnsmælinga. Á vegum Orkustofnunar var grunnvatnshæð og hiti einkum mælt á tímabilinu júní til september en vatnshæð nær mánaðarlega á vegum Landsvirkjunar allt árið í völdum holum. Síritar mældu vatnshæð í ST-5, 17 og 18. Í ágúst 1980 var síritinn í ST-17 fluttur í ST-25, á fyrirhuguðu stíflustæði, og er þar enn.

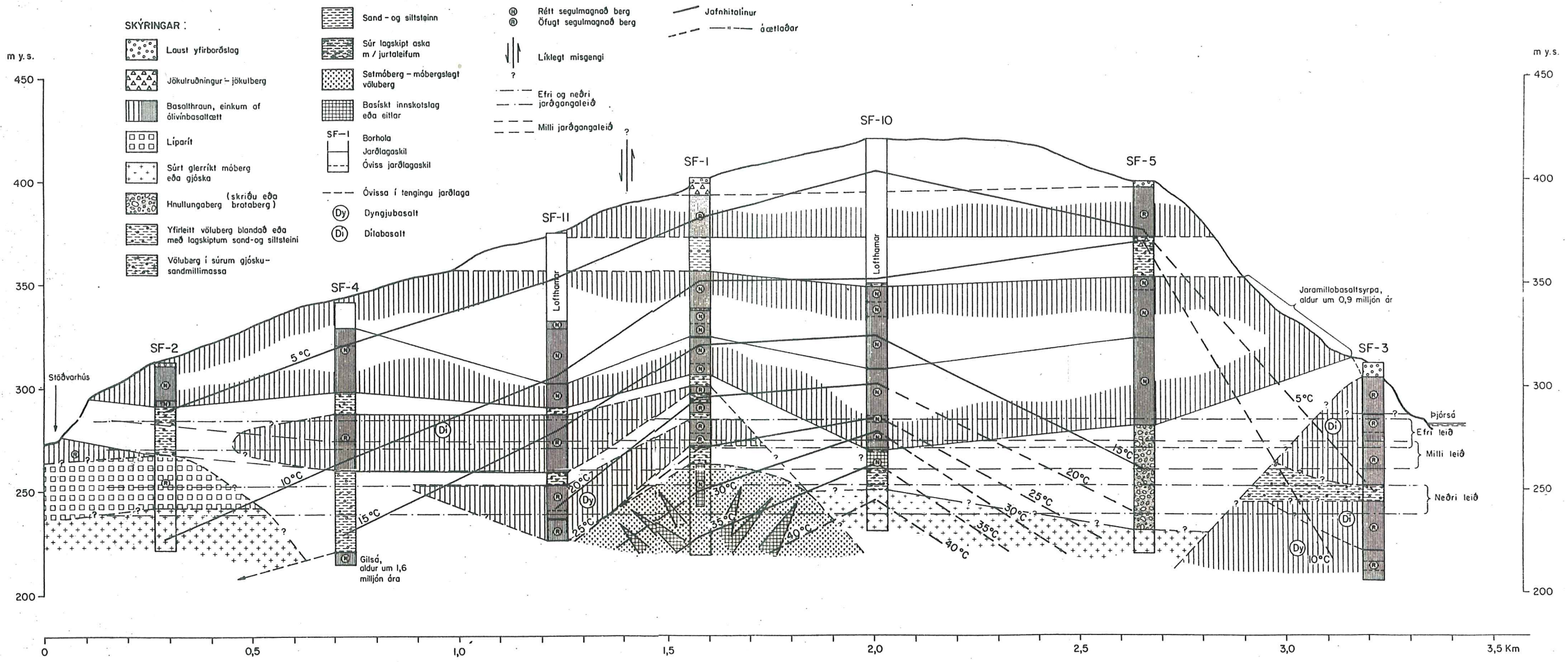
## 4 GRUNNVATNSMÆLINGAR Í GRUNNBERGI

### 4.1 Sandafell

Á tímabilinu maí-desember 1980 voru boraðar í Sandafelli 11 kjarnaholur, SF-1 til SF-11 (mynd 1). Fyrir voru 4 kjarnaholur ST-10 til ST-13, frá 1975, á þá fyrirhuguðu stöðvarhúsnaði. Dýpi á grunnvatn var 1-23 m, eða 13 m að meðaltali síðsumars 1980. Hitamælt var í öllum holum og er hitinn mestur í SF-1, 9 og 10 (mynd 1, 2 og 3). Á mynd 1 eru teiknaðar jafnhitalínur í Sandafelli á 277 m y.s. sem samsvarar efra jarðgangabilinu. Hinn hái hitastigull, allt að 0,37°C/m (viðauki B), bendir til þess, að innskot kunni að vera undir Sandafelli. Hliðstæðar mælingar í Búðarhálsi sýna mun lægri hita og hitastigul. Tafla 1 sýnir hvaða lágmarkshiti er í hverjum hundruðshluta jarðganganna.







- SKÝRINGAR :**
- Laust yfirborðslag
  - Jökulruðningur - jökulberg
  - Basalhraun, einkum af ólívínbasalttætt
  - Líparít
  - Súrt glerríkt móberg eða gjóska
  - Hnullungabergr (skriðu eða brotaberg)
  - Yfirleitt völuberg blandað eða með lagskiptum sand- og siltsteini
  - Völuberg í súrum gjösku-sandmillimassa

- Sand- og siltsteinn
- Súrlagskipt aska m / jurtalefum
- Setmóberg - móbergslagt völuberg
- Basískt innkotslag eða eitlar
- SF-I Borhola Jarðlagaskil Óviss jarðlagaskil
- Dyngjubasalt
- Dítabasalt

- Rétt segulmagnað berg Ófugt segulmagnað berg
- Líklegt misgengi
- Efri og neðri jarðgangaleið
- Milli jarðgangaleið

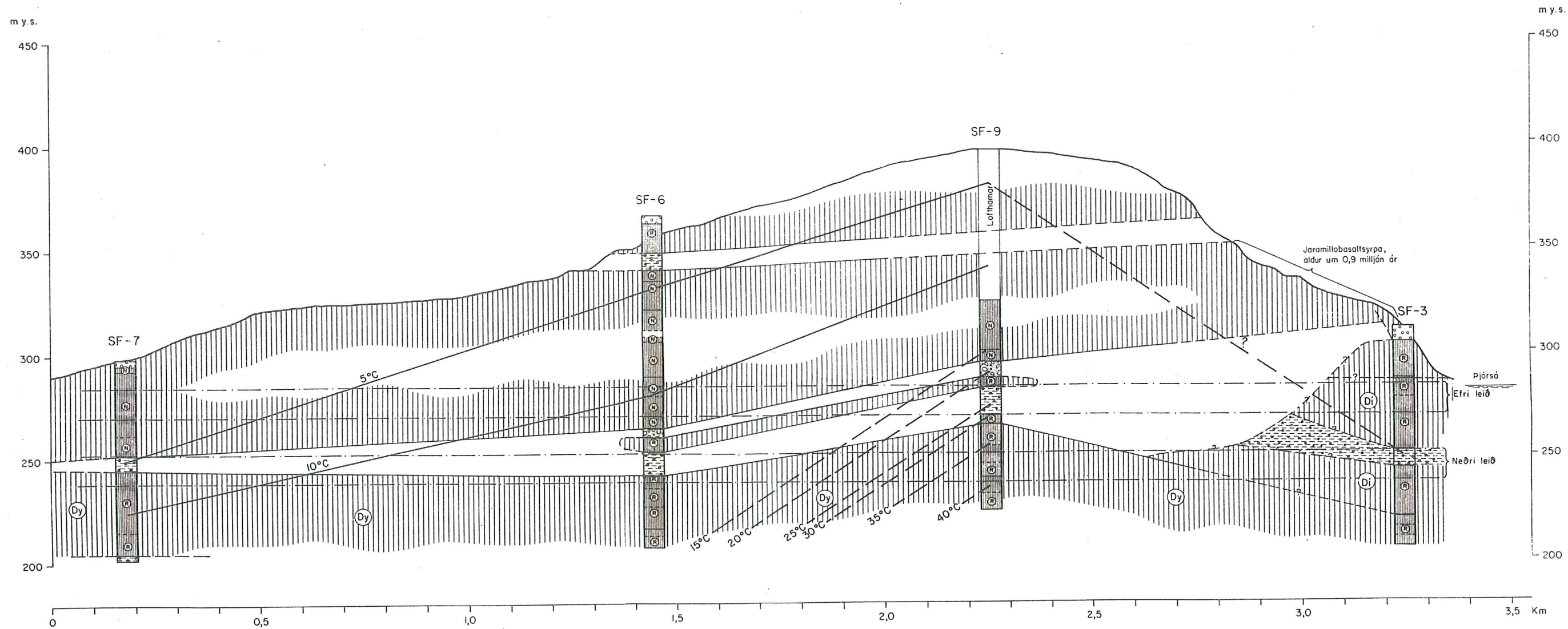
- Jafnhitalínur
- áætlaðar

Staðsetning, sjá mynd 1

SULTARTANGAVIRKJUN  
Jafnhitalínur í Sandafelli  
Jarðgangaleið I

MÝND 2





SULTARTANGAVIRKJUN  
 Jafnhitalínur í Sandafelli  
 Jarðgangaleið II

Staðsetning, sjá mynd 1  
 Skýringar, sjá mynd 2

MYND 3

VOD-MJ-838-BK-LH  
 81.06.0662-GSJ-EBF



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TAFLA 1

Hiti í jarðgangabilum í Sandafelli 1980

	≥10°C	≥20°C	≥30°C	≥40°C	
GANGALEIÐ I					
Efri jarðgangaleið %	60	25	5	0	~3,1 km
Milli " %	60	25	5	3	~3,1 km
Neðri " %	75	35	20	5	~3,2 km
GANGALEIÐ II					
Efri jarðgangaleið %	30	10	0	0	~3,1 km
Neðri " %	60	20	10	0	~3,2 km

#### 4.2 Búðarháls

Árið 1979 voru boraðar þrjár holur í Búðarhálsi, BH-1, 2 og 3, og 1980 tvær til viðbótar, BH-4 og 5. Mesti hiti sem mælt hefur í þessum holum sumurin '79 og '80 er eftirfarandi:

TAFLA 2

Hámarkshiti í borholum í Búðarhálsi

	1979	1980
BH-1	4,6°C	5,0°C
BH-2	8,6°C	7,7°C
BH-3	4,2°C	5,0°C
BH-4		4,5°C
BH-5		5,0°C

Sjá nánar í viðaukum A og B. BH-holurnar í Búðarhálsi eru ekki merktar á korti.

#### 4.3 Búrfell

Sumarið 1980 var boruð ein kjarnahola í Sámsstaðaklifi, BF-1. Mældist hitinn þar mestur 5,4°C á 60 m dýpi. Sjá nánar í viðauka B. BF-holan er ekki merkt á kort. Við Búrfell eru nokkrar BH-holur frá sjöunda áratugnum. Til aðgreiningar frá BH-holunum í Búðarhálsi hefur verið bætt B aftan við Búrfellsholurnar í viðauka A.

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## 5 GRUNNVATNSMÆLINGAR Í TUNGNAÁRHRAUNUM

### 5.1 Hæðarmælingar grunnvatns

Tungnaárhraunin eru yngri en 9000 ára og hafa runnið eftir lægðum berggrunnsins, sem myndaður og mótaður var á Ísöld. Berggrunnurinn er verr vatnsleiðandi en nútímahraunin og eru þess lítil merki að vatnsskipti séu þar á milli. Á mynd 7 er sýnd grunnvatnshæð á milli Búðarháls og Búrfells tímabilið júní til september. Grunnvatnshæðirnar voru teiknaðar eftir grunnvatnsreiknilíkani, sem gert hefur verið á Straumfræðistöð Orkustofnunar, yfir svæðið þetta tímabil. Með því móti eru notaðar þær upplýsingar sem líkanið gefur af leiðni hraunanna. Á mynd 7 er grunnvatnsstaðan hæst í júní en lækkaði svo jafnt og þétt fram á veturinn. Þó var lítil breyting syðst á svæðinu, á móts við Búrfell, við Gjána á milli Skeljafells og Stangarfjalls og á milli Vaðöldu og Þjórsár. Sunnan Tungnaár (myndir 6 og 7) er nokkur óregla í grunnvatnshæðinni, a.m.k. yfir sumarið, enda er þar mikið af gerfigígum. Jafnhæðarlínur grunnvatns þéttast sunnan fyrirhugaðs stíflustæðis við Tungnaá (myndir 6 og 7) en einkum við hugsaða línu, frá Ármótafossi til Vaðöldu og áfram til Valafells. Þetta bendir til þess að bergið sé þarna ver vatnsleiðandi en norðan og sunnan við, enda er þar lengra á milli jafnhæðarlínanna. Samkvæmt myndum 4 og 5 er mesta hæð grunnvatns í flestum borholum frá Búðarhálsi til Búrfells síðast í maí. Þessi, nær samtíma toppur sýnir hve vel Tungnaárhraunin eru vatnsleiðandi. Sunnan Langölduhagar grunnvatnið sér öðruvísi. Bæði eru ferlar holanna óreglulegri og einnig dreifast grunnvatnstopparnir yfir apríl-ágúst (myndir 4 og 5). Einkum er TH-9 óregluleg (mynd 5), en það er líklega vegna þess að hún er í farvegi Helliskvíslar. Ásamt henni kunna Hrauneyjakvísl og hugsanlega Sigöldulón og Langöldulón að vera völd að ofangreindri óreglu. Sunnan Tungnaár eru jafnhæðarlínur grunnvatns óvenju þéttar, í gömlu farvegnum, líklega frekar vegna þess hve áin hefur borið mikið silt undir sig en að bergið sé svo þétt. Í framhaldi þess má nefna, að meðallektin í hraunlagastaflanum neðan efsta kargans á stíflustæði fyrirhugaðrar virkjunar við Sultartanga er um  $1,5 \times 10^{-3}$  m/s, en á áður fyrirhuguðu stíflustæði á milli Fitjaskóga og Búðarháls eru samsvarandi tölur  $2-3 \times 10^{-3}$  m/s (Jón Ingimarsson 1980).

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## 5.2 Hitamælingar grunnvatns

Samkvæmt hitamælingum og grunnvatnslíkani Laufeyjar B. Hannesdóttur (óbirt skýrsla), þá berast einkum tveir grunnvatnsstraumar inn á Sultartangasvæðið (myndir 7 og 9). Sá stærri er austanstraumurinn, sem kemur inn á milli Langöldu og Valafells og er 20-30 sinnum vatnsmeiri en norðanstraumurinn (LBH óbirt), sem kemur inn á milli Búðarháls og Fitja-skóga. Norðanstraumurinn er einkum lækjarvatn úr Búðarhálsi og lekavatn úr Þjórsá. Afrennsli grunnvatnsins í Tungnaárhraunum á Sultartangasvæðinu er mest á milli Sauðafells og Búrfells, en sjálfsagt fer líka eitthvað ofan í Þjórsárdal um Gjána á milli Skeljafells og Stangarfjalls.

Samkvæmt hitamælingum virðist harla lítið vatn blandast grunnvatninu úr Þjórsá og Tungnaá við venjulegt rennsli ána. Þær holur sem sýna óvenju hátt hitastig (6-9°C, valinn meðalhiti) eru allar mjög nærri Tungnaá og sýna staðbundin tengsl við árvatnið (mynd 8). Flestar holur á bökkum Þjórsár og Tungnaár sýna lítil sem engin merki blöndunar (2-4°C, valinn meðalhiti) þrátt fyrir að grunnvatnsborðið, sunnan Tungnaár og og Sultartanga, mældist síðastliðið sumar allt að 4 m lægra en árnar. Grunnvatnshitinn í neðri hluta Sultartanga er rúmlega 1°C lægri en í norðanstraumnum við ST-14 til ST-21 (mynd 8). Yfirleitt urðu litlar hitabreytingar á stíflustæðinu yfir sumarið, oft minni en 0,5°C (viðaukar A og B).

Í holunum ST-14 til ST-21 virðist hitatoppurinn hafa verið í júlí, á svæðinu sunnan Langöldu í ágúst, í Sultartanga í ágúst og september, umhverfis Vaðöldu einnig í ágúst og september (óskýr toppur) og vestan Valafells í ágúst. Á Hafinu var hitatoppurinn illa skilgreindur.

Svo virðist sem norðanstraumurinn fari í suður þvert yfir Tungnaá en leiti mun síður út eftir Sultartanganum (sbr. hitastig í holum á myndum 8 og 9). Ekki er ólíklegt að eitthvert vatn úr norðanstraumnum leiti inn á Hafið og blandist þar lækjarvatni úr Stangarfjalli og Sandafelli, að ógleymdri Rauðá (sbr. 10°C hita í PH-42, sem er í farvegi árinna). Hiti norðanstraumsins er 3-4°C en austanstraumurinn er 5-6°C. Austanstraumurinn fer fyrst í vestur en beygir svo meðfram Valafelli til suðvesturs. Hluti hans fer þó til norðvesturs í átt að PH-6 og mætir þar norðanstraumnum við línu sem hugsast dregin frá Vaðöldu að Haldi.



1981-06-04

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Síðan sveigir hann til suðvesturs og hverfur af svæðinu á milli Búrfells og Sandafells.

## 6 LOKAORÐ

### 6.1 Samantekt

Í Sandafelli er hitastigullinn allt að  $0,37^{\circ}\text{C}/\text{m}$ . Grunnvatnið mældist nærfri  $40^{\circ}\text{C}$  á jarðgangabilum, og hæst í SF-10. Um það bil 25% ganganna á leið I, eða 0,8 af 3,1 km eru heitari en  $20^{\circ}\text{C}$ . Gangaleið II er nokkuð kaldari en leið I.

Inn á svæðið umhverfis Vaðöldu berast tveir grunnvatnsstraumar í Tungnaárhrauninum. Annar er norðanstraumurinn á milli Fitjaskóga og Búðarháls, og austanstraumurinn á milli Langöldu og Tagls, og er hann 20-30 sinnum vatnsmeiri en sá fyrrnefndi. Á Sultartangasvæði var vatnshæðin 1980 mest í maí. Meðallekt hraunanna neðan efsta kargans á stæði Sultartangastíflu er skv. dæluþrófunum  $1,5 \cdot 10^{-3}$  m/s. Samkvæmt hitamælingum, þá eru botnar Tungnaár og Þjórsár mjög þéttir og lítið árvatn blandast grunnvatninu við venjulegt rennsli ána. Hiti norðanstraumsins er  $3-4^{\circ}\text{C}$  en austanstraumsins er  $5-6^{\circ}\text{C}$ .

### 6.2 Framhaldsrannsóknir

Allgóð mynd er komin af hitaferlum á jarðgangaleiðum Sandafells og mun sú mynd skýrast enn frekar með kjarnaborunum sumarsins '81.

Ástæða er til að bæta frekar við þá mynd af grunnvatni Tungnaárhrauna á svæði Sultartangavirkjunar, sem til er. Á Hafinu vantar 3-5 loftborsholur. Einkum væri forvitnilegt að vita hve mikið vatn fer um Gjána á milli Skeljafells og Stangarfjalls. Austan Þjórsár á milli Hafs og Valafells þarf 3-5 loftborsholur. Bora mætti u.þ.b. 10 loftborsholur við stíflustæðið sunnan Tungnaár, þar sem norðanstraumurinn fer að líkindum einkum um. Einnig vantar allt að 10 loftborsholur í Sultartanga, einkum umhverfis Blautukvísl.

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Halda þarf síðan áfram hæðar- og hitamælingum svo sjá megi hegðan grunnvatnsins í ljósi lengri tíma og endurbæta reiknilíkanið af grunnvatninu, einkum umhverfis verðandi stíflustæði og frárennslis-skurð.

### 6.3 Þakkarorð

Að endingu vill undirritaður einkum þakka Laufeyju B. Hannesdóttur á Straumfræðistöð og Guðmundi H. Vigfússyni á Landmælingum, fyrir þátt þeirra í tölvuvinnslu grunnvatnsgagna og gerð grunnvatnsmynda og taflna.

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GRUNNVATHSMÆLINGAR  
I BÖRHÖLUM

GRUNNVATHSMÆLINGAR  
I BÖRHÖLUM

Mælti: BK  
Umnið: BK  
1980

Mælti: BK  
Umnið: BK  
1980

HAF - HRAUNEYJAFELL

HAF - HRAUNEYJAFELL

Þegs,  
Mæli-  
ingaf

Þegs,  
Mæli-  
ingaf

HEITII HÖLUGRUNNVATHNSBÖRD ■ 9.5.5.											
ST04	ST05	ST06	ST08	ST09	TH01	TH02	TH03A	TH04	TH06	TH08	TH09
01.21											279.93
01.23	264.50	265.53	269.10	271.80	275.05	255.87	268.90	267.37	340.83	375.72	368.13
02.05	264.46	265.52	269.04	Purr	273.05	256.12	268.77				279.70
03.04	264.59	265.66	272.38		256.21		267.47				279.90
05.29	265.50	266.48	270.33	271.50	274.83	258.29	271.70	268.60	281.45	341.54	377.04
06.27											281.44
06.28	265.45		270.25	Purr	275.70	257.45	271.10	268.50			
06.30									341.96	380.23	366.52
07.04	265.31	266.33	270.14	Purr	274.61	257.24	270.82	268.36	281.25	341.69	360.06
07.24	265.16		269.90		275.36		270.65		281.12	341.95	380.30
07.26					256.70						
07.29	264.93		269.76	Purr	274.13	256.62	270.42	268.13	280.98	341.55	373.98
08.13					267.13						
08.18						256.28					
08.19									341.74	380.03	364.19
08.20	264.92		269.69	Purr	275.60		270.00	267.92	280.67		
09.03					255.94					341.25	379.63
09.04	265.13	265.76	269.43	Purr	274.51		269.76		280.30		
09.20	264.63		269.28		274.83	255.74	267.57		341.33	379.27	363.31
09.21											280.23
09.23						269.60					
10.09		265.50							340.73	378.43	362.70
10.10	264.39	265.49	269.09		265.41	269.18	267.30	279.90			
11.10	264.21	265.32	268.83				267.13				
11.11					205.09	268.88	279.76				
11.14									339.01	377.63	362.24
12.09	264.01	264.50	268.72				266.37	266.92			
12.10											361.63
12.11					254.85						
12.15											279.29



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GRUNNVÁTNISMÆLINGAR  
I BÖRHÖLUM

GRUNNVÁTNISMÆLINGAR  
I BÖRHÖLUM

Mælti:  
Umfeld: BK  
1980

Mælti:  
Umfeld: BK  
1980

SULTARTANGI

HEITI HÖLUGRUNNVÁTNISGRÖÐ ■ ■ ■ ■ ■

Þætti- indar	PH14	PH15A	PH16	PH18	PH19	PH20B	PH21	PH22	PH23	PH25	PH26	PH27	PH28
06.27	284.91												
07.25		283.53	283.67	285.09	282.21	282.46	282.83	282.80	283.06	283.64			
08.21	284.28	Purr	283.11	Purr	283.35	283.46	284.81	282.08	282.26		282.57	282.80	283.39
09.21	283.45	Purr					281.40					Purr	281.92
09.23			282.48	282.54									
09.24				Purr		281.77		281.49	281.79				282.42
12.16									281.06				

SULTARTANGI

HEITI HÖLUGRUNNVÁTNISGRÖÐ ■ ■ ■ ■ ■

Þætti- indar	PH01	PH02	PH03	PH04	PH05	PH06	PH07	PH08	PH09	PH10A	PH11	PH12	PH13
05.29		274.44		285.87	284.48								
06.20						288.30							
06.26													286.48
06.27	275.89		280.31	284.61	283.90	275.78	276.59				286.03	287.36	
06.28		274.45				249.48	244.33						
07.04		274.32		284.44	283.75								
07.08						243.92							
07.24	275.57	274.08	279.71	283.98	283.28	275.35	276.08						
07.26						248.63	243.49						
07.29		273.90		283.86	281.33			243.34					
08.18						248.14	243.02						
08.20	275.06	273.59	279.36	283.51	282.74	274.82	275.75						
08.21						288.10	287.78	287.05	285.91				
09.03						242.65							
09.04		273.21		282.87	282.09								
09.07										286.84			
09.20		273.04			247.53	242.44							
09.21						275.43				287.64	287.18	286.25	Purr
09.23	274.50		278.51	282.28	281.58	274.27							
10.10		272.65		282.05	281.50		242.09						
11.02											286.79		
11.10		272.36											
11.11						241.75							
11.26					282.00	281.53							
12.02		272.04											
12.05		272.06											
12.09		271.88											
12.11						241.63							
12.15					281.59	281.21							
12.16												287.57	

ORKUSTOFNUN  
Væðisorkuðeild

ORKUSTOFNUN  
Væðisorkuðeild

GRUNNVÁTNISMÆLINGAR  
I BÖRHÖLUM

GRUNNVÁTNISMÆLINGAR  
I BÖRHÖLUM

Mælti:  
Umfeld: BK  
1980

Mælti:  
Umfeld: BK  
1980

SANGAFELL

HEITI HÖLUGRUNNVÁTNISGRÖÐ ■ ■ ■ ■ ■

Þætti- indar	SF01	SF02	SF03	SF04	SF05	SF06	SF07	SF08	SF09	SF10	SF11
06.26	397.16	290.56	293.28		376.63						
06.27				346.29							
07.26	397.66	290.41	293.31	340.46	378.40						
08.22	398.19	290.82	293.48	340.84	379.65	348.69	277.41				
09.22	398.08	290.46	293.87	340.71	381.73	347.89	279.67	288.82			
10.05									380.18		
10.06										417.96	373.39
11.11										411.16	373.61
11.27											384.71
12.08											373.61
12.03											363.66

SANGAFELL

HEITI HÖLUGRUNNVÁTNISGRÖÐ ■ ■ ■ ■ ■

Þætti- indar	SF01	SF02	SF03	SF04	SF05	SF06	SF07	SF08	SF09	SF10	SF11
06.26	397.16	290.56	293.28		376.63						
06.27				346.29							
07.26	397.66	290.41	293.31	340.46	378.40						
08.22	398.19	290.82	293.48	340.84	379.65	348.69	277.41				
09.22	398.08	290.46	293.87	340.71	381.73	347.89	279.67	288.82			
10.05									380.18		
10.06										417.96	373.39
11.11										411.16	373.61
11.27											384.71
12.08											373.61
12.03											363.66

Borun lauk: 08.22 10.04 11.08 12.04

TAFLA 3B

ORKUSTOFNUN Vatnsorkudeill

GRUNNVATNSMÆLINGAR I BÖRHOLUM

Mæli: BK  
Unnid: BK  
1980

HEITI HOLU/GRUNNVATNSBÖRÐ a y.s.

Bas- mæ- lingar	PH29	PH30	PH31	PH32	PH33	PH34	PH35	PH36	PH37	PH40	PH41	PH42	PH43	PH45	PH5B	PH05	PH06	DF10	H002	S101	S103	S122	
07.24																							
07.25																							
08.20																							
08.21																							
08.22																							
09.20																							
09.21																							
09.23																							
10.14																							
12.16																							

ORKUSTOFNUN Vatnsorkudeill

GRUNNVATNSMÆLINGAR I BÖRHOLUM

Mæli: BK  
Unnid: BK  
1980

HEITI HOLU/GRUNNVATNSBÖRÐ a y.s.

Bas- mæ- lingar	PH29	PH30	PH31	PH32	PH33	PH34	PH35	PH36	PH37	PH40	PH41
07.24											
07.25											
08.20											
08.21											
09.21											
09.24											

ORKUSTOFNUN Vatnsorkudeill

GRUNNVATNSMÆLINGAR I BÖRHOLUM

Mæli: BK  
Unnid: BK  
1980

HEITI HOLU/GRUNNVATNSBÖRÐ a y.s.

\* Fossaði inn í holuna.

ORKUSTOFNUN Vatnsorkudeill

GRUNNVATNSMÆLINGAR I BÖRHOLUM

Mæli: BK  
Unnid: BK  
1980

HEITI HOLU/GRUNNVATNSBÖRÐ a y.s.

BURFELL - SANDAFELL

Bas- mæ- lingar	ST10	ST11	ST12	ST13	BF01	BH01	BH02	BH06	BH11	LD05	LD07	LD13	LD22
01.31													
03.04													
05.29													
06.28													
06.30													
07.04													
07.26													
08.18													
08.19													
08.22													
09.03													
09.20													
09.22													
10.10													
10.18													
11.11													
11.25													
12.11													

ORKUSTOFNUN Vatnsorkudeill

GRUNNVATNSMÆLINGAR I BÖRHOLUM

Mæli: BK  
Unnid: BK  
1980

HEITI HOLU/GRUNNVATNSBÖRÐ a y.s.

Bas- mæ- lingar	ST14	ST15	ST16	ST17	ST18	ST19*	ST20A	ST21	ST23	ST24
05.29										
06.27										
07.04										
07.25										
07.29										
08.20										
08.21										
09.04										
09.21										
09.23										
10.10										
11.26										
12.15										
12.16										

ORKUSTOFNUN Vatnsorkudeill

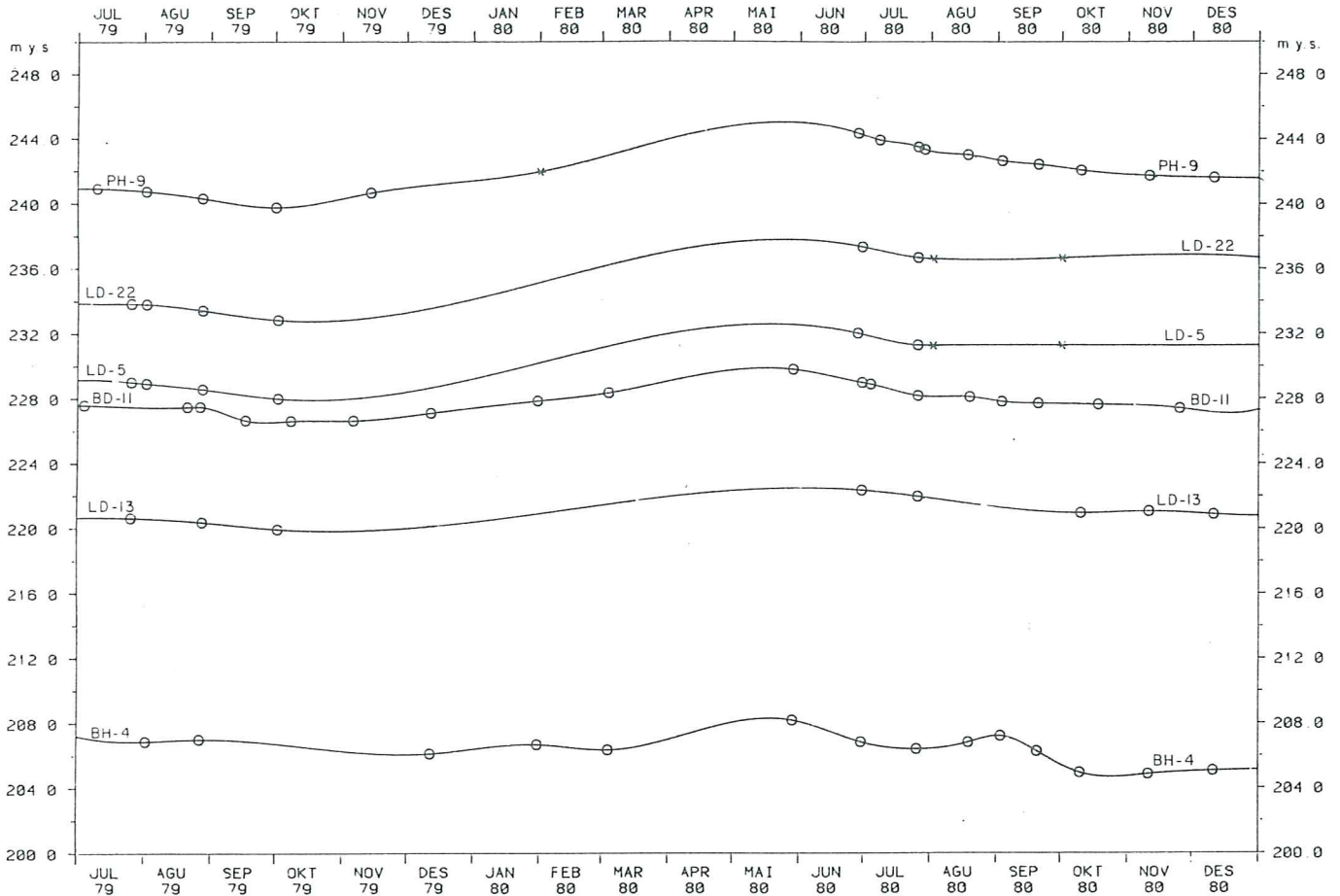
GRUNNVATNSMÆLINGAR I BÖRHOLUM

Mæli: BK  
Unnid: BK  
1980

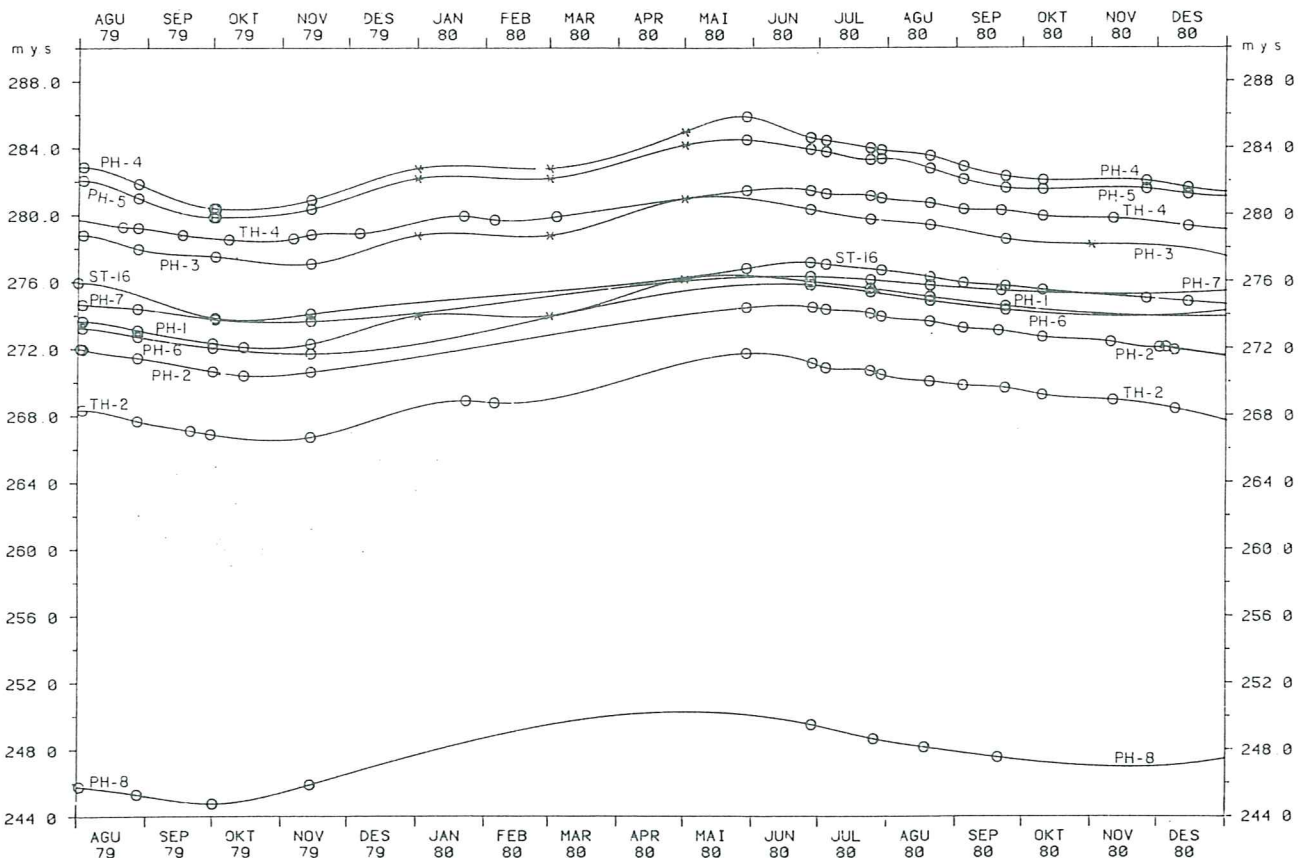
HEITI HOLU/GRUNNVATNSBÖRÐ a y.s.

Bas- mæ- lingar	ST14	ST15	ST16	ST17	ST18	ST19*	ST20A	ST21	ST23	ST24
05.29										
06.27										
07.04										
07.25										
07.29										
08.20										
08.21										
09.04										
09.21										
09.23										
10.10										
11.26										
12.15										
12.16										

BD-11, BH-4, LD-5, 13, 22, PH-9

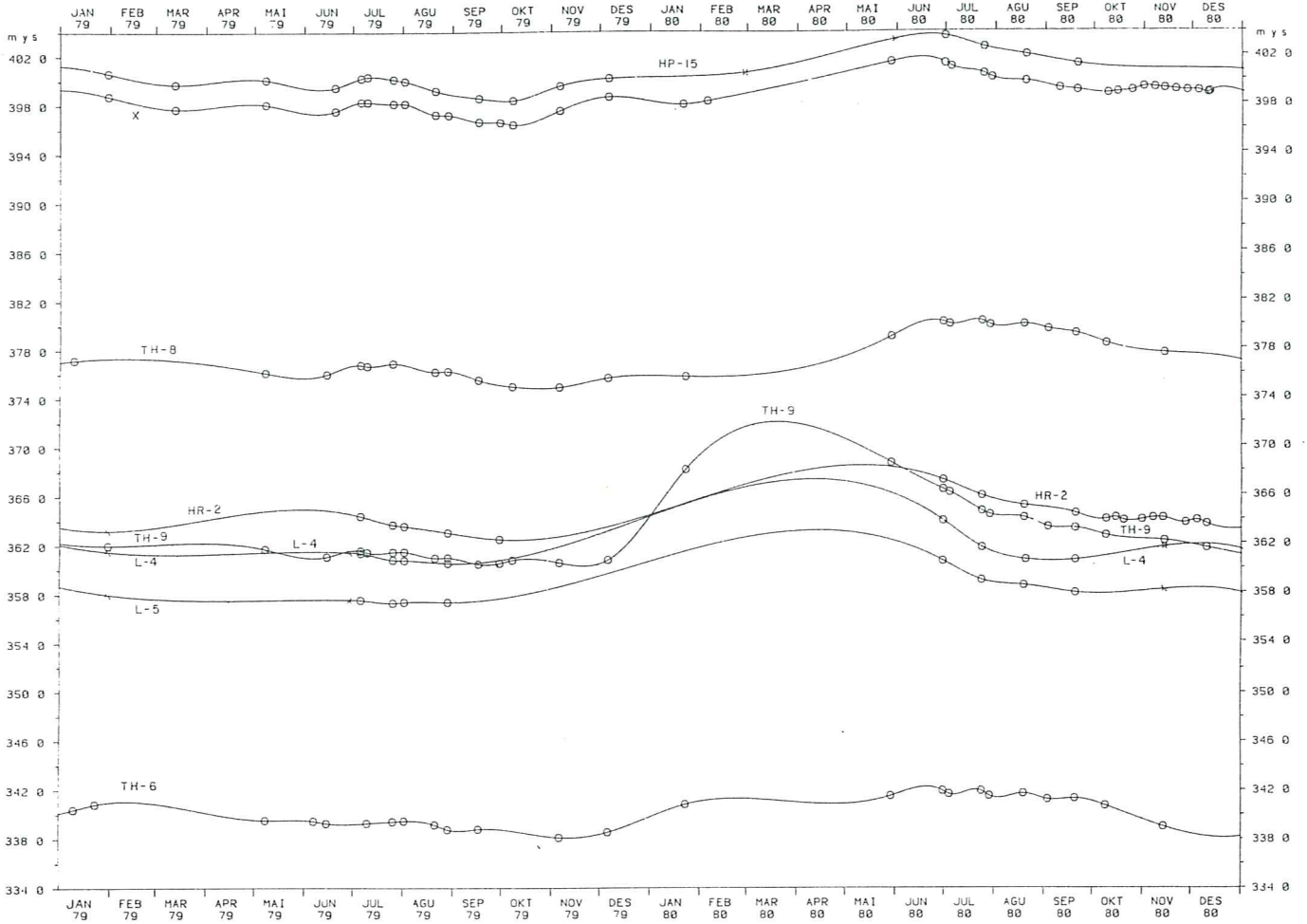


PH-1, 2, 3, 4, 5, 6, 7, 8, ST-16, TH-2, 4

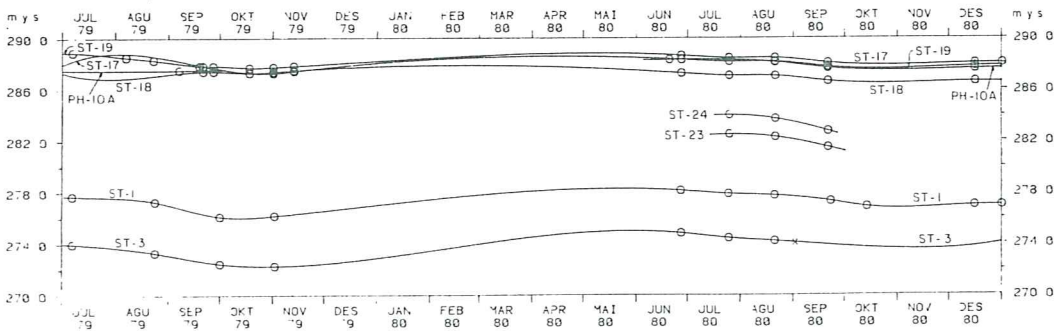




L-4, L-5, HP-15, HR-2, TH-6, TH-8, TH-9, X



PH-10A, ST-1, 3, 15, 17, 18, 19, 23, 24

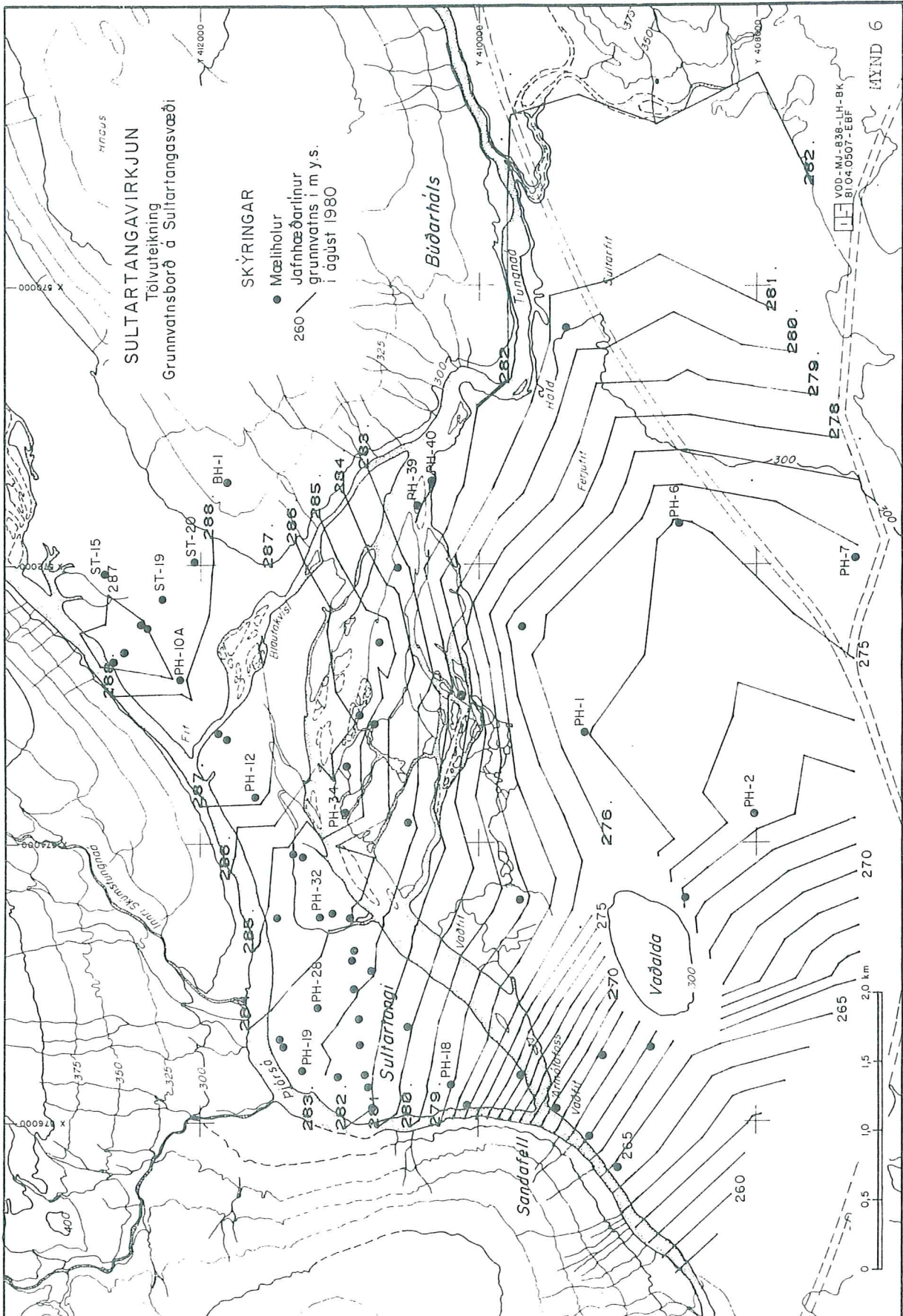


SULTARTANGAVIRKJUN  
Grunnvatnshæð i holum  
i Tungnaðrhraunum

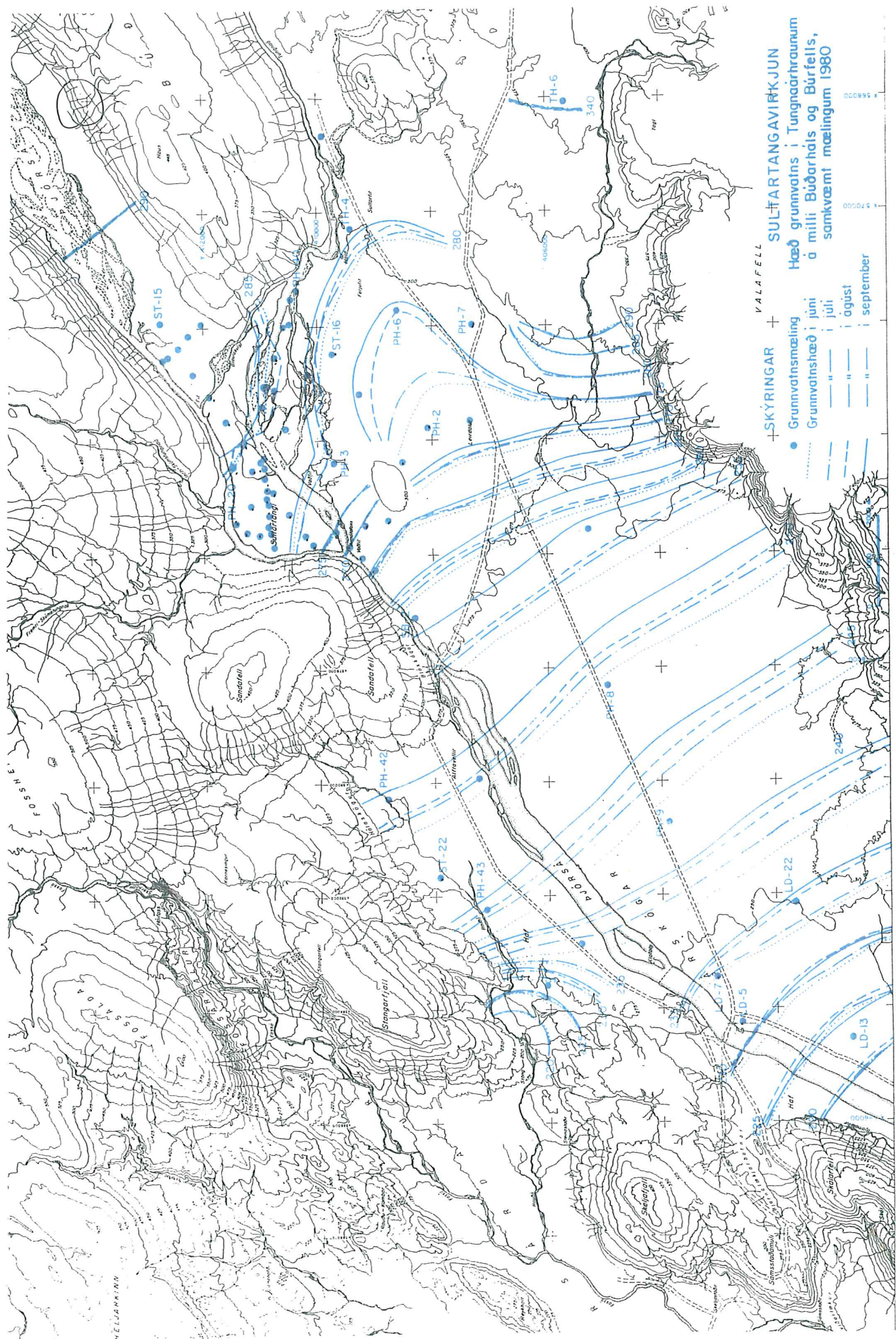
SKÝRINGAR

- Mælt grunnvatnsborð
- × Áætlað grunnvatnsborð
- Reiknað grunnvatnsborð

100-MJ-888-PK-LH  
8/05/03P



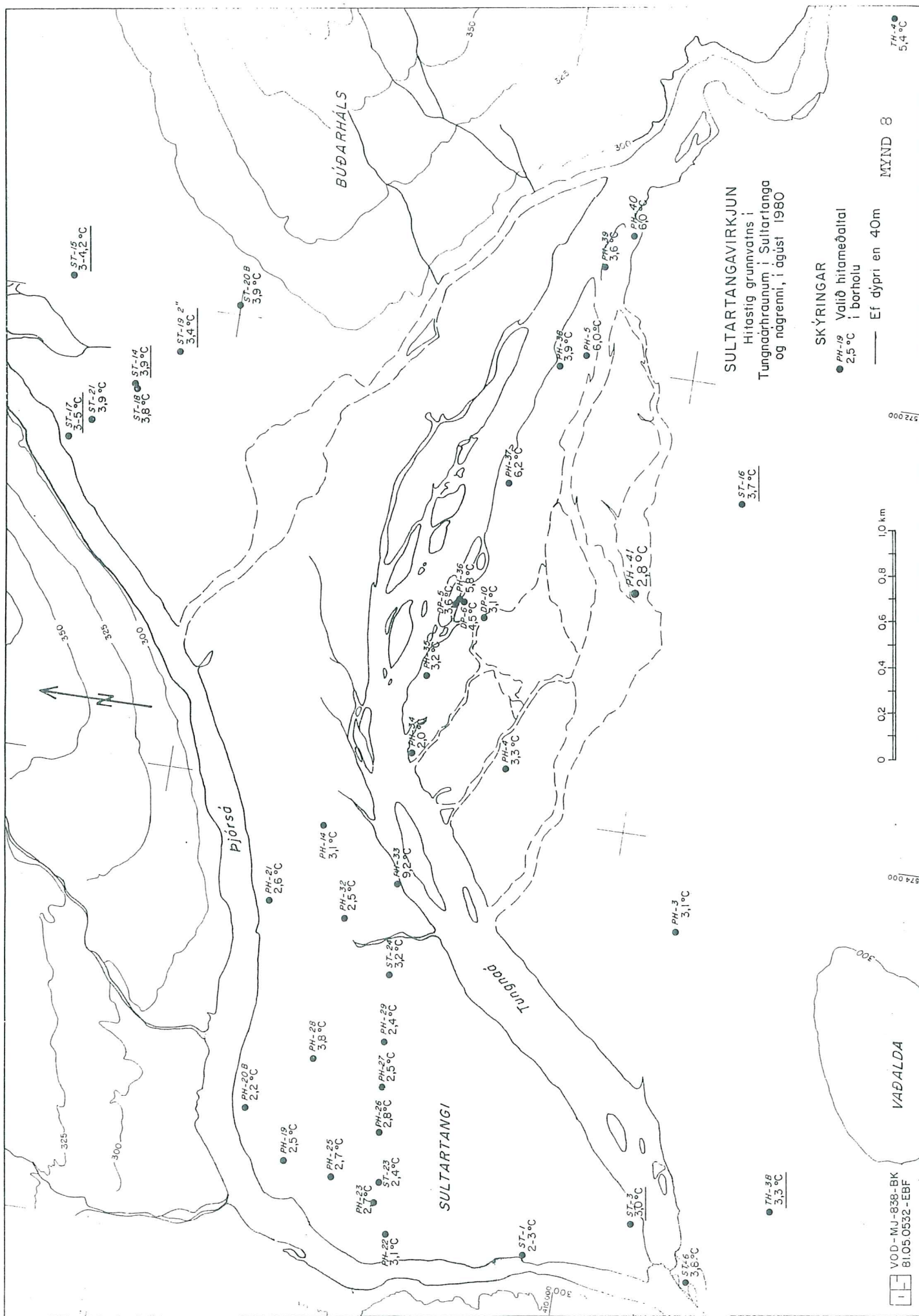




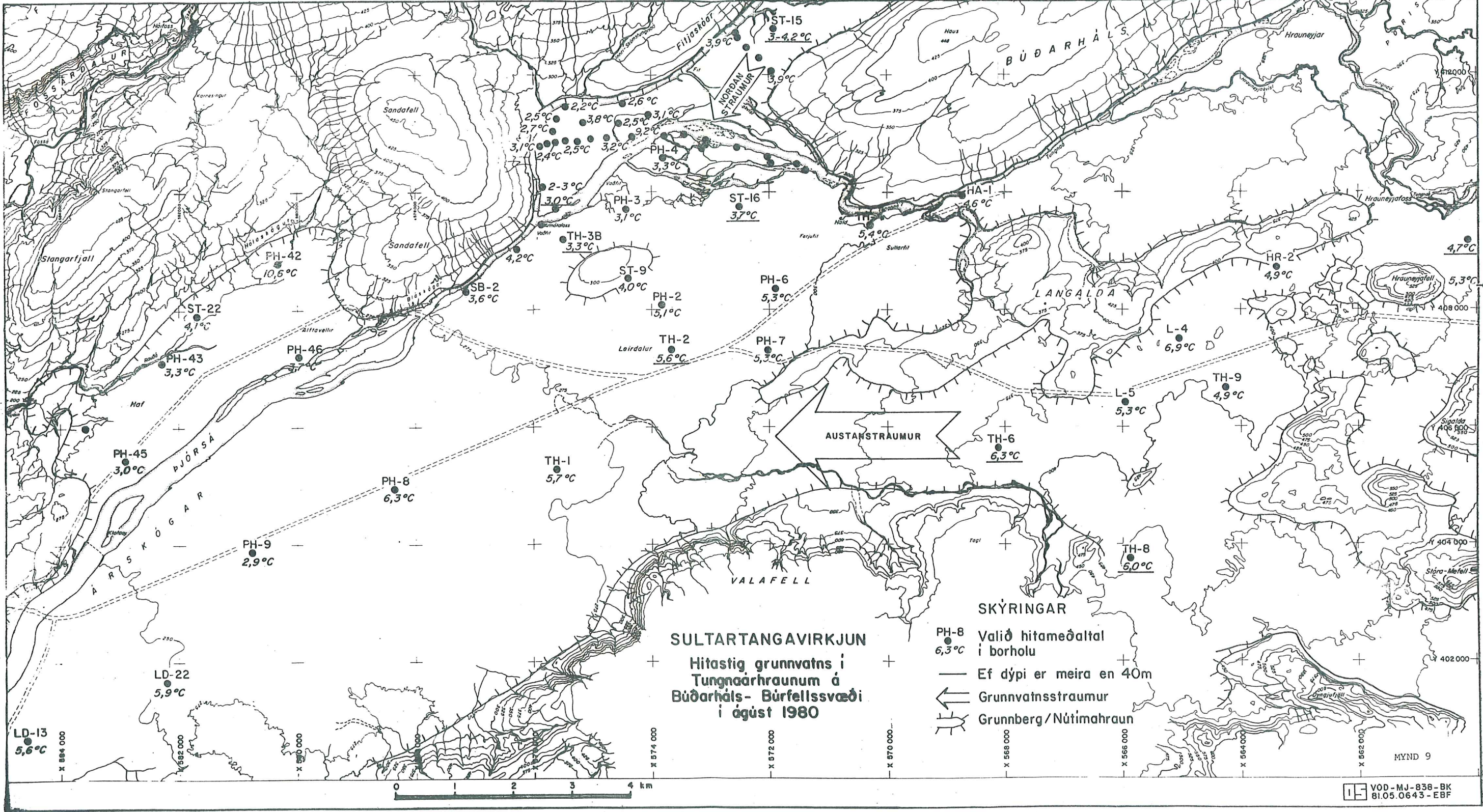
+ SKÝRINGAR + VALAFELL + SULFARTANGAVIRKJUN  
 • Hæð grunnvæns í Tungnaárrauurum á milli Búðarháls og Búrfells, samkvæmt mælingum 1980  
 --- Grunnvatnsmæling  
 --- Grunnvatnshæð í júní  
 --- " " í júlí  
 --- " " í ágúst  
 --- " " í september











Station Code	Temperature (°C)
LD-13	5,6°C
LD-22	5,9°C
PH-45	3,0°C
PH-43	3,3°C
ST-22	3,1°C
PH-42	10,6°C
PH-46	3,7°C
PH-8	6,3°C
PH-9	2,9°C
PH-4	3,3°C
PH-3	3,1°C
PH-2	5,1°C
PH-7	5,3°C
PH-6	5,3°C
PH-1	5,7°C
TH-1	5,7°C
TH-2	5,6°C
TH-3B	3,3°C
TH-3	3,0°C
TH-6	6,3°C
TH-8	5,0°C
TH-9	4,9°C
L-4	6,9°C
L-5	5,3°C
SB-2	3,6°C
ST-9	4,0°C
ST-16	3,7°C
ST-15	3-4,2°C
HA-1	4,6°C
HR-2	4,9°C
HR-1	4,7°C



1981-06-04

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HEIMILDASKRÁ

- Björn Jónasson, Davíð Egilson, Halína Guðmundsson & Jósef Hólmjárn 1978: Búðarhálsvirkjun. Jarðfræði- og jarðvatnsrannsóknir. Orkustofnun, OS-ROD-7819, 18 s. auk viðauka og mynda.
- Björn Jónasson, Sveinn Þorgrímsson, Halína Guðmundsson & Freyr Þórarínsson 1979: Búðarhálsvirkjun. Jarðfræðirannsóknir 1978. Orkustofnun. OS79008/ROD05, 115 s.
- Björn Jónasson 1976: Sultartangi, Hydroelectric Project, Geological Report. Orkustofnun, OS-ROD-7631, 32 s.
- Elsa G. Vilmundardóttir 1977: Tungnaárhraun. Jarðfræðiskýrsla. Orkustofnun, OS-ROD-7702, 156 s.
- Ingibjörg Kaldal & Skúli Víkingsson 1972: Sultartangi. Jarðfræðiskýrsla. Orkustofnun, 49 s.
- Jón Ingimarsson 1980: Dæluprófanir. Orkustofnun, ROD, greinargerð, JI-80/06, desember 1980.
- Laufey B. Hannesdóttir 1980: Grunnvatnslíkan af Búrfellshraunum. (Óbirt).
- Orkustofnun 1980: Búðarhálsvirkjun. Jarðfræði og grunnvatnsrannsóknir. Skýrsla tekin saman af starfshópi á Raforkudeild Orkustofnunar. OS80019/ROD09, 170 s.
- Sveinn Þorgrímsson 1981: Sandafell - Jarðgöng. Bergtæknileg greining. Orkustofnun, VOD, greinargerð, SvÞ-81/01, janúar 1981.

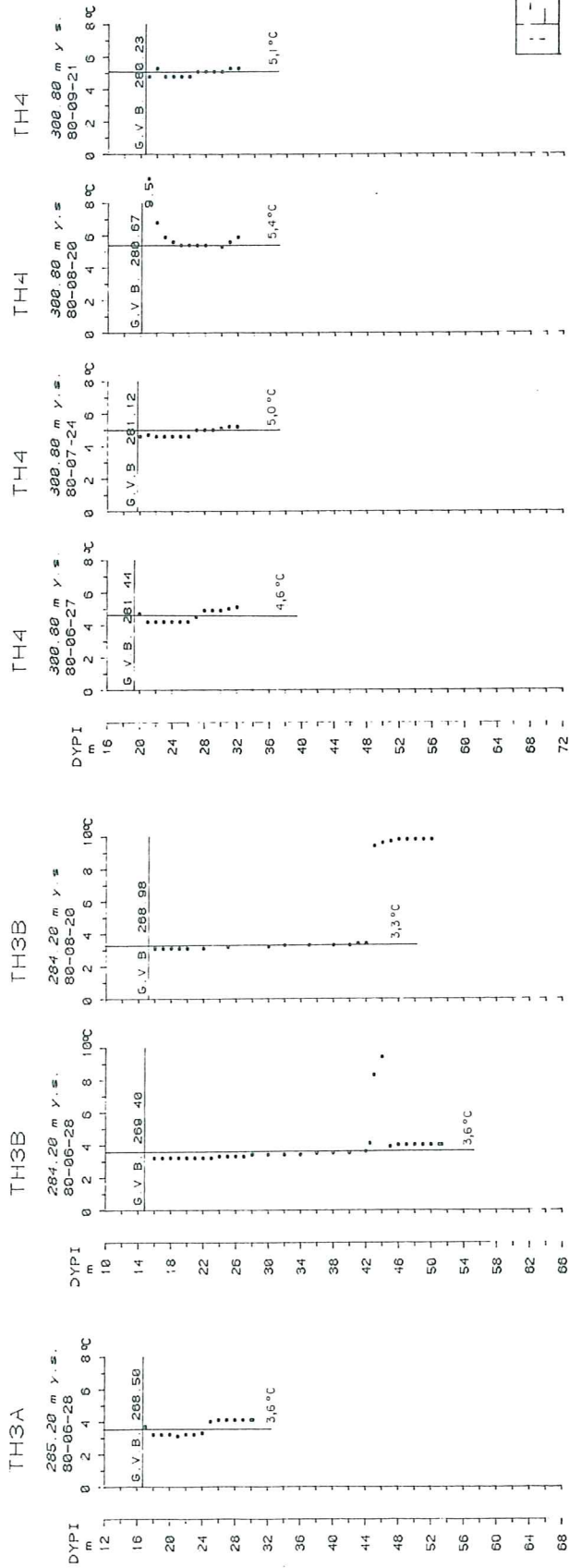
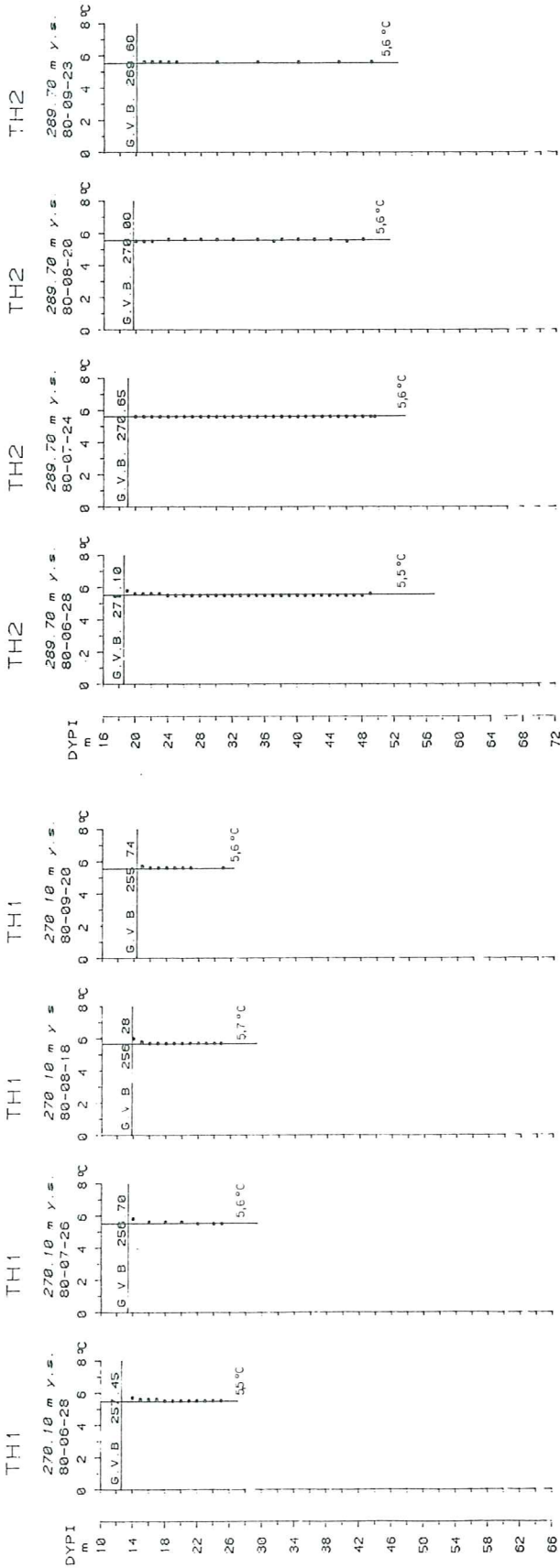


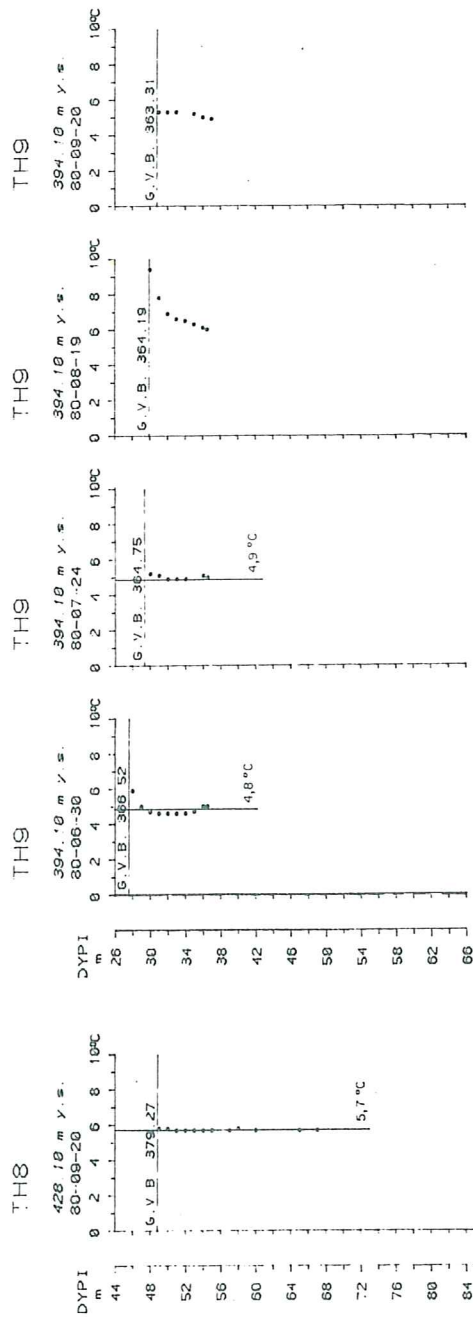
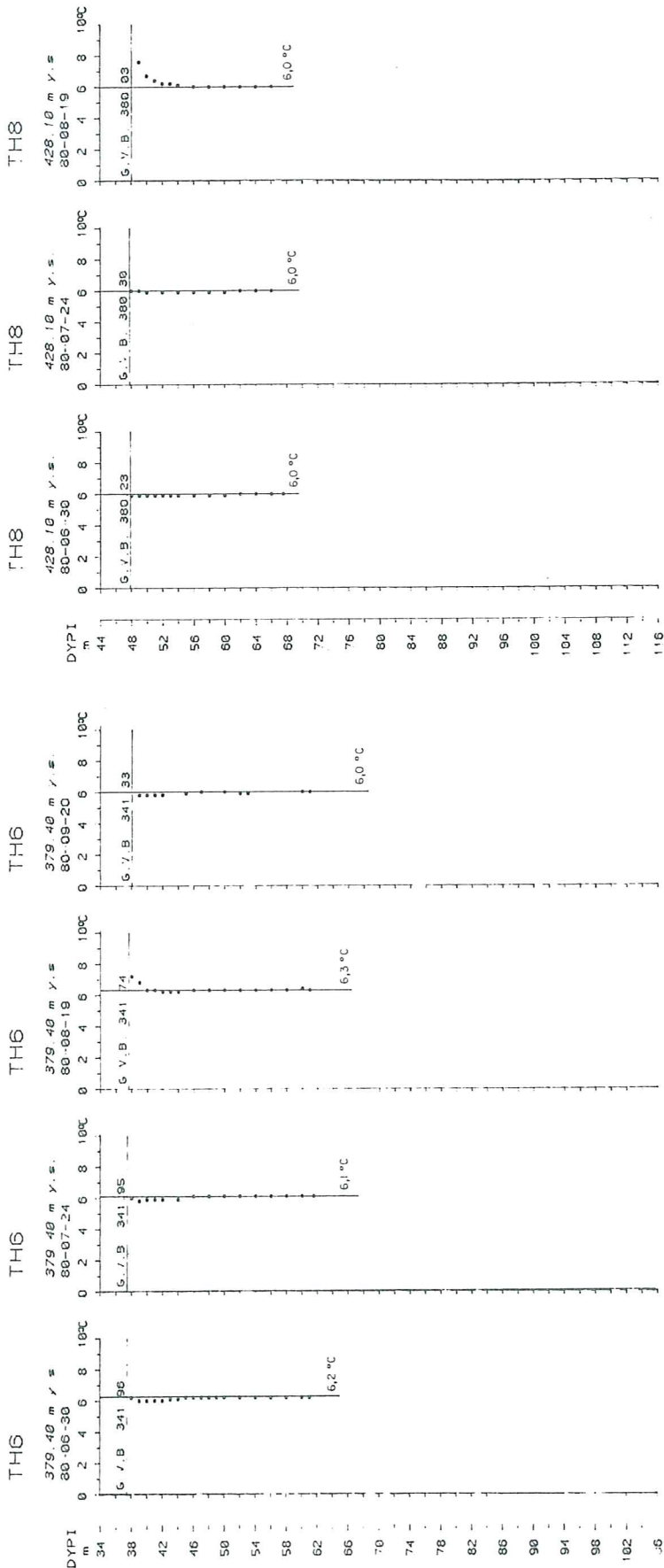
VIÐAUKI A

Hitamælingar í holum boruðum fyrir 1980

VOD-MJ-838 BK  
81.04.0521

SULTARTANGAVIRKJUN  
YADOLDUSVAEDI  
HITAMAEILINGAR I BORHOLJUM  
HOLUR BORADAR FYRIR 1980

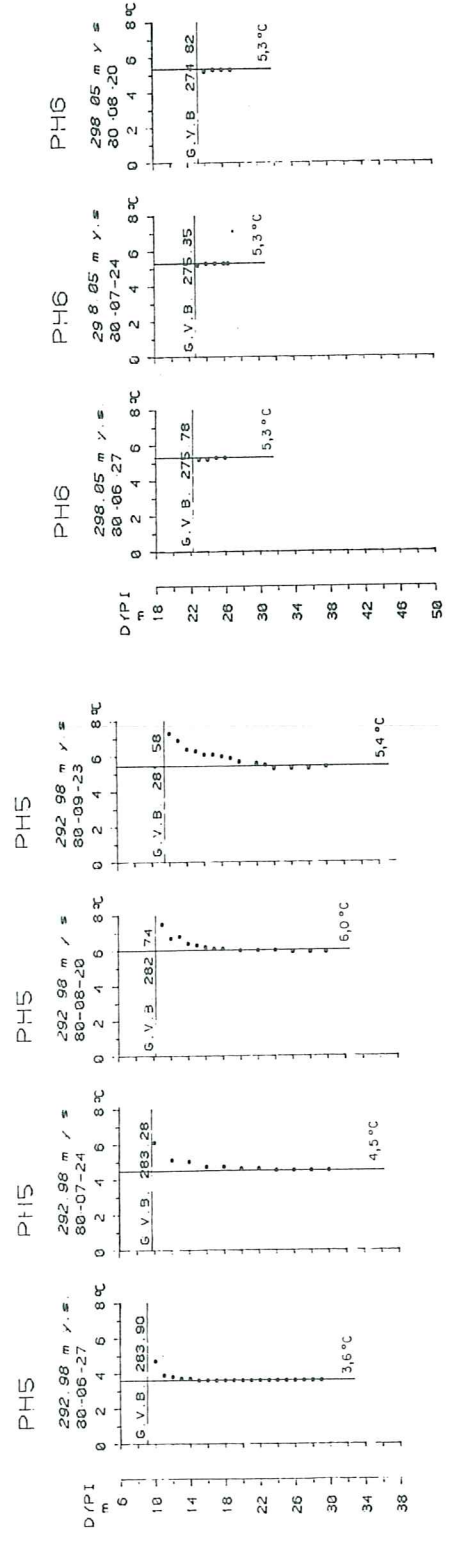
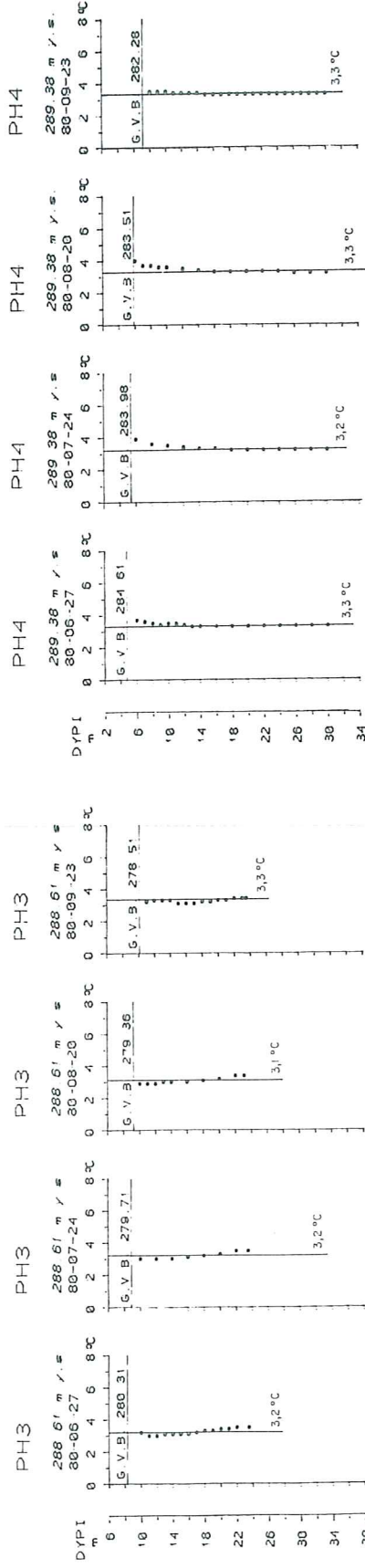
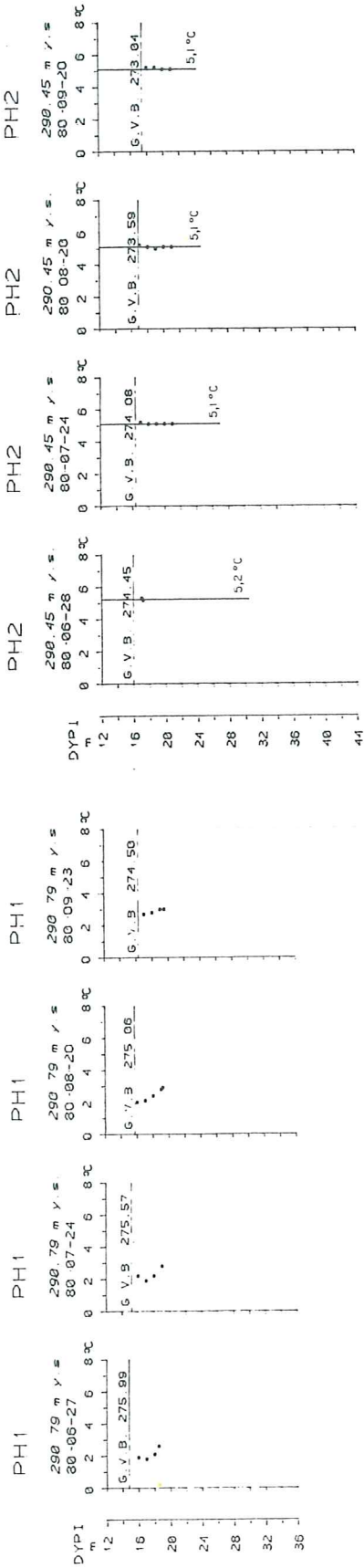




VOD-MJ-838 BK  
81.04.0522

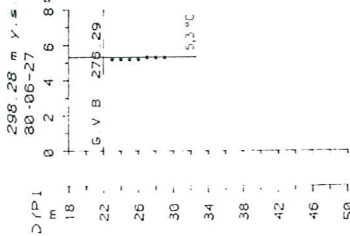
SULTARTANGAVIRKJUN  
VADALDA - BURFELL  
HITAEIÆLINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980



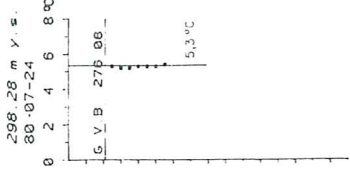


VOD-MJ-838 BK  
81.04.0523  
SULTARTANGA/IRKJUN  
VADILDUSVAEDI  
HITAMAEILINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980

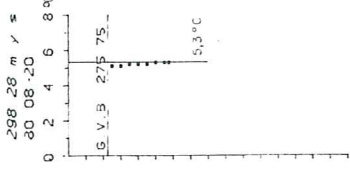
PH7



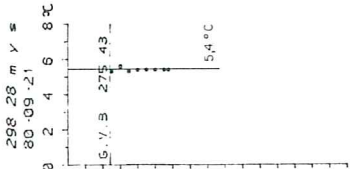
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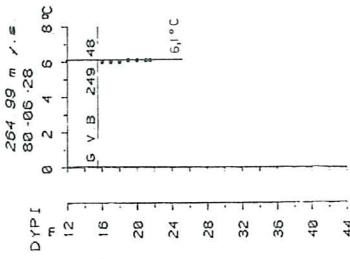
PH7



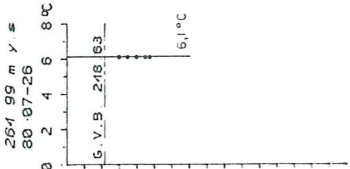
PH7



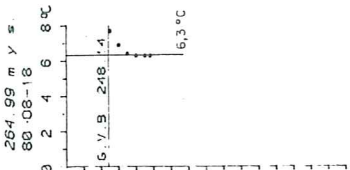
PH8



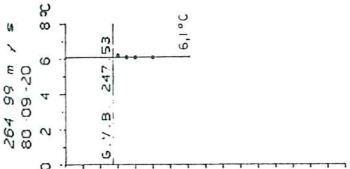
PH8



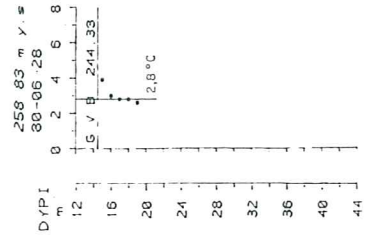
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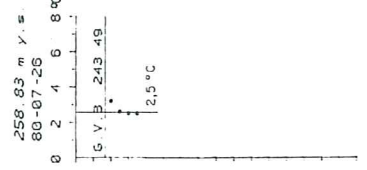
PH8



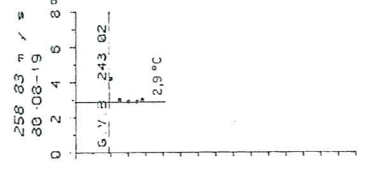
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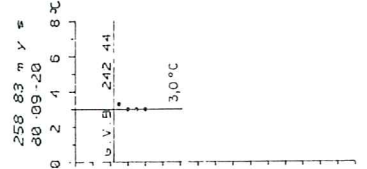
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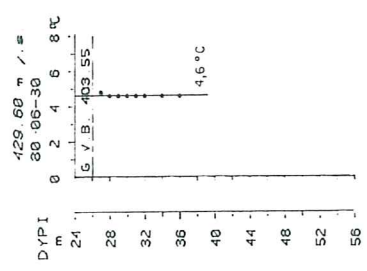
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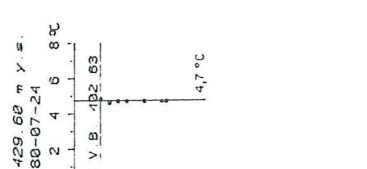
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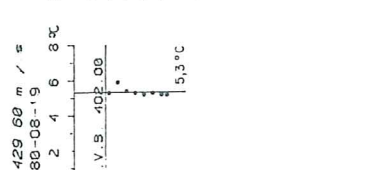
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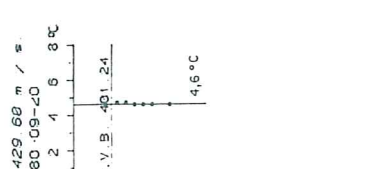
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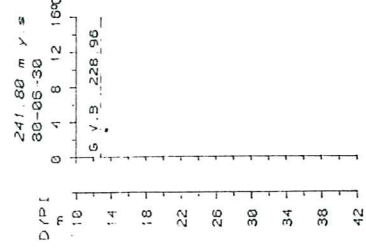
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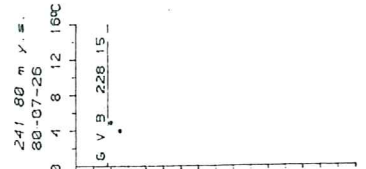
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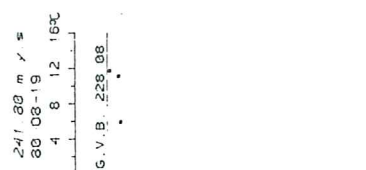
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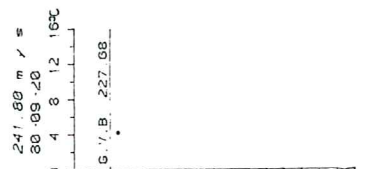
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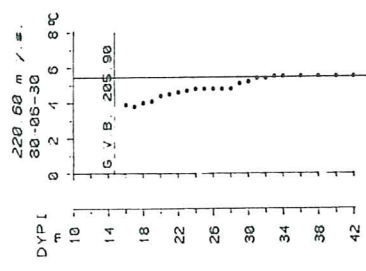
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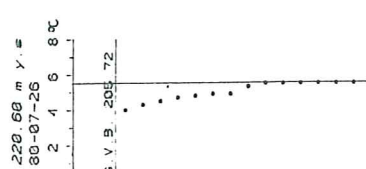
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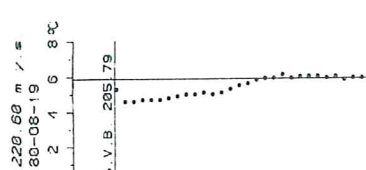
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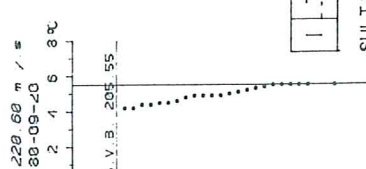
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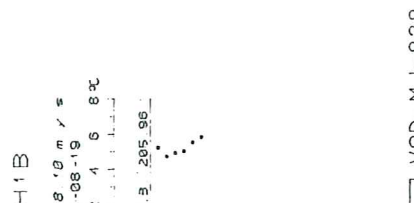
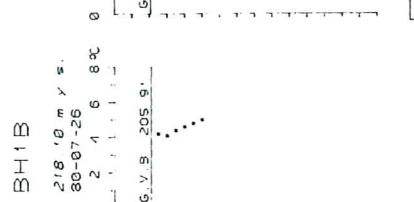
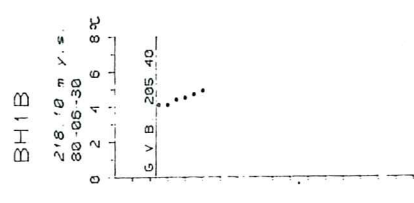
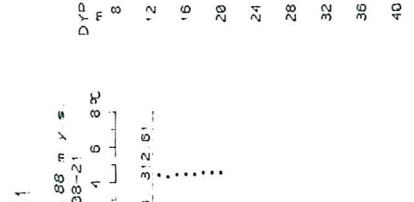
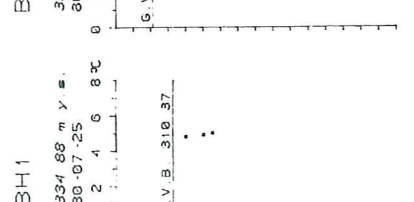
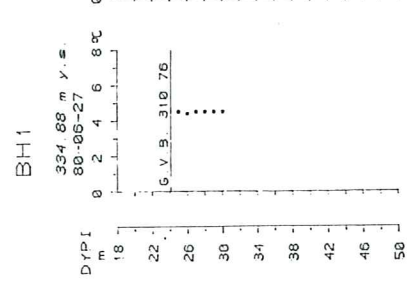
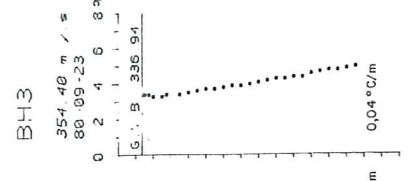
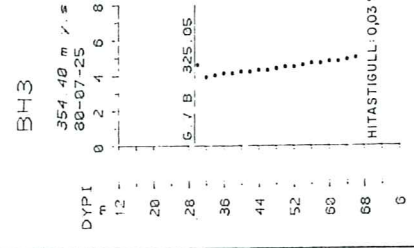
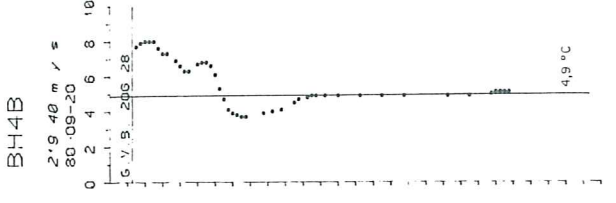
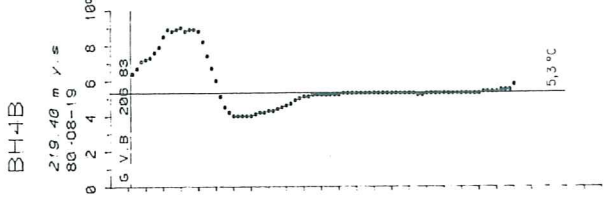
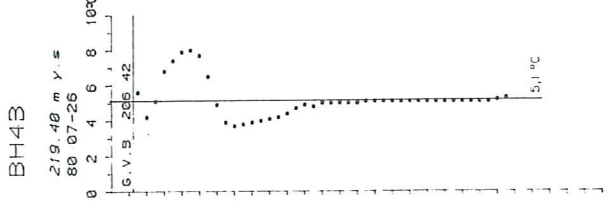
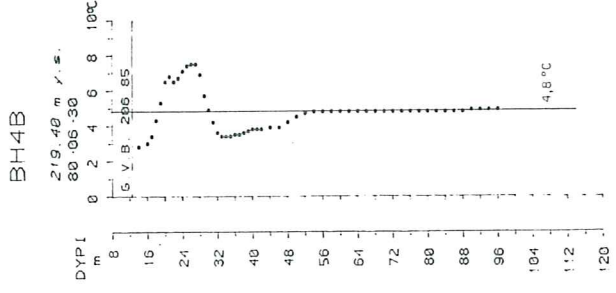
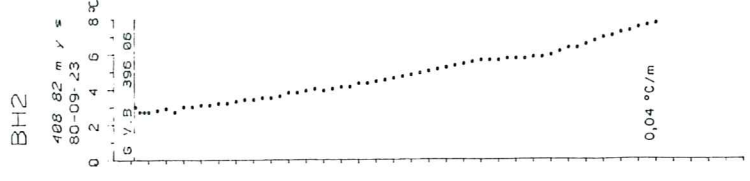
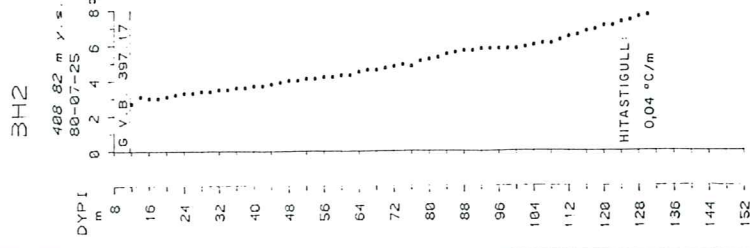
BH6B



BH6B



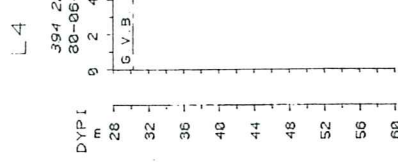
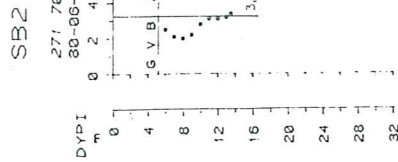
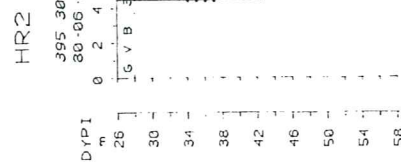
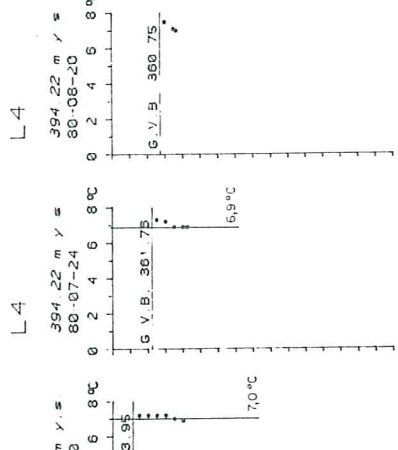
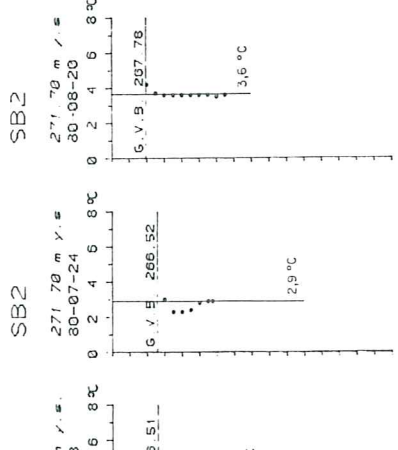
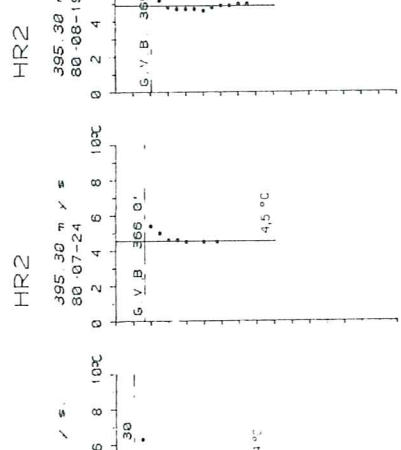
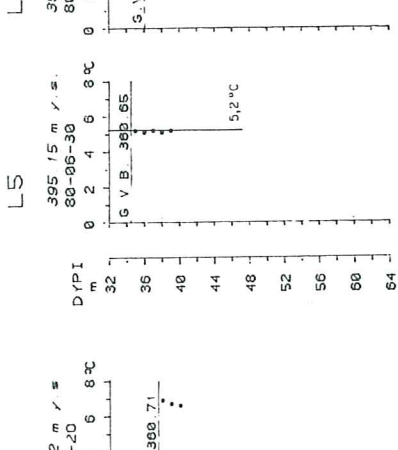
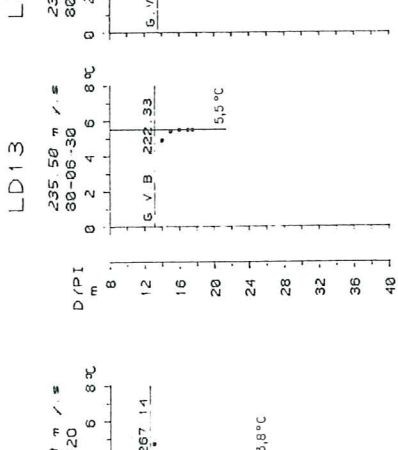
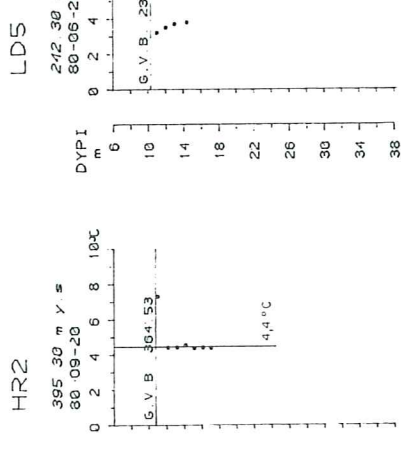
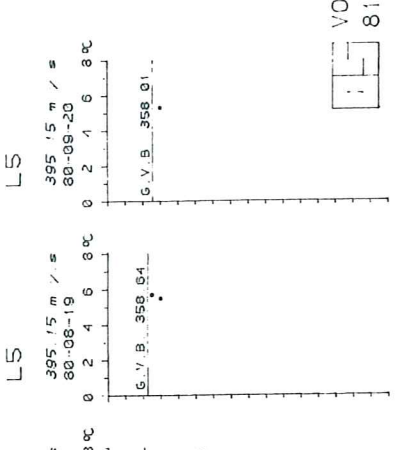
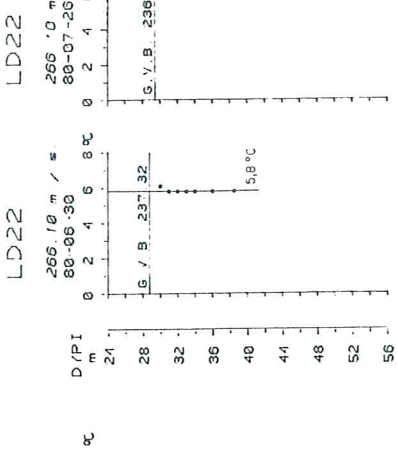
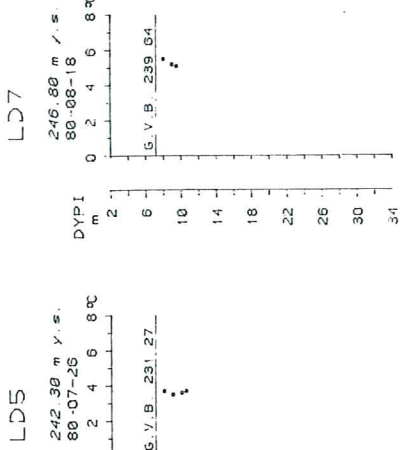
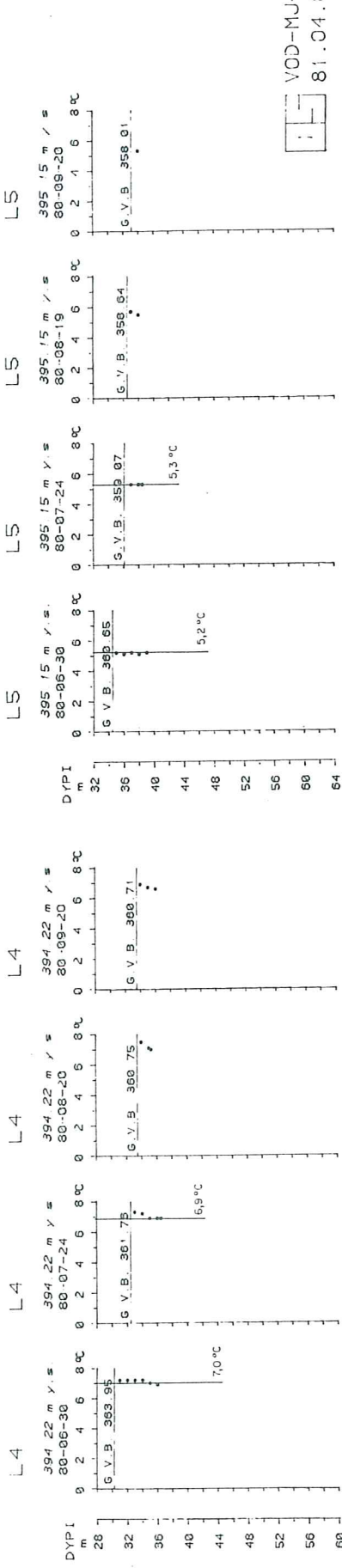
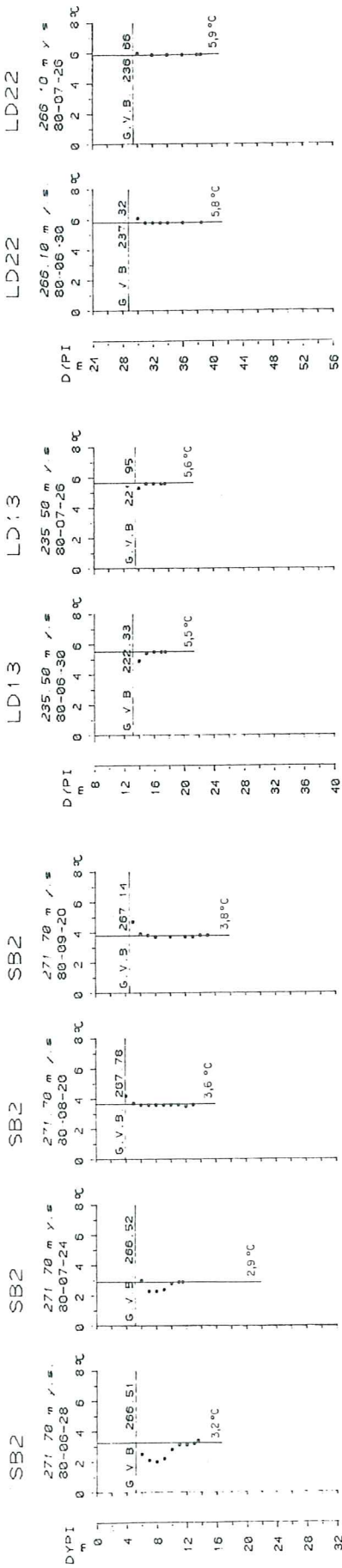
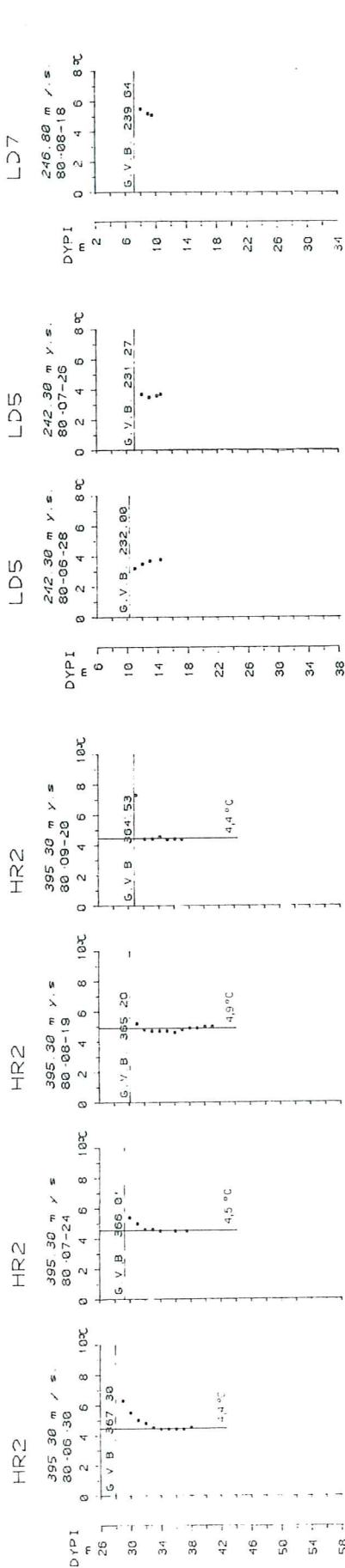
VOD-MJ-838 BK  
81.04.0524  
SULTARTANGAVIRKJUN  
HRAUNYJAFELL - BURFELL  
HITAMAELINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980



VOD-MJ-838 BK  
8:04.0525

SULTARTANGAVIRKJUN  
BUDARHALS - BURFELL  
HITAMÆLINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980

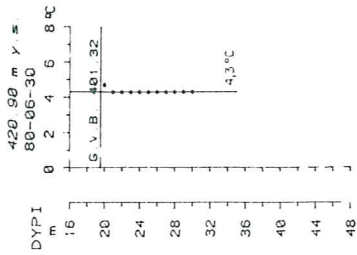




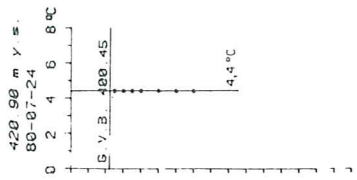
VOD-MJ-838 BK  
81.04.0526

SULTARTANGAVIRKJUN  
BURFELL - HRAUNEYJAFELL  
HITAMAELINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980

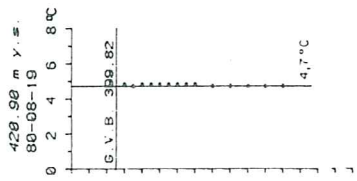
X1



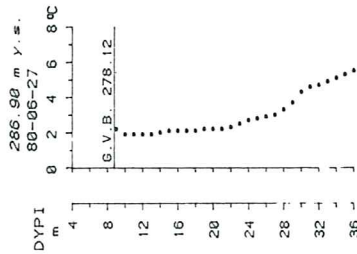
X1



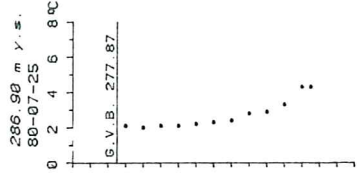
X1



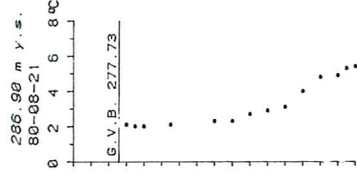
ST1



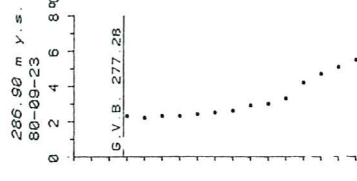
ST1



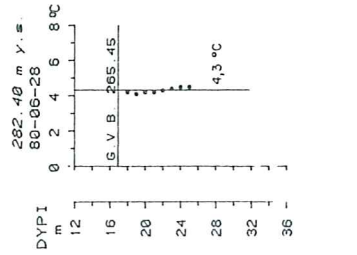
ST1



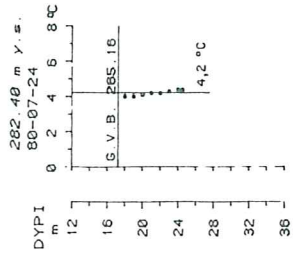
ST1



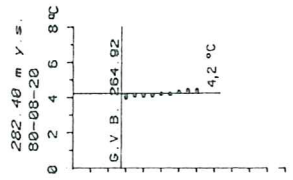
ST4



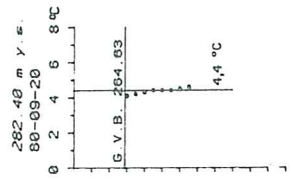
ST4



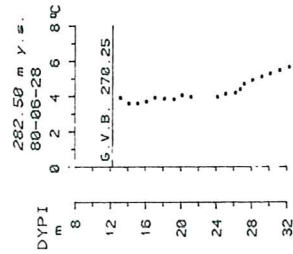
ST4



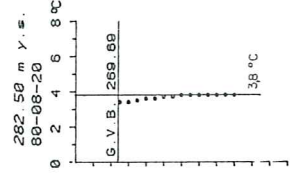
ST4



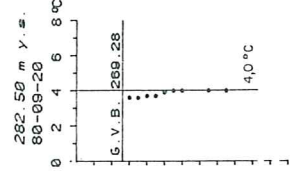
ST6



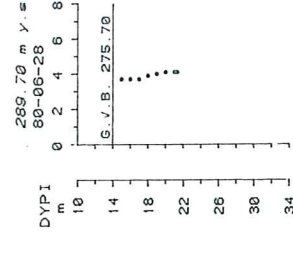
ST6



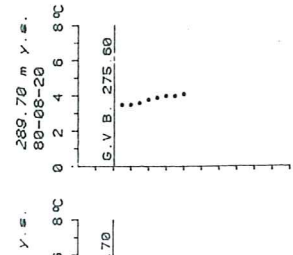
ST6



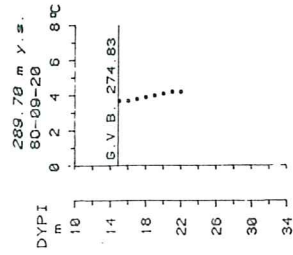
ST9



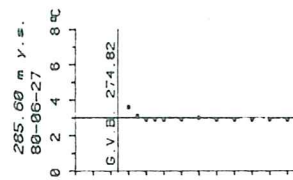
ST9



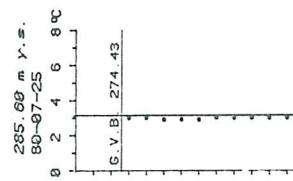
ST9



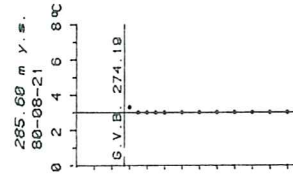
ST3



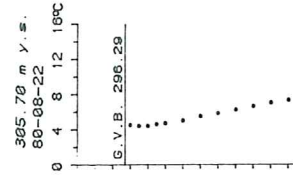
ST3



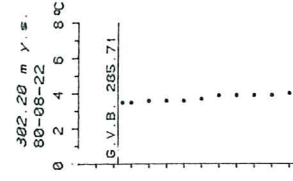
ST3



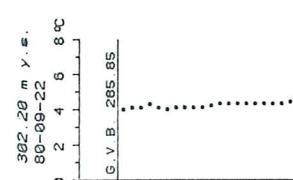
ST10



ST11



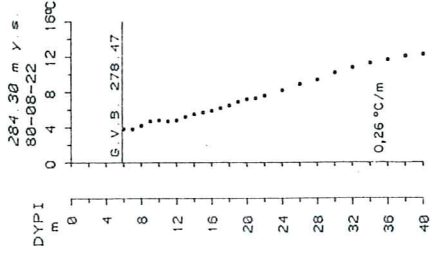
ST11



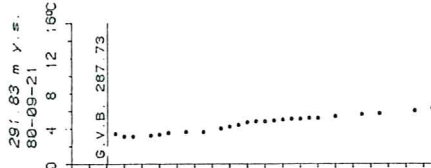
VOD-MJ-838 BK  
81.04.0527

SULTANGAVIRKJUN  
HRAUNYJAFELL-SANDAFELL  
HITANAELINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980

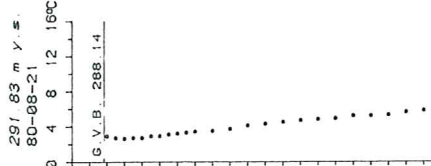
ST12



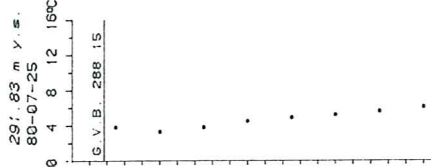
ST17



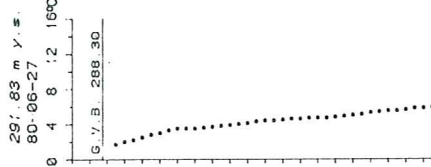
ST17



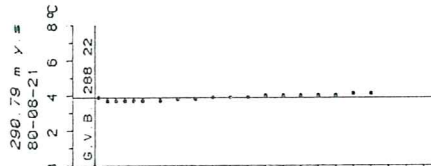
ST17



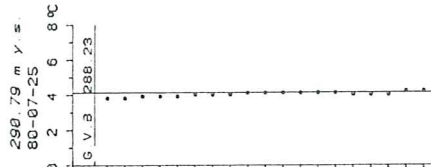
ST17



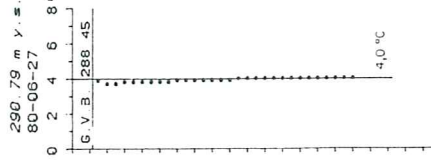
ST14



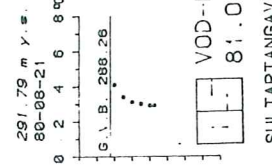
ST14



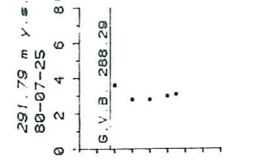
ST14



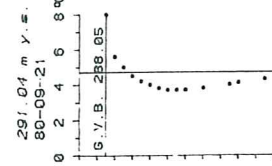
ST19 I"



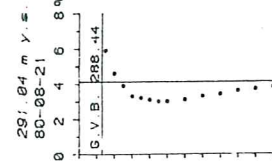
ST19 I"



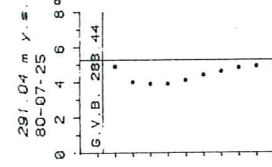
ST15



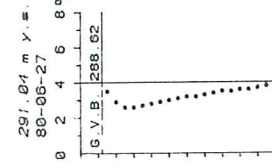
ST15



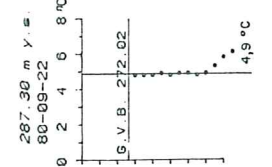
ST15



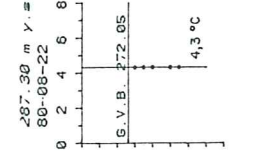
ST15



ST13



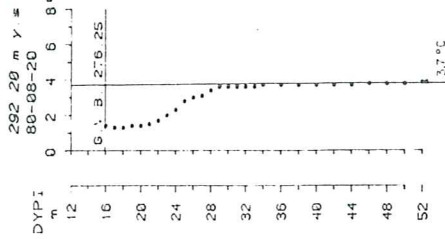
ST13



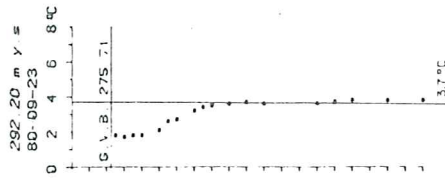
SULTARTANGA/IRKJUN  
SANDAFELL - SULTARTANGI  
HITAMÆLINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980



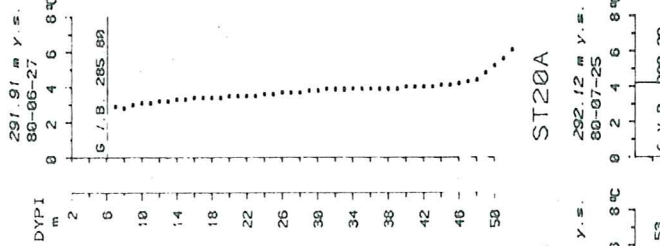
ST16



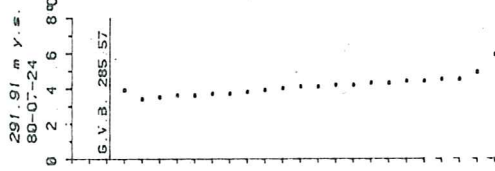
ST16



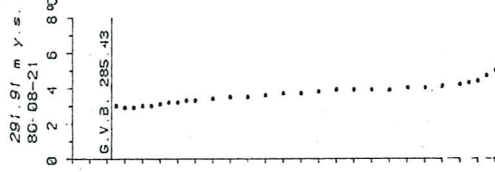
ST192"



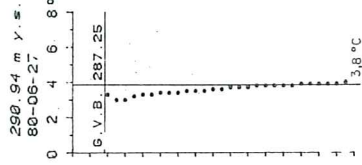
ST192"



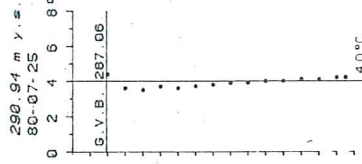
ST192"



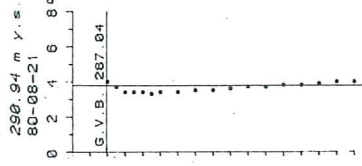
ST18



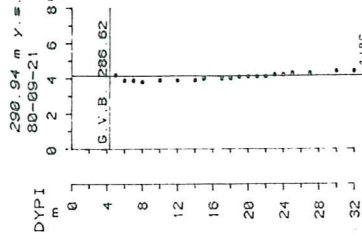
ST18



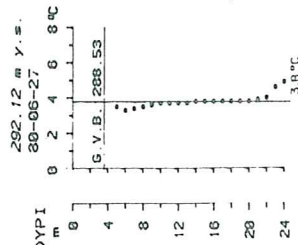
ST18



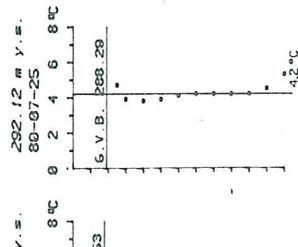
ST18



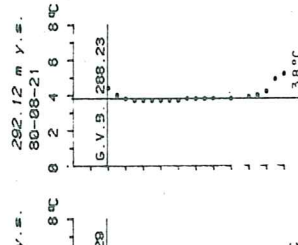
ST20A



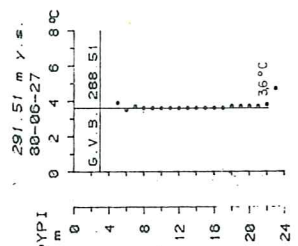
ST20A



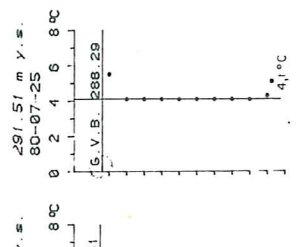
ST20A



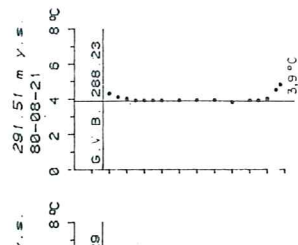
ST20B



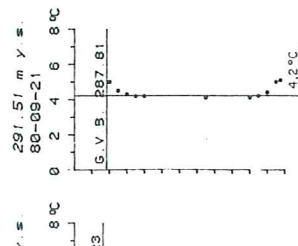
ST20B



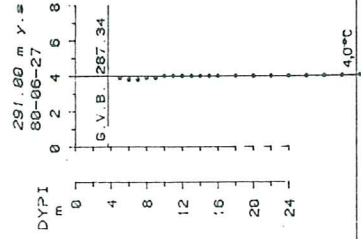
ST20B



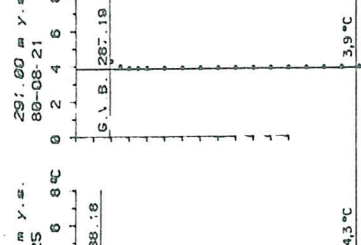
ST20B



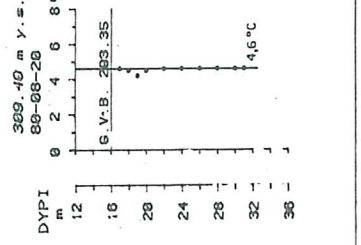
ST21



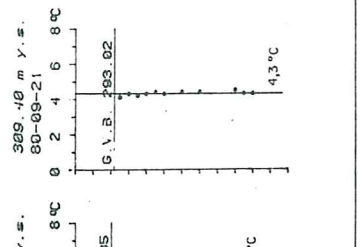
ST21



HA01



HA01



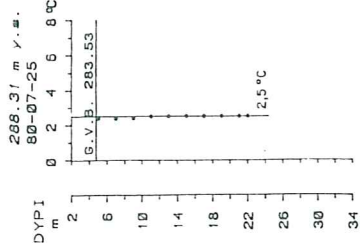
VOD-MJ-838 BK  
81.04.0529

SULTARTANGAVIRKJUN  
SULTARTANGI - HALD  
HITAMAEILINGAR I BORHOLUM  
HOLUR BORADAR FYRIR 1980

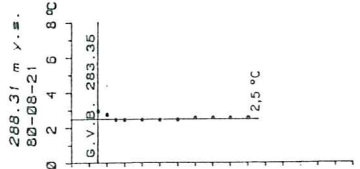
VIÐAUKI B

Hitamælingar í holum boruðum árið 1980

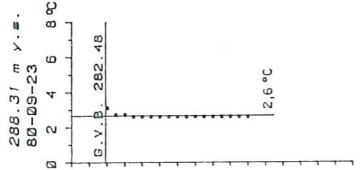
PH19



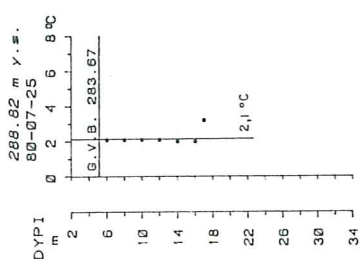
PH19



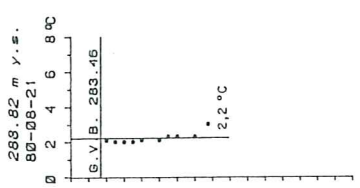
PH19



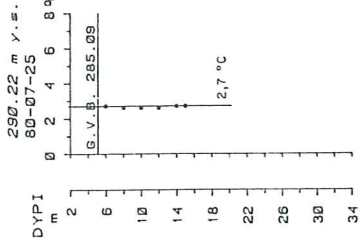
PH20B



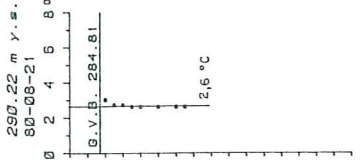
PH20B



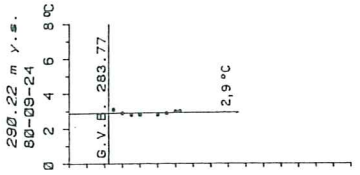
PH21



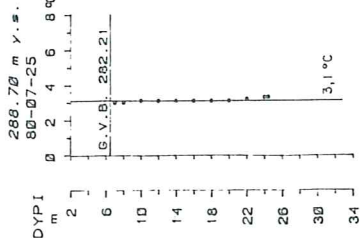
PH21



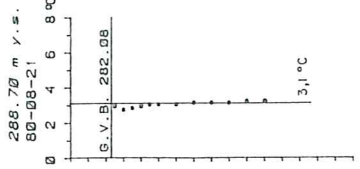
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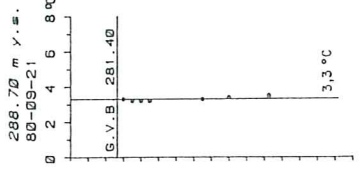
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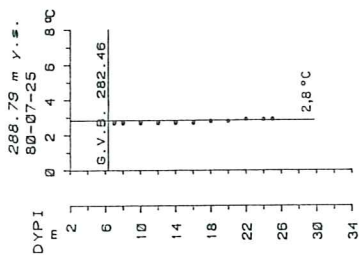
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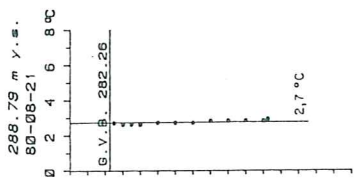
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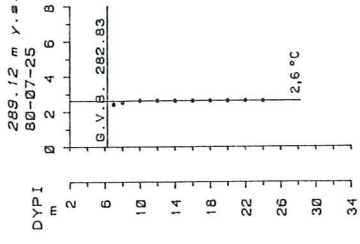
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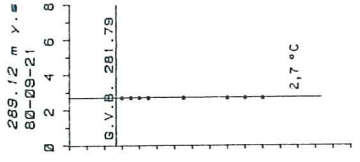
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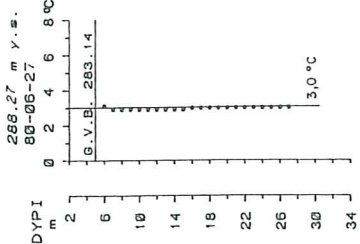
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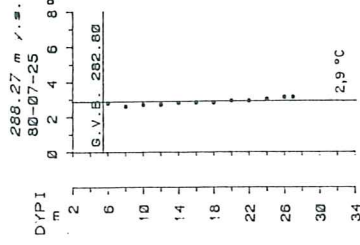
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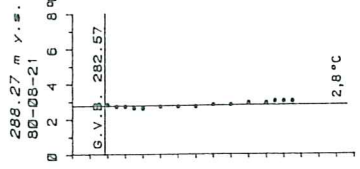
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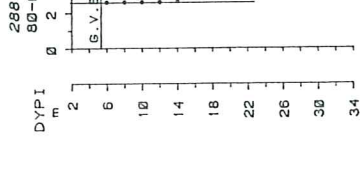
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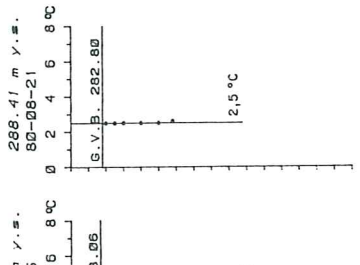
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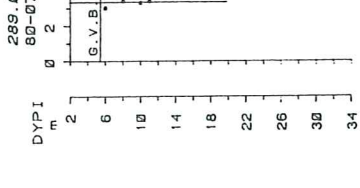
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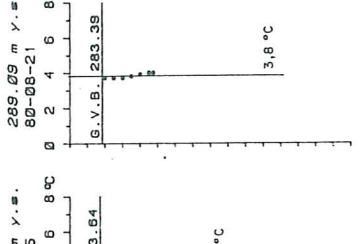
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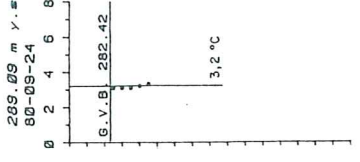
PH28



PH28



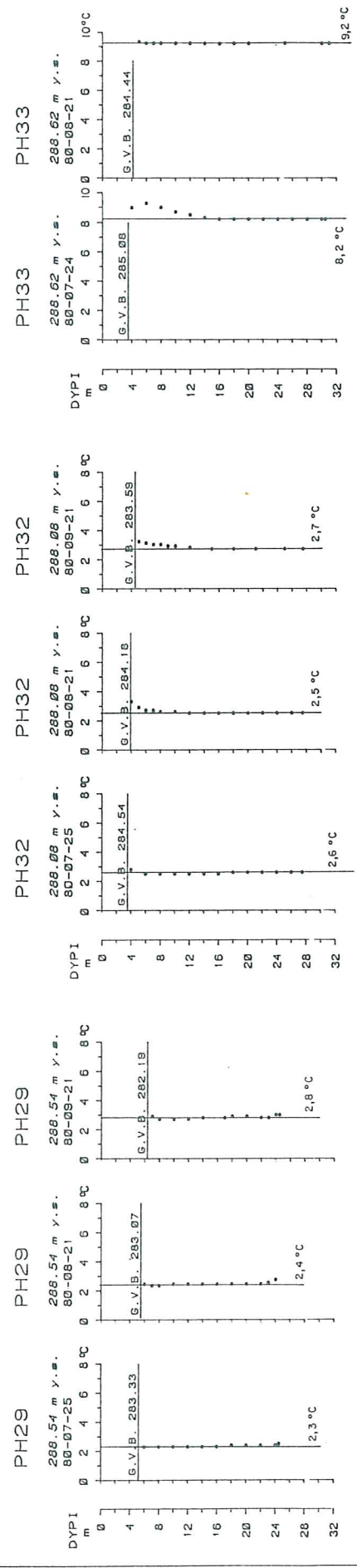
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VOD-MJ-838 BK  
81.04.0451

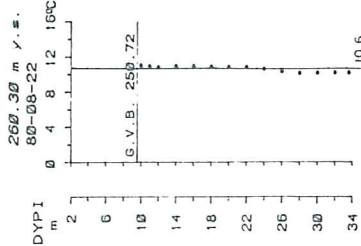
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HOLUR BORADAR 1980



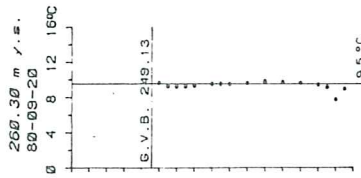


VOD-MJ-838 BK  
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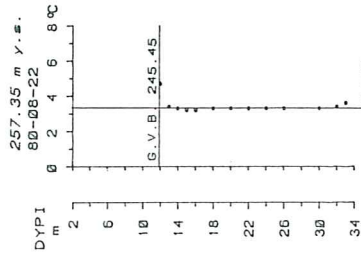
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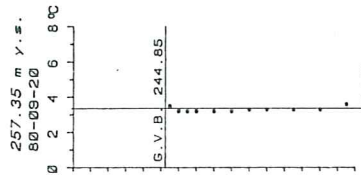
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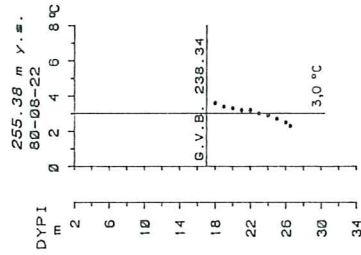
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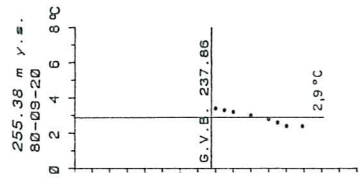
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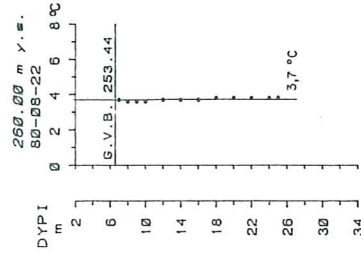
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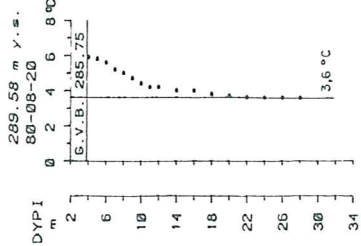
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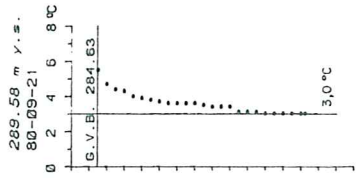
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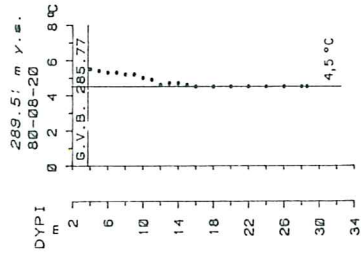
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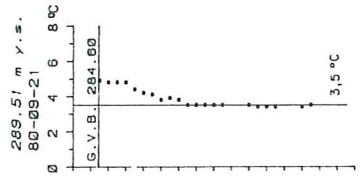
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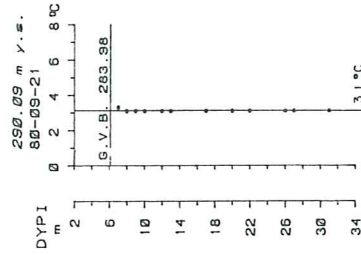
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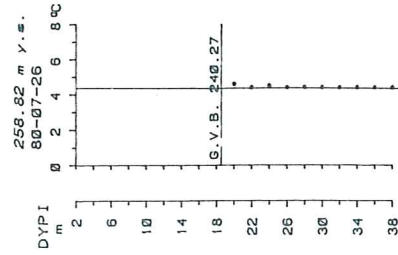
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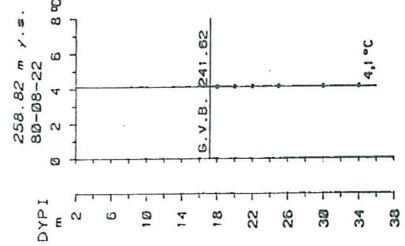
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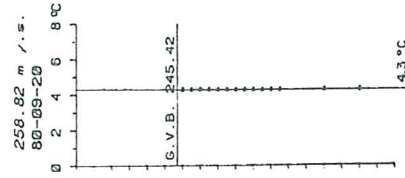
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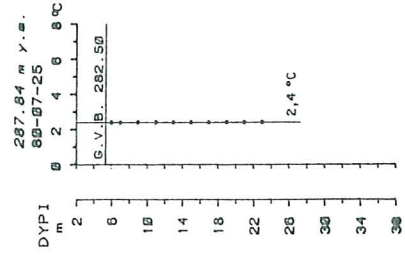
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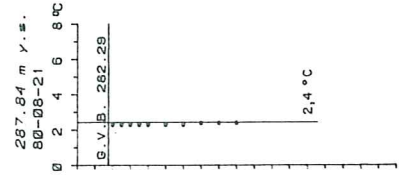
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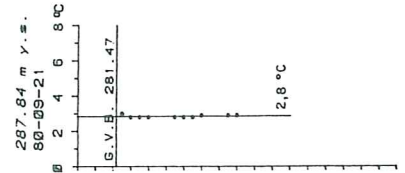
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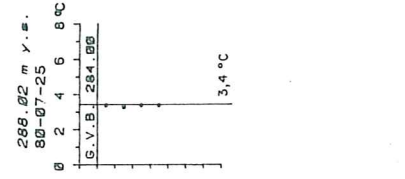
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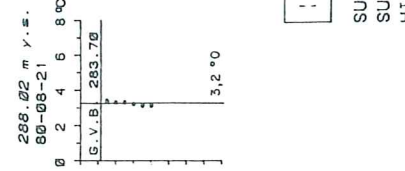
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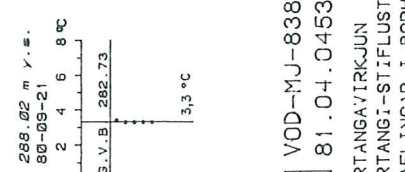
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ST24

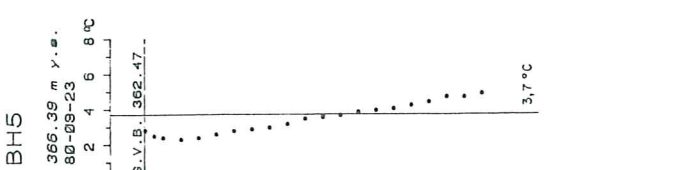
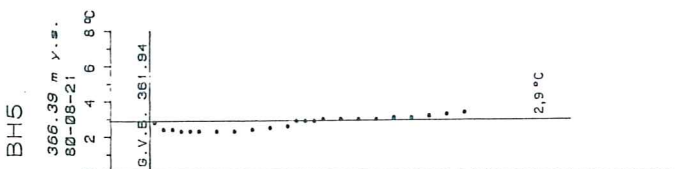
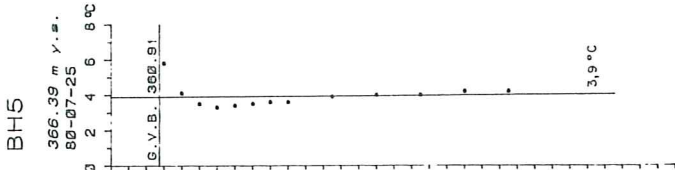
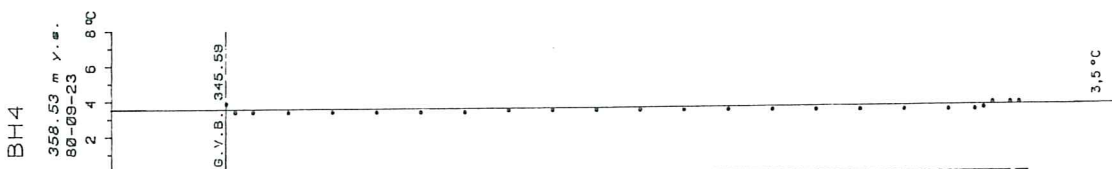
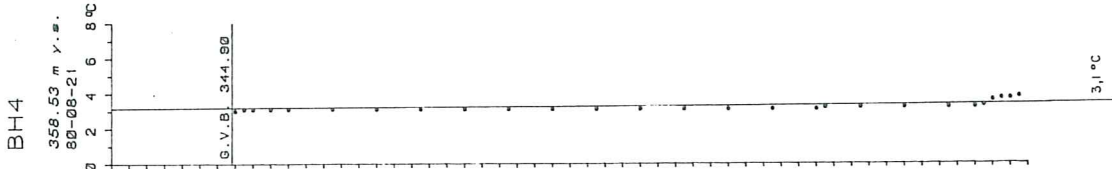
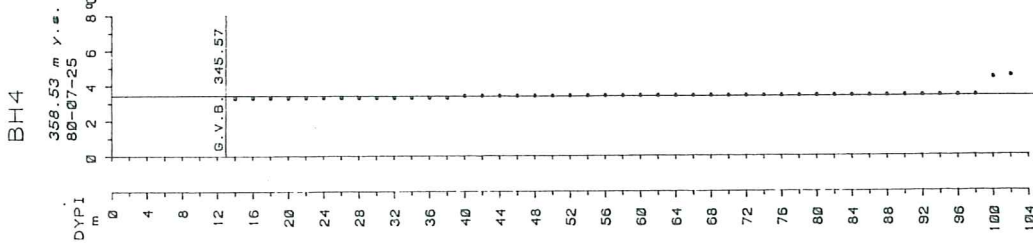
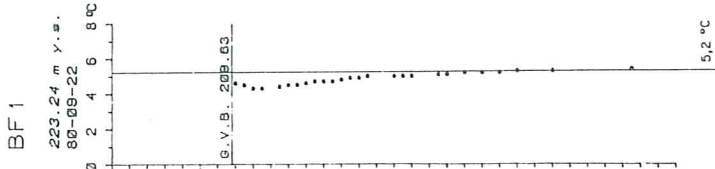
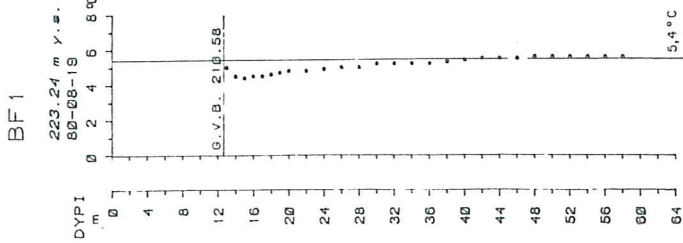


ST24



VOD-MJ-838 BK  
81.04.0453

SULTARTANGAVIRKJUN  
SULTARTANGI-STIFLUSTAEDI  
HITAYAEILINGAR I BORHOLUM  
HOLUR BORADAR 1980



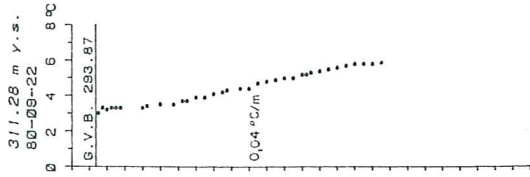
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81.04.0454  
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BUDARHALS - BURFELL  
HITAMAEILINGAR I BORHOLUM  
HOLUR BORADAR 1980



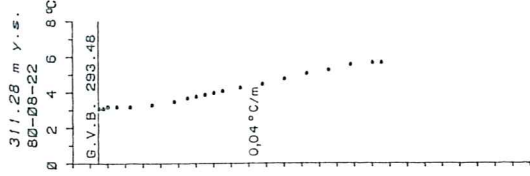
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 81.04.0455  
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 SANDAFELL  
 HITAMÆLINGAR I BORHOLM  
 HOLUR BORADAR 1980



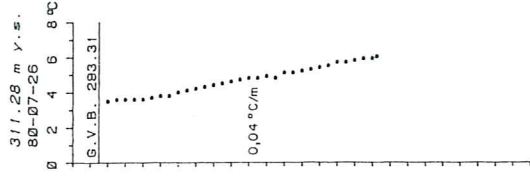
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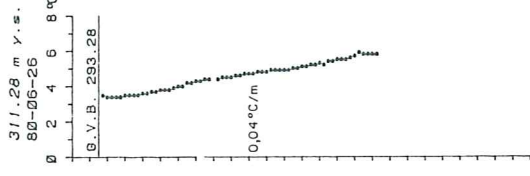
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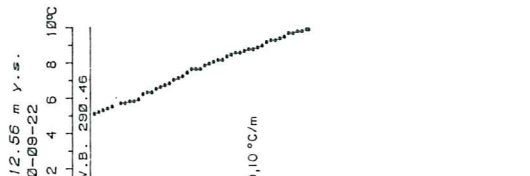
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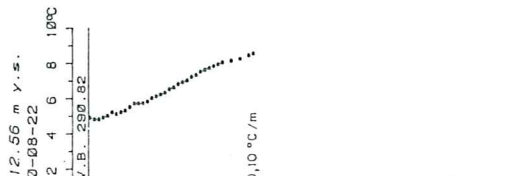
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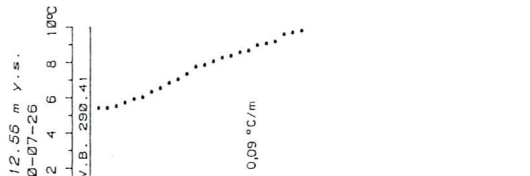
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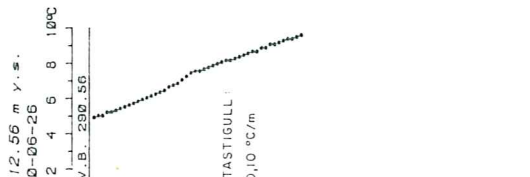
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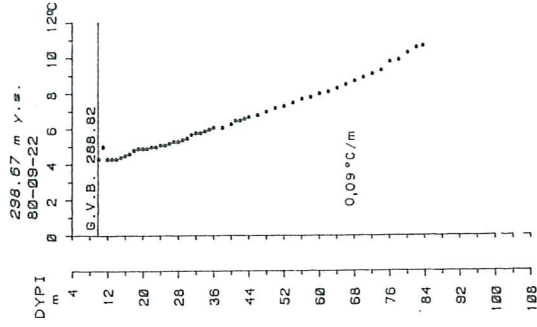
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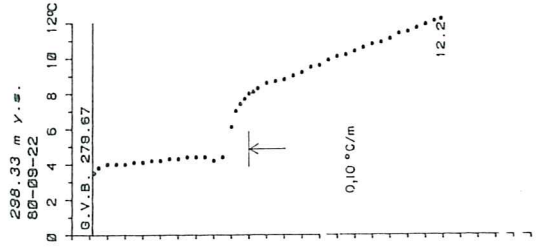
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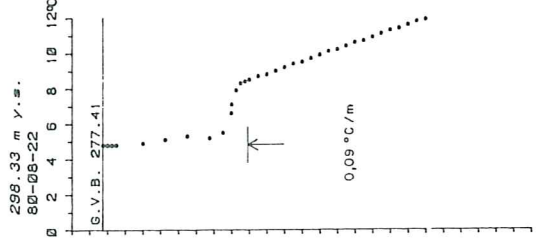
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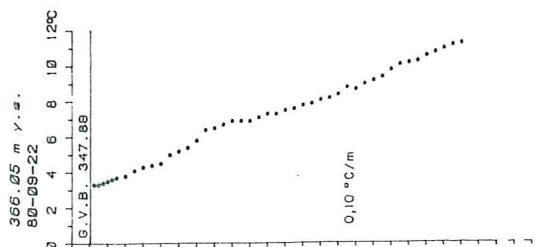
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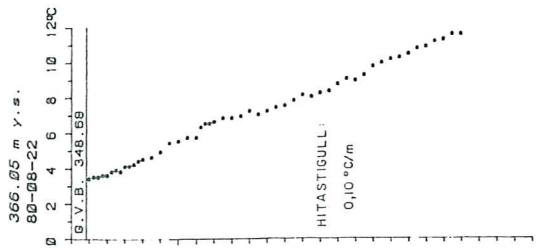
SF7



SF6

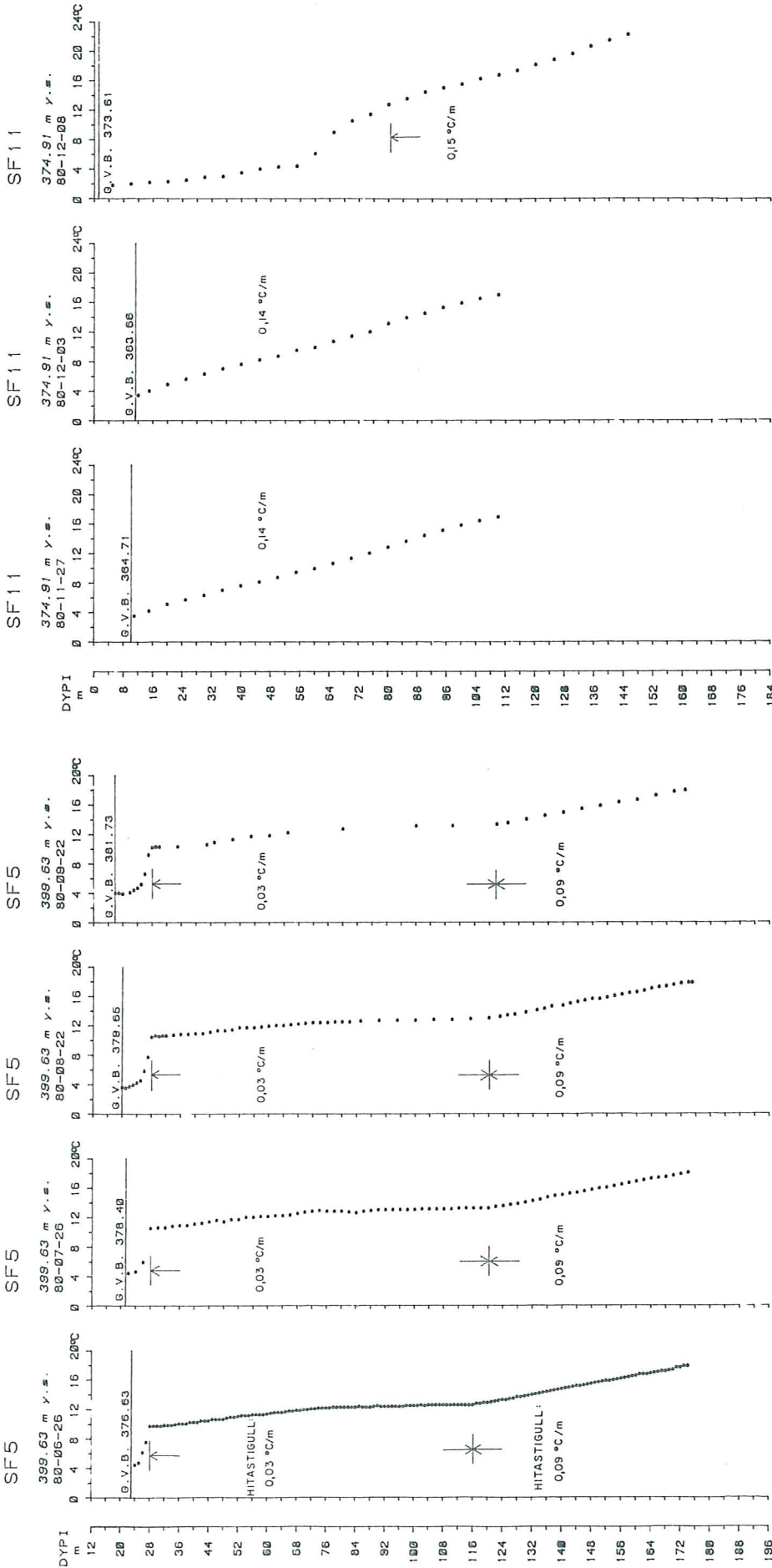


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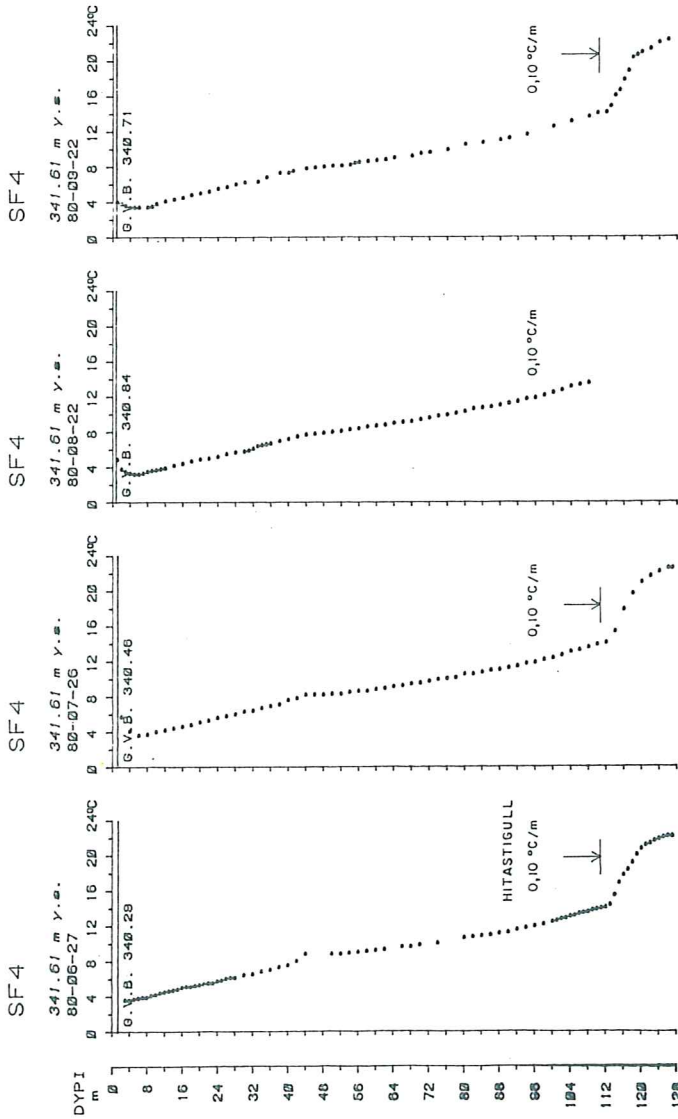
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DYPÍ m  
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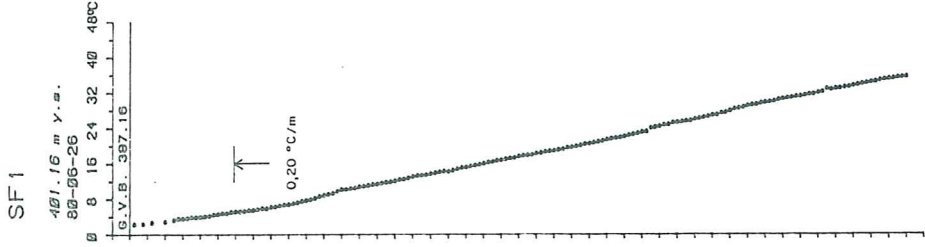
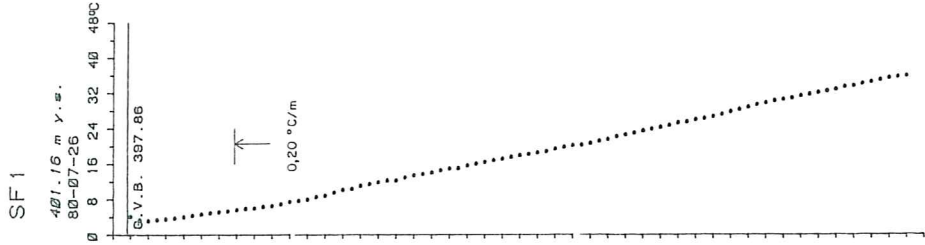
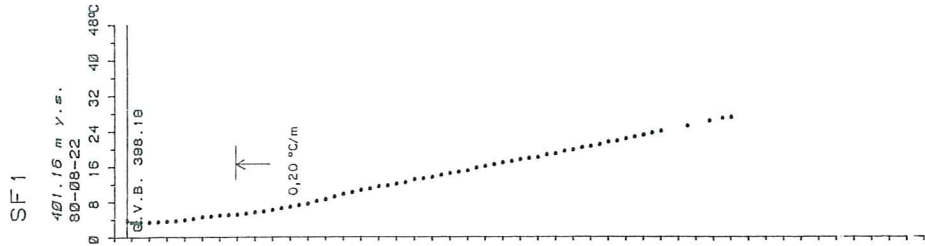
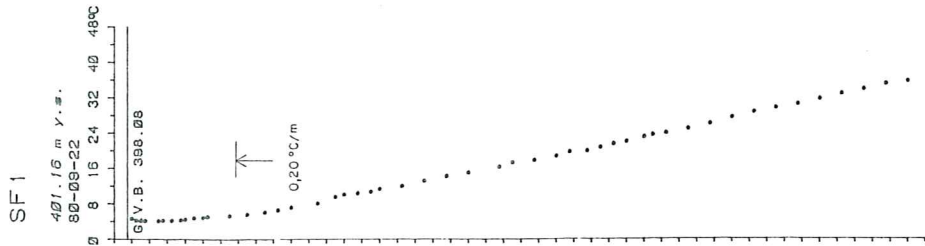
VOD--MJ--838 3K  
 81.04.0456  
 SULTARTANGAVIRKJUN  
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 HITAMAELINGAR I BORHOLUM  
 HOLUR BORADAR 1980

VOD-MJ-838 BK  
81.04.0457  
SULTARTANGAYIRKJUN  
SANDAFELL  
HITAMÆLINGAR I BORHOLUM  
HOLUR BORADAR 1980

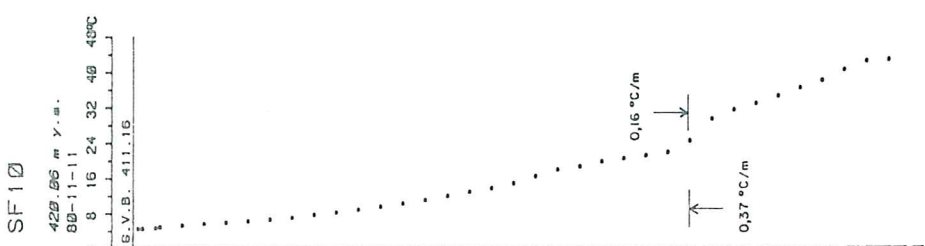




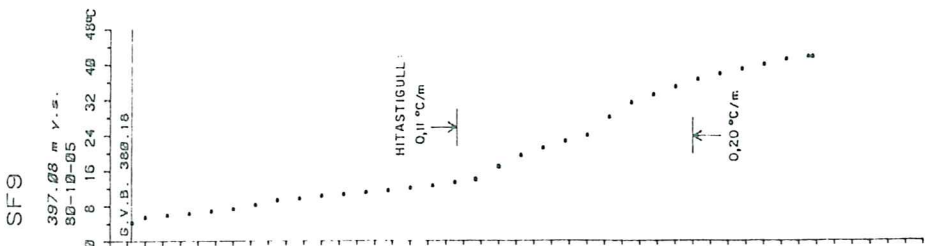
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 SANDAFELL  
 HITAMAELINGAR I BORHOLUM  
 HOLUR BORADAR 1980



DyPI  
 m  
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DyPI  
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DyPI  
 m  
 12 20 28 36 44 52 60 68 76 84 92 100 108 116 124 132 140 148 156 164 172 180 188 196

