



Prepared for:
Rijkswaterstaat
Dienst Getijdewateren

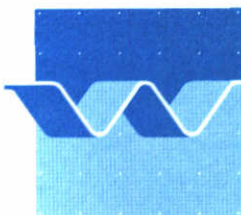
Wave conditions along the Dutch coast

AFGEHANDELD

Part B: Figures
Report on numerical model studies
July 1993

	bibliotheek postbus 177 - 2600 MH Delft waterloopkundig laboratorium/WL
BB	62253
WL	
EXPL	 R0000990

Wave conditions along the Dutch coast



delft hydraulics

List of figures

- 4.1 Data sources bathymetry
- 4.2 Comparison long profiles L33 and L35 with corresponding Jarkus-profiles
- 4.3 Effect of averaging on profile representation
- 4.4 Comparison long profile L33 with corresponding section of the Hoku-model
- 4.5 Data points Hoku bathymetry detail outer delta
- 4.6 Data points 250 x 250 bathymetry detail outer delta
- 4.7 Origin of data bathymetry
- 4.8 Waterlevel and windspeed synthetic extreme storm
- 4.9 Current field extreme storm flood conditions
- 4.10 Current field extreme storm ebb conditions
- 4.11 Locations of computational grids
- 4.12 Location wave measuring stations
- 4.13 Expected significant wave height versus storm surge level
- 4.14 Location of output points, lines and areas
- 4.15 Location of output points, lines and areas detail zeegat van Texel
- 4.16 Bottom topography, Run SSS, outer model (in m below NAP)
- 4.17 Bottom topography, Run SSS, zeegat mode (in m below NAP)
- 4.18 Current field, Run SSS, Zeegat model
- 4.19a Significant wave height contours, Run SSS, outer model (in m)
- 4.19b Main wave directions, Run SSS, outer model
- 4.20a Significant wave height contours, Run SSS, Inner model (in m)
- 4.20b Main wave directions, Run SSS, Inner model
- 4.21a Significant wave height contours, Run SSS, Zeegat model (in m)
- 4.21b Main wave directions, Run SSS, Zeegat model
- 4.22a Significant wave height contours, Run SSS, Detail Haaks (in m)
- 4.22b Main wave directions, Run SSS, Detail Haaks
- 4.23a Significant wave height contours, Run SSS, Detail Malzwin (in m)
- 4.23b Main wave directions, Run SSS, Detail Malzwin
- 4.24a Significant wave height Egmond profile comparison buiten and binnen model
- 4.24b Significant wave height Molengat profile comparison buiten and zeegat model
- 4.24c Significant wave height Marsdiep profile comparison of buiten and zeegat model
- 4.24d Significant wave height Breewijd profile comparison buiten and zeegat model
- 4.24e Significant wave height nhpaal 10 profile comparison buiten, binnen and zeegat model
- 4.25a Significant wave height Egmond profile varying water level
- 4.25b Significant wave height Egmond profile varying water level
- 4.25c Mean wave period Egmond profile varying water level
- 4.25d Effect of water level variation Egmond profile
- 4.25e Significant wave height Molengat profile varying water level
- 4.25f Significant wave height Molengat profile varying water level
- 4.25g Significant wave height Marsdiep profile varying water level
- 4.25h Mean wave period Marsdiep profile varying water level
- 4.25i Significant wave height Marsdiep profile varying water level
- 4.25j Mean wave period Marsdiep profile varying water level
- 4.25k Significant wave height Breewijd profile varying water level
- 4.25l Significant wave height Breewijd profile varying water level

List of figures (continued)

- 4.25m Effect of water level variation entrance Wadden Sea
- 4.26a Significant wave height Egmond profile varying incoming wave height
- 4.26b Significant wave height Egmond profile varying incoming wave height
- 4.26c Mean wave period Egmond profile varying incoming wave height
- 4.26d Effect of wave height variation Egmond profile
- 4.26e Significant wave height Molengat profile varying incoming wave height
- 4.26f Significant wave height Molengat profile varying incoming wave height
- 4.26g Significant wave height Marsdiep profile varying incoming wave height
- 4.26h Mean wave period Marsdiep profile varying incoming wave height
- 4.26i Significant wave height Marsdiep profile varying incoming wave height
- 4.26j Mean wave period Marsdiep profile varying incoming wave height
- 4.26k Significant wave height Breewijd profile varying incoming wave height
- 4.26l Significant wave height Breewijd profile varying incoming wave height
- 4.26m Effect of wave height variation entrance Wadden Sea
- 4.27a Significant wave height Egmond profile varying wave period
- 4.27b Mean wave period Egmond profile varying wave period
- 4.27c Wave steepness Egmond profile varying wave period
- 4.27d Significant wave height Egmond profile varying wave period
- 4.27e Mean wave period Egmond profile varying wave period
- 4.27f Effect of wave period variation Egmond profile
- 4.27g Significant wave height Molengat profile varying wave period
- 4.27h Significant wave height Molengat profile varying wave period
- 4.27i Significant wave height Marsdiep profile varying wave period
- 4.27j Mean wave period Marsdiep profile varying wave period
- 4.27k Significant wave height Marsdiep profile varying wave period
- 4.27l Mean wave period Marsdiep profile varying wave period
- 4.27m Significant wave height Breewijd profile varying wave period
- 4.27n Significant wave height Breewijd profile varying wave period
- 4.27o Effect of wave period variation entrance Wadden Sea
- 4.28a Significant wave height Molengat profile varying wave direction
- 4.28b Significant wave height Marsdiep profile varying wave direction
- 4.28c Mean wave period Marsdiep profile varying wave direction
- 4.28d Significant wave height Breewijd profile varying wave direction
- 4.28e Effect of main wave direction entrance Wadden Sea
- 4.29a Significant wave height Egmond profile varying directional spreading
- 4.29b Significant wave height Egmond profile varying directional spreading
- 4.29c Mean wave period Egmond profile varying directional spreading
- 4.29d Effect of directional spreading Egmond profile
- 4.29e Significant wave height Molengat profile varying directional spreading
- 4.29f Significant wave height Molengat profile varying directional spreading
- 4.29g Significant wave height Marsdiep profile varying directional spreading
- 4.29h Mean wave period Marsdiep profile varying directional spreading
- 4.29i Significant wave height Marsdiep profile varying directional spreading
- 4.29j Mean wave period Marsdiep profile varying directional spreading
- 4.29k Significant wave height Breewijd profile varying directional spreading
- 4.29l Significant wave height Breewijd profile varying directional spreading

List of figures (continued)

- 4.29m Effect of directional spreading entrance Wadden Sea
- 4.30a Significant wave height Egmond profile varying wind speed
- 4.30b Significant wave height Egmond profile varying wind speed
- 4.30c Mean wave period Egmond profile varying wind speed
- 4.30d Effect of wind speed variation Egmond profile
- 4.30e Significant wave height Molengat profile varying wind speed
- 4.30f Significant wave height Molengat profile varying wind speed
- 4.30g Significant wave height Marsdiep profile varying wind speed
- 4.30h Mean wave period Marsdiep profile varying wind speed
- 4.30i Significant wave height Marsdiep profile varying wind speed
- 4.30j Mean wave period Marsdiep profile varying wind speed
- 4.30k Significant wave height Breewijd profile varying wind speed
- 4.30l Significant wave height Breewijd profile varying wind speed
- 4.30m Effect of wind speed variation entrance Wadden Sea
- 4.31a Significant wave height Molengat profile varying current conditions
- 4.31b Mean wave period Molengat profile varying current conditions
- 4.31c Significant wave height Marsdiep profile varying current conditions
- 4.31d Mean wave period Marsdiep profile varying current conditions
- 4.31e Significant wave height Breewijd profile varying current conditions
- 4.31f Mean wave period Breewijd profile varying current conditions
- 4.31g Effect of current conditions entrance Wadden Sea
- 4.32a Significant wave height Egmond profile varying bottom friction coefficient
- 4.32b Significant wave height Egmond profile varying bottom friction
- 4.32c Mean wave period Egmond profile varying bottom friction
- 4.32d Effect of friction coefficient Egmond profile
- 4.32e Significant wave height Molengat profile varying bottom friction coefficient
- 4.32f Significant wave height Molengat profile varying bottom friction coefficient
- 4.32g Significant wave height Marsdiep profile varying bottom friction coefficient
- 4.32h Mean wave period Marsdiep profile varying bottom friction coefficient
- 4.32i Significant wave height Marsdiep profile varying bottom friction coefficient
- 4.32j Mean wave period Marsdiep profile varying bottom friction coefficient
- 4.32k Significant wave height Breewijd profile varying bottom friction coefficient
- 4.32l Significant wave height Breewijd profile varying bottom friction coefficient
- 4.32m Effect of friction coefficient entrance Wadden Sea
- 4.33a Significant wave height Egmond profile frequency change friction on/off
- 4.33b Mean wave period Egmond profile frequency change friction on/off
- 4.33c Effect of frequency change friction Egmond profile
- 4.33d Significant wave height Molengat profile frequency change friction on/off
- 4.33e Significant wave height Marsdiep profile frequency change friction on/off
- 4.33f Mean wave period Marsdiep profile frequency change friction on/off
- 4.33g Significant wave height Breewijd profile frequency change friction on/off
- 4.33h Effect of frequency change friction entrance Wadden Sea
- 4.34a Significant wave height Egmond profile varying wave breaking coefficient
- 4.34b Significant wave height Egmond profile varying wave breaking coefficient
- 4.34c Mean wave period Egmond profile varying wave breaking coefficient
- 4.34d Effect of breaking coefficient Egmond profile

List of figures (continued)

- 4.34e Significant wave height Molengat profile varying wave breaking coefficient
- 4.34f Significant wave height Molengat profile varying wave breaking coefficient
- 4.34g Significant wave height Marsdiep profile varying wave breaking coefficient
- 4.34h Mean wave period Marsdiep profile varying wave breaking coefficient
- 4.34i Significant wave height Marsdiep profile varying wave breaking coefficient
- 4.34j Mean wave period Marsdiep profile varying wave breaking coefficient
- 4.34k Significant wave height Breewijd profile varying wave breaking coefficient
- 4.34l Significant wave height Breewijd profile varying wave breaking coefficient
- 4.34m Effect of breaking coefficient entrance Wadden Sea
- 4.35a Significant wave height Egmond profile frequency change breaking on/off
- 4.35b Significant wave height Egmond profile frequency change breaking on/off
- 4.35c Mean wave period Egmond profile frequency change breaking on/off
- 4.35d Effect of frequency change breaking Egmond profile
- 4.35e Significant wave height Molengat profile frequency change breaking on/off
- 4.35f Significant wave height Molengat profile frequency change breaking on/off
- 4.35g Significant wave height Marsdiep profile frequency change breaking on/off
- 4.35h Mean wave period Marsdiep profile frequency change breaking on/off
- 4.35i Significant wave height Marsdiep profile frequency change breaking on/off
- 4.35j Mean wave period Marsdiep profile frequency change breaking on/off
- 4.35k Significant wave height Breewijd profile frequency change breaking on/off
- 4.35l Significant wave height Breewijd profile frequency change breaking on/off
- 4.35m Effect of frequency change breaking entrance Wadden Sea
- 4.36a Bottom variability bathymetry of profiles
- 4.36b Bottom variability relation depth - significant wave height
- 4.37a Significant wave height and mean wave period Egmond profile
- 4.37b Significant wave height Egmond profile, total uncertainty
- 4.37c Significant wave height Egmond profile, normalized uncertainty due to parameters WS, HS and TM
- 4.37d Significant wave height Egmond profile, Normalized uncertainty due to parameters WI and SD
- 4.37e Significant wave height Egmond profile, Normalized uncertainty due to parameters FV, BW and BC
- 4.37f Mean wave period Egmond profile, total uncertainty
- 4.37g Mean wave period Egmond profile, normalized uncertainty due to parameters WS, HS and TM
- 4.37h Mean wave period Egmond profile, normalized uncertainty due to parameters WI and SD
- 4.37i Mean wave period Egmond profile, normalized uncertainty due to parameters FV, BW and BC
- 4.38a Significant wave height and mean wave period Molengat profile
- 4.38b Significant wave height Molengat profile, total uncertainty
- 4.38c Significant wave height Molengat profile, normalized uncertainty due to parameters WS, HS and TM
- 4.38d Significant wave height Molengat profile, normalized uncertainty due to parameters WI, SR and SD

List of figures (continued)

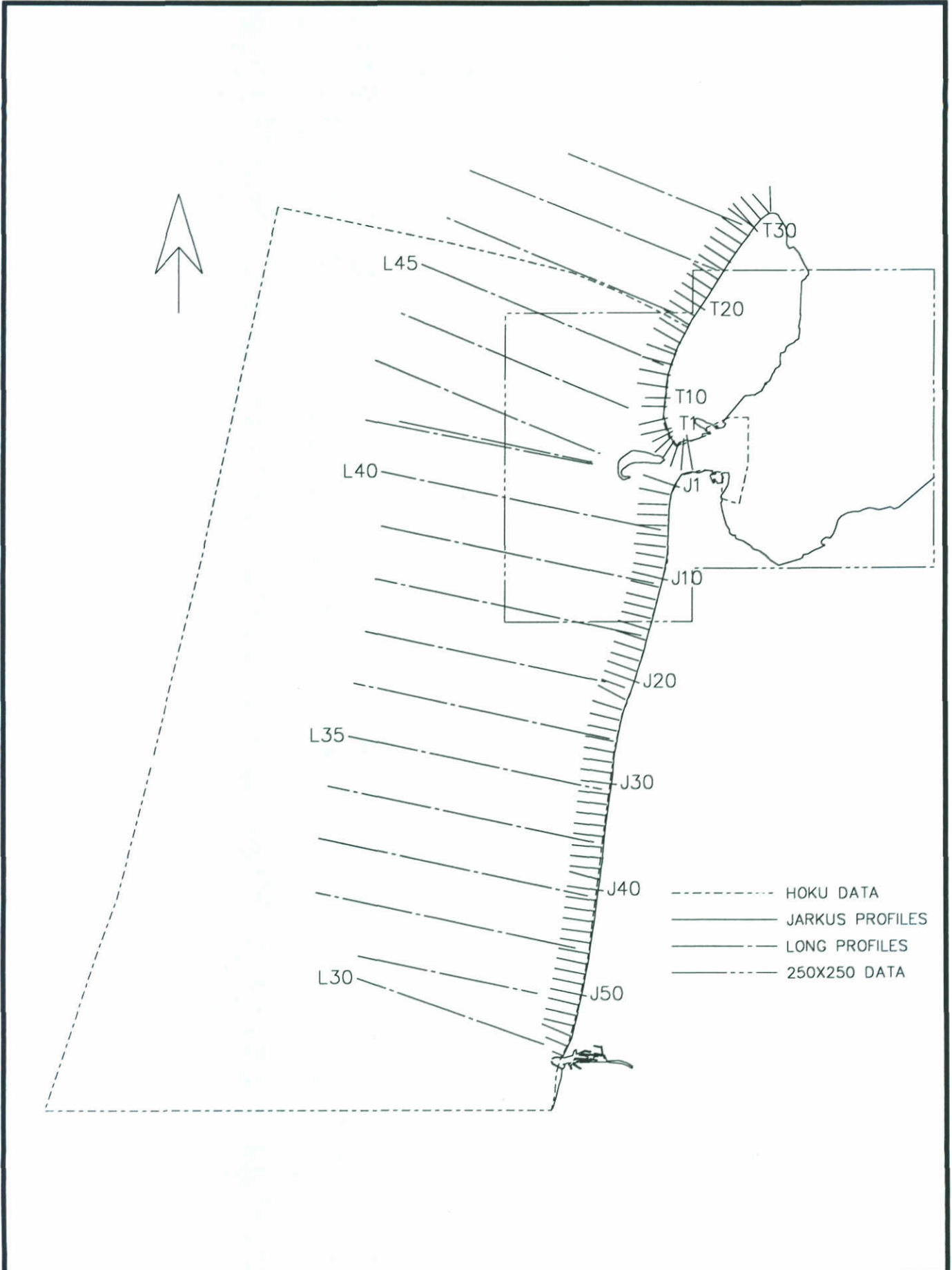
- 4.38e Significant wave height Molengat profile, normalized uncertainty due to parameters FV, BW and BC
- 4.38f Mean wave period Molengat profile, total uncertainty
- 4.38g Mean wave period Molengat profile, normalized uncertainty due to parameters WS, HS and TM
- 4.38h Mean wave period Molengat profile, normalized uncertainty due to parameters WI, SR and SD
- 4.38i Mean wave period Molengat profile, normalized uncertainty due to parameters FV, BW and BC
- 4.39a Significant wave height and mean wave period Marsdiep profile
- 4.39b Significant wave height Marsdiep profile, total uncertainty
- 4.39c Significant wave height Marsdiep profile, normalized uncertainty due to parameters WS, HS and TM
- 4.39d Significant wave height Marsdiep profile, normalized uncertainty due to parameters WI, SR and SD
- 4.39e Significant wave height Marsdiep profile, normalized uncertainty due to parameters FV, BW and BC
- 4.39f Mean wave period Marsdiep profile, total uncertainty
- 4.39g Mean wave period Marsdiep profile, normalized uncertainty due to parameters WS, HS and TM
- 4.39h Mean wave period Marsdiep profile, normalized uncertainty due to parameters WI, SR and SD
- 4.39i Mean wave period Marsdiep profile, normalized uncertainty due to parameters FV, BW and BC

- 5.1a Measured wave height H_{m0} (down) and wave period T_{m01} (uP0, storm December 1982, offshore stations
- 5.1b Measured wave height H_{m0} (down) and wave period T_{m01} (up), storm December 1982, Egmond stations
- 5.2a Measured wind speed (down) and direction (up) storm December 1982, offshore stations
- 5.2b Measured wind speed (down) and direction (up) storm December 1982, Egmond stations
- 5.3 Locations of computational grids validation computations
- 5.4 Significant wave height H_s and mean wave period T_m , 16 December 1982, 0.00 h
- 5.5 Significant wave height H_s and mean wave period T_m , 16 December 1982, 6.00 h
- 5.6 Significant wave height H_s and mean wave period T_m , 16 December 1982, 18.00 h
- 5.7a Variation bathymetry Egmond profile, profile 40.000, 1977-1984
- 5.7b Variation bathymetry Egmond profile, profile 40.500, 1977-1984
- 5.7c Variation bathymetry Egmond profile, profile 41.000, 1977-1984
- 5.8a Measured wave height H_{m0} (down) and wave period T_{m01} (up), storm November 1981, Schulpengat

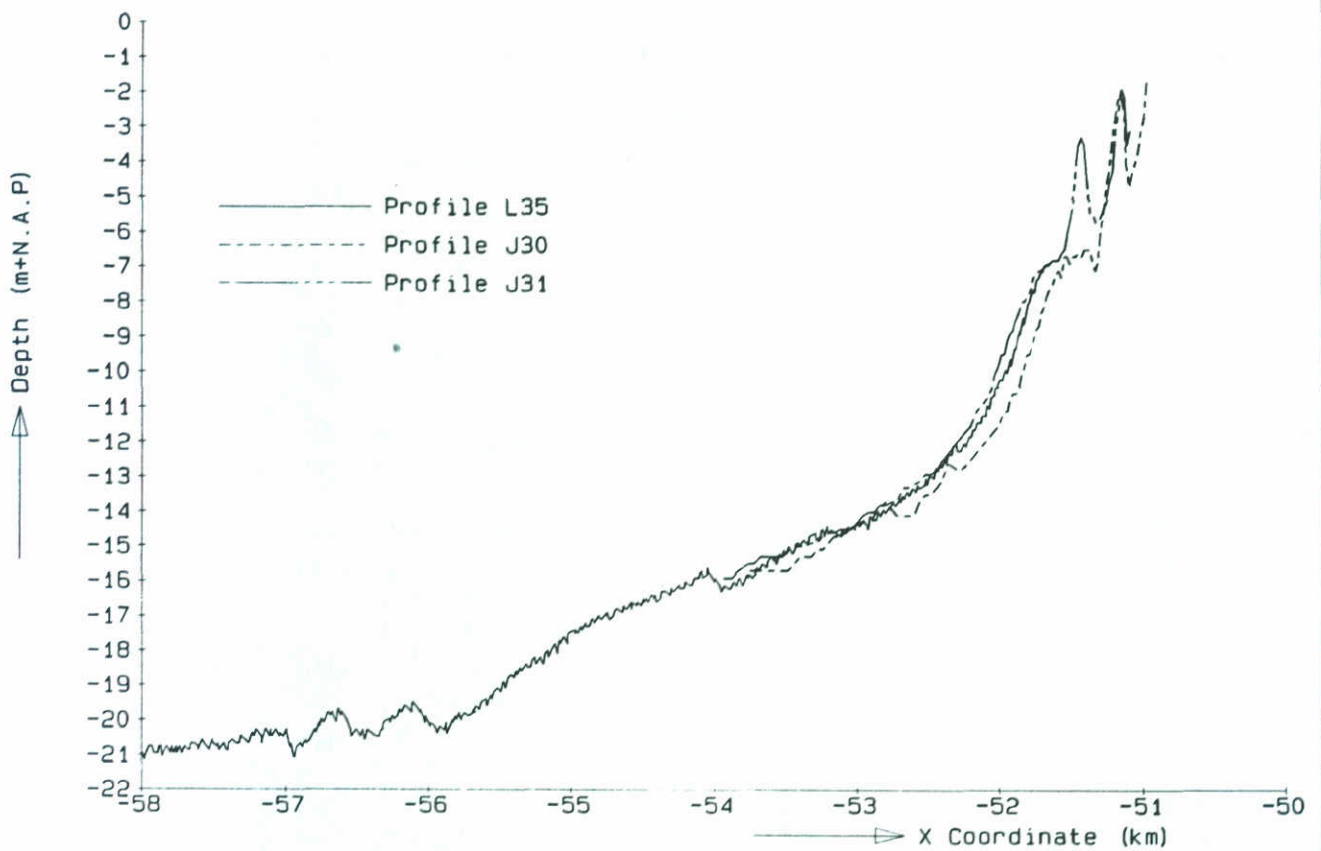
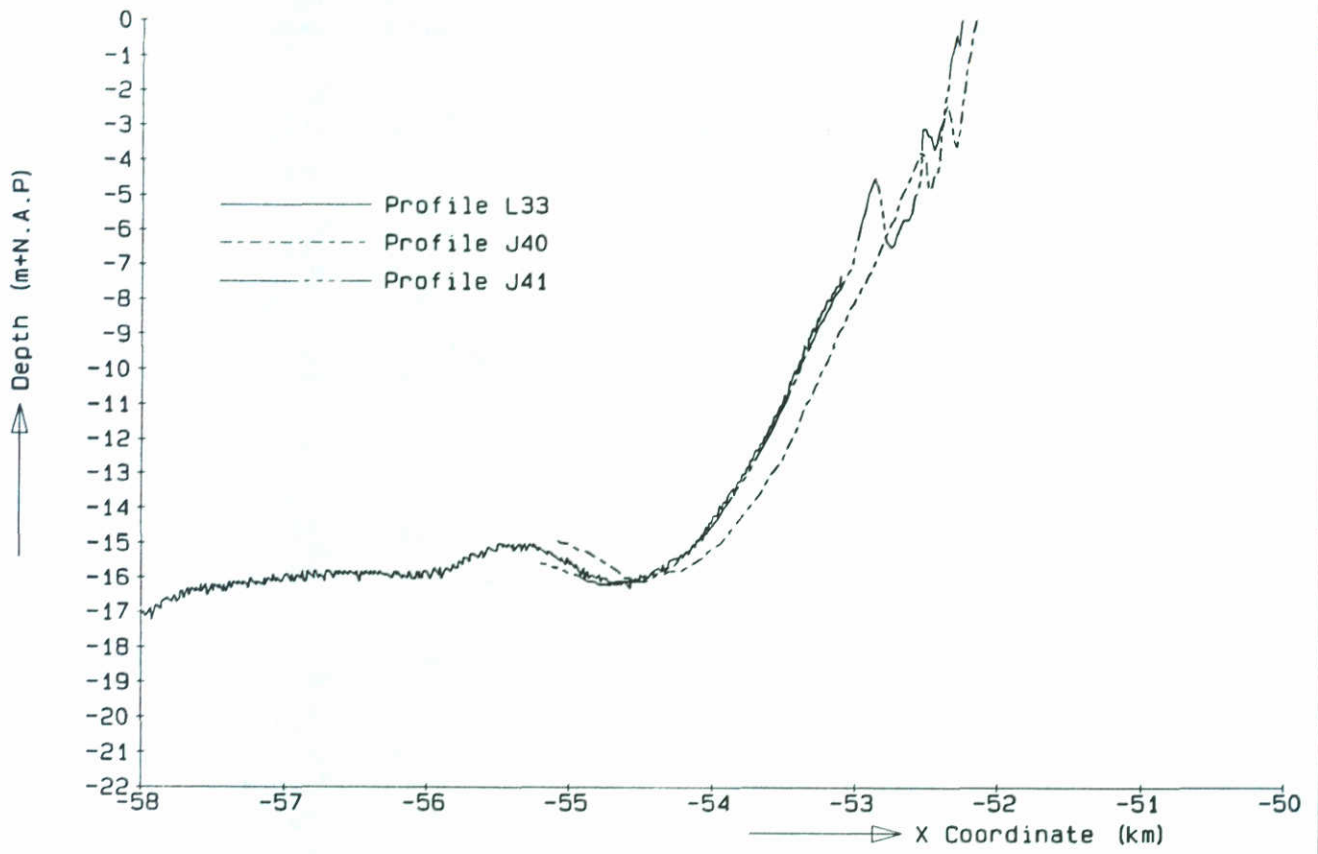
List of figures (continued)

- 5.8b Measured wave height H_{m0} (down) and wave period T_{m01} (up), storm November 1981, Bollen
- 5.9a Measured wind speed (down) and direction (up) storm November 1981, Schulpengat
- 5.9b Measured wind speed (down) and direction (up) storm November 1981, Bollen
- 5.10 Current field storm 24 November 1981
- 5.11 Amplification factor for effect of air-water temperature difference

- 6.1 Position of NAP -10 m contour HISWA output coast of North-Holland
- 6.2 Position of NAP -5 m contour HISWA output coast of North-Holland
- 6.3 Position of NAP -10 m contour HISWA output coast of Texel
- 6.4 Position of NAP -5 m contour HISWA output coast of Texel
- 6.5a Significant wave height H_s and mean wave period T_m at NAP -10 m contour coast of North-Holland
- 6.5b Main wave direction at NAP -10 m contour coast of North-Holland
- 6.6a Significant wave height H_s and mean wave period T_m at NAP -5 m contour coast of North-Holland
- 6.6b Main wave direction at NAP -5 m contour coast of North-Holland
- 6.7a Significant wave height H_s and mean wave period T_m at NAP -10 m contour coast of Texel
- 6.7b Main wave direction at NAP -10 m contour coast of Texel
- 6.8a Significant wave height H_s and mean wave period T_m at NAP -5 m contour coast of Texel
- 6.8b Main wave direction at NAP -5 m contour coast of Texel
- 6.9a Significant wave height H_s and mean wave period T_m at NAP -10 m contour Coast of North-Holland
- 6.9b Main wave direction at NAP -10 m contour coast of North-Holland
- 6.10a Significant wave height H_s and mean wave period T_m at NAP -5 m contour coast of North-Holland
- 6.10b Main wave direction at NAP -5 m contour coast of North-Holland
- 6.11a Significant wave height H_s and mean wave period T_m at NAP -10 m contour coast of Texel
- 6.11b Main wave direction at NAP -10 m contour coast of Texel
- 6.12a Significant wave height H_s and mean wave period T_m at NAP -5 m contour coast of Texel
- 6.12b Main wave direction at NAP -5 m contour coast of Texel



DATA SOURCES BATHYMETRY	HYDRA	
	SCALE 1:500000	
DELFT HYDRAULICS	H 1355	FIG. 4.1



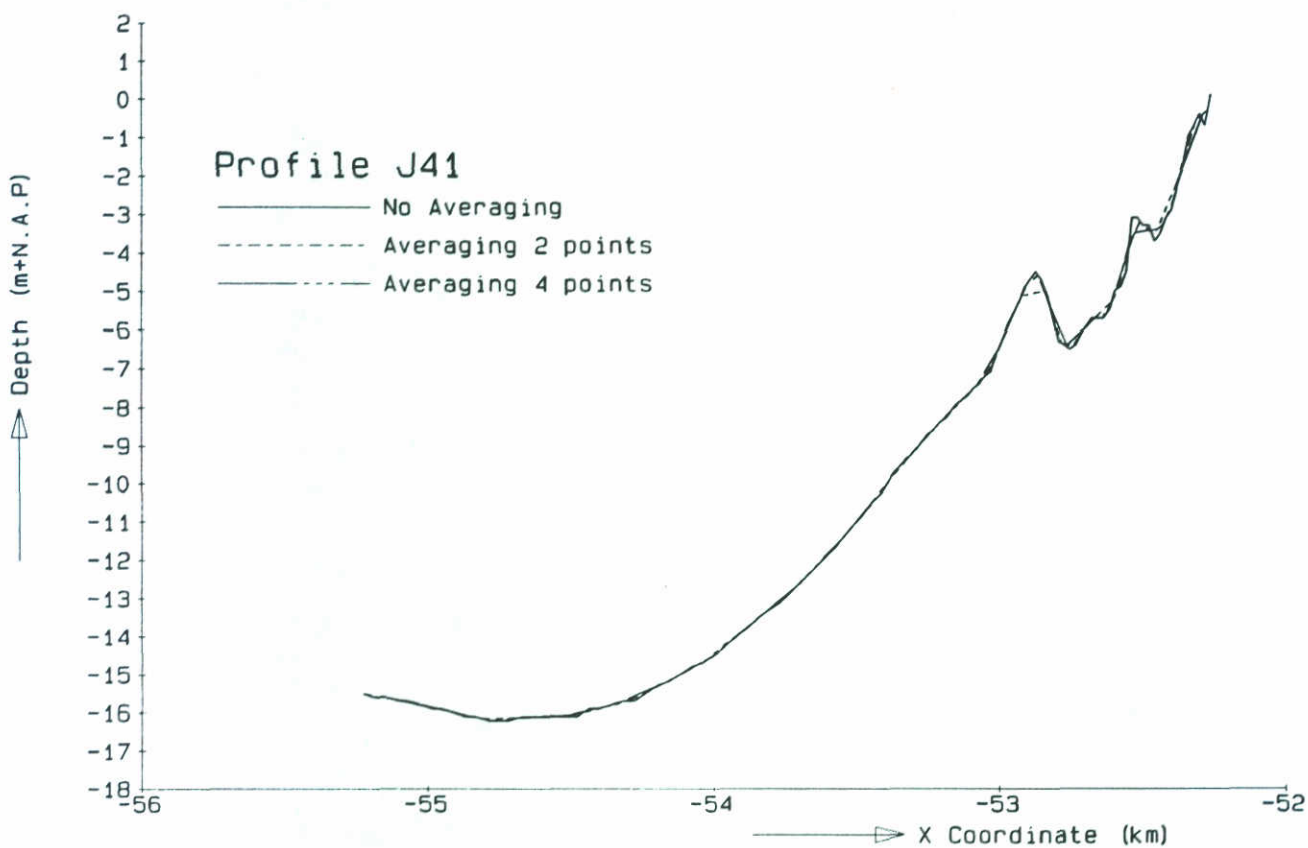
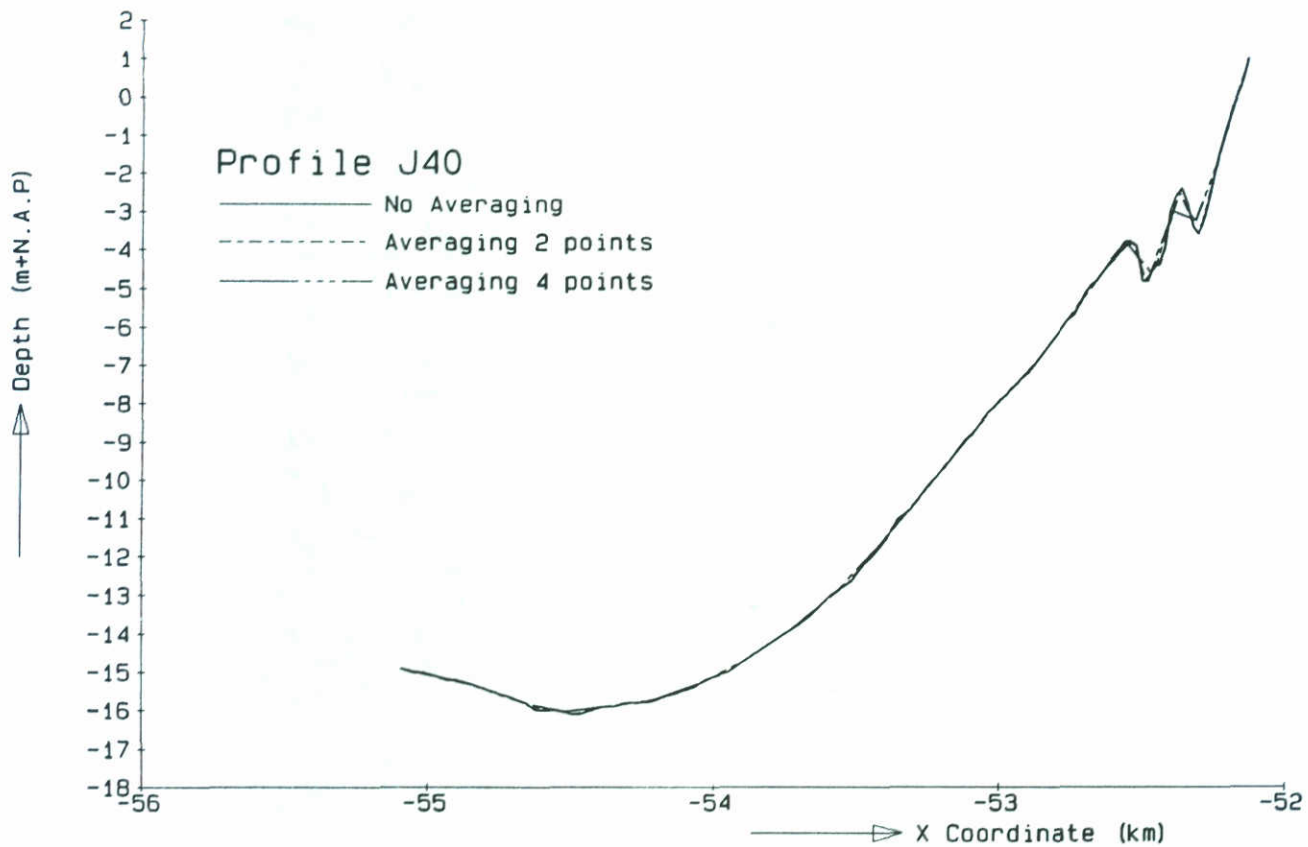
COMPARISON LONG PROFILES L33
AND L35 WITH CORRESPONDING
JARKUS-PROFILES

HYDRA

DELFT HYDRAULICS

H1355

Fig.4.2



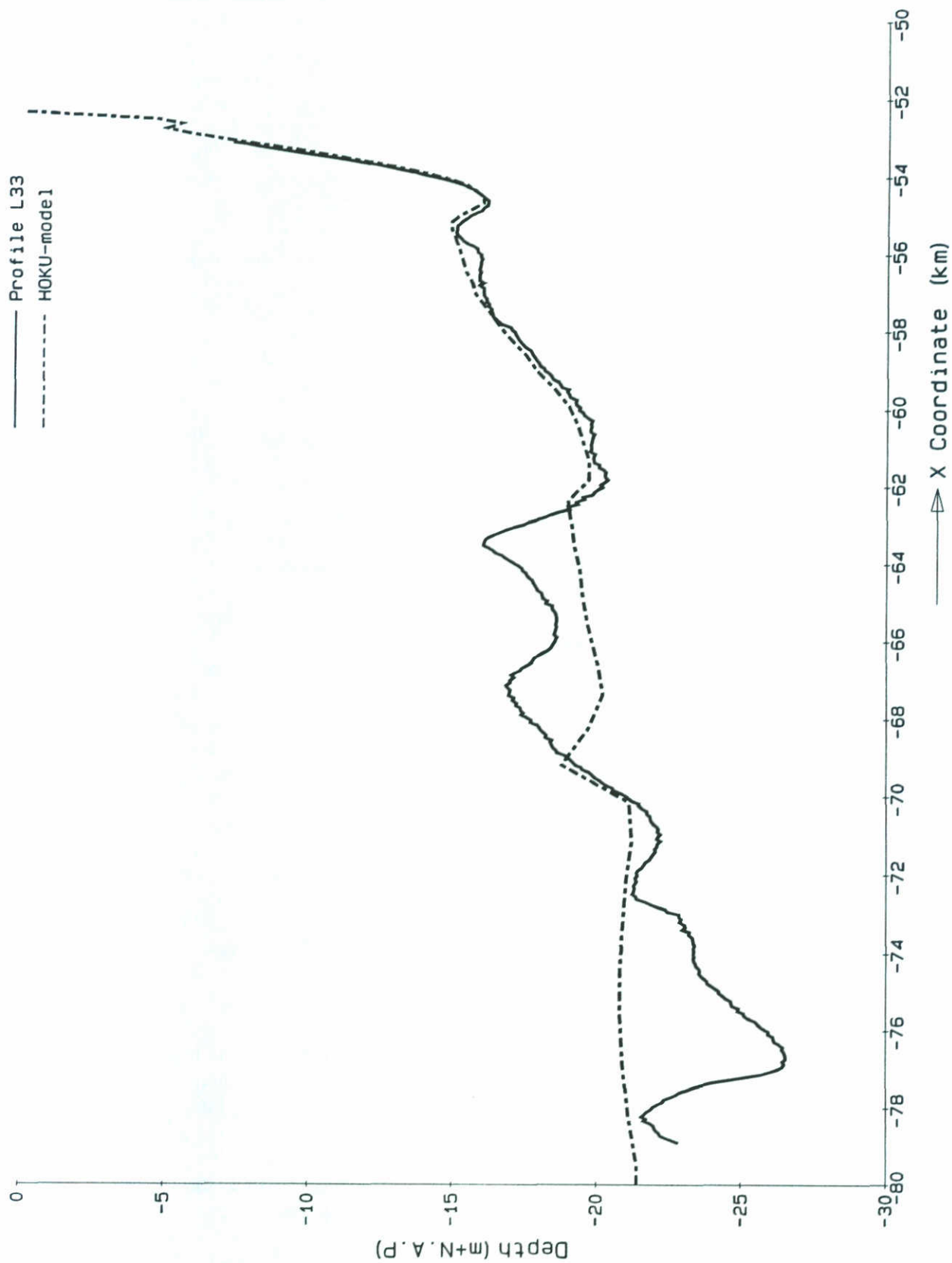
EFFECT OF AVERAGING ON
PROFILE REPRESENTATION

HYDRA

DELFT HYDRAULICS

H1355

Fig.4.3



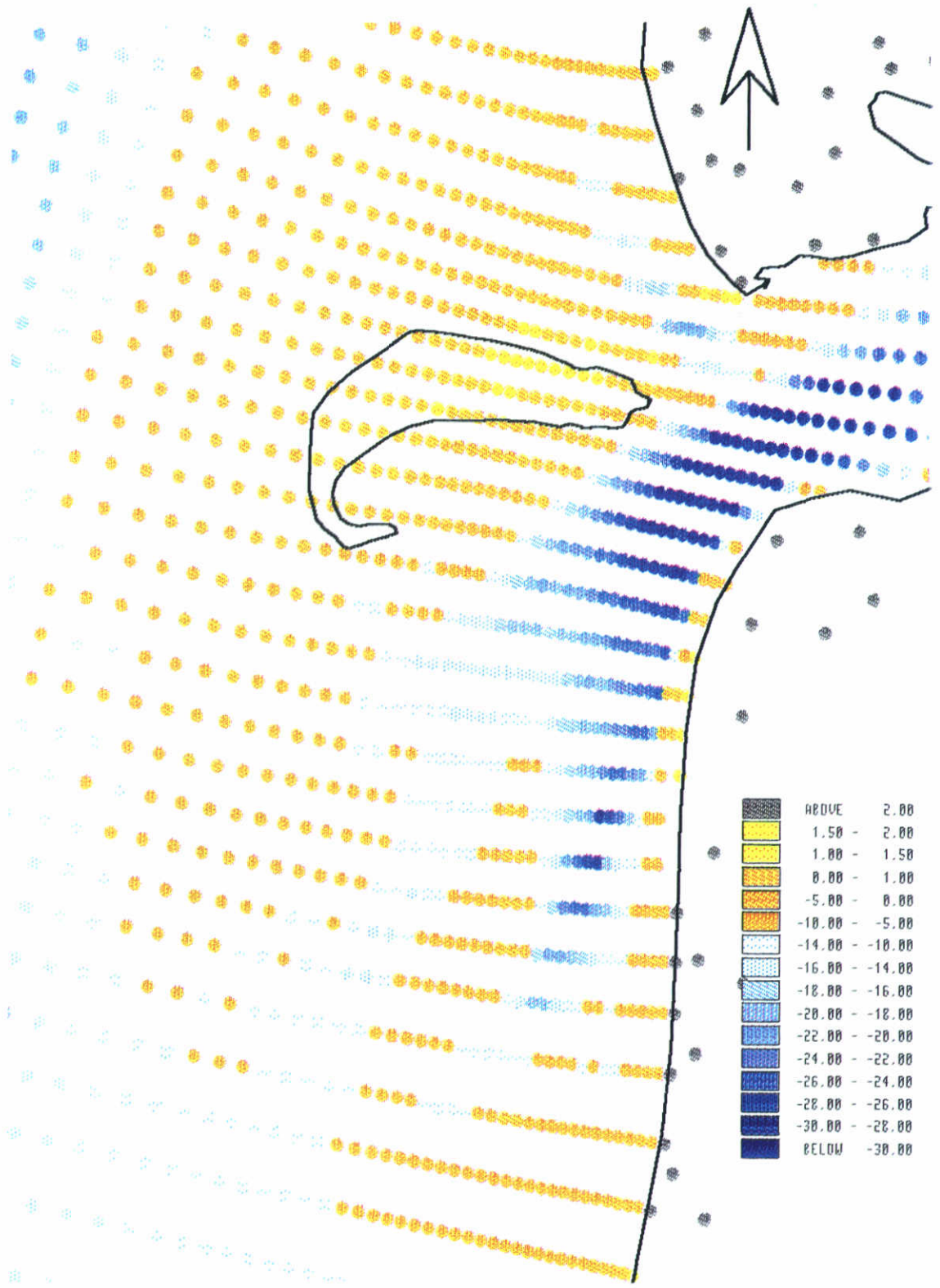
COMPARISON LONG PROFILE L33 WITH
CORRESPONDING SECTION OF THE HOKU-MODEL

HYDRA

DELFT HYDRAULICS

H1355

FIG. 4.4



DATA POINTS HOKU BATHYMETRY
 DETAIL OUTER DELTA

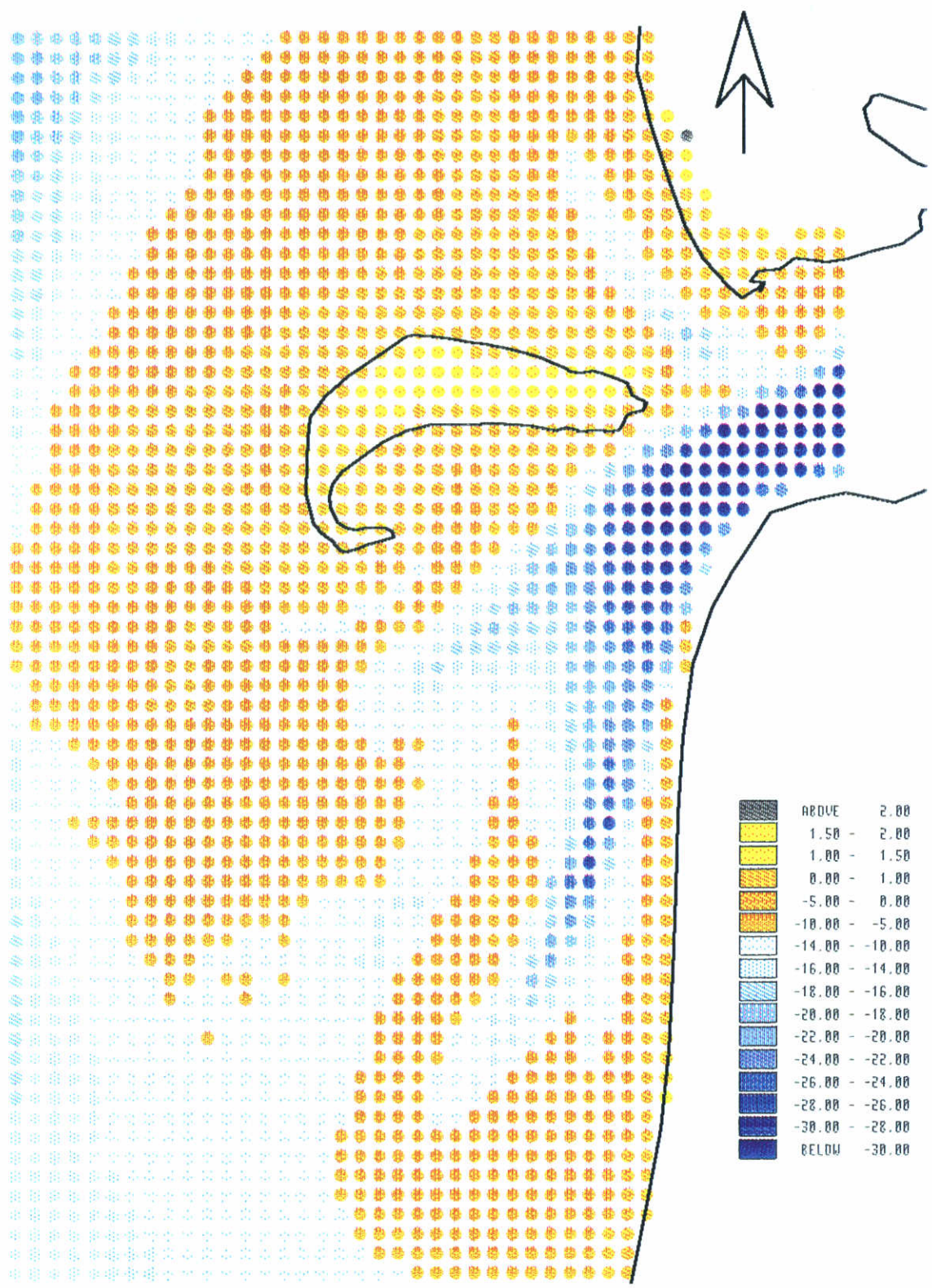
HYDRA

Scale 1 : 80000

DELFT HYDRAULICS

H1355

Fig 4.5



DATA POINTS 250x250 BATHYMETRY
 DETAIL OUTER DELTA

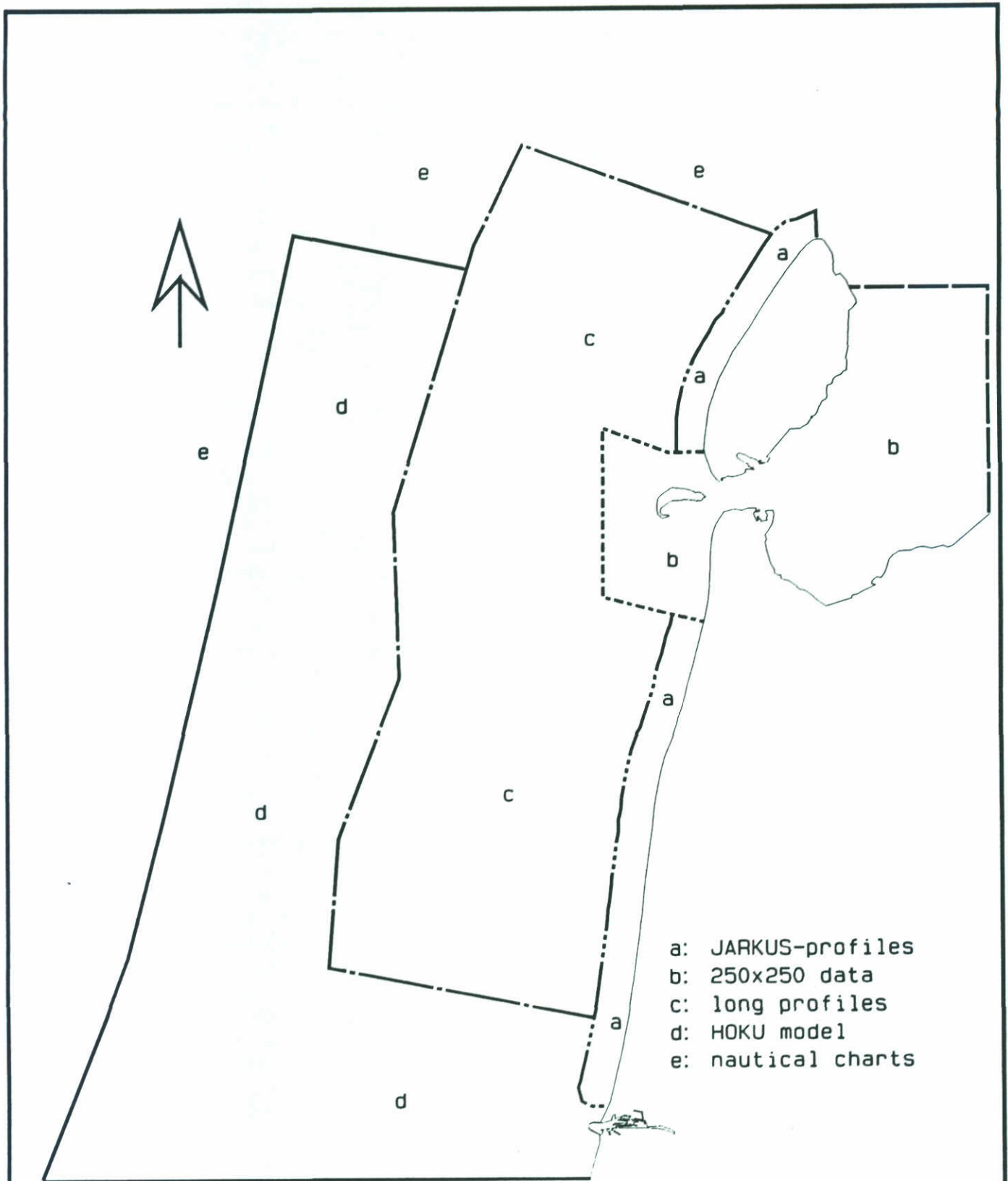
HYDRA

Scale 1 : 80000

DELFT HYDRAULICS

H1355

Fig 4.6



ORIGIN OF DATA BATHYMETRY

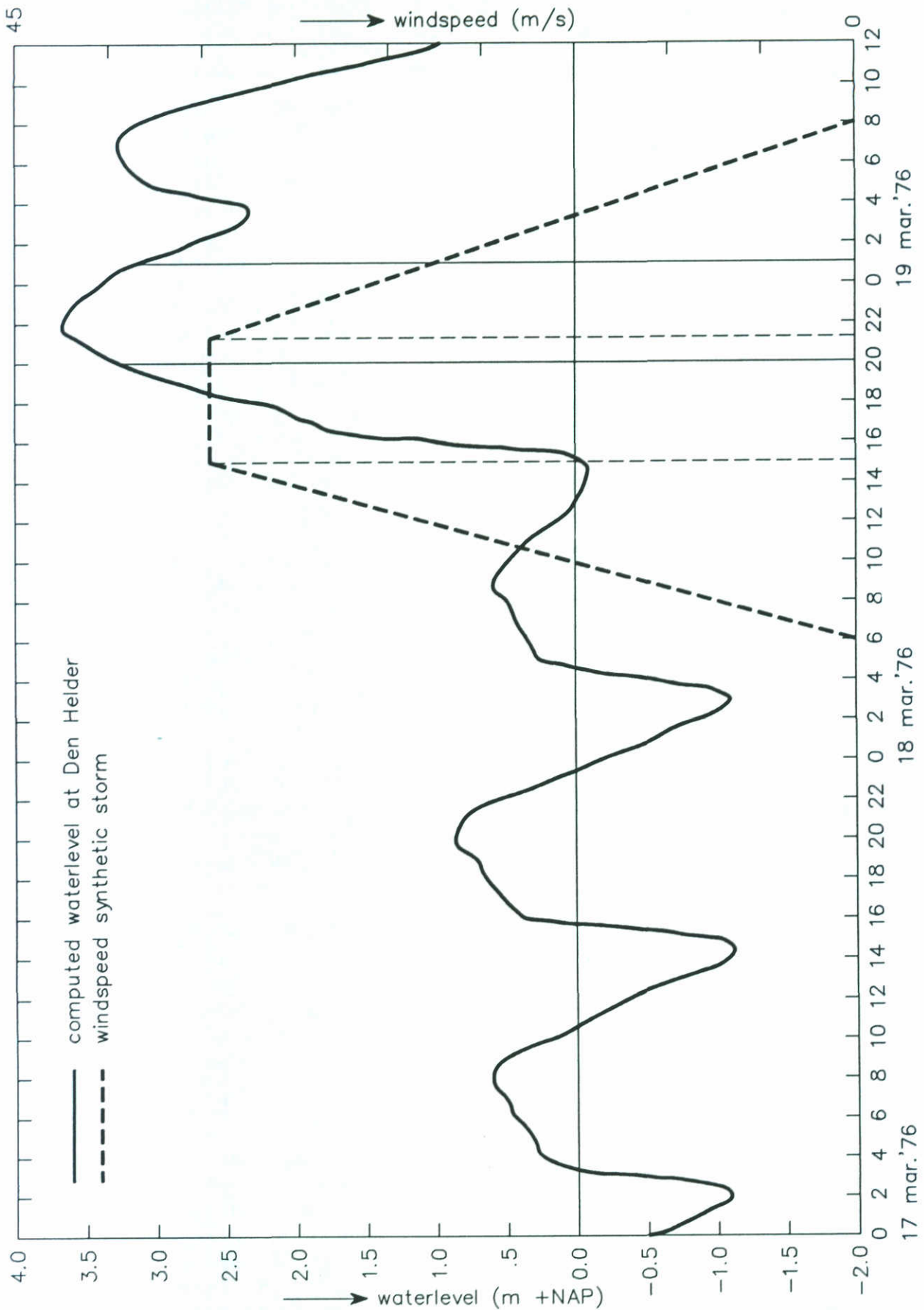
HYDRA

Scale 1 : 500000

DELFT HYDRAULICS

H1355

Fig 4.7



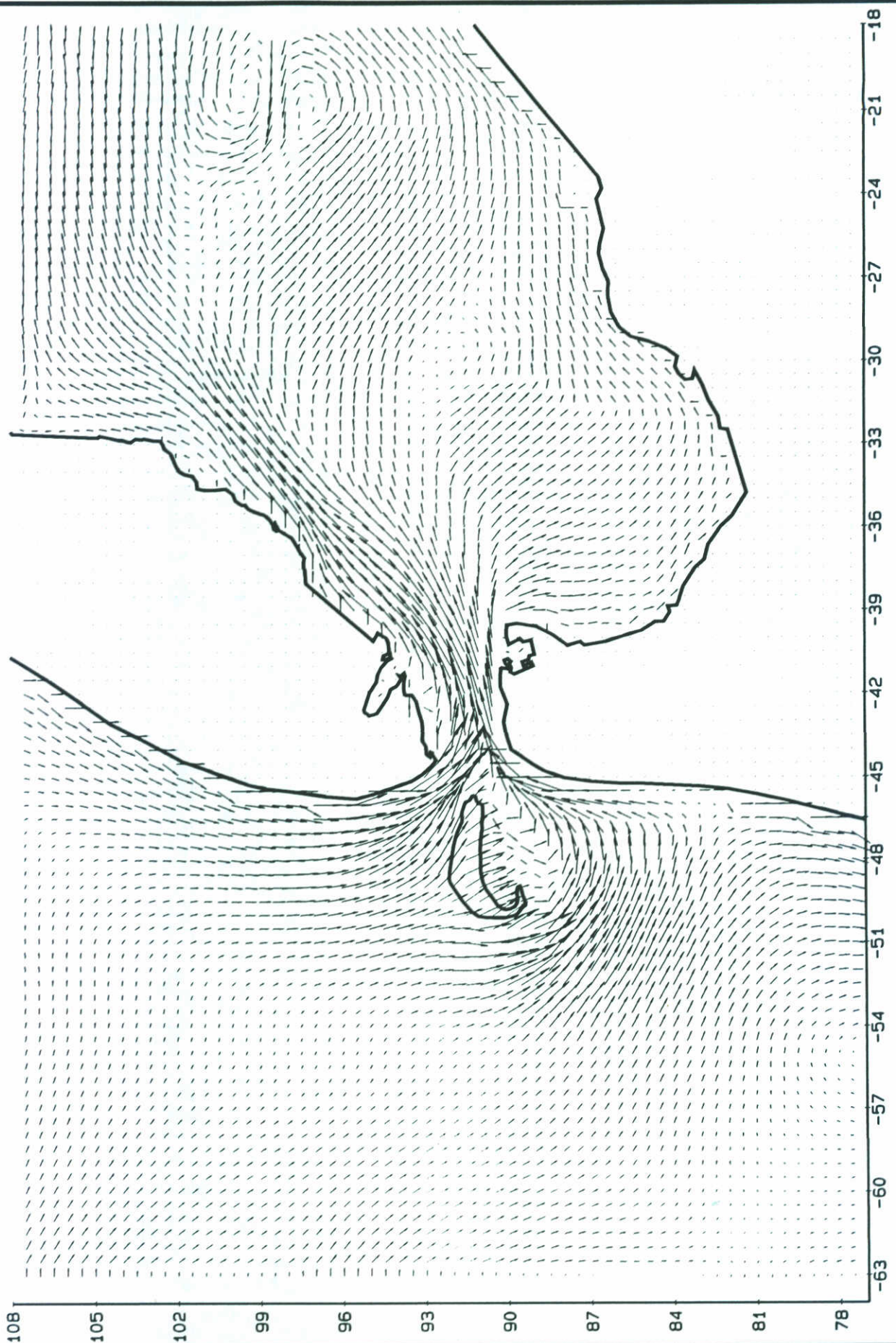
WATERLEVEL AND WINDSPEED
 SYNTHETIC EXTREME STORM

HYDRA

DELFT HYDRAULICS

H 1355

FIG. 4.8



CURRENT FIELD EXTREME STORM
FLOOD CONDITIONS

HYDRA

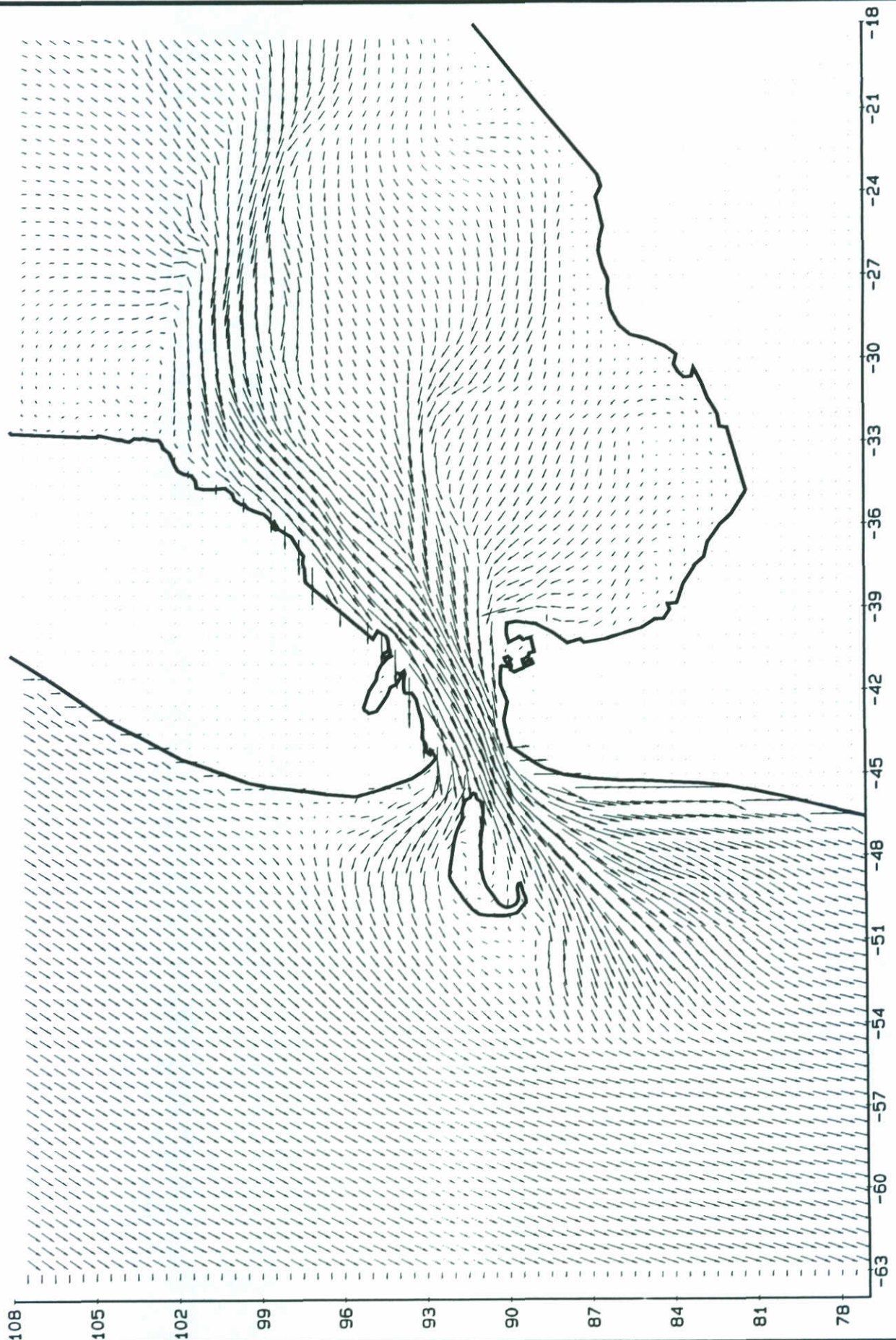
T=20.00 h

Scale 1 : 200000

DELFT HYDRAULICS

H1355

Fig 4.9



CURRENT FIELD EXTREME STORM
 EBB CONDITONS

HYDRA

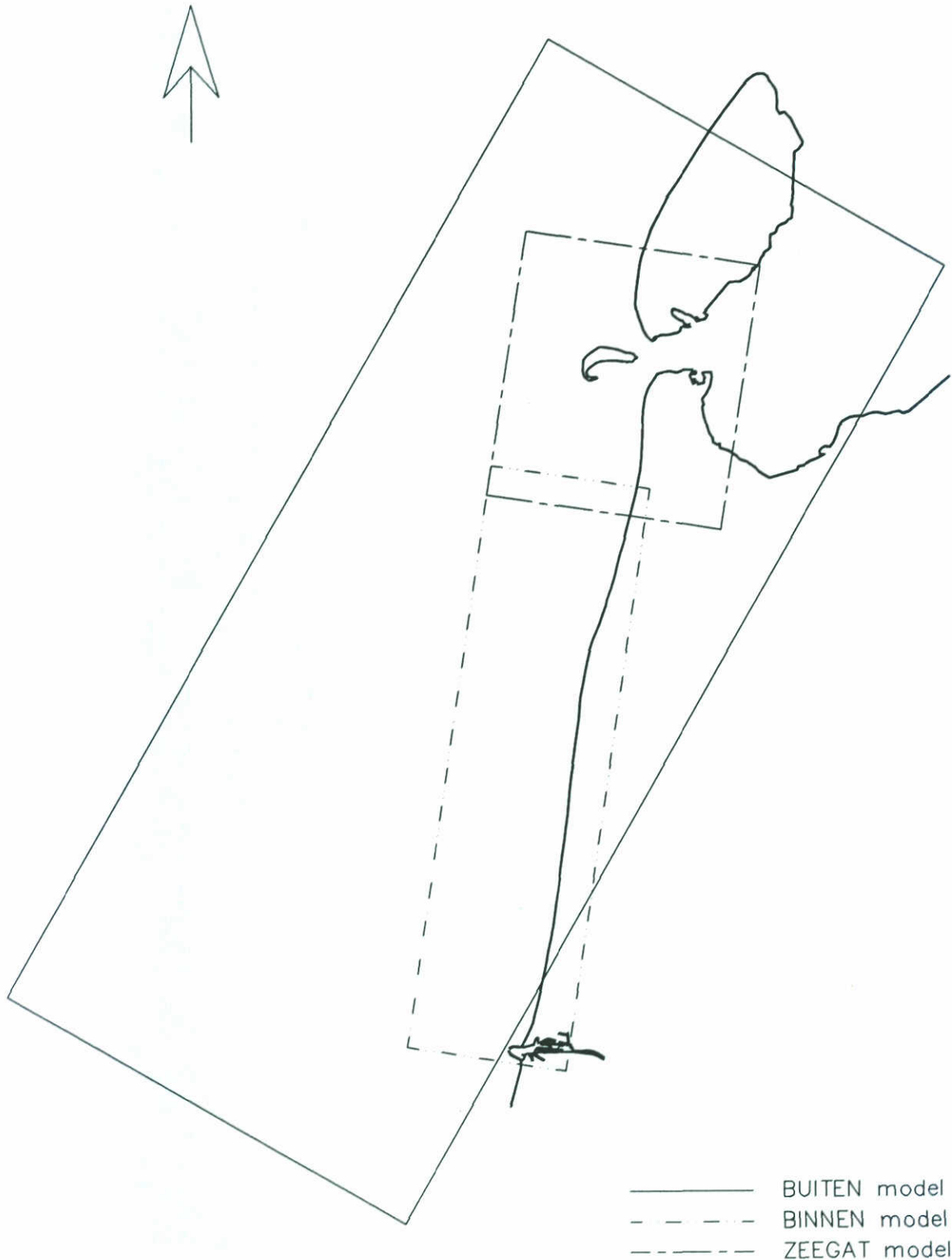
T=01.00 h

Scale 1 : 200000

DELFT HYDRAULICS

H1355

Fig 4.10



LOCATIONS OF COMPUTATIONAL GRIDS

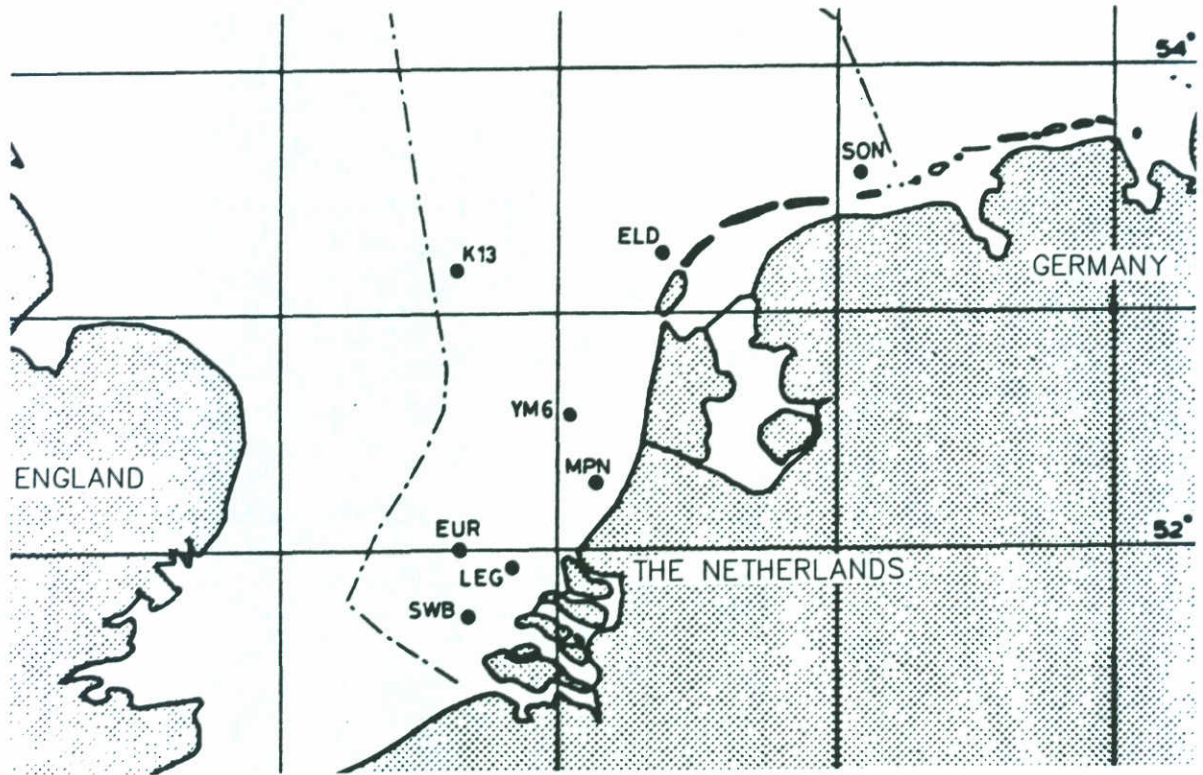
HYDRA

SCALE 1:500000

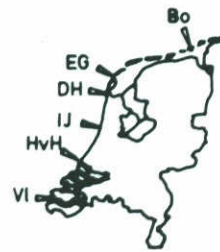
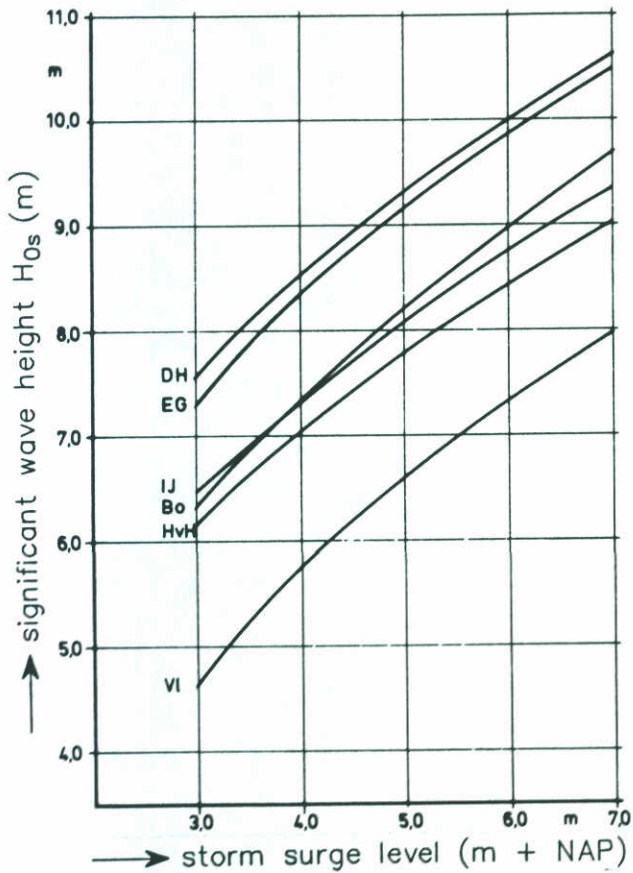
DELFT HYDRAULICS

H 1355

FIG. 4.11

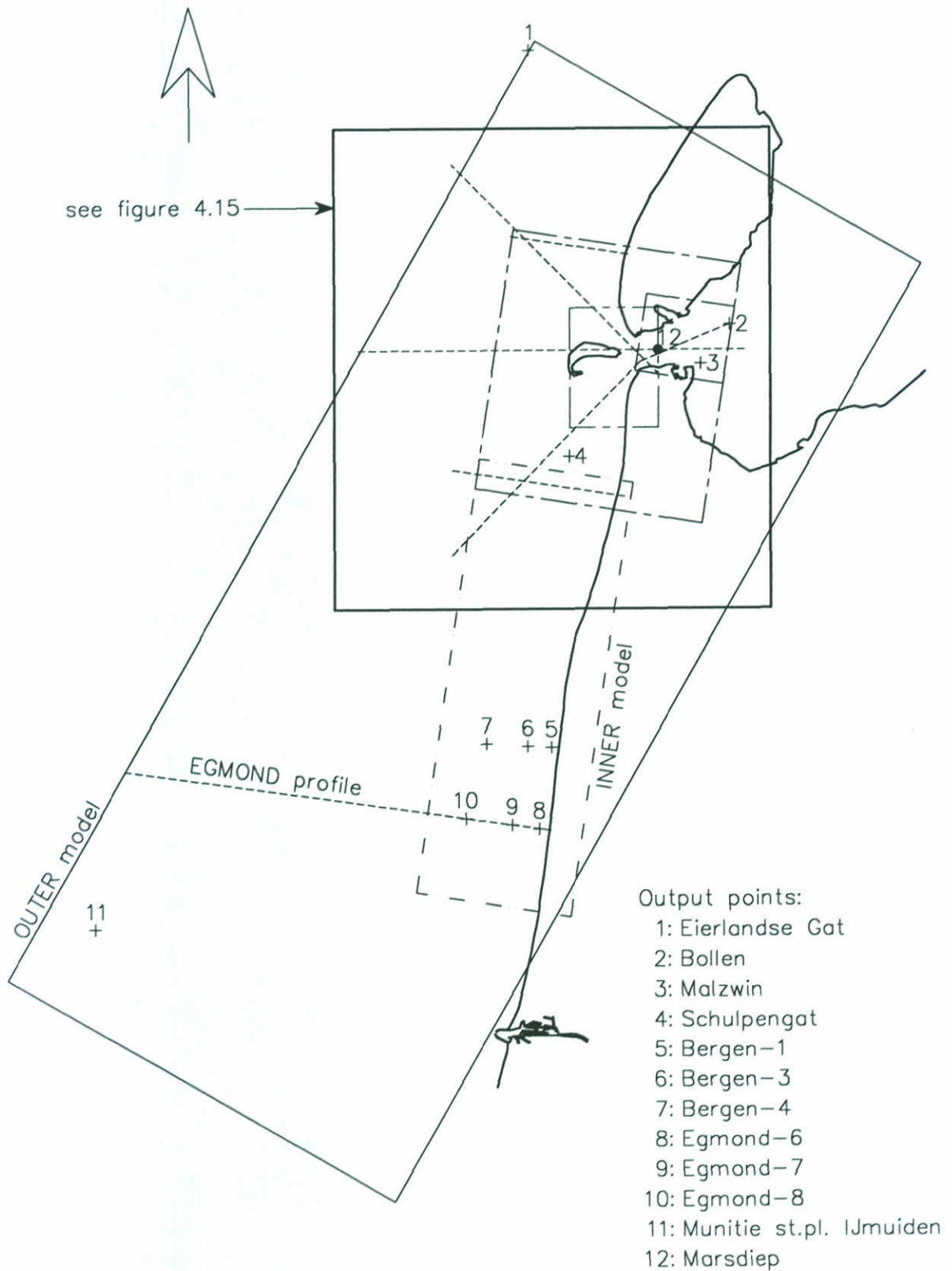


LOCATION WAVE MEASURING STATIONS



- DH = Den Helder
 - EG = Eierlandsche Gat
 - IJ = IJmuiden
 - Bo = Borkum
 - HvH = Hoek van Holland
 - VI = Vlissingen ♦)
- ♦) outside shoal area

EXPECTED SIGNIFICANT WAVE HEIGHT
VERSUS STORM SURGE LEVEL



LOCATION OF OUTPUT POINTS, LINES AND AREAS

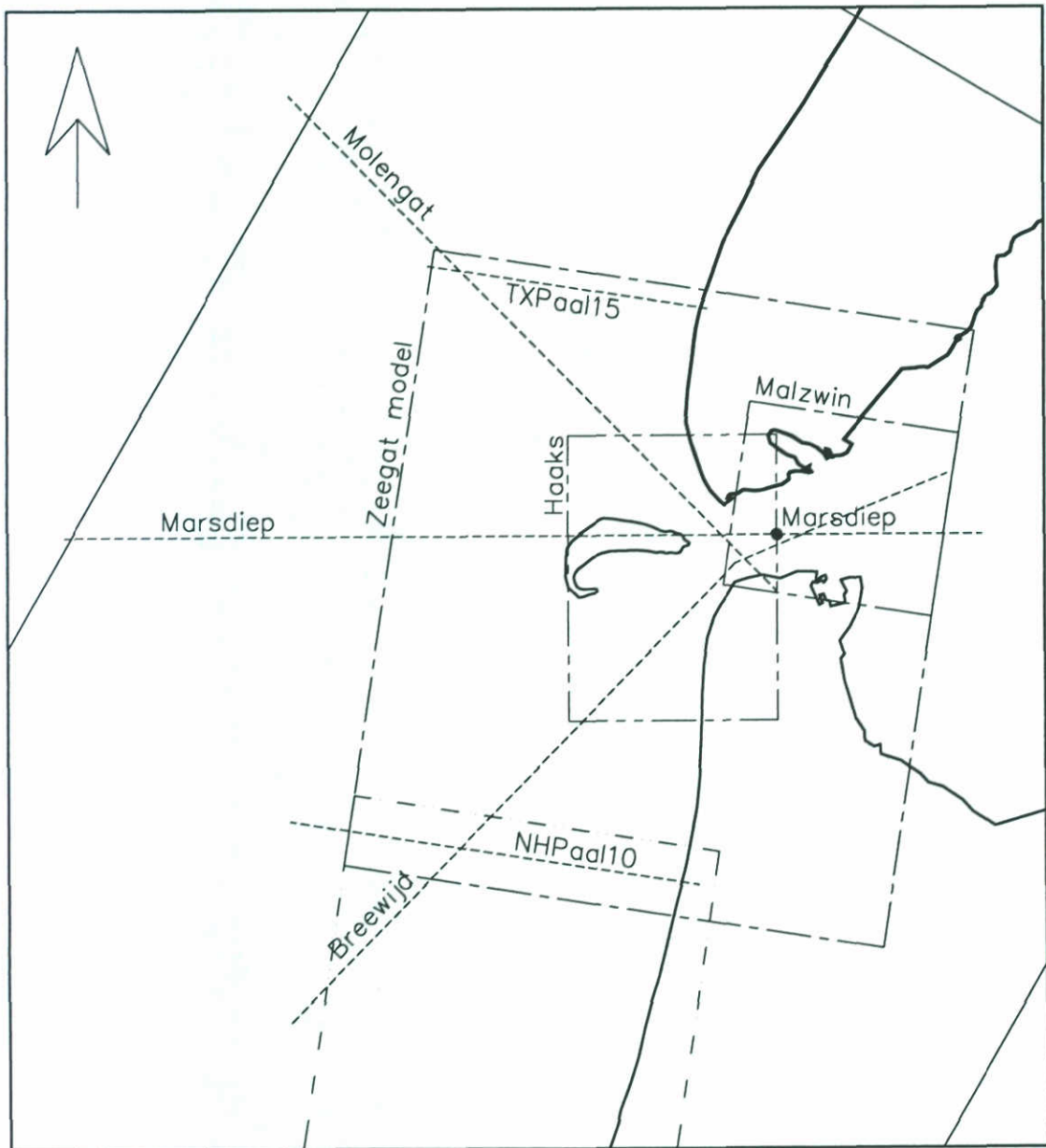
HYDRA

SCALE 1:500000

DELFT HYDRAULICS

H 1355

FIG. 4.14



LOCATION OF OUTPUT POINTS, LINES AND AREAS
 DETAIL ZEEGAT VAN TEXEL

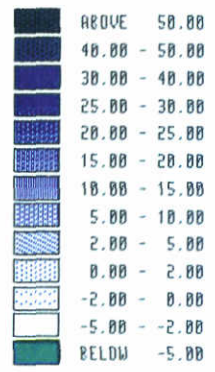
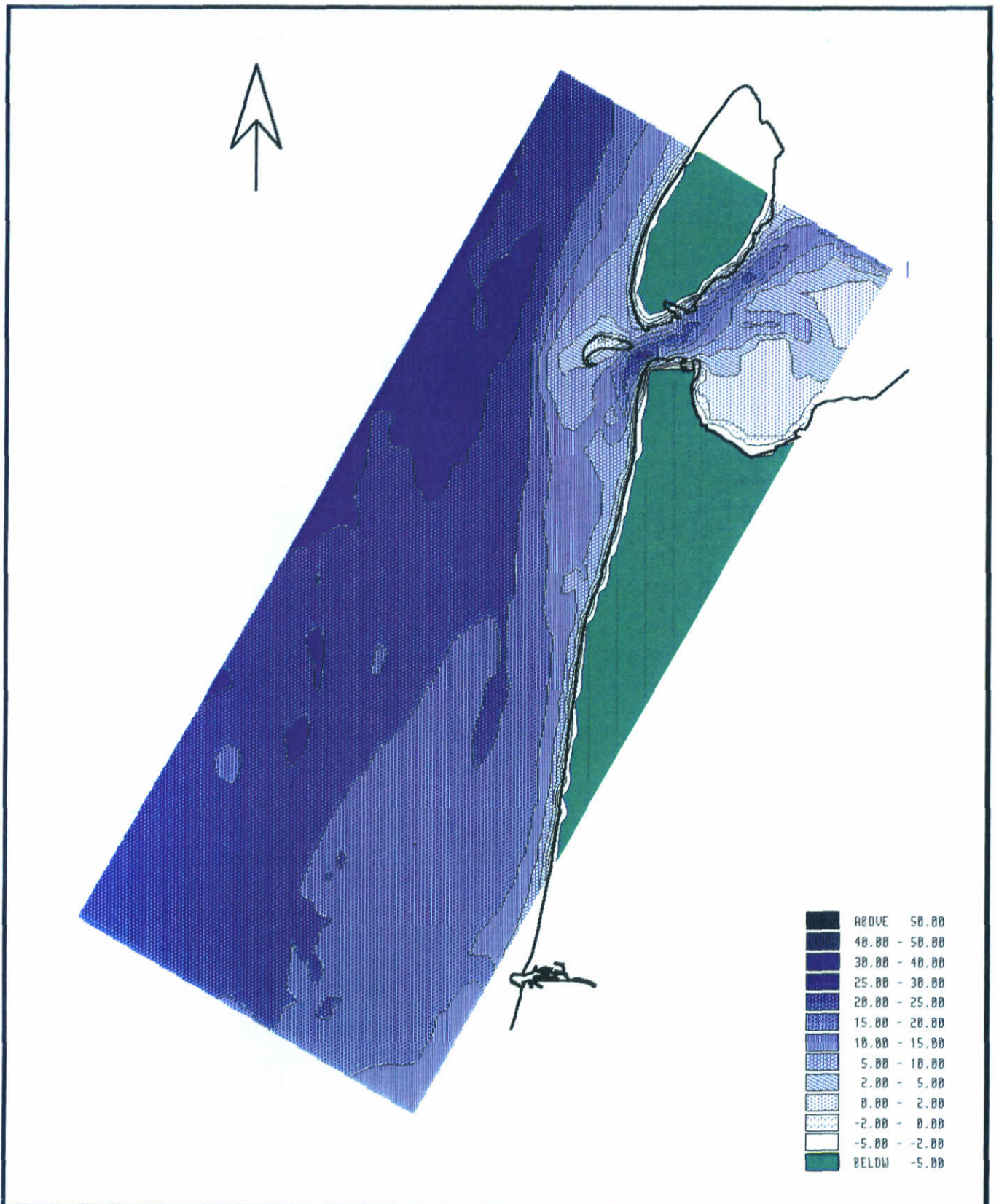
HYDRA

SCALE 1:250000

DELFT HYDRAULICS

H 1355

FIG. 4.15



BOTTOM TOPOGRAPHY
 RUN SSS OUTER MODEL (IN M BELOW NAP)

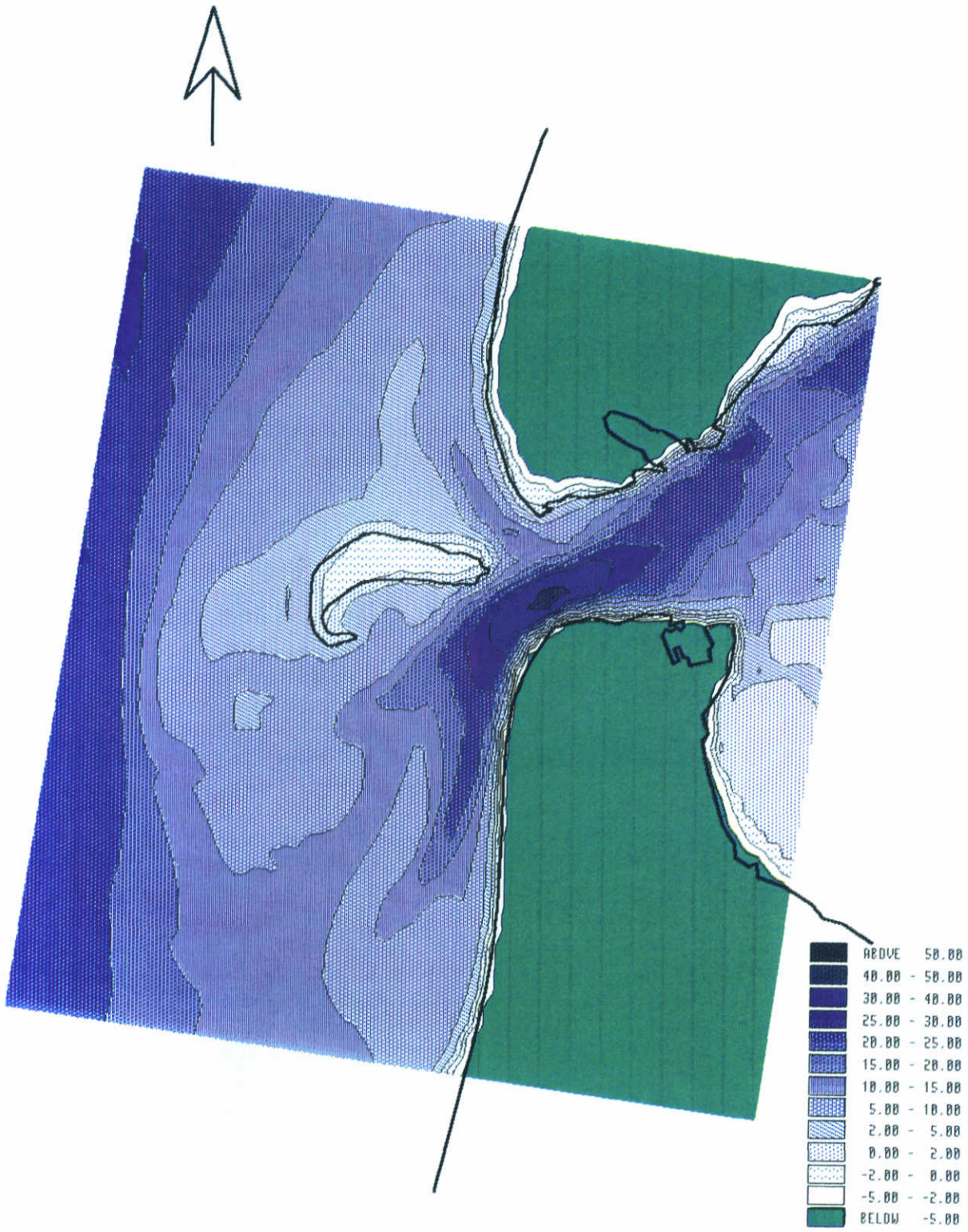
HYDRA SSSBURK

Scale 1 : 500000

DELFT HYDRAULICS

H1355

Fig 4.16



BOTTOM TOPOGRAPHY
 RUN SSS, ZEEGAT MODEL (IN M BELOW NAP)

HYDRA

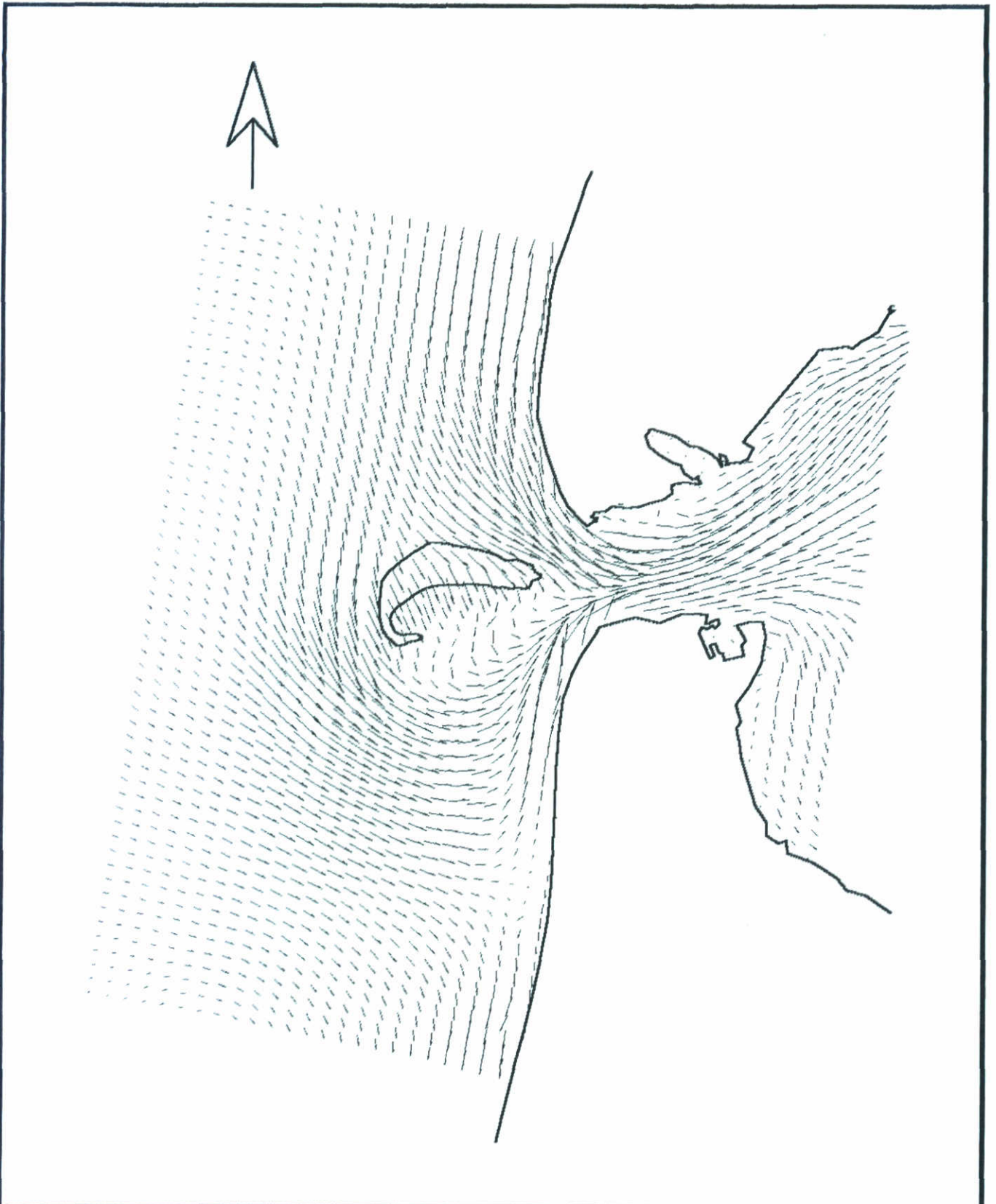
SSSZGRK

Scale 1 : 150000

DELFT HYDRAULICS

H1355

Fig 4.17



CURRENT FIELD
RUN SSS, ZEEGAT MODEL

HYDRA

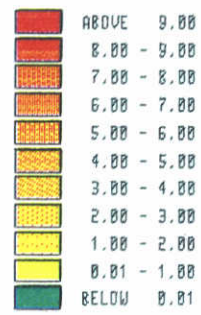
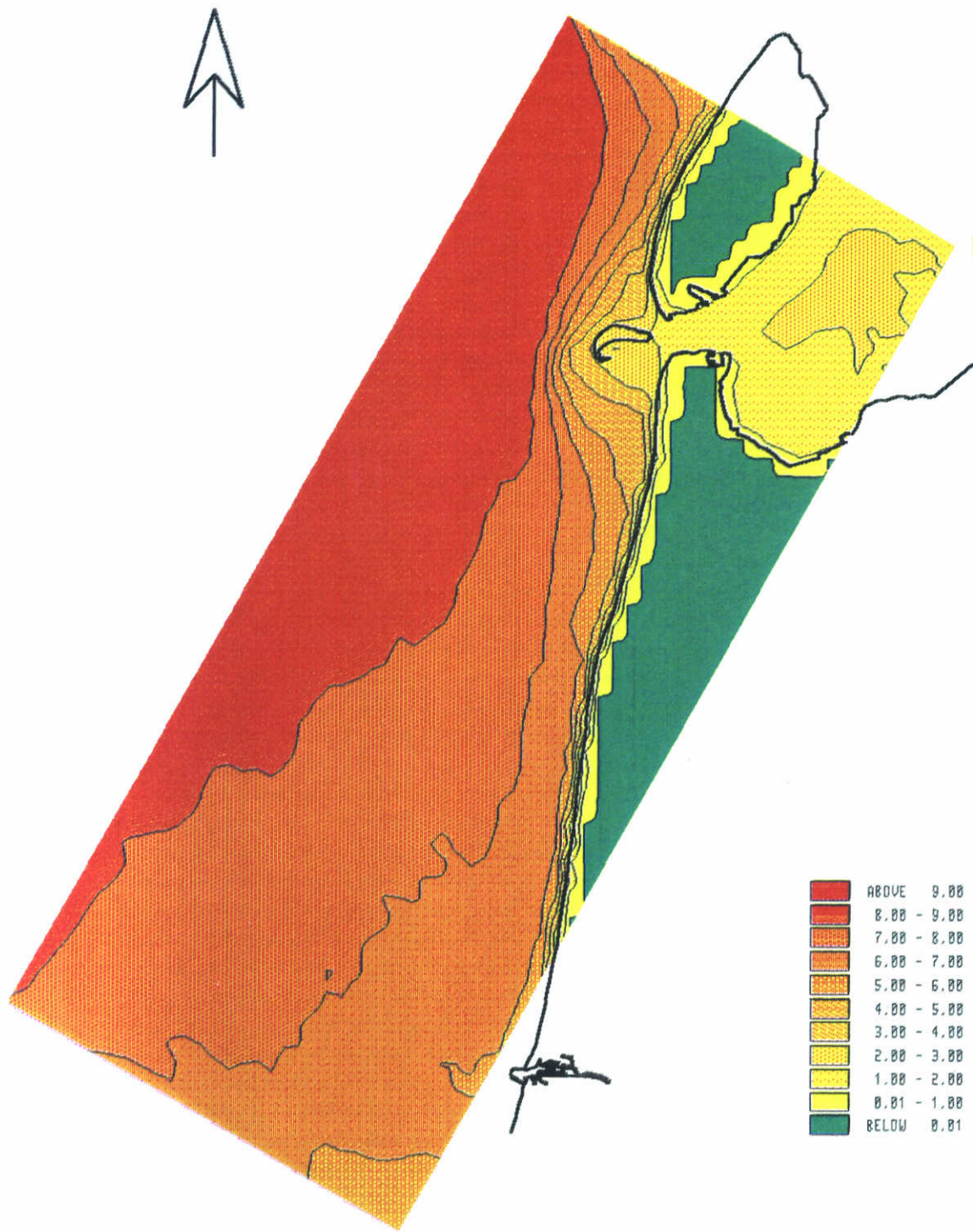
SSSZGRK

Scale 1 : 150000

DELFT HYDRAULICS

H1355

Fig 4.18



SIGNIFICANT WAVE HEIGHT CONTOURS
 RUN SSS OUTER MODEL (IN M)

HYDRA

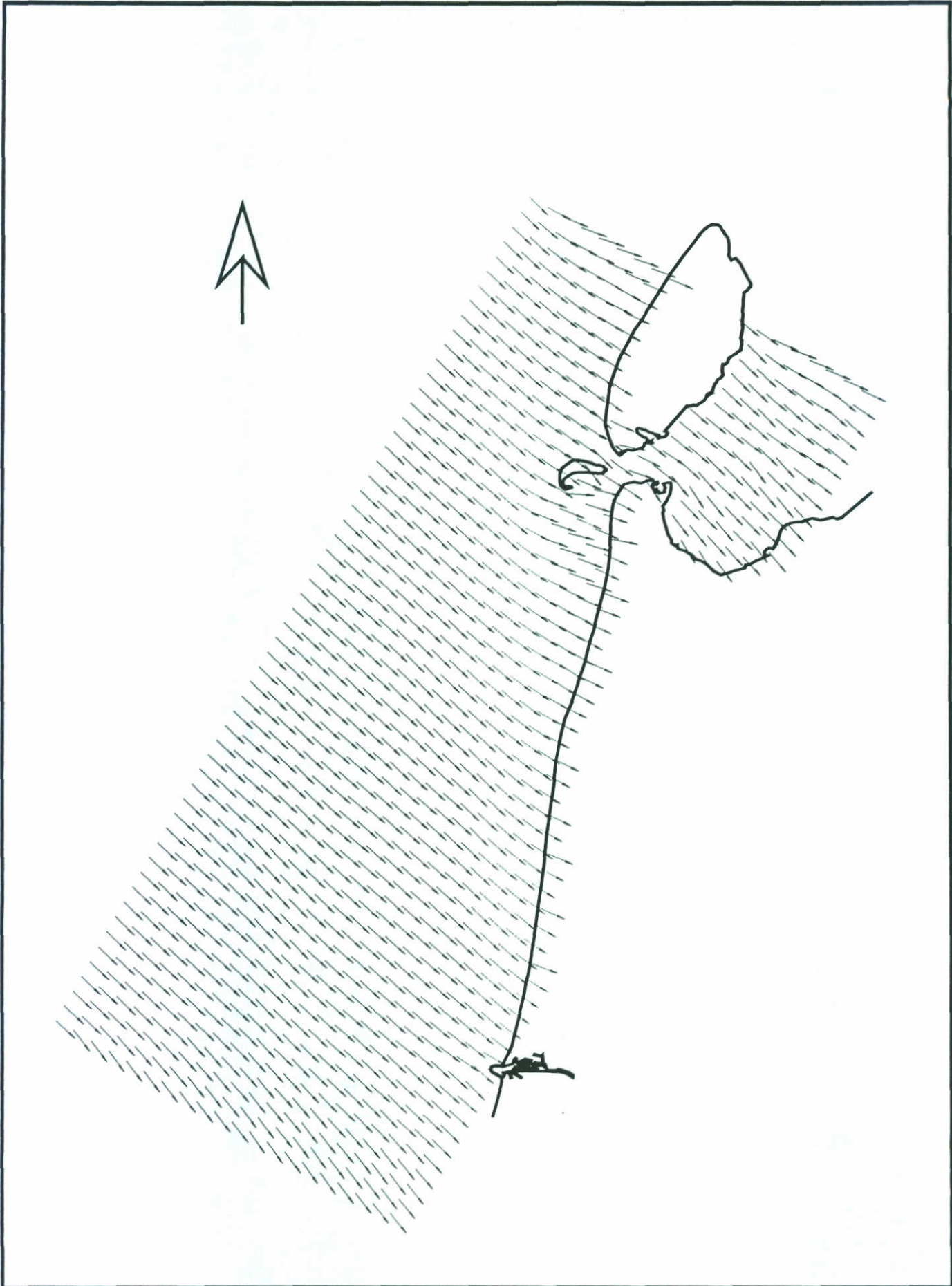
SSSBURK

Scale 1 : 500000

DELFT HYDRAULICS

H1355

Fig 4.19a



MAIN WAVE DIRECTIONS
RUN SSS OUTER MODEL

HYDRA

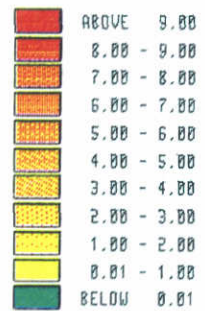
SSSBURK

Scale 1 : 500000

DELFT HYDRAULICS

H1355

Fig 4.19b



SIGNIFICANT WAVE HEIGHT CONTOURS
 RUN SSS INNER MODEL (IN M)

HYDRA

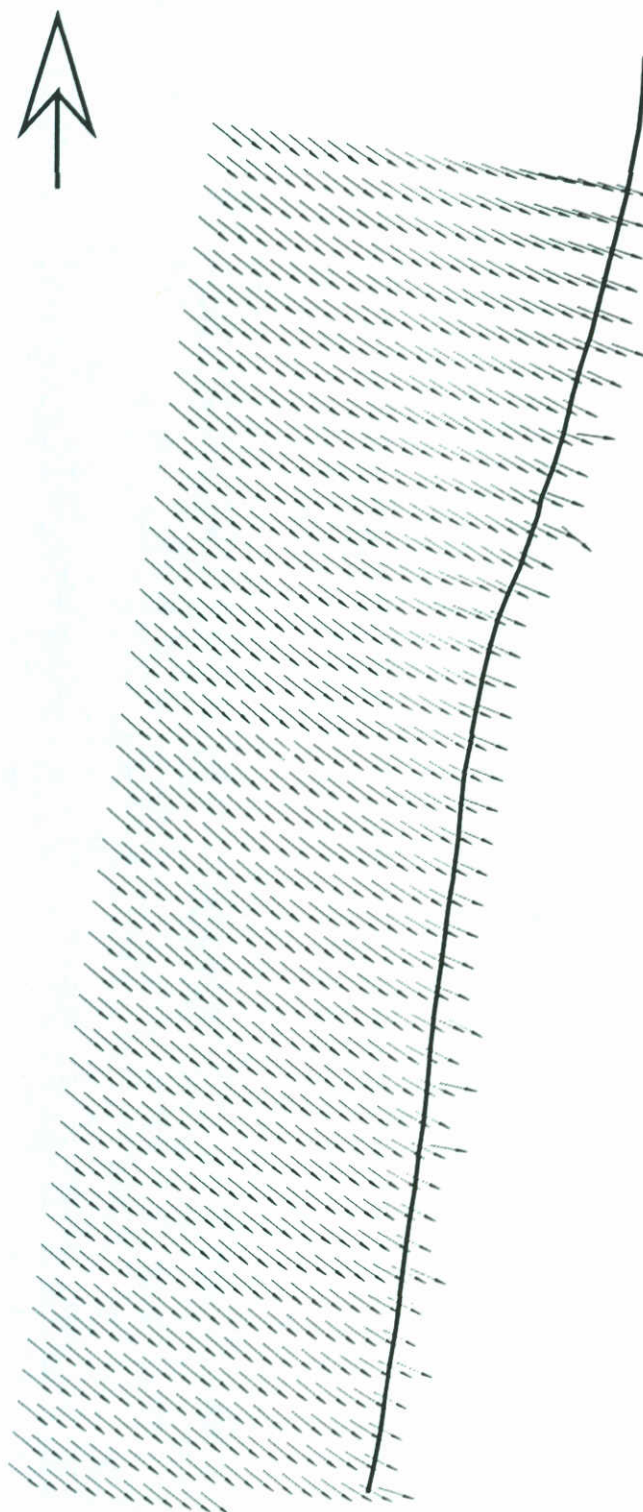
SSSBIRK

Scale 1 : 220000

DELFT HYDRAULICS

H1355

Fig 4.20a



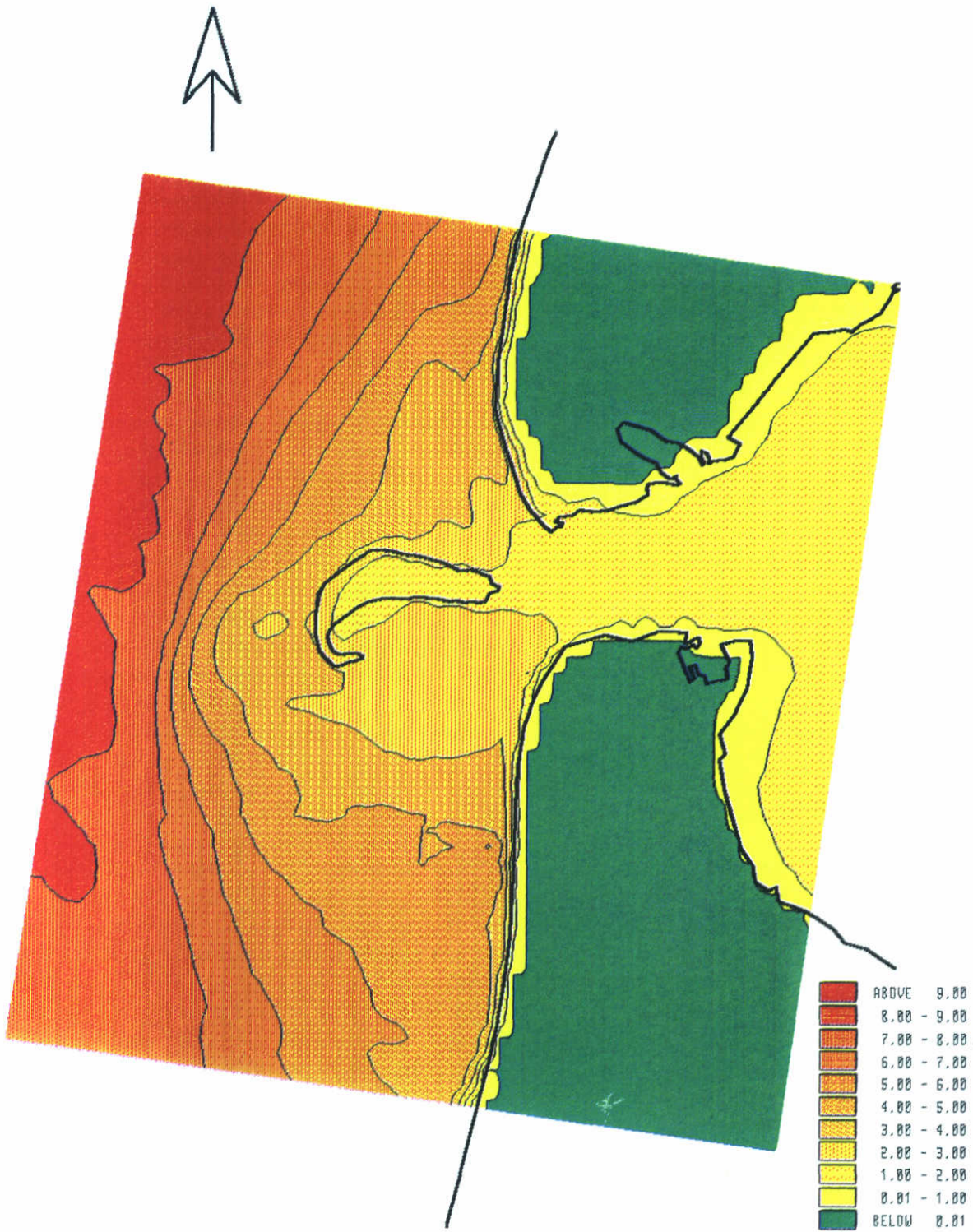
MAIN WAVE DIRECTIONS
RUN SSS INNER MODEL

HYDRA SSSBIRK

Scale 1 : 220000

DELFT HYDRAULICS

H1355 Fig 4.20b



SIGNIFICANT WAVE HEIGHT CONTOURS
 RUN SSS, ZEEGAT MODEL (IN M)

HYDRA

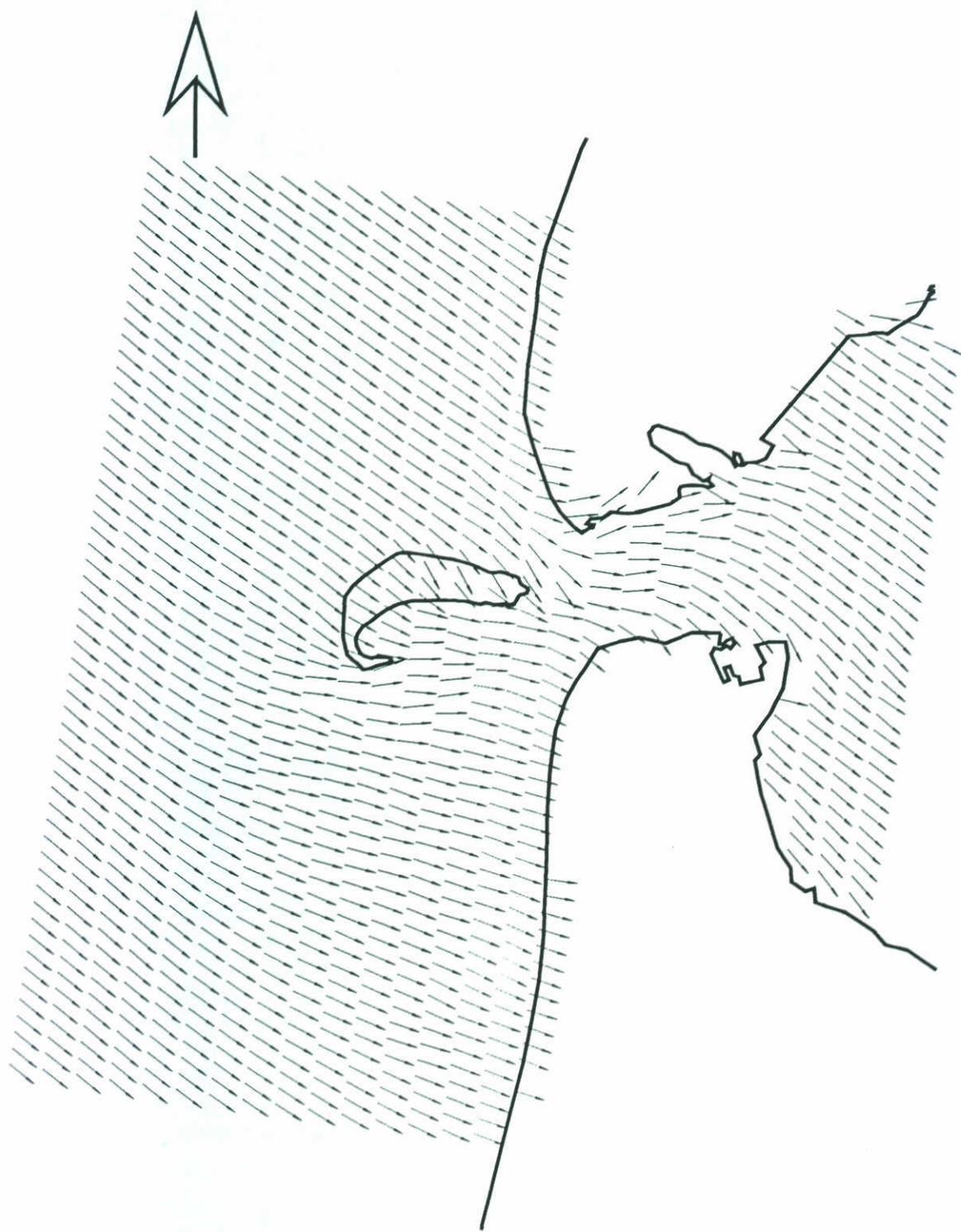
SSSZGRK

Scale 1 : 150000

DELFT HYDRAULICS

H1355

Fig 4.21a



MAIN WAVE DIRECTIONS
 RUN SSS, ZEEGAT MODEL

HYDRA

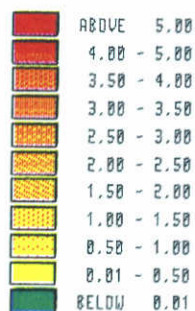
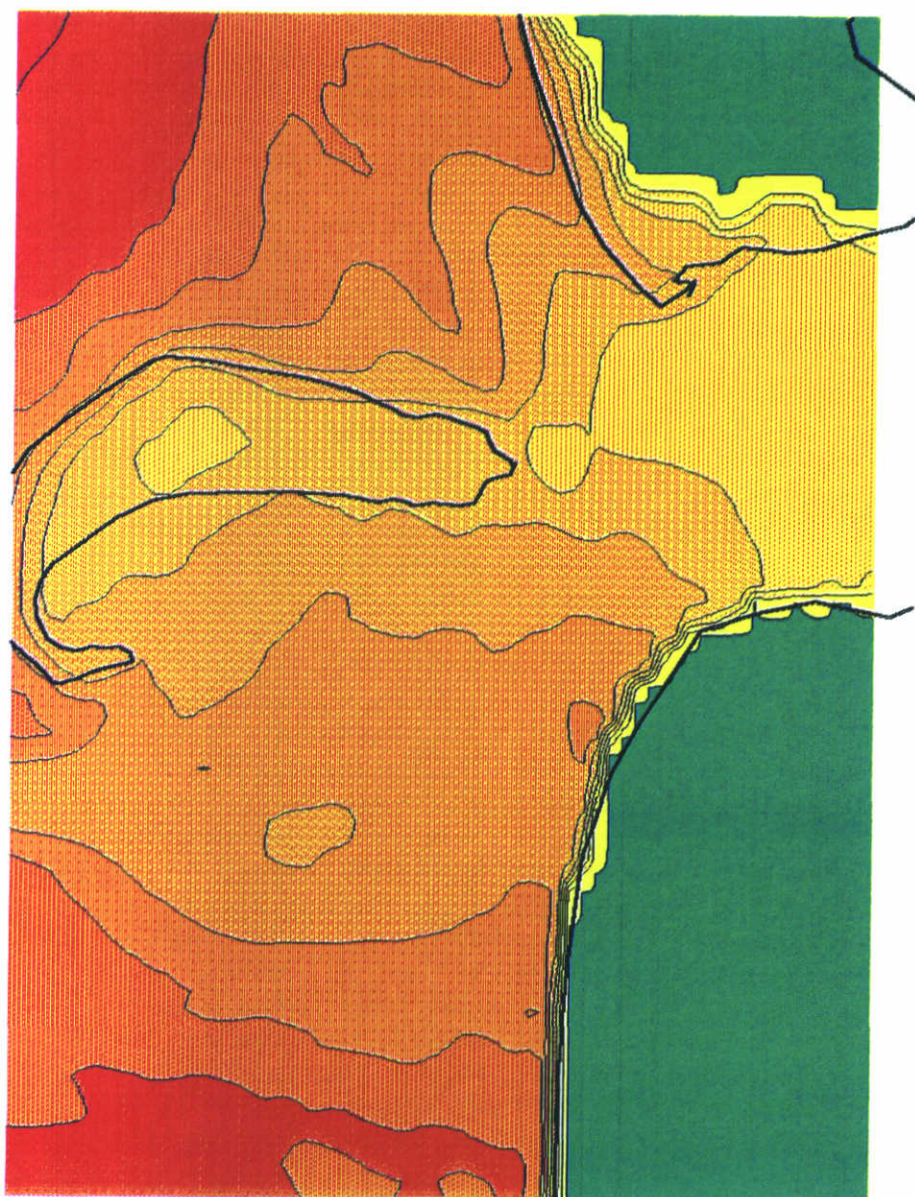
SSSZGRK

Scale 1 : 150000

DELFT HYDRAULICS

H1355

Fig 4.21b



SIGNIFICANT WAVE HEIGHT CONTOURS
RUN SSS, DETAIL HAAKS (IN M)

HYDRA

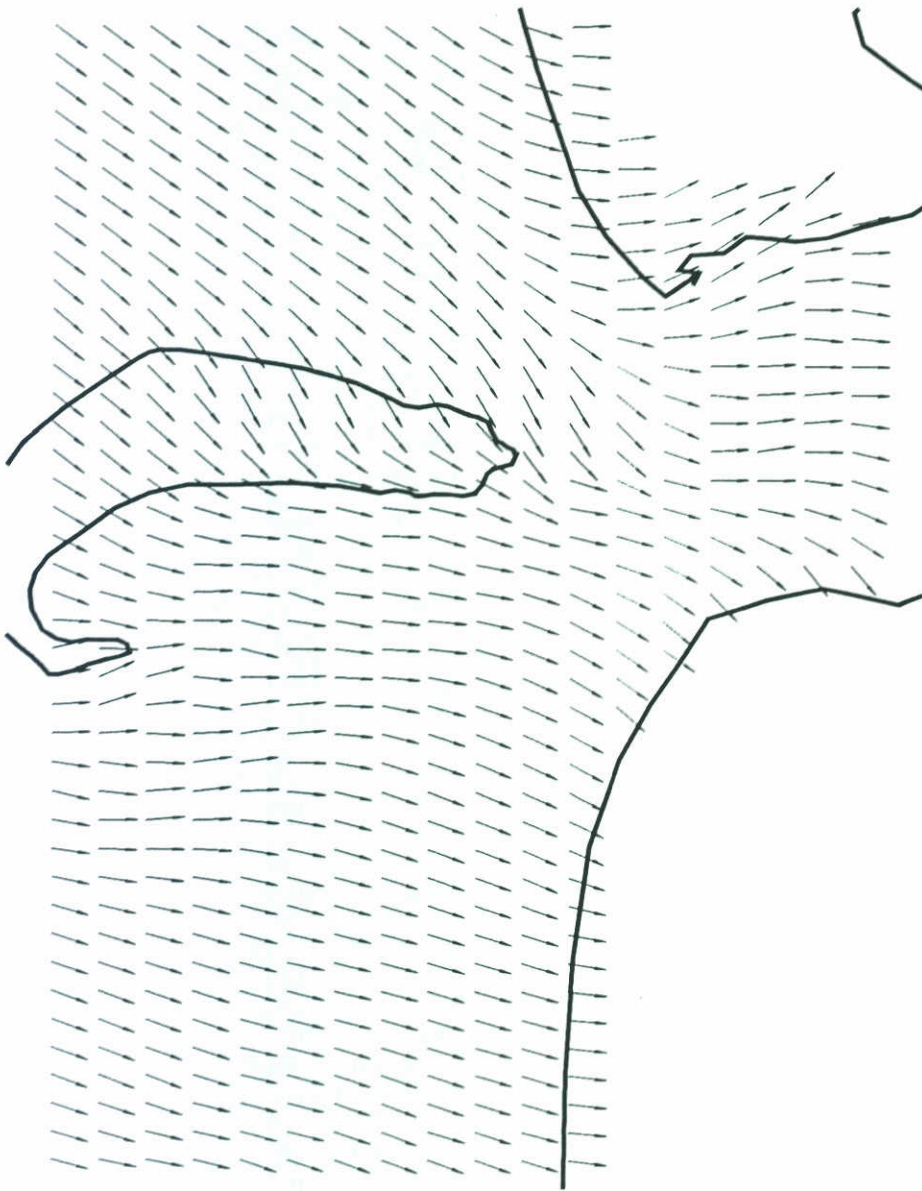
SSSZGHK

Scale 1 : 65000

DELFT HYDRAULICS

H1355

Fig 4.22a



MAIN WAVE DIRECTIONS
RUN SSS, DETAIL HAAKS

HYDRA

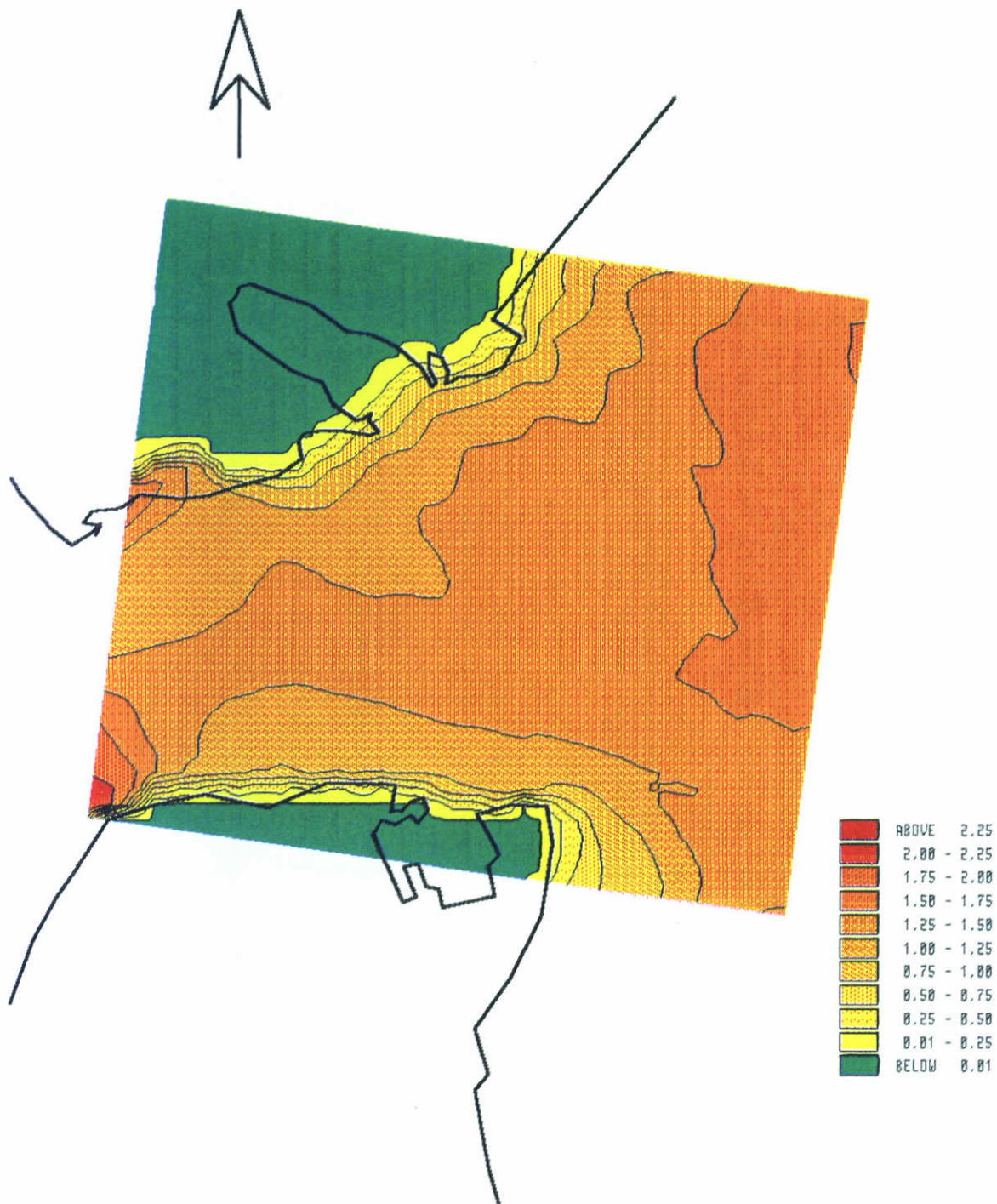
SSSZGHK

Scale 1 : 65000

DELFT HYDRAULICS

H1355

Fig 4.22b



SIGNIFICANT WAVE HEIGHT CONTOURS
 RUN SSS, DETAIL MALZWIN (IN M)

HYDRA

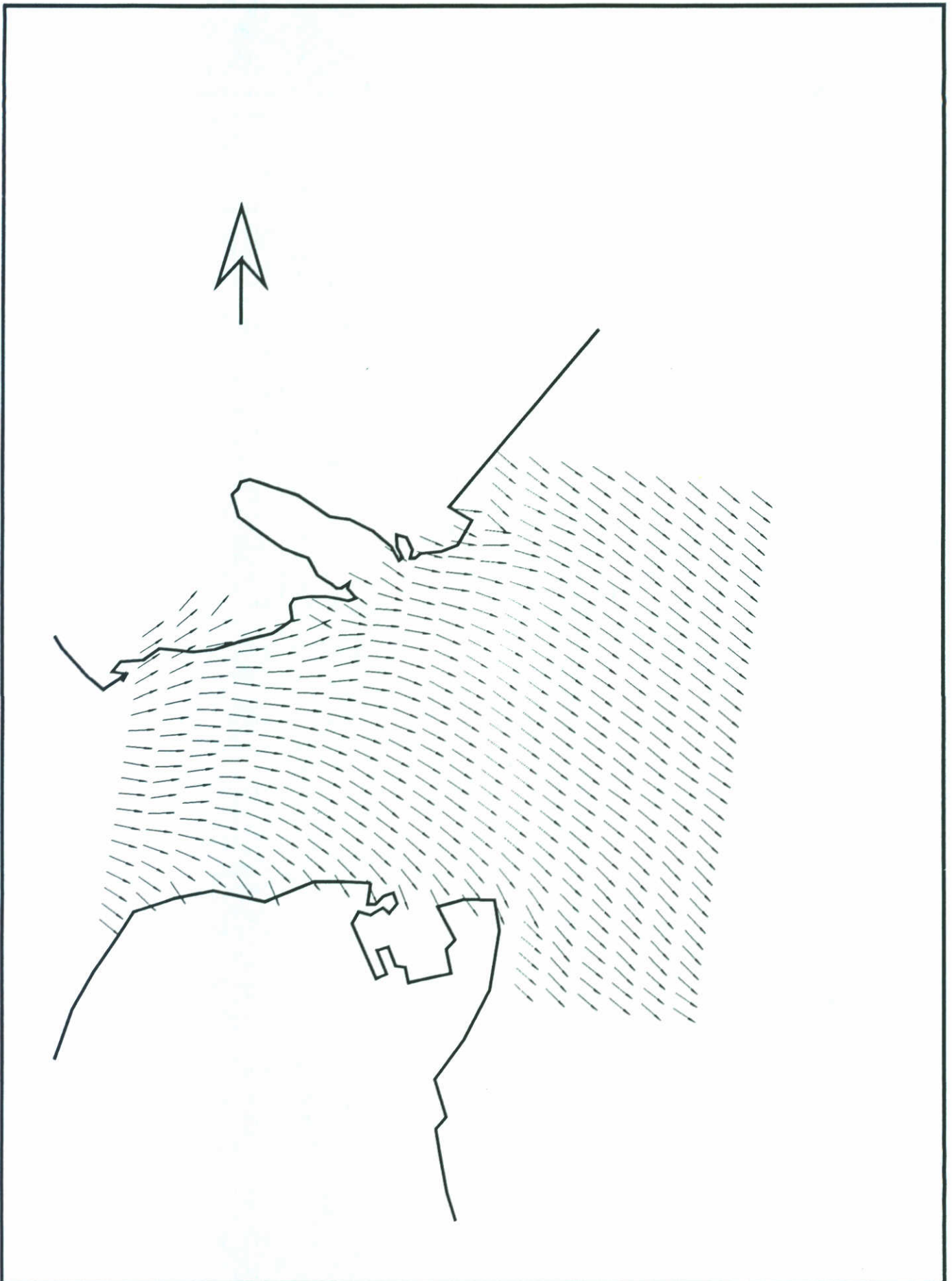
SSSZGMZ

Scale 1 : 65000

DELFT HYDRAULICS

H1355

Fig 4.23a



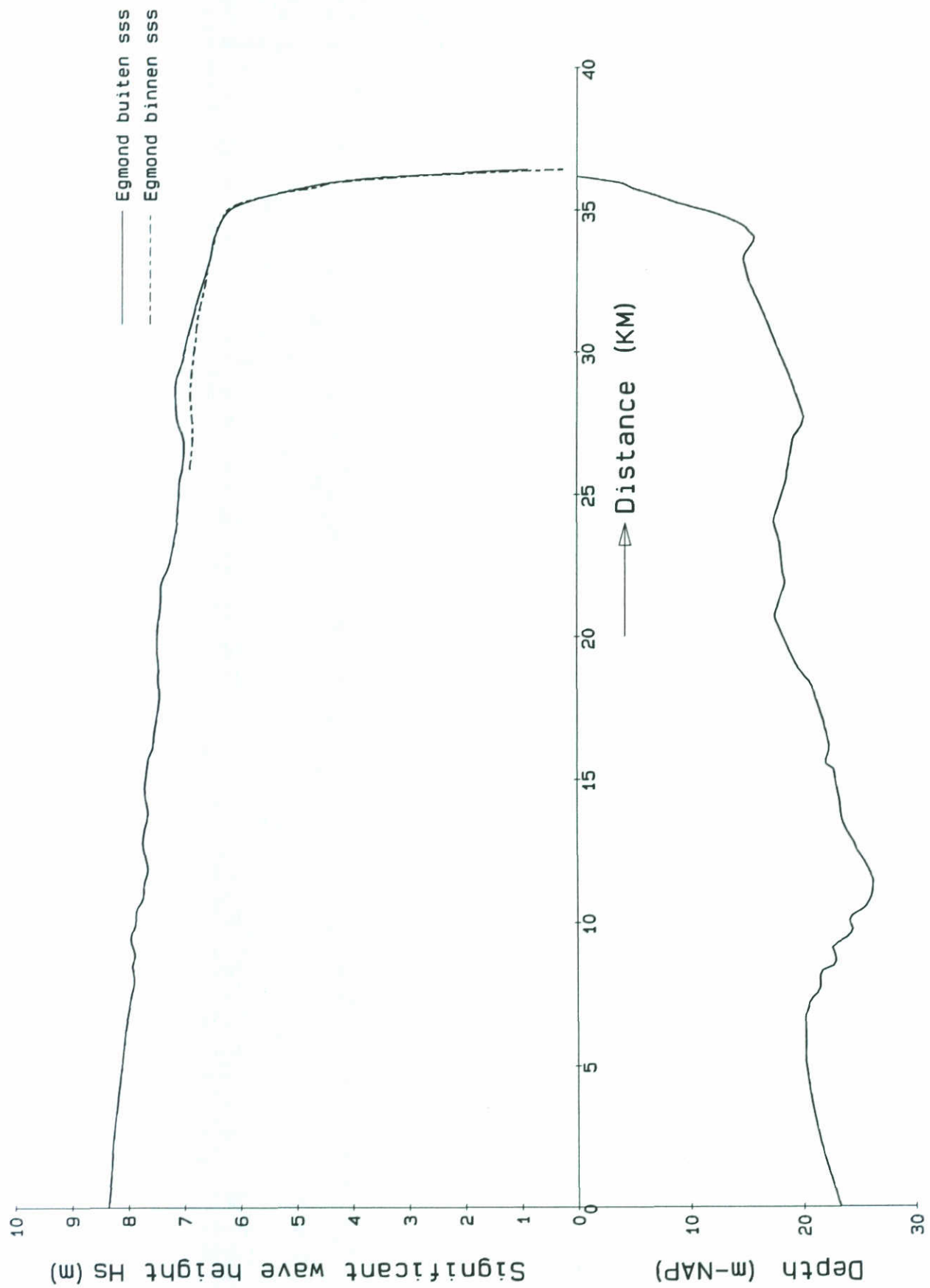
MAIN WAVE DIRECTIONS
RUN SSS, DETAIL MALZWIN

HYDRA SSSZGMZ

Scale 1 : 65000

DELFT HYDRAULICS

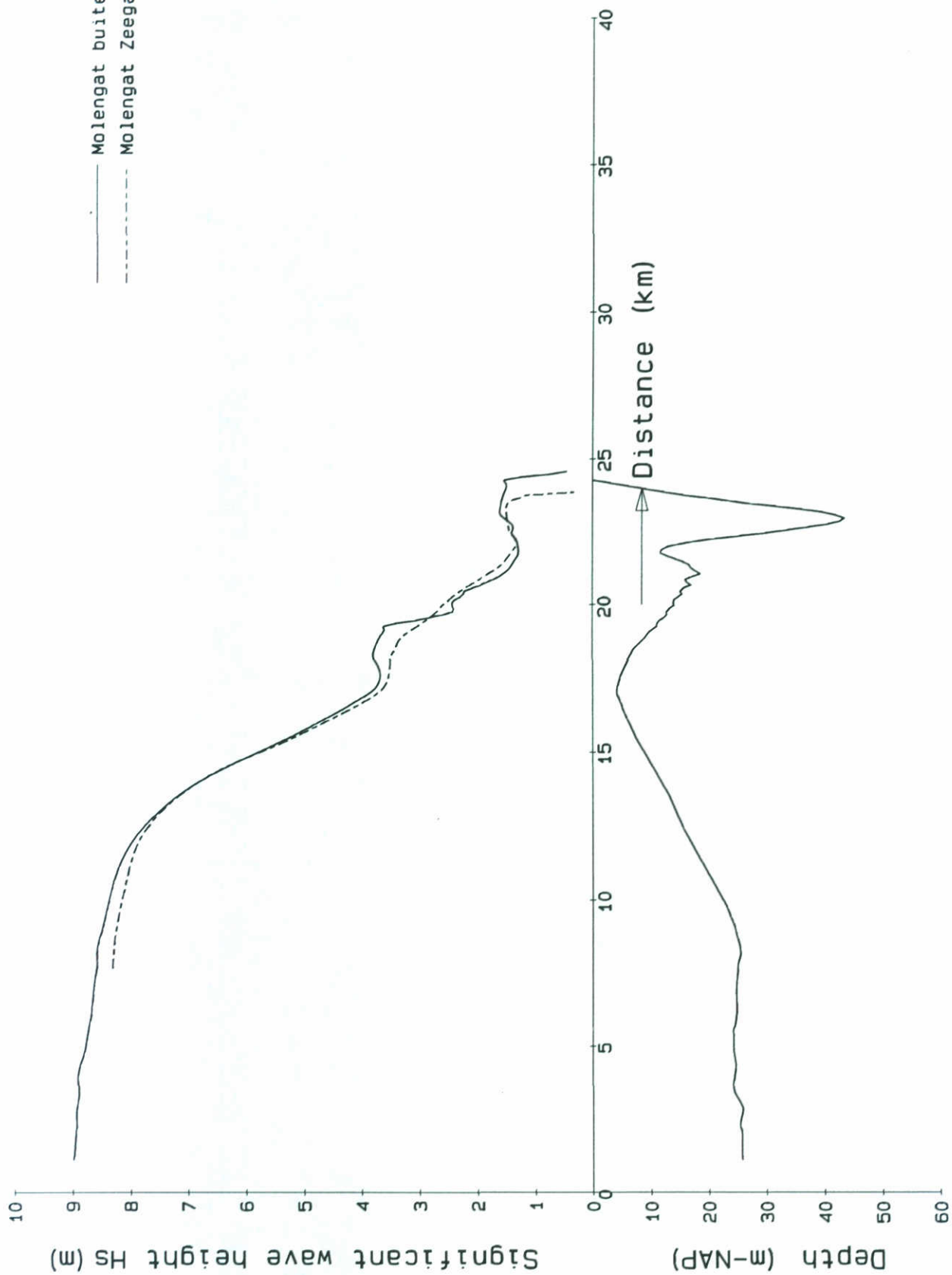
H1355 Fig 4.23b



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
COMPARISON BUITEN AND BINNEN MODEL

HYDRA-HISWA

SSSBUEG



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
COMPARISON BUITEN AND ZEEGAT MODEL

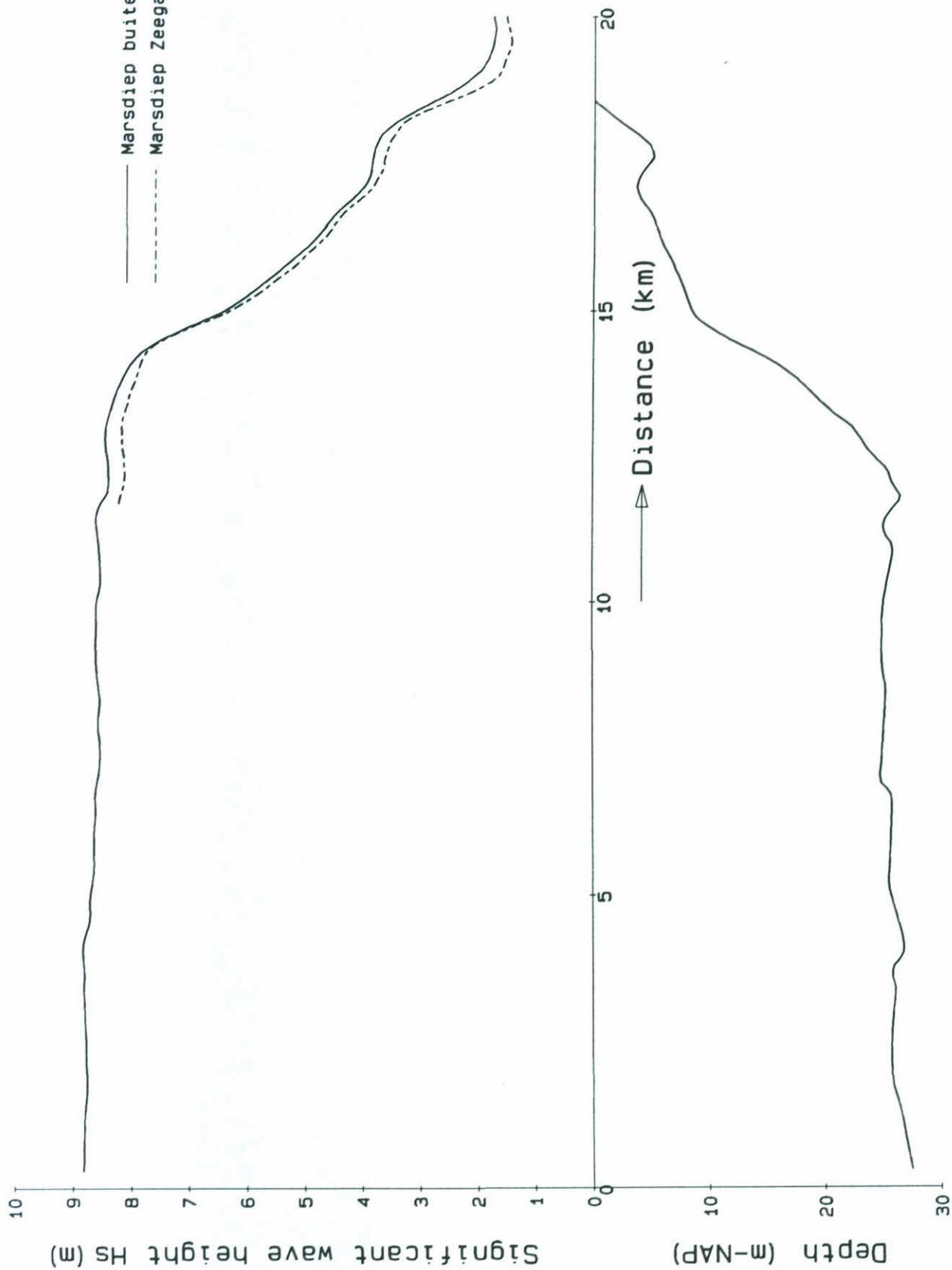
HYDRA-HISWA

SSSMG

DELFT HYDRAULICS

H1355

FIG 4.24b



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
COMPARISON OF BUITEN AND ZEEGAT MODEL

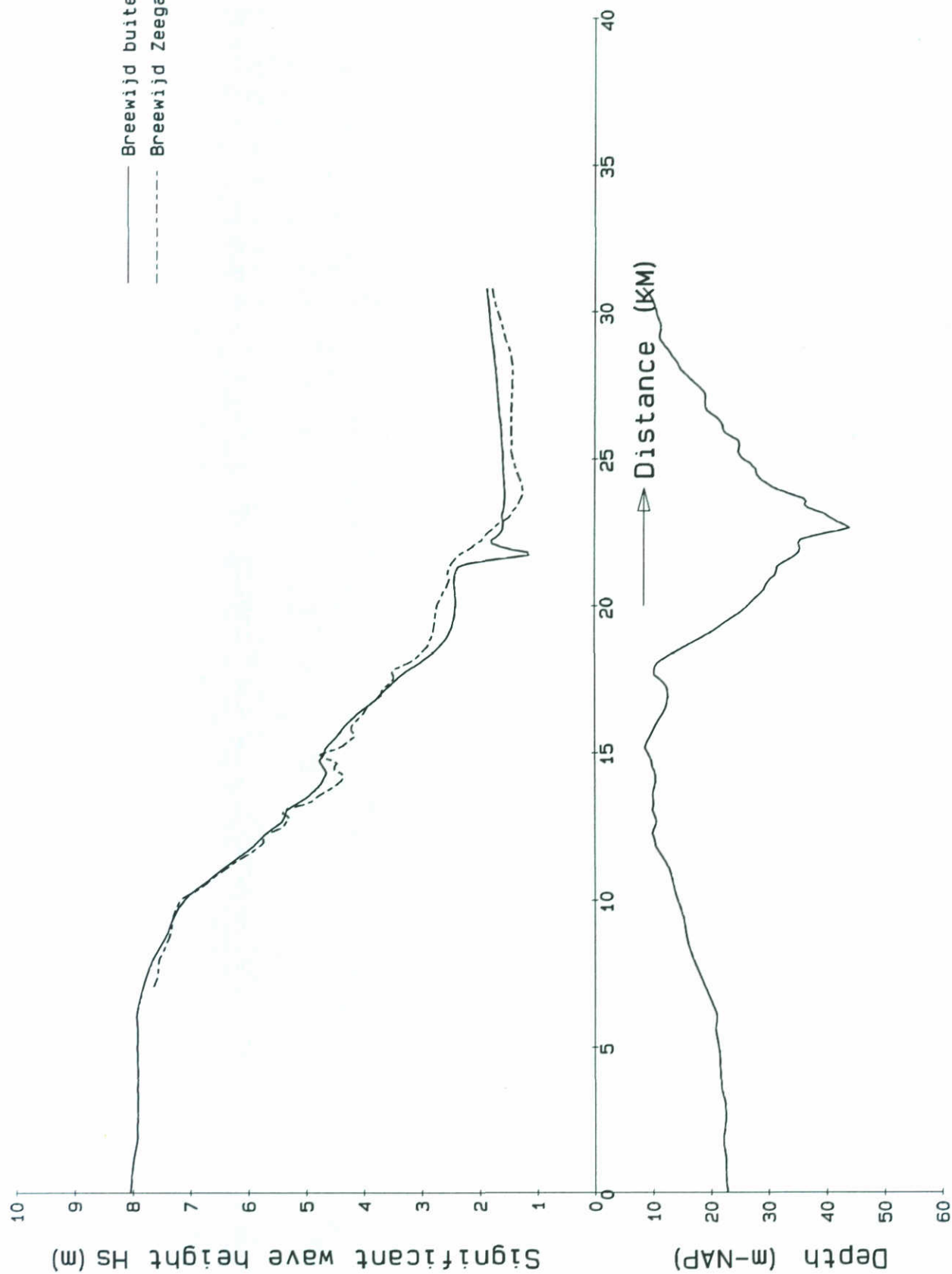
HYDRA-HISWA

SSSMD

DELFT HYDRAULICS

H1355

FIG 4.24c



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
COMPARISON BUITEN AND ZEEGAT MODEL

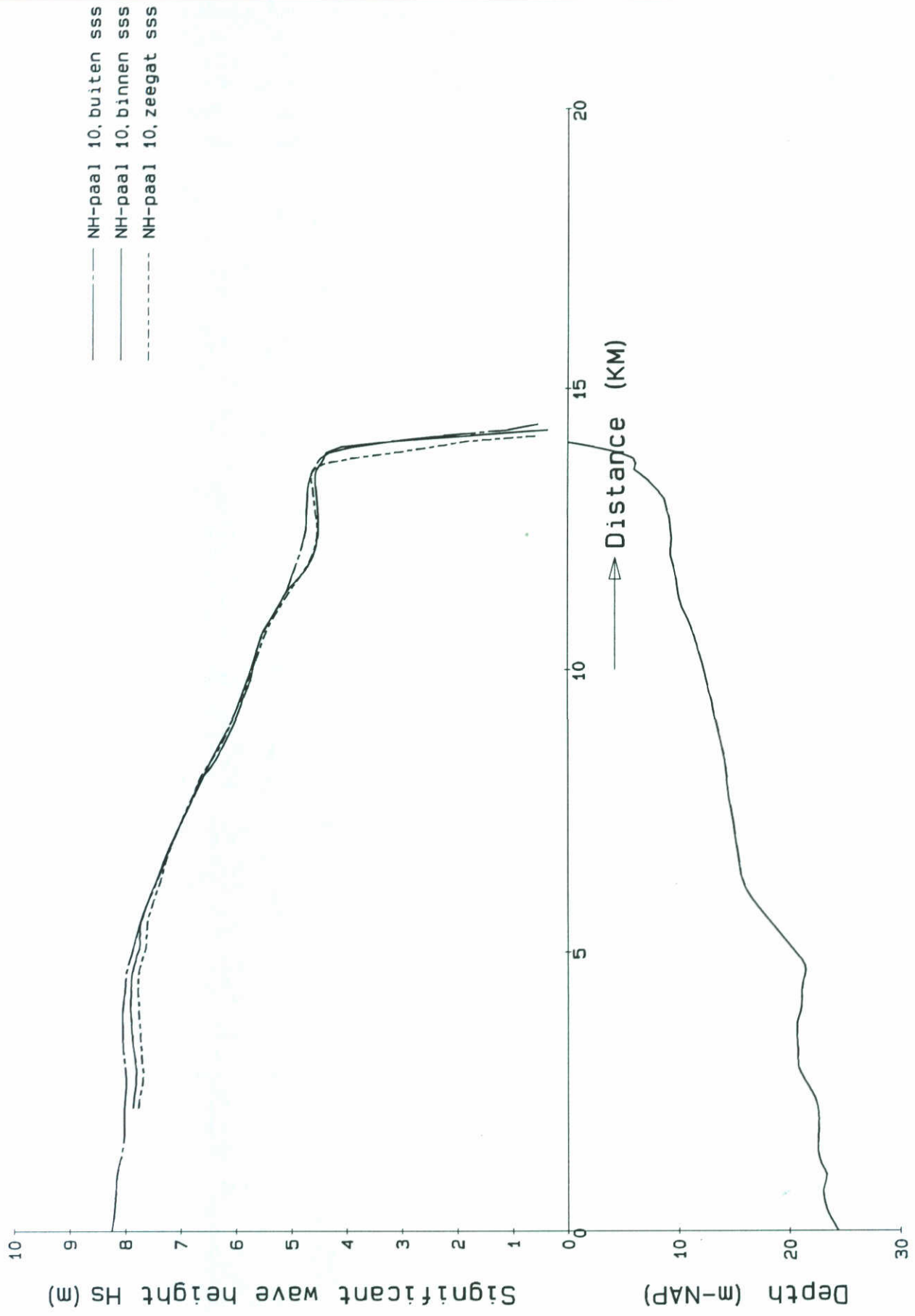
HYDRA-HISWA

SSSBW

DELFT HYDRAULICS

H1355

FIG 4.24d

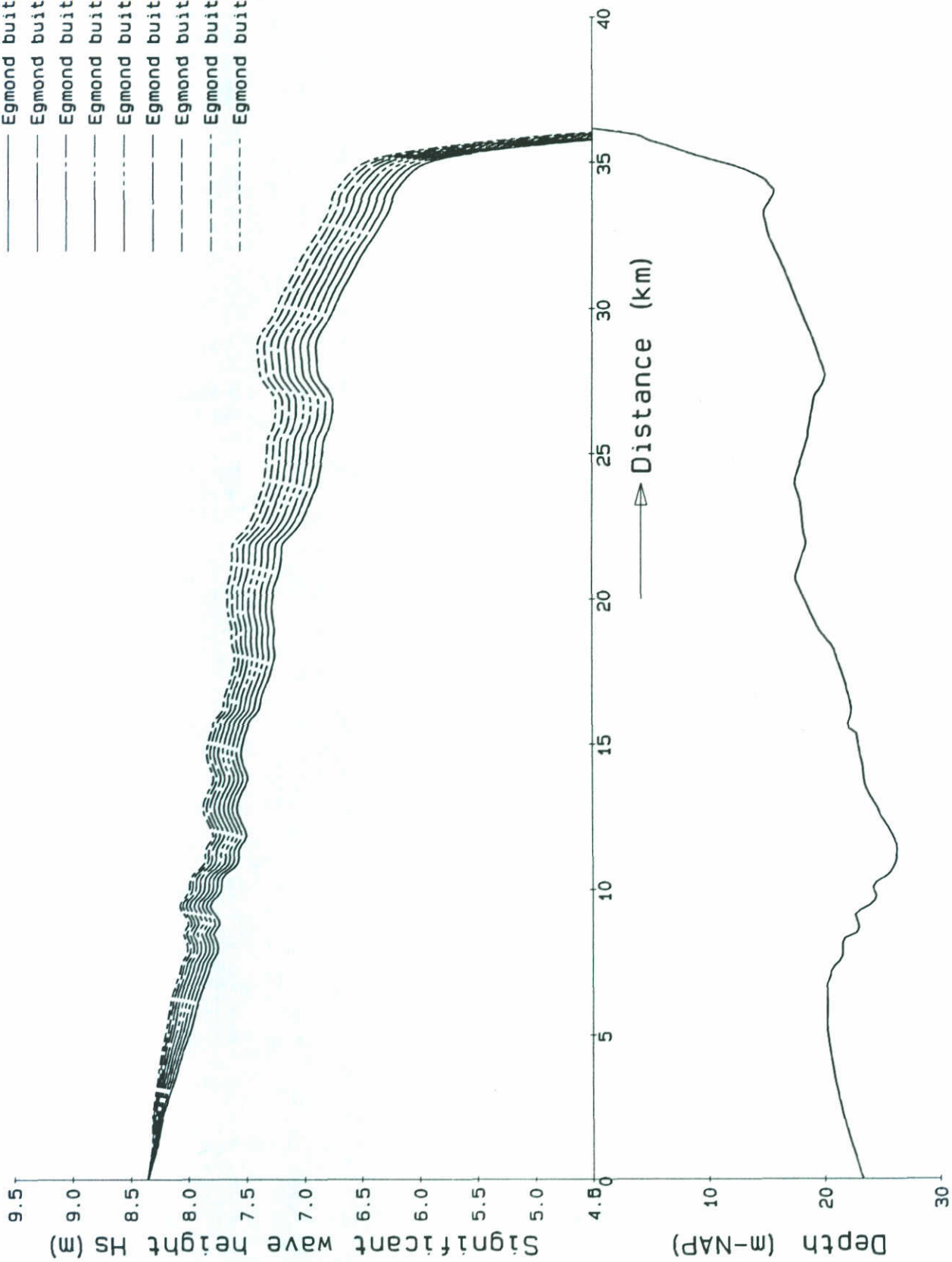


SIGNIFICANT WAVE HEIGHT NHPAAL10 PROFILE
COMPARISON BUITEN, BINNEN AND ZEEGAT MODEL

HYDRA-HISWA

SSSNH

- Egmond buiten Ws1
- Egmond buiten Ws2
- Egmond buiten Ws3
- Egmond buiten Ws4
- Egmond buiten Sss
- Egmond buiten Ws5
- Egmond buiten Ws6
- Egmond buiten Ws7
- Egmond buiten Ws8



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WATER LEVEL

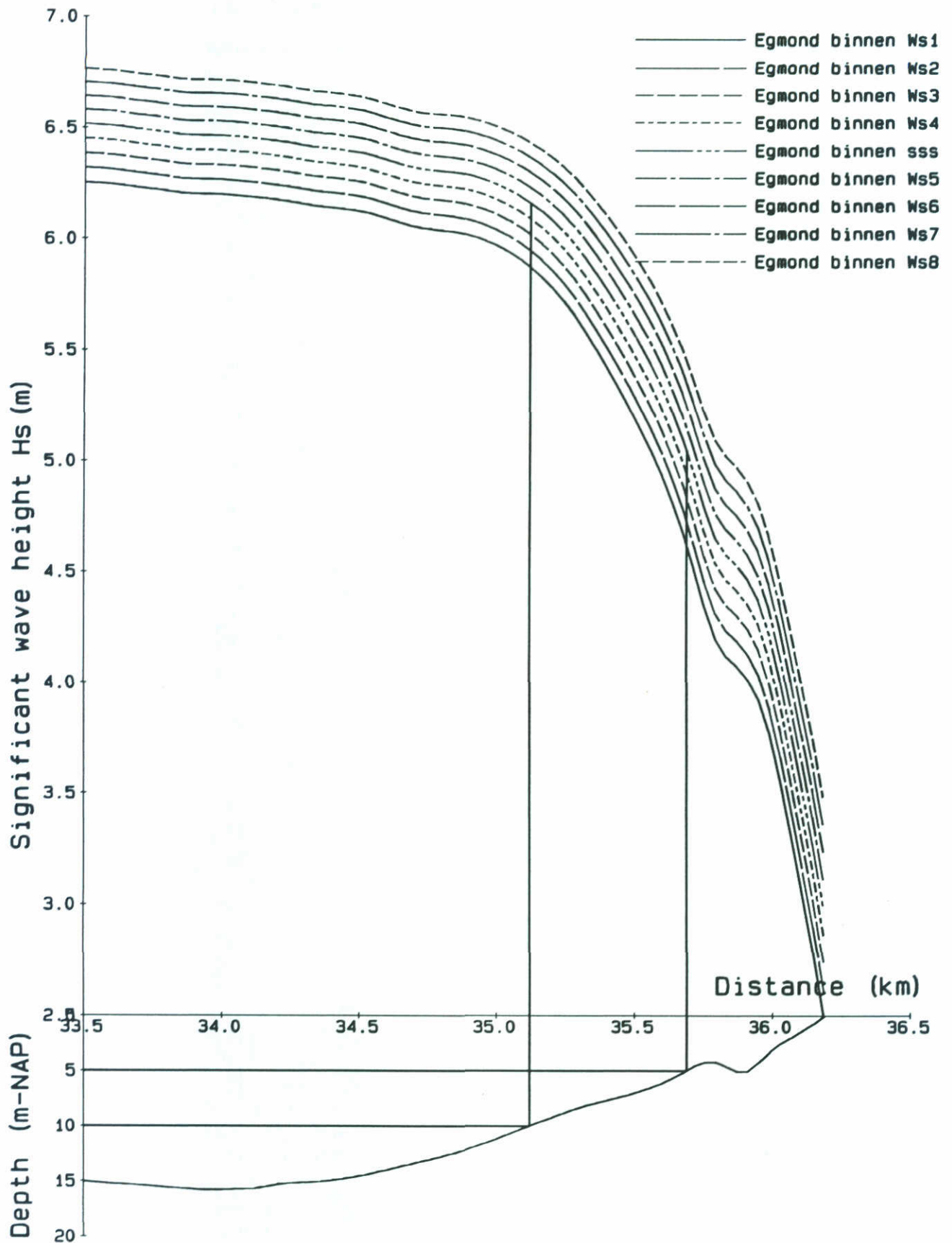
HYDRA-HISWA

WSBUEG

DELFT HYDRAULICS

H1355

FIG. 4.25a



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WATER LEVEL

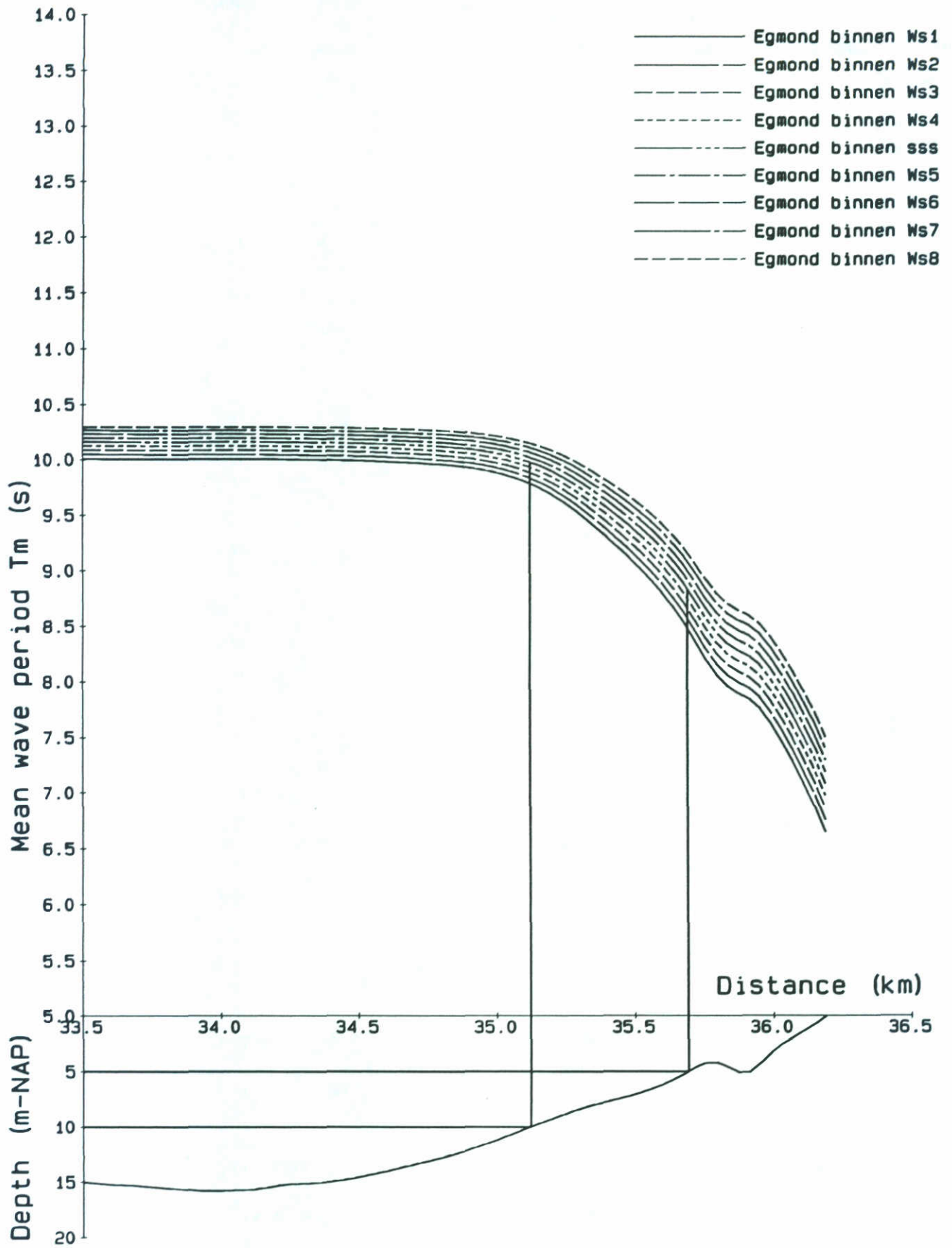
HYDRA-HISWA

WS1WS8

DELFT HYDRAULICS

H1355

FIG. 4.25b



MEAN WAVE PERIOD EGMOND PROFILE
VARYING WATER LEVEL

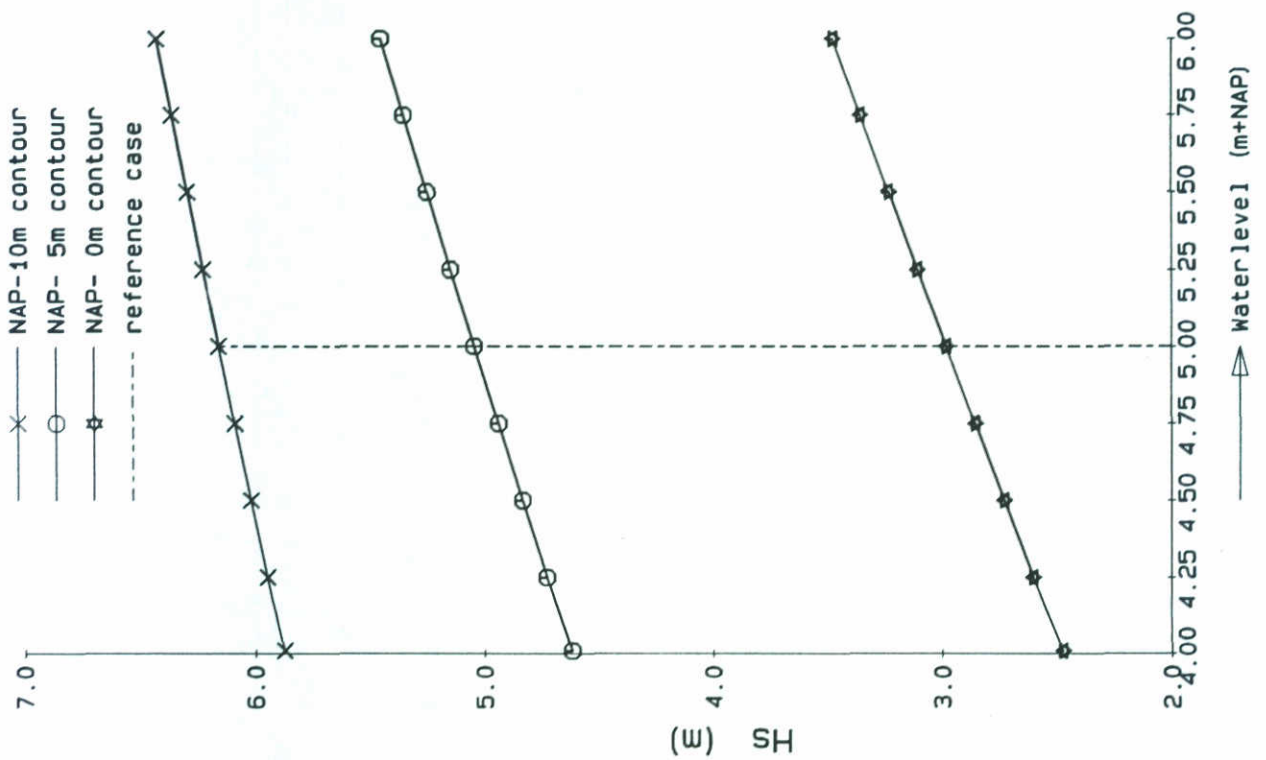
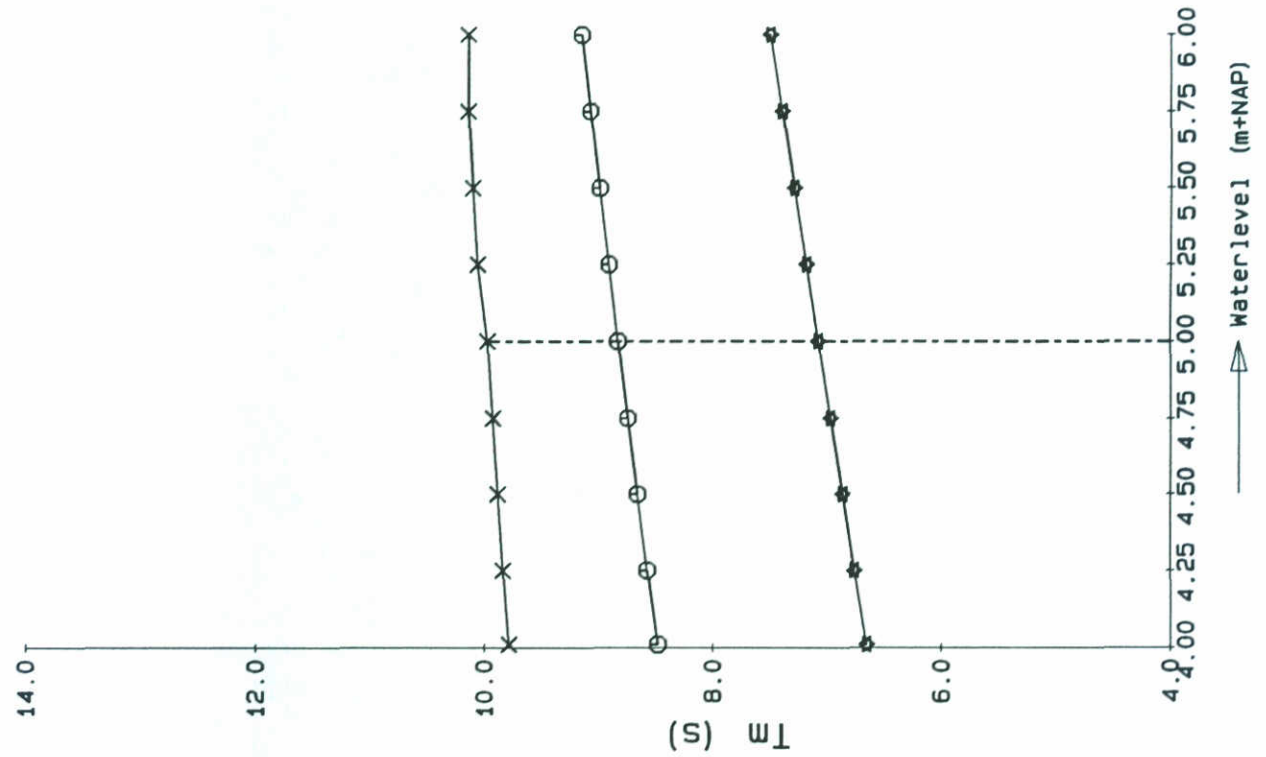
HYDRA-HISWA

WS1WS8

DELFT HYDRAULICS

H1355

FIG. 4.25c



EFFECT OF WATER LEVEL VARIATION
EGMOND PROFILE

HYDRA-HISWA

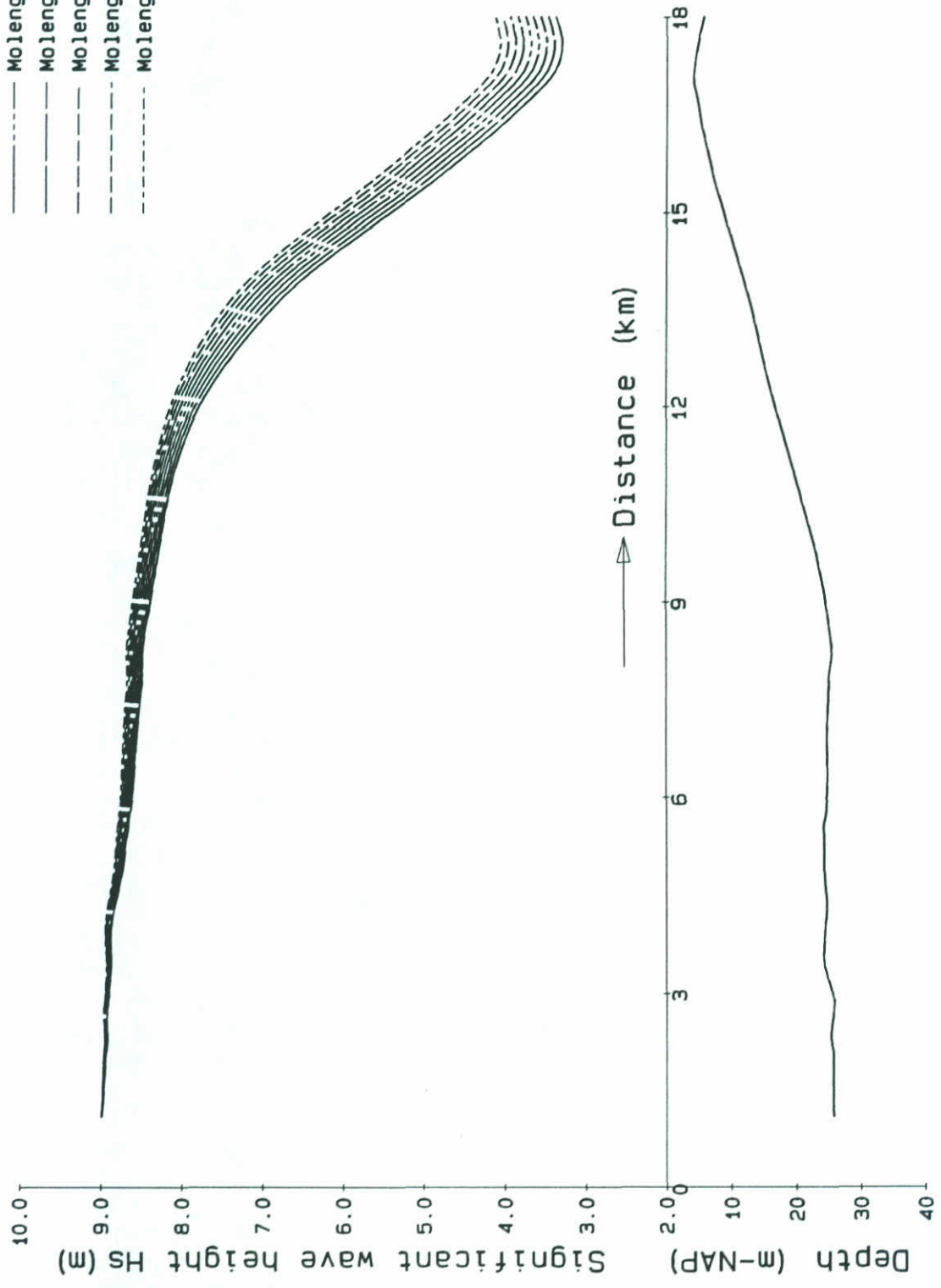
WS1WS8

DELFT HYDRAULICS

H1355

FIG.4.25d

- Molengat buiten Ws1
- - Molengat buiten Ws2
- · - Molengat buiten Ws3
- · - Molengat buiten Ws4
- · - Molengat buiten Sss
- · - Molengat buiten Ws5
- · - Molengat buiten Ws6
- · - Molengat buiten Ws7
- · - Molengat buiten Ws8



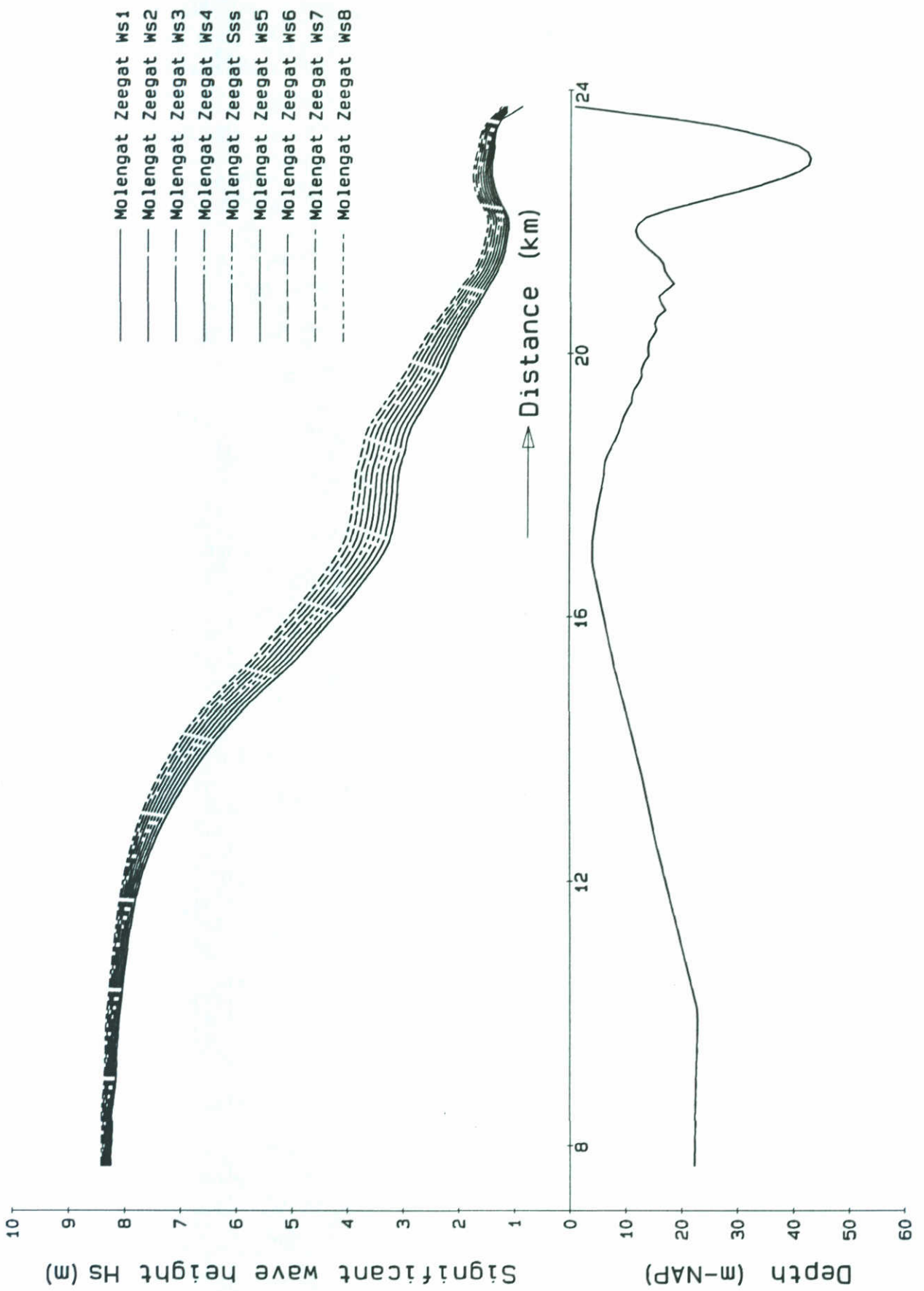
SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WATER LEVEL

HYDRA-HISWA WSBUMG

DELFT HYDRAULICS

H1355

FIG. 4.25e



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WATER LEVEL

HYDRA-HISWA

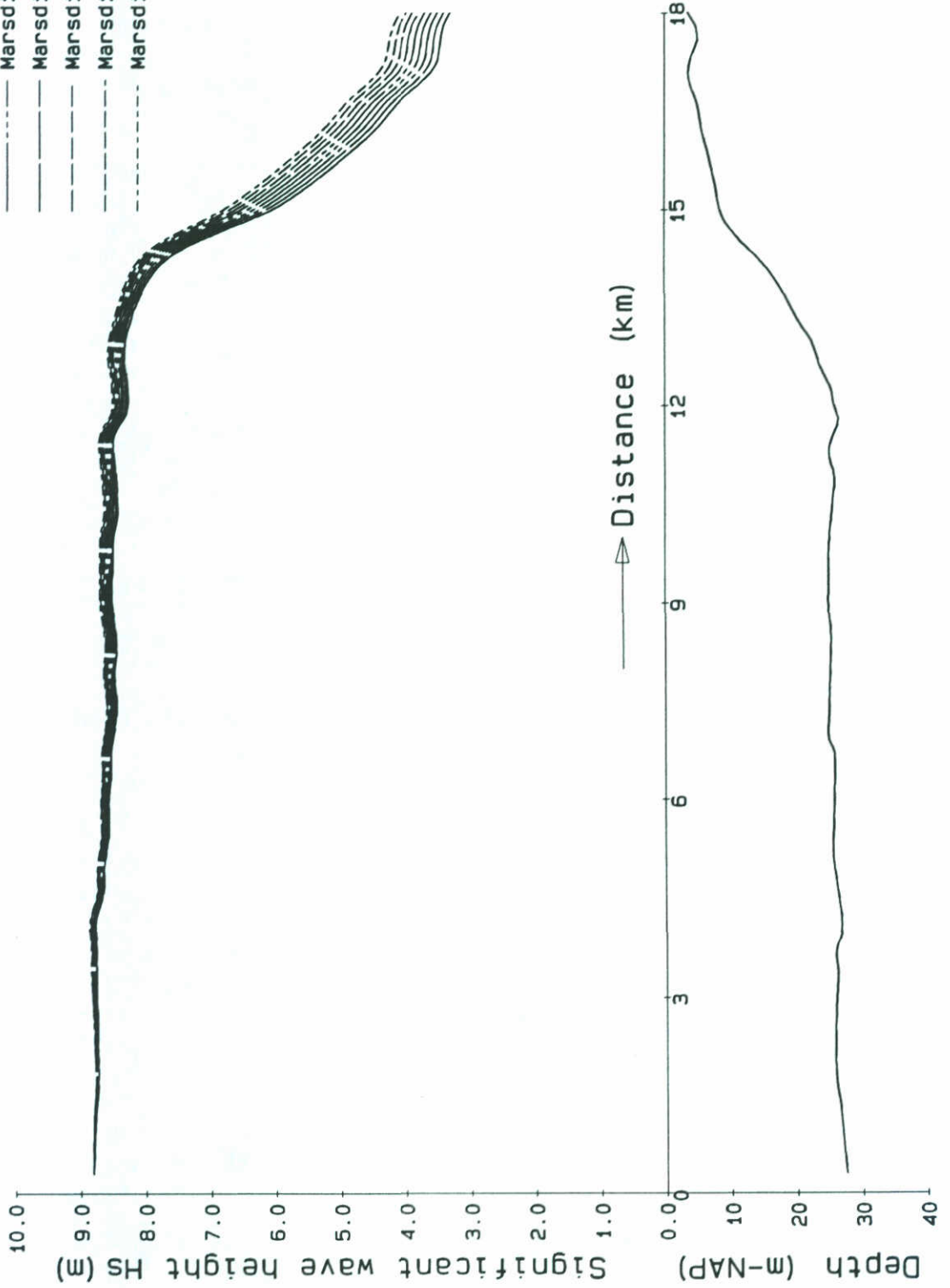
WSZGMG

DELFT HYDRAULICS

H1355

FIG. 4.25f

- Marsdiep buiten WS1
- - Marsdiep buiten WS2
- · - Marsdiep buiten WS3
- · - Marsdiep buiten WS4
- · - Marsdiep buiten SSS
- · - Marsdiep buiten WS5
- · - Marsdiep buiten WS6
- · - Marsdiep buiten WS7
- · - Marsdiep buiten WS8



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WATER LEVEL

HYDRA-HISWA

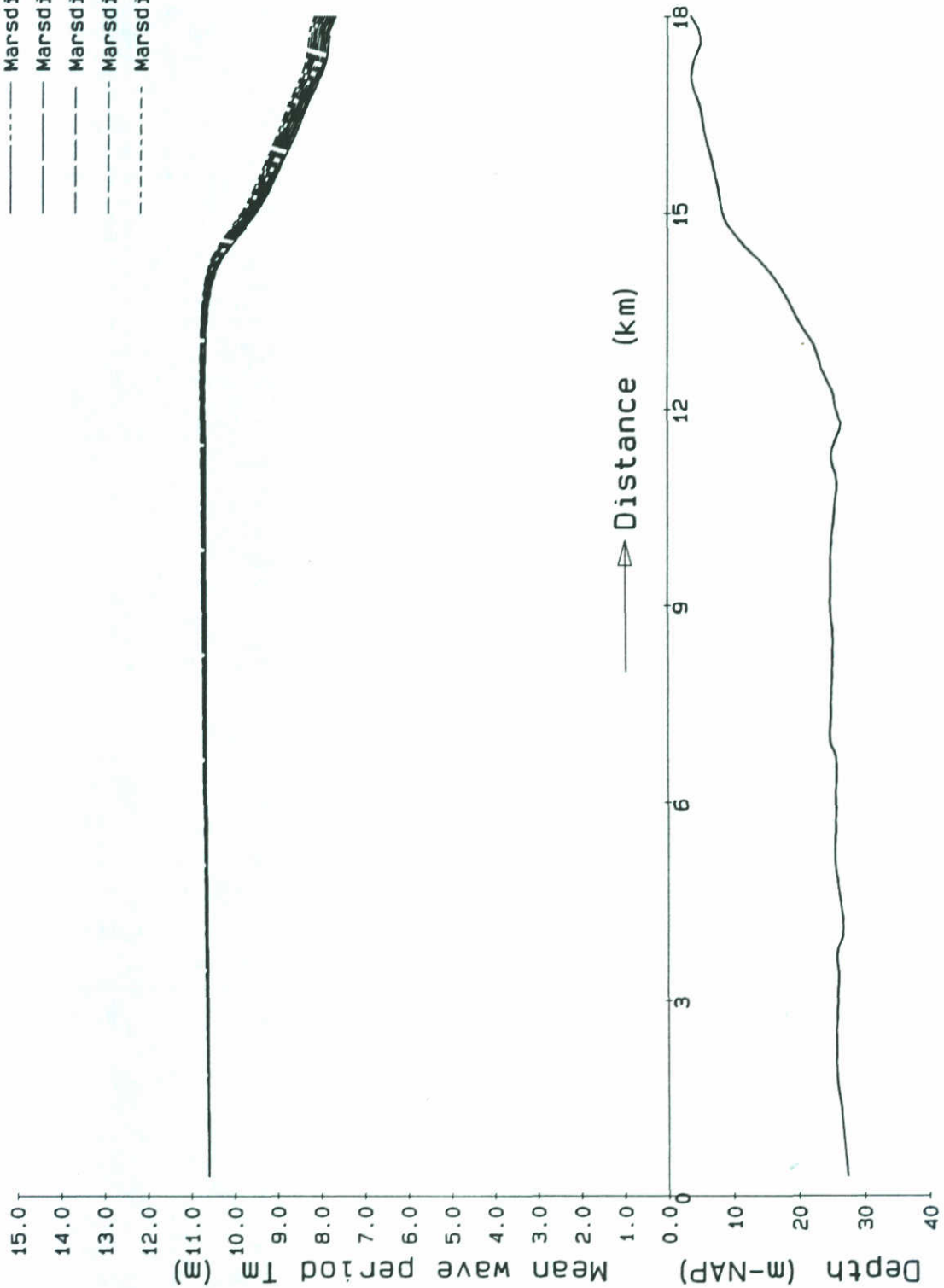
WSBUMD

DELFT HYDRAULICS

H1355

FIG. 4.25g

- Marsdiep buiten Ws1
- Marsdiep buiten Ws2
- Marsdiep buiten Ws3
- Marsdiep buiten Ws4
- Marsdiep buiten Sss
- Marsdiep buiten Ws5
- Marsdiep buiten Ws6
- Marsdiep buiten Ws7
- Marsdiep buiten Ws8



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WATER LEVEL

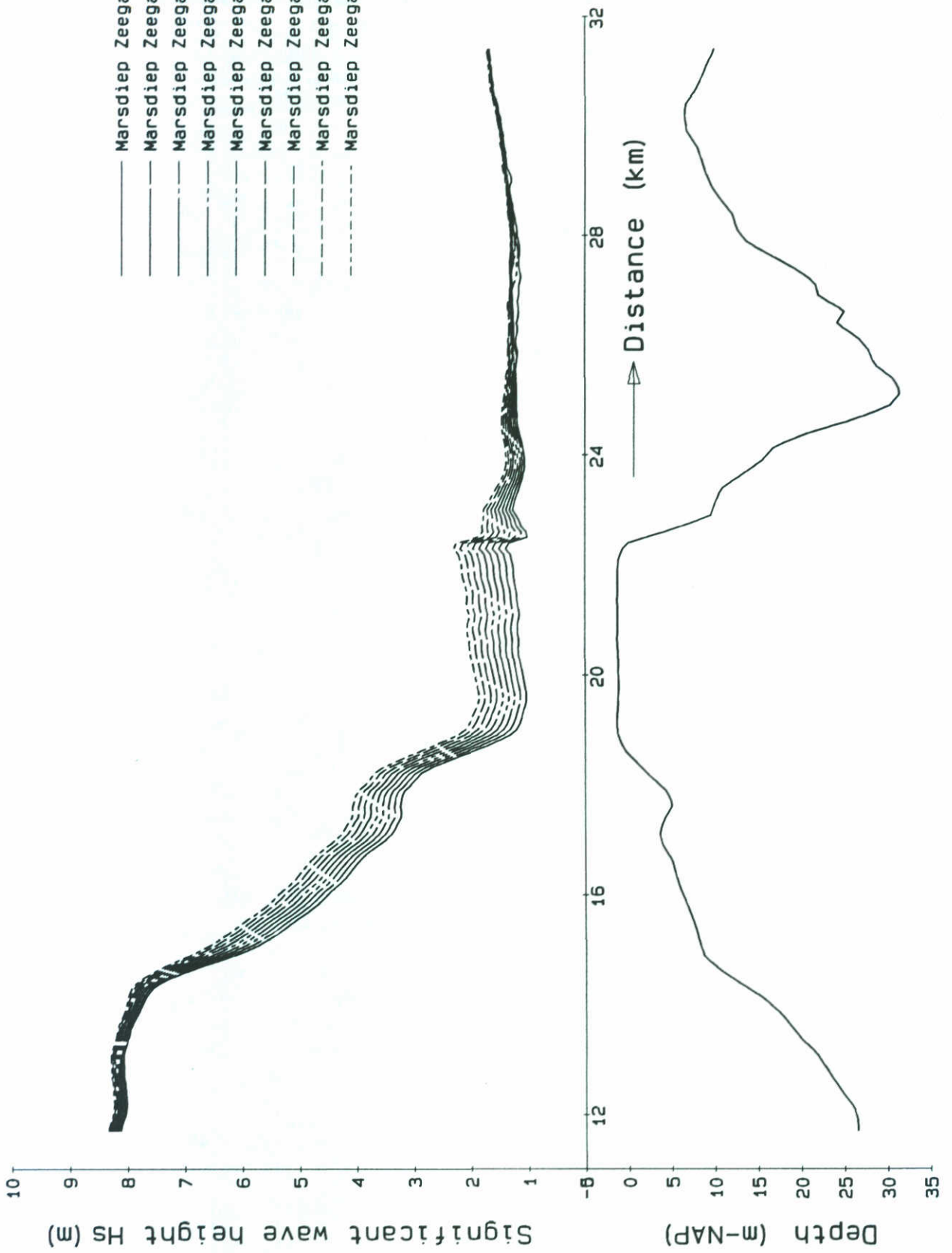
HYDRA-HISWA

WSBUMD

DELFT HYDRAULICS

H1355

FIG. 4.25h



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WATER LEVEL

HYDRA-HISWA

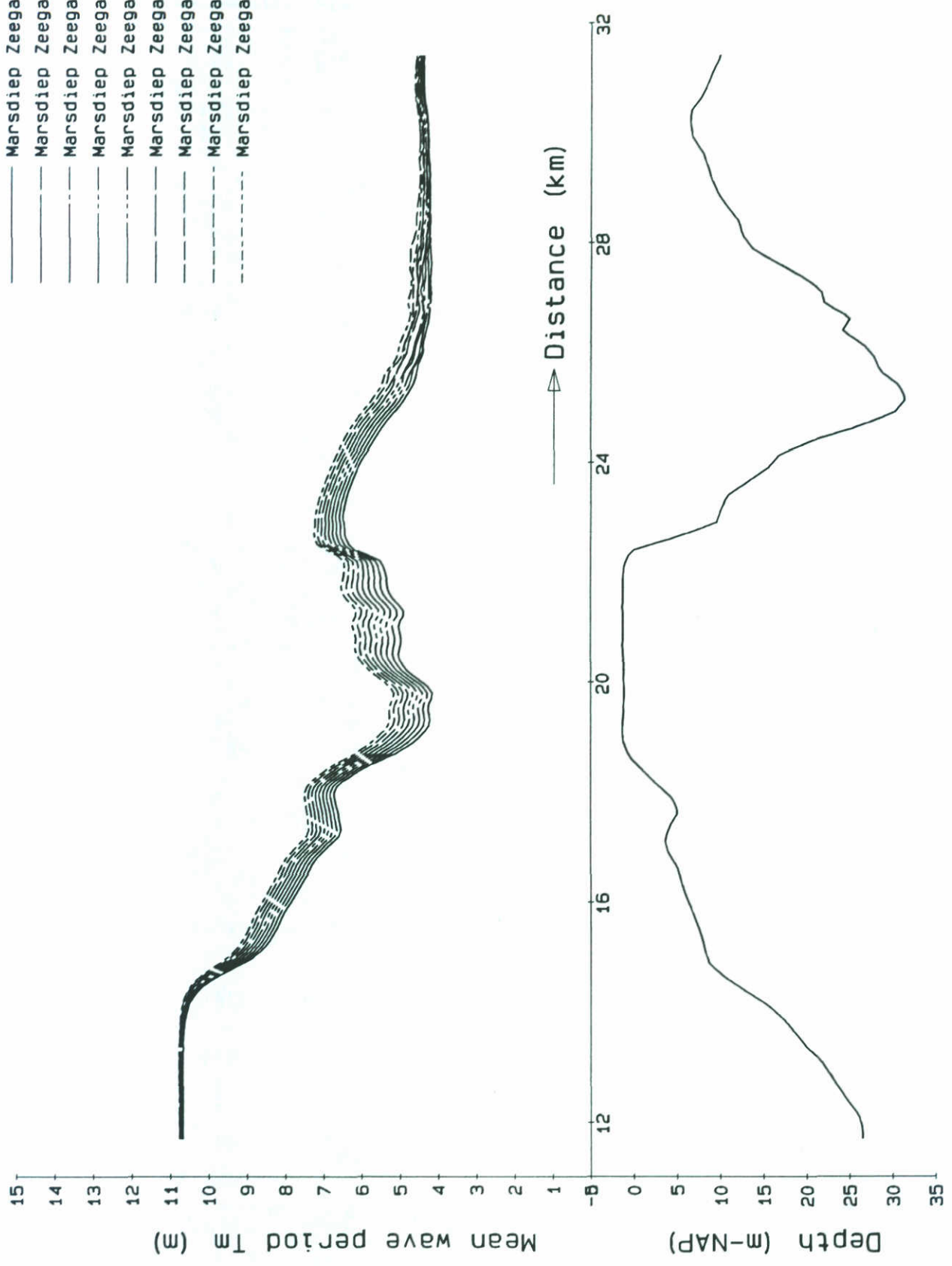
WSZGMD

DELFT HYDRAULICS

H1355

FIG.4.25i

- Marsdiep Zeegat Ws1
- Marsdiep Zeegat Ws2
- Marsdiep Zeegat Ws3
- Marsdiep Zeegat Ws4
- Marsdiep Zeegat Sss
- Marsdiep Zeegat Ws5
- Marsdiep Zeegat Ws6
- Marsdiep Zeegat Ws7
- Marsdiep Zeegat Ws8



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WATER LEVEL

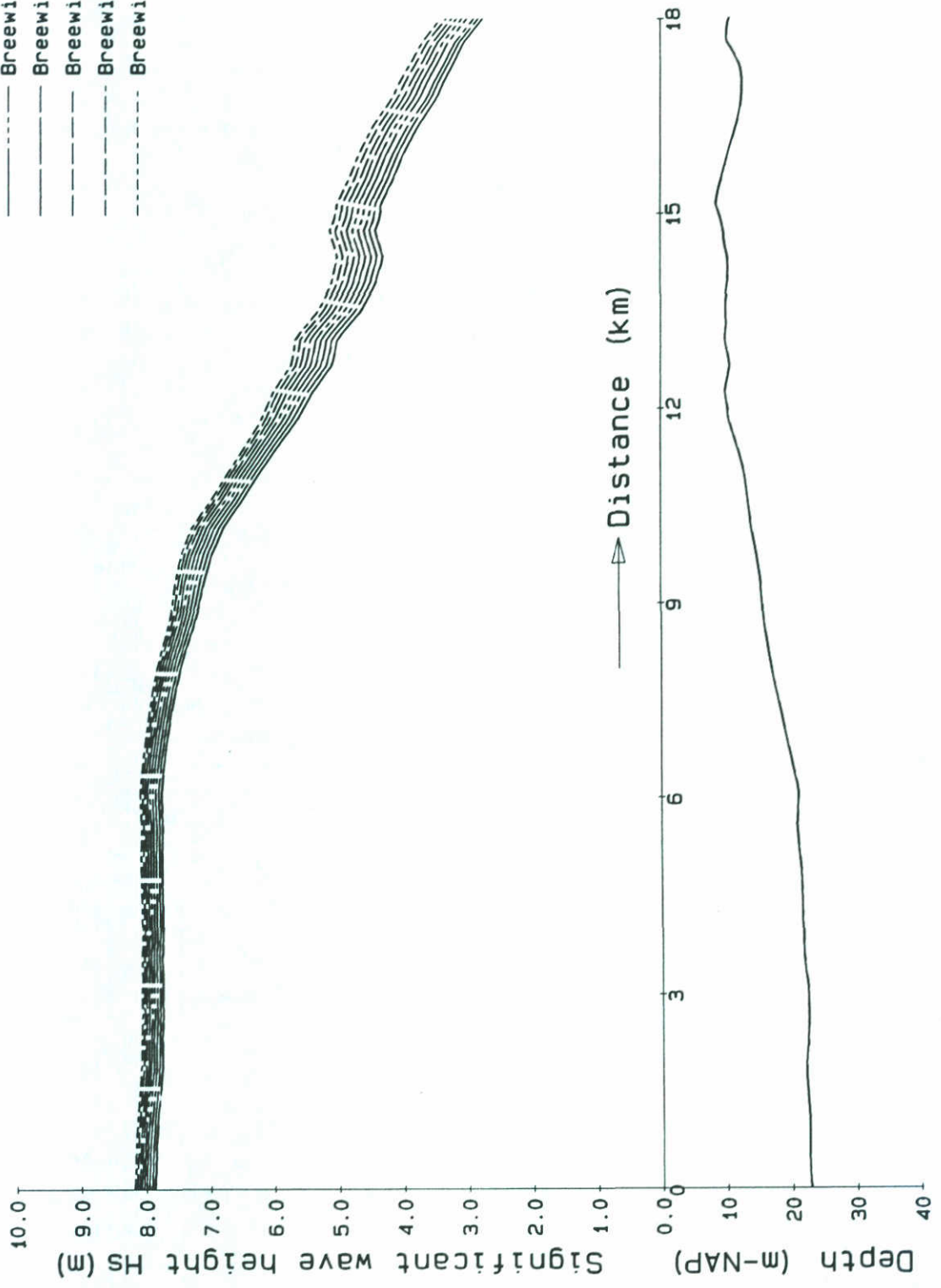
HYDRA-HISWA WSZGMD

DELFT HYDRAULICS

H1355

FIG. 4.25j

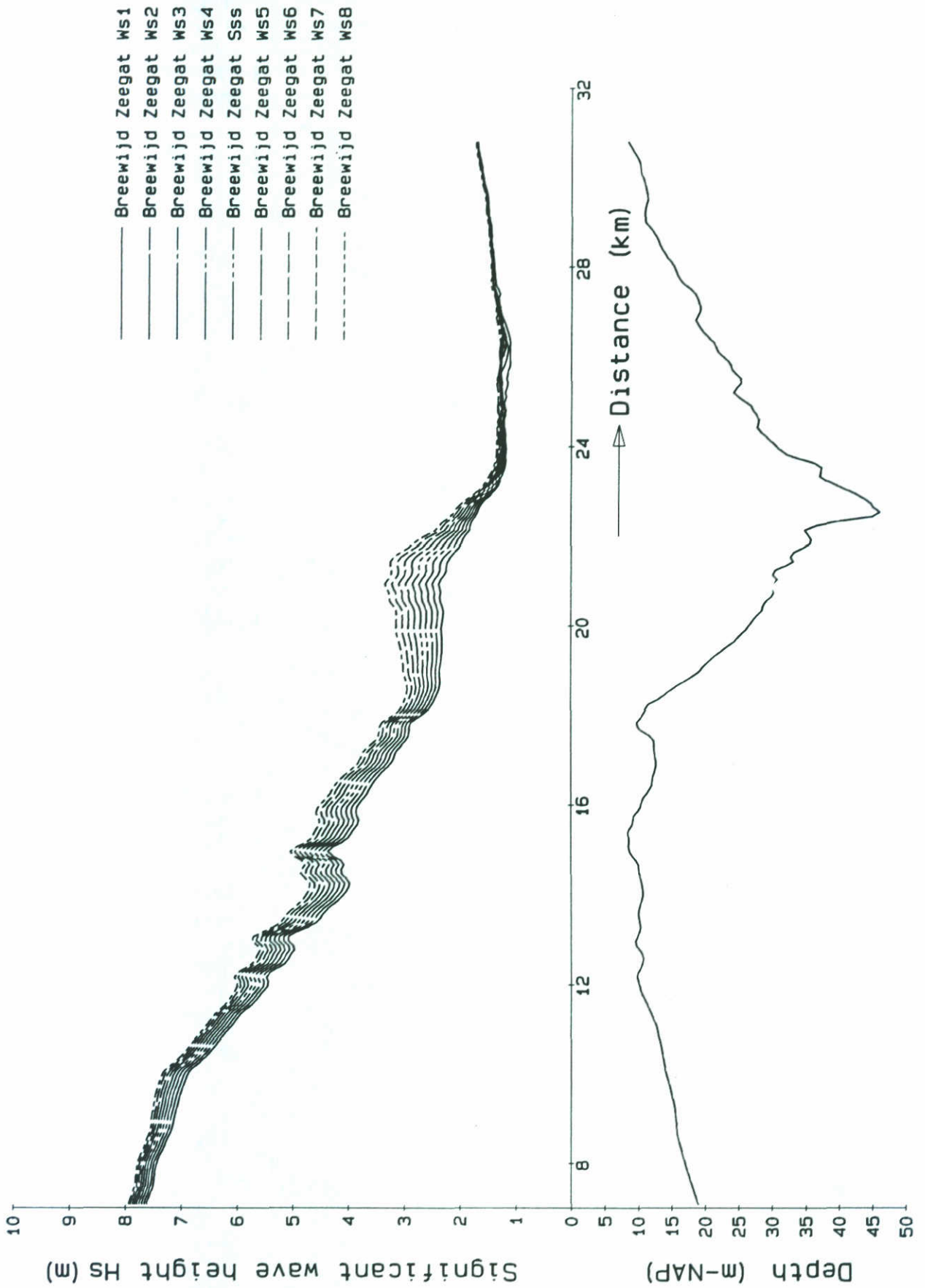
- Breewijd buiten Ws1
- - Breewijd buiten Ws2
- · - Breewijd buiten Ws3
- · - Breewijd buiten Ws4
- · - Breewijd buiten Sss
- · - Breewijd buiten Ws5
- · - Breewijd buiten Ws6
- · - Breewijd buiten Ws7
- · - Breewijd buiten Ws8



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WATER LEVEL

HYDRA-HISWA	WSBUBW
H1355	FIG. 4.25k

DELFT HYDRAULICS



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WATER LEVEL

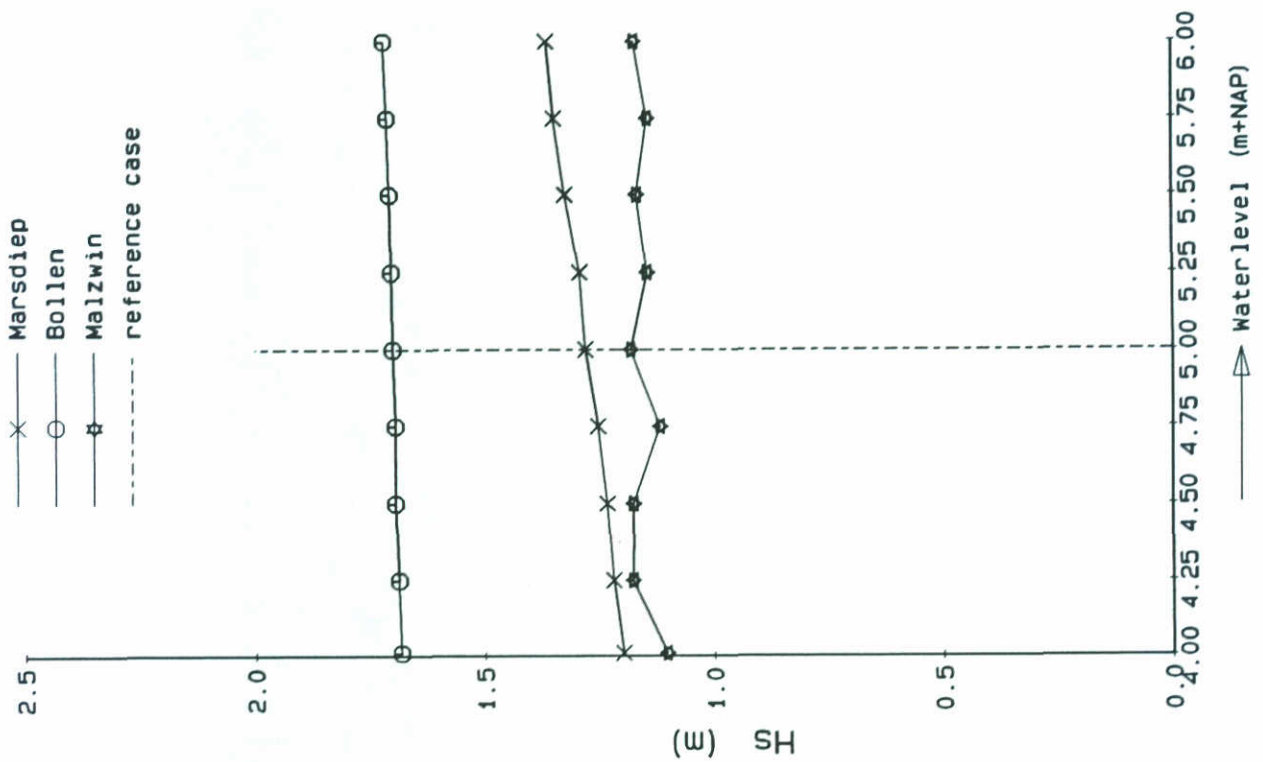
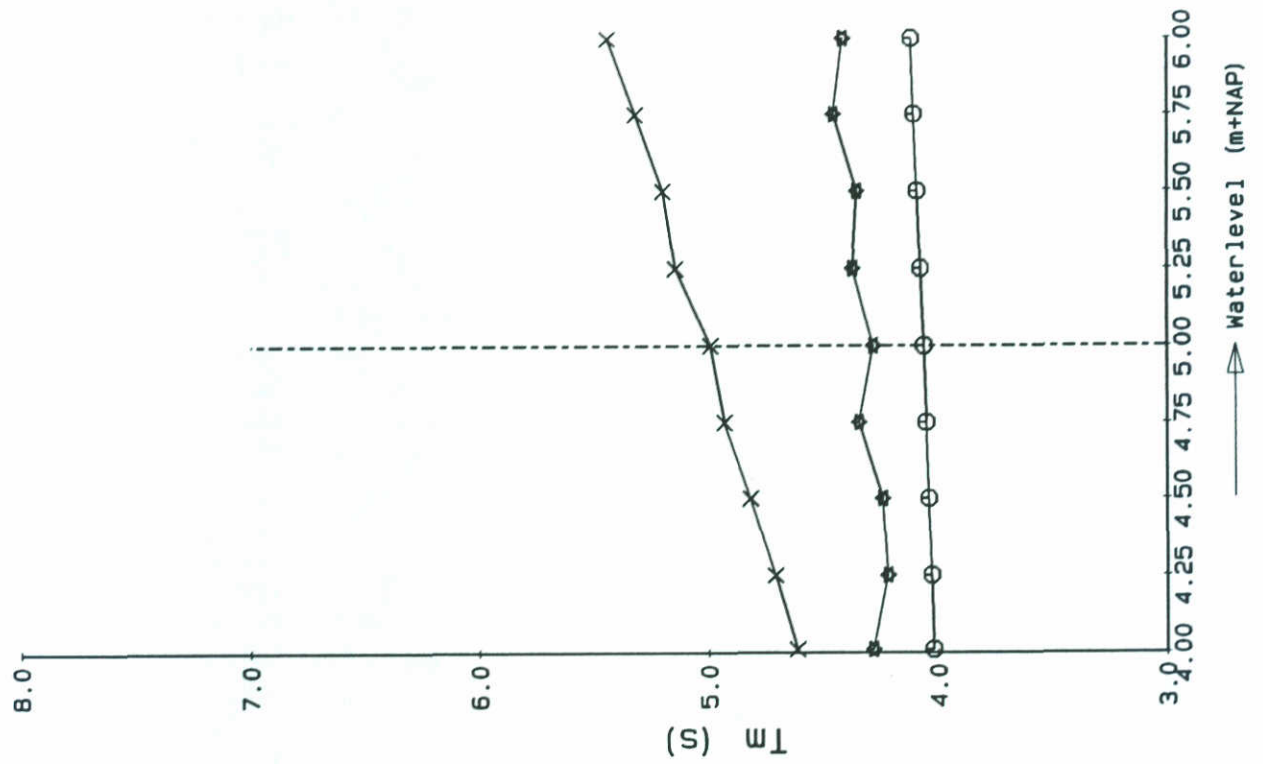
HYDRA-HISWA

WSZGBW

DELFT HYDRAULICS

H1355

FIG. 4.251



- x — Marsdiep
- o — Bollen
- * — Malzwin
- - - reference case

EFFECT OF WATER LEVEL VARIATION
ENTRANCE WADDEN SEA

HYDRA-HISWA

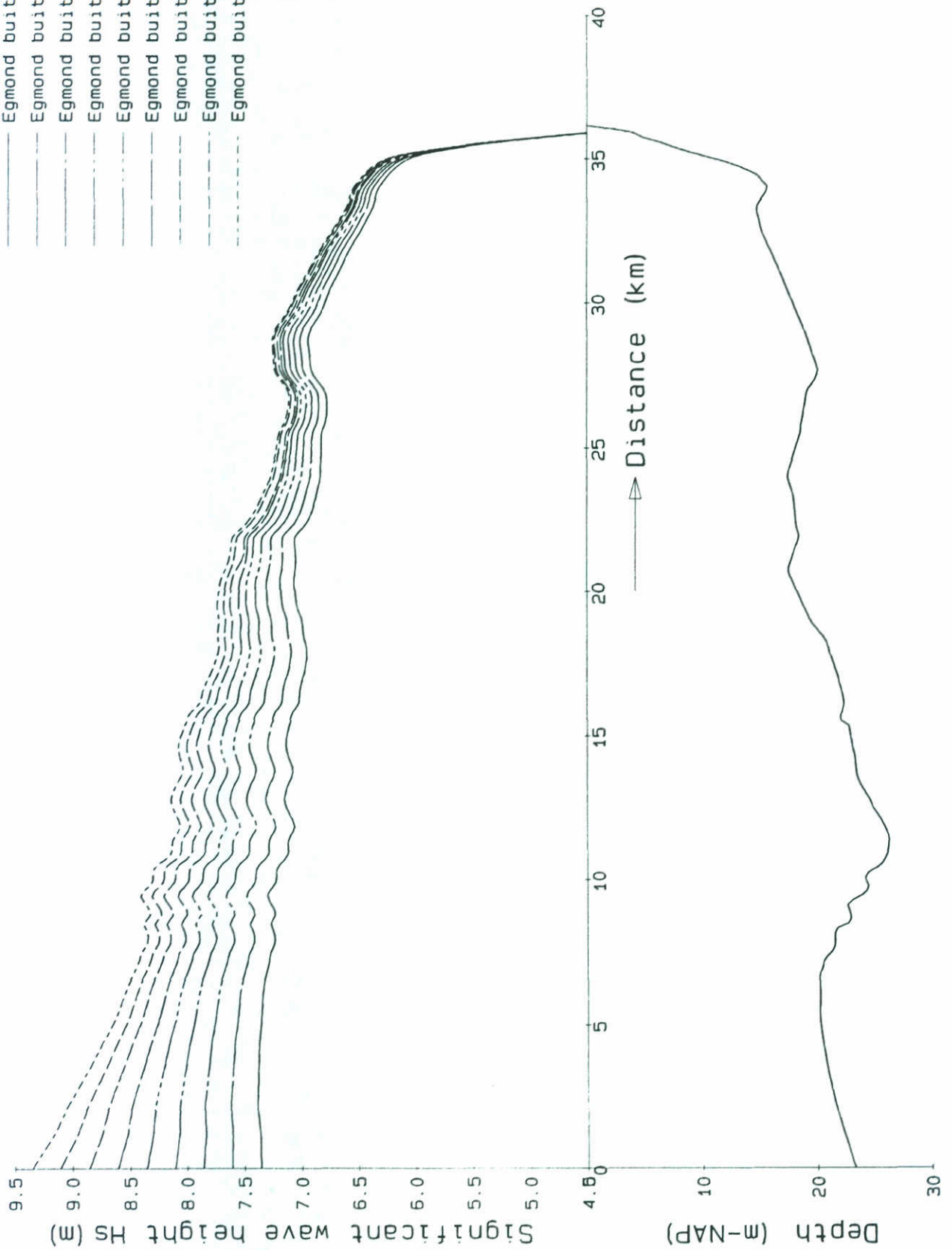
WS1WS8

DELFT HYDRAULICS

H1355

FIG. 4.25m

- Egmond buiten Hs1
- - - Egmond buiten Hs2
- · - · - Egmond buiten Hs3
- · - · - · - Egmond buiten Hs4
- · - · - · - · - Egmond buiten Sss
- · - · - · - · - · - Egmond buiten Hs5
- · - · - · - · - · - · - Egmond buiten Hs6
- · - · - · - · - · - · - · - Egmond buiten Hs7
- · - · - · - · - · - · - · - · - Egmond buiten Hs8



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING INCOMING WAVE HEIGHT

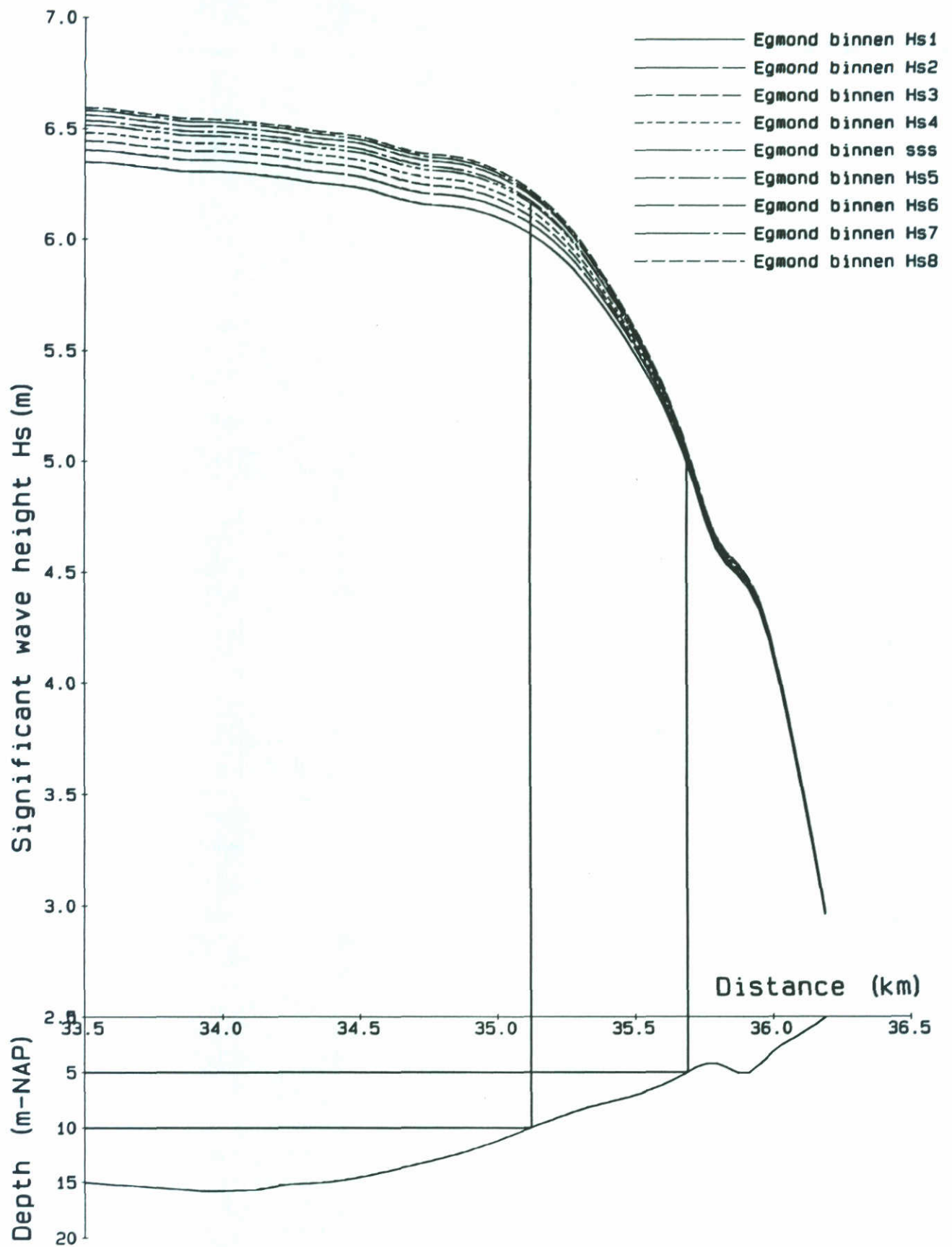
HYDRA-HISWA

HSBUEG

DELFT HYDRAULICS

H1355

FIG. 4.26a



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING INCOMING WAVE HEIGHT

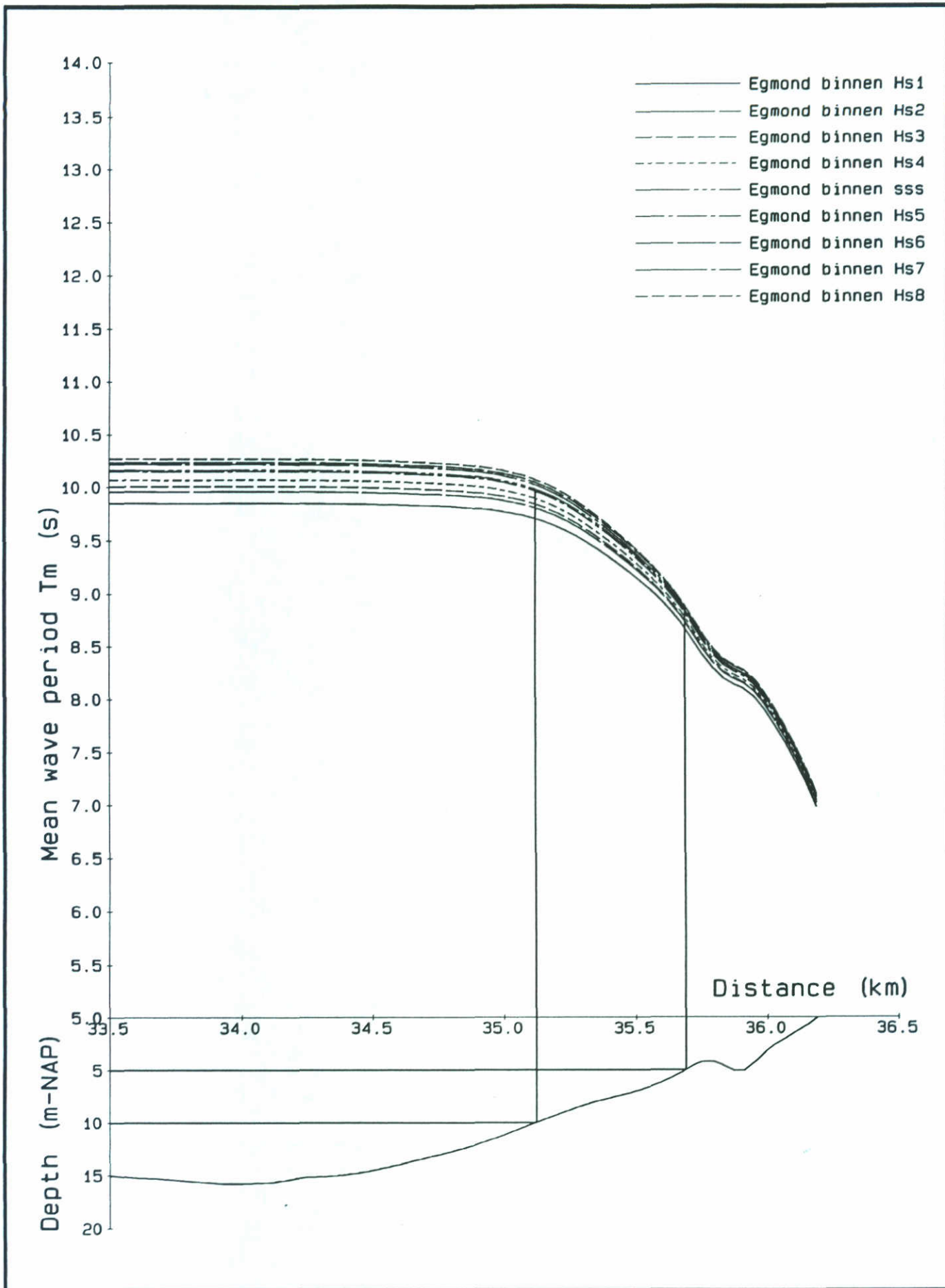
HYDRA-HISWA

HS1HS8

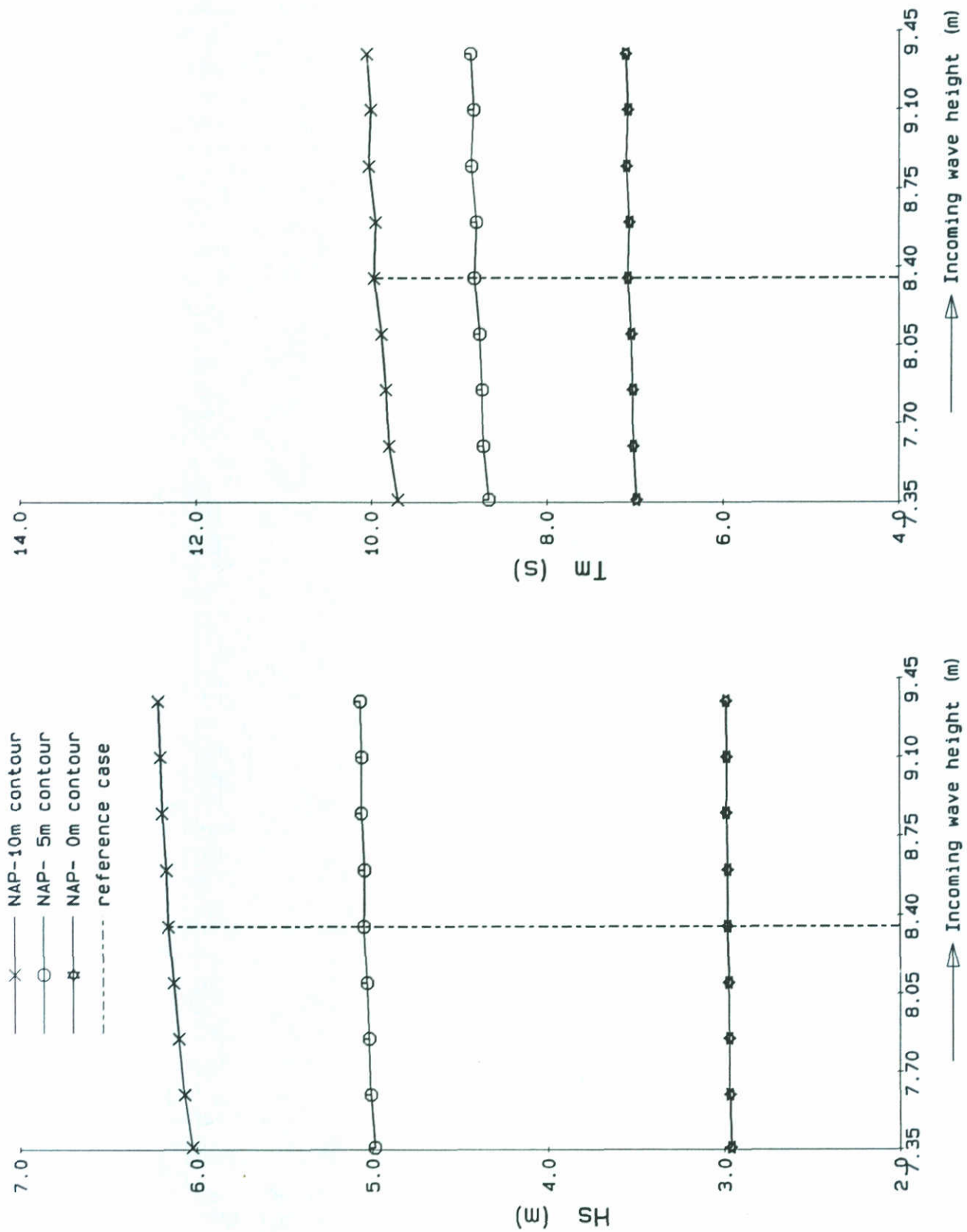
DELFT HYDRAULICS

H1355

FIG. 4.26b



MEAN WAVE PERIOD EGMOND PROFILE VARYING INCOMING WAVE HEIGHT	HYDRA-HISWA	HS1HS8
DELFT HYDRAULICS	H1355	FIG. 4.26c



EFFECT OF WAVE HEIGHT VARIATION
EGMOND PROFILE

HYDRA-HISWA

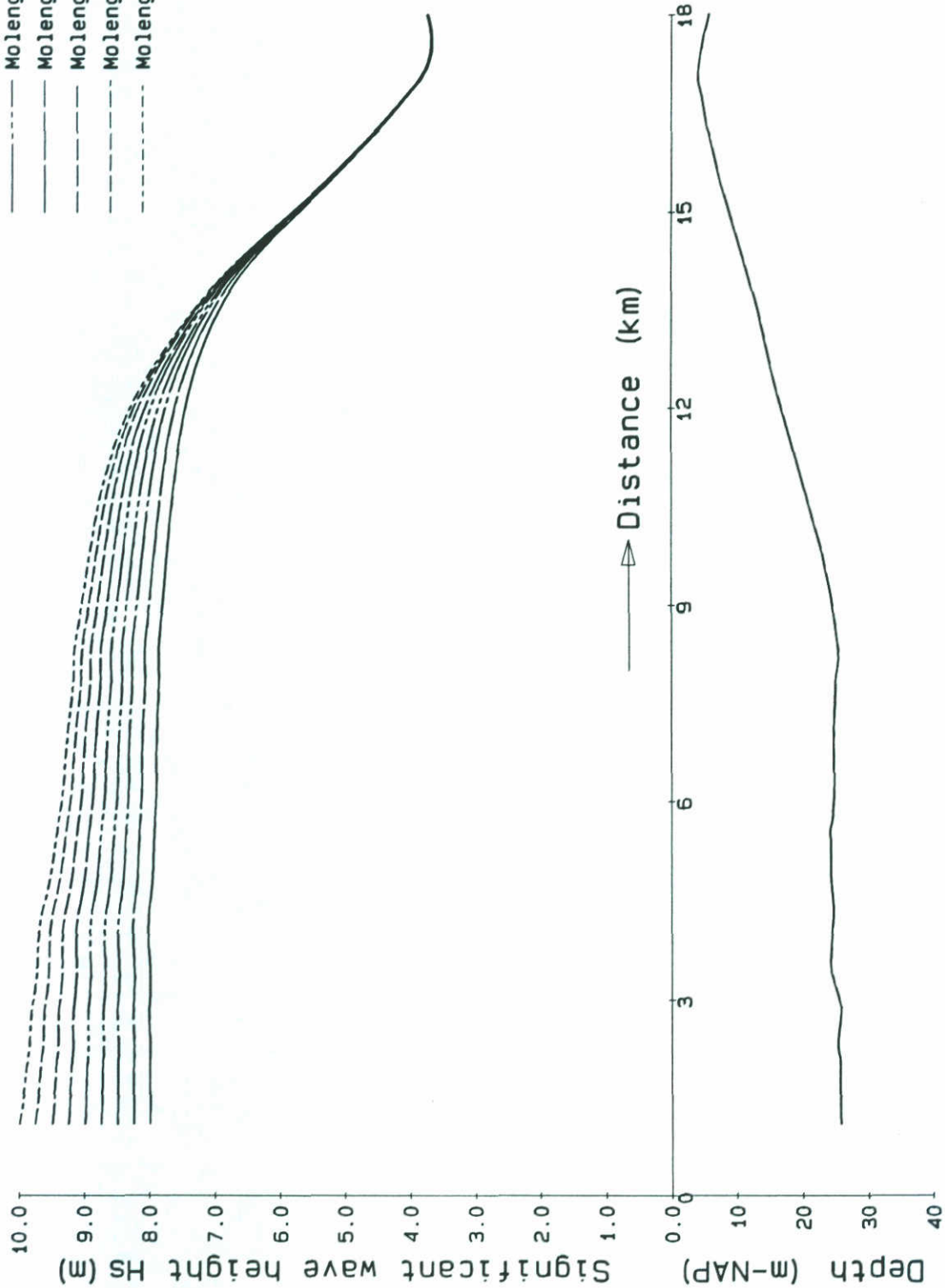
HS1HS8

DELFT HYDRAULICS

H1355

FIG.4.26d

— Molengat buiten Hs1
 — Molengat buiten Hs2
 — Molengat buiten Hs3
 — Molengat buiten Hs4
 — Molengat buiten Hs5
 — Molengat buiten Hs6
 — Molengat buiten Hs7
 - - Molengat buiten Hs8



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING INCOMING WAVE HEIGHT

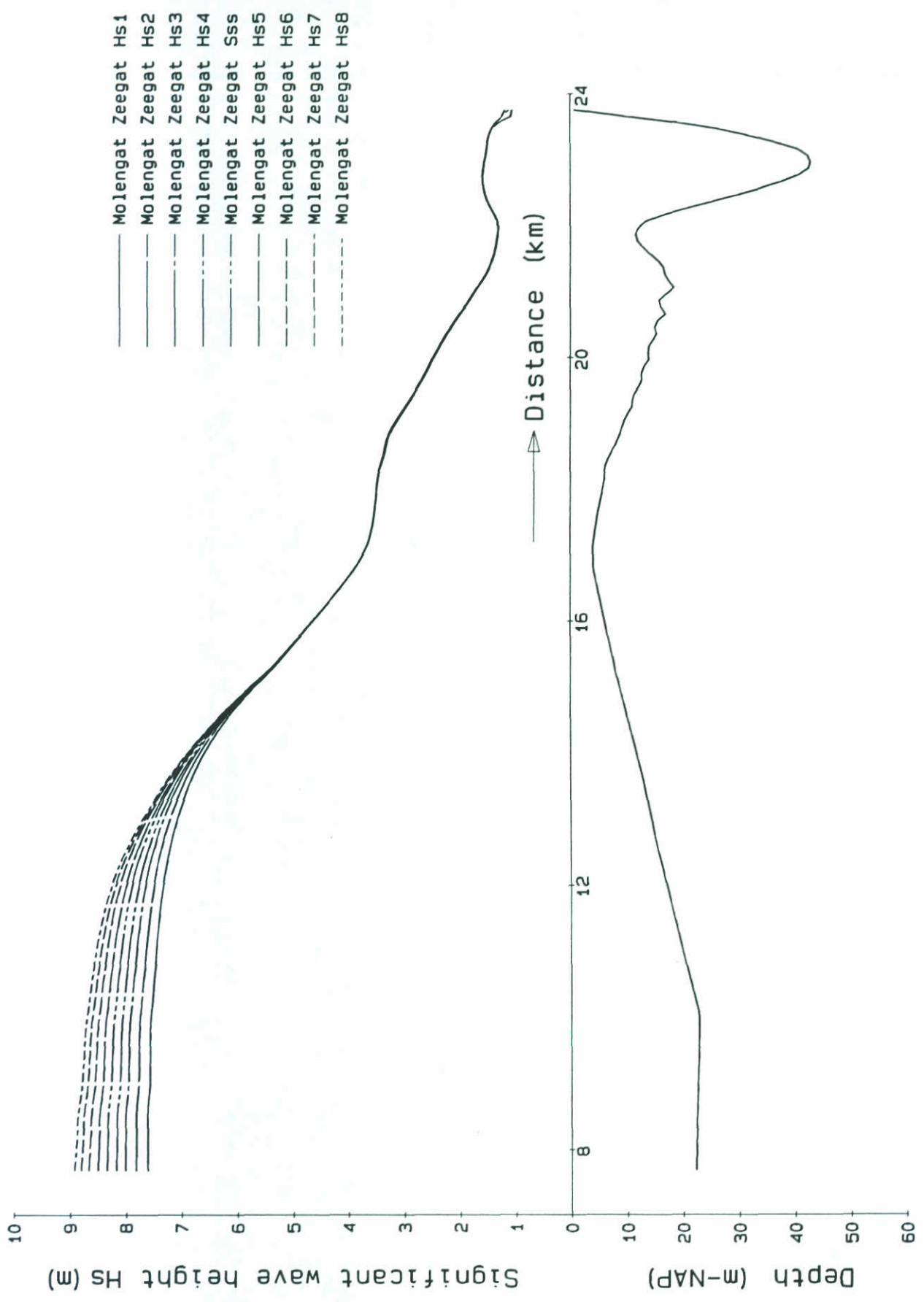
HYDRA-HISWA

HSBUMG

DELFT HYDRAULICS

H1355

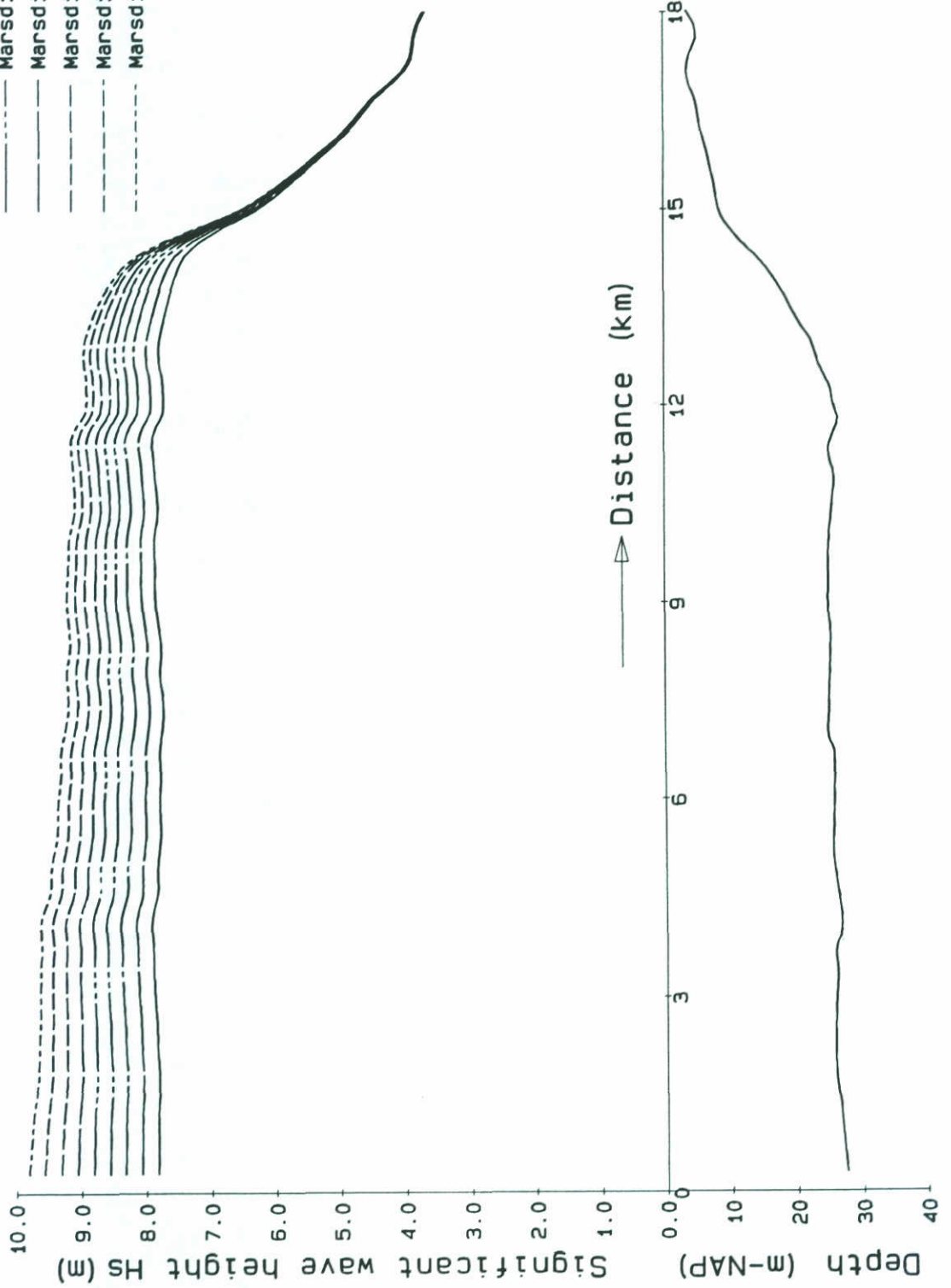
FIG. 4.26e



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING INCOMING WAVE HEIGHT

HYDRA-HISWA	HSZGMG
H1355	FIG. 4.26f

— Marsdiep buiten Hs1
 — Marsdiep buiten Hs2
 - - Marsdiep buiten Hs3
 - - Marsdiep buiten Hs4
 - - Marsdiep buiten Sss
 - - Marsdiep buiten Hs5
 - - Marsdiep buiten Hs6
 - - Marsdiep buiten Hs7
 - - Marsdiep buiten Hs8



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING INCOMING WAVE HEIGHT

HYDRA-HISWA

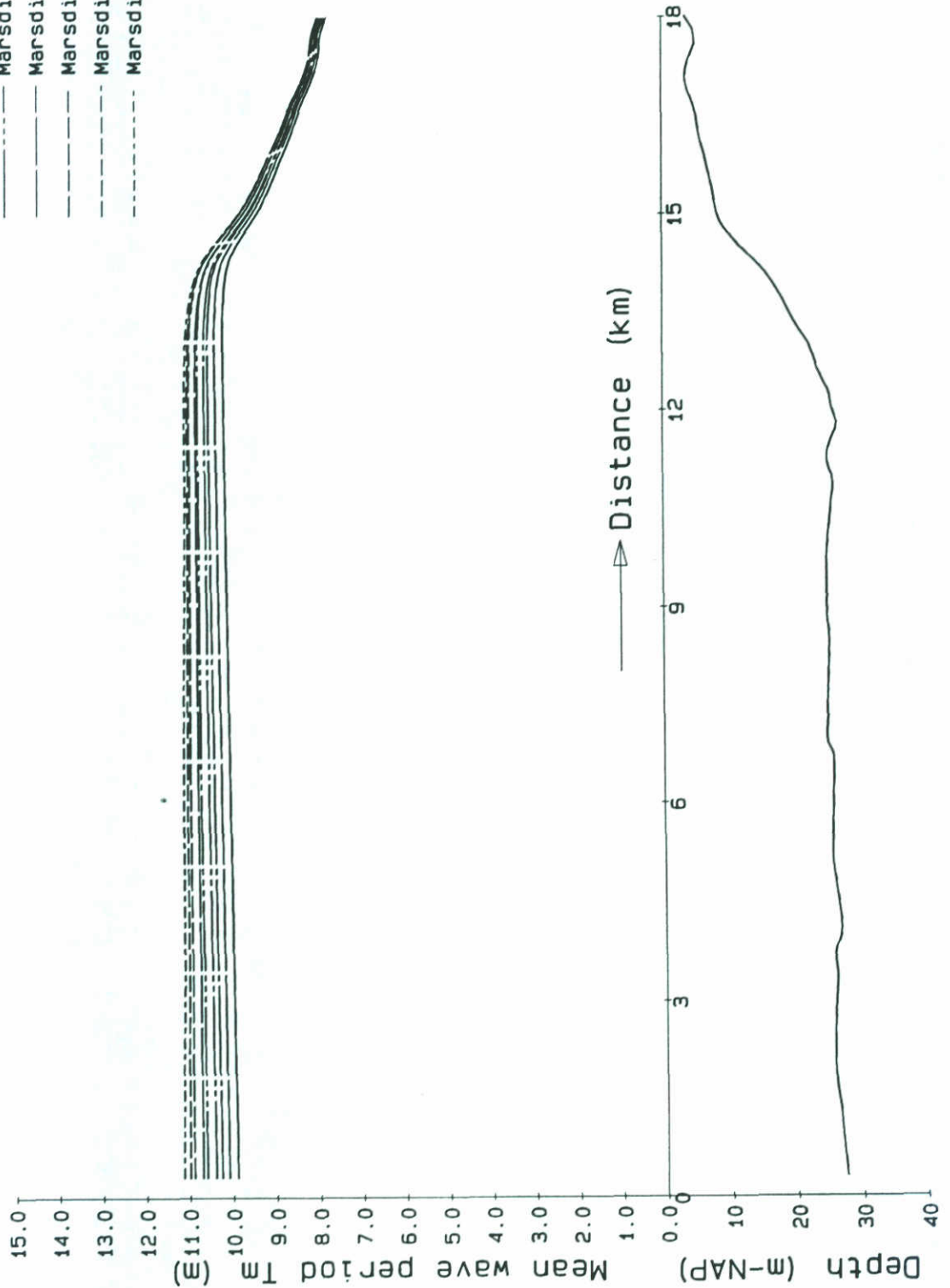
HSBUMD

DELFT HYDRAULICS

H1355

FIG. 4.26g

- Marsdiep buiten Hs1
- Marsdiep buiten Hs2
- Marsdiep buiten Hs3
- Marsdiep buiten Hs4
- Marsdiep buiten Sss
- Marsdiep buiten Hs5
- Marsdiep buiten Hs6
- Marsdiep buiten Hs7
- Marsdiep buiten Hs8



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING INCOMING WAVE HEIGHT

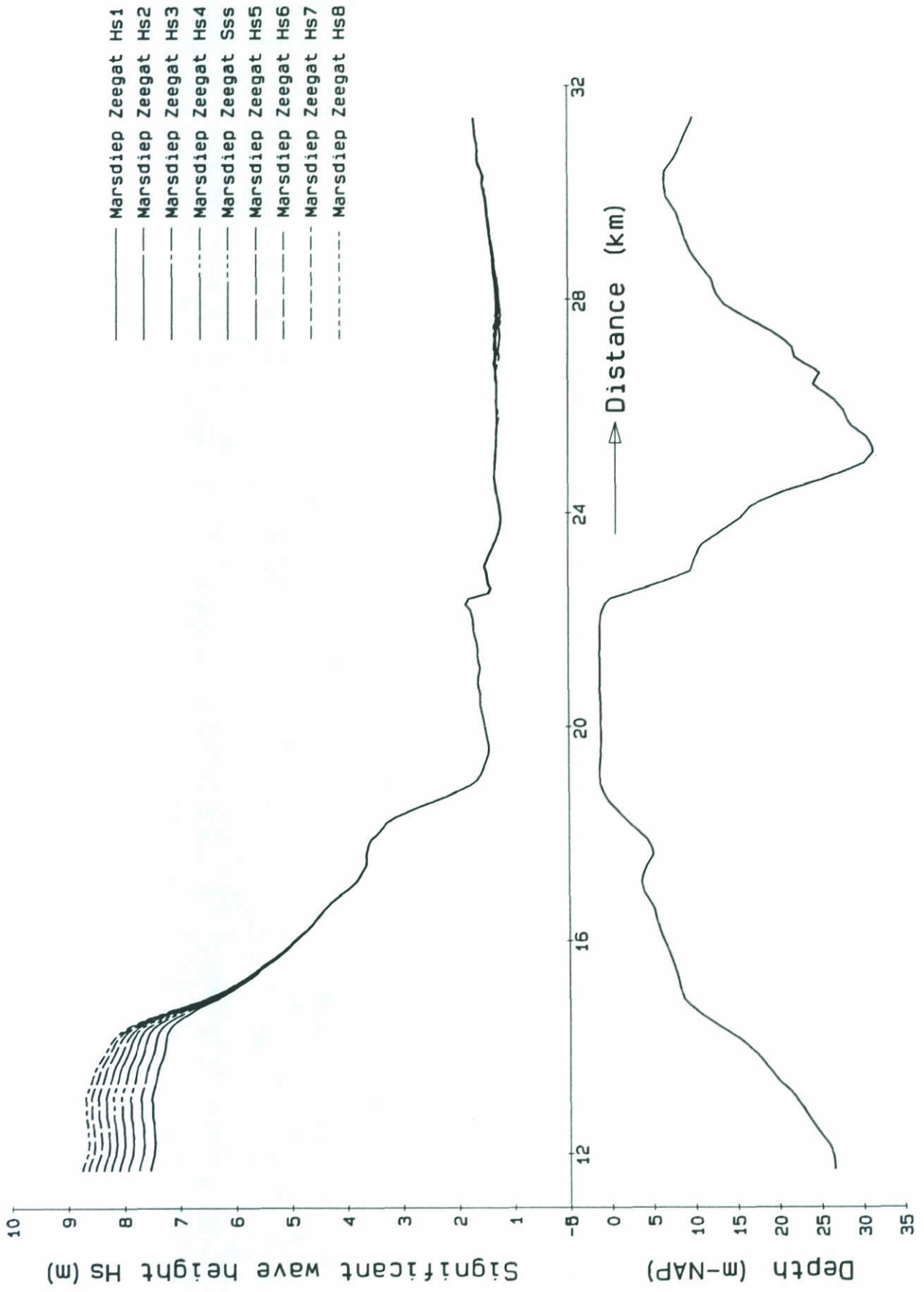
HYDRA-HISWA

HSBUMD

DELFT HYDRAULICS

H1355

FIG. 4.26h



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING INCOMING WAVE HEIGHT

HYDRA-HISWA

HSZGMD

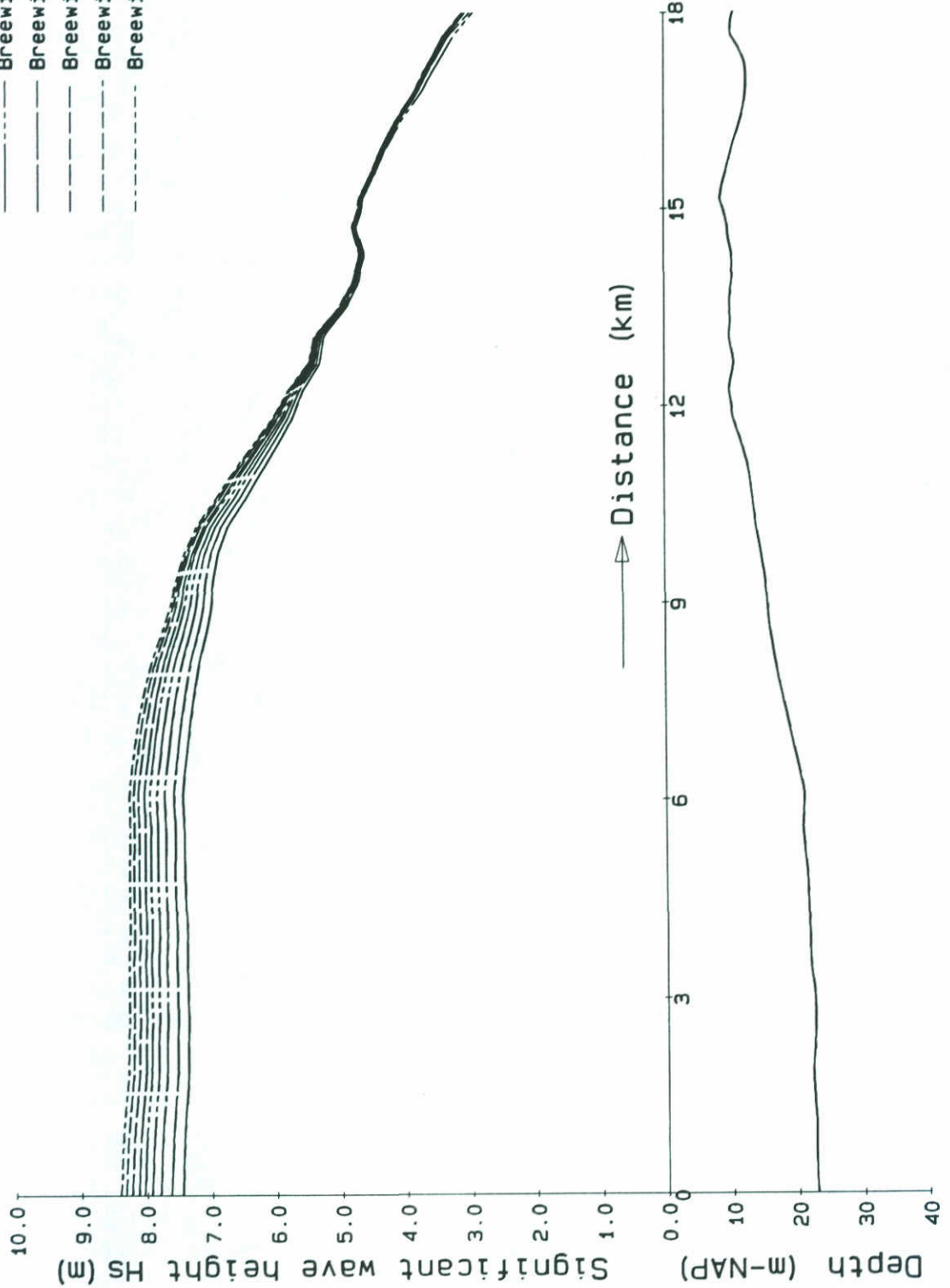
- Marsdiep Zeegat Hs1
- - - Marsdiep Zeegat Hs2
- · - Marsdiep Zeegat Hs3
- · · Marsdiep Zeegat Hs4
- · · · Marsdiep Zeegat Sss
- · · · · Marsdiep Zeegat Hs5
- · · · · · Marsdiep Zeegat Hs6
- · · · · · · Marsdiep Zeegat Hs7
- · · · · · · · Marsdiep Zeegat Hs8



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING INCOMING WAVE HEIGHT

HYDRA-HISWA	HSZGMD
H1355	FIG. 4.26j

— Breewijd buiten Hs1
 - - Breewijd buiten Hs2
 ··· Breewijd buiten Hs3
 -·- Breewijd buiten Hs4
 -·- Breewijd buiten Sss
 - - Breewijd buiten Hs5
 - - Breewijd buiten Hs6
 - - Breewijd buiten Hs7
 - - Breewijd buiten Hs8



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING INCOMING WAVE HEIGHT

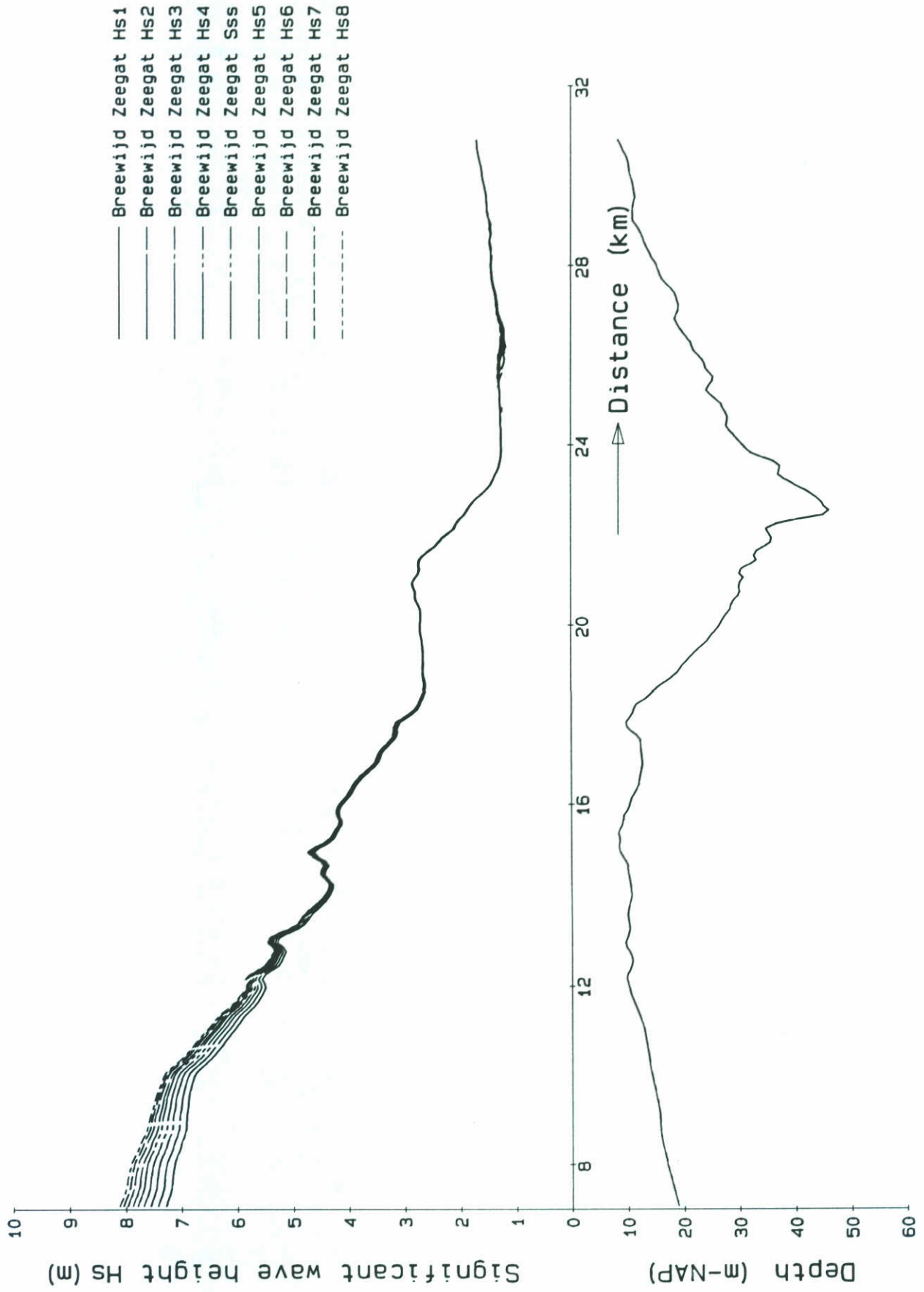
HYDRA-HISWA

HSBUBW

DELFT HYDRAULICS

H1355

FIG. 4.26k



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING INCOMING WAVE HEIGHT

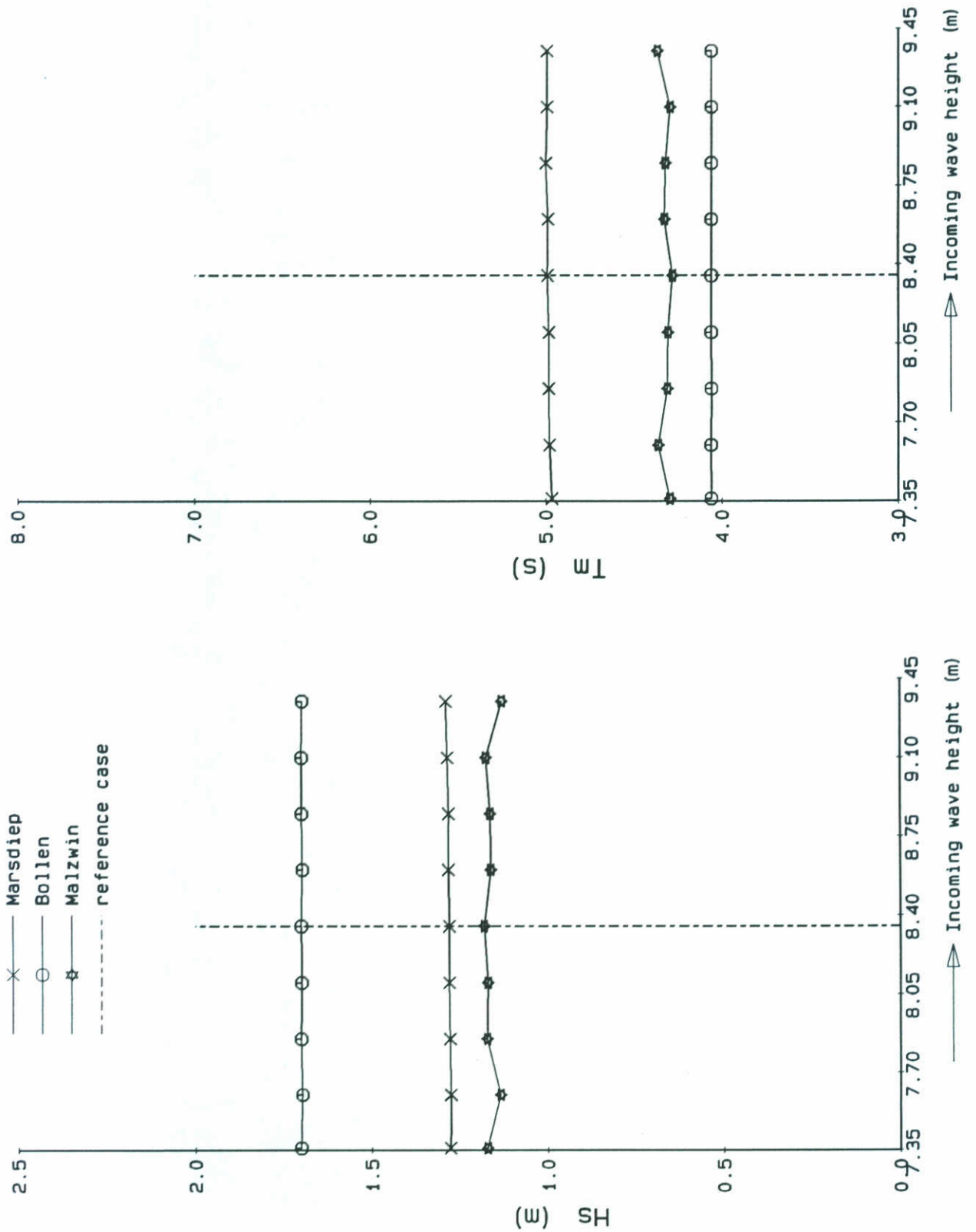
HYDRA-HISWA

HSZGBW

DELFT HYDRAULICS

H1355

FIG. 4.261



EFFECT OF WAVE HEIGHT VARIATION
ENTRANCE WADDEN SEA

HYDRA-HISWA

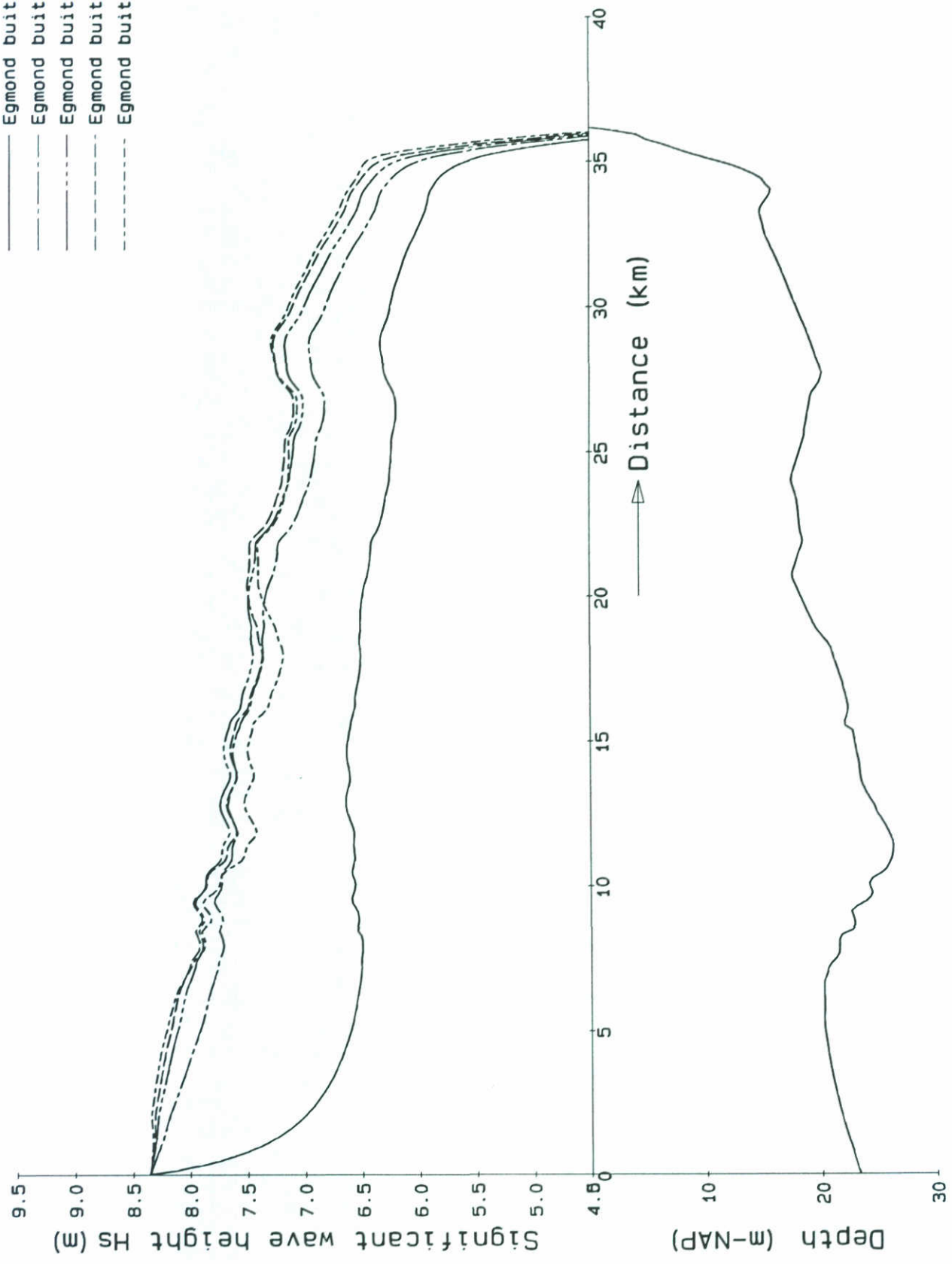
HS1HS8

DELFT HYDRAULICS

H1355

FIG. 4.26m

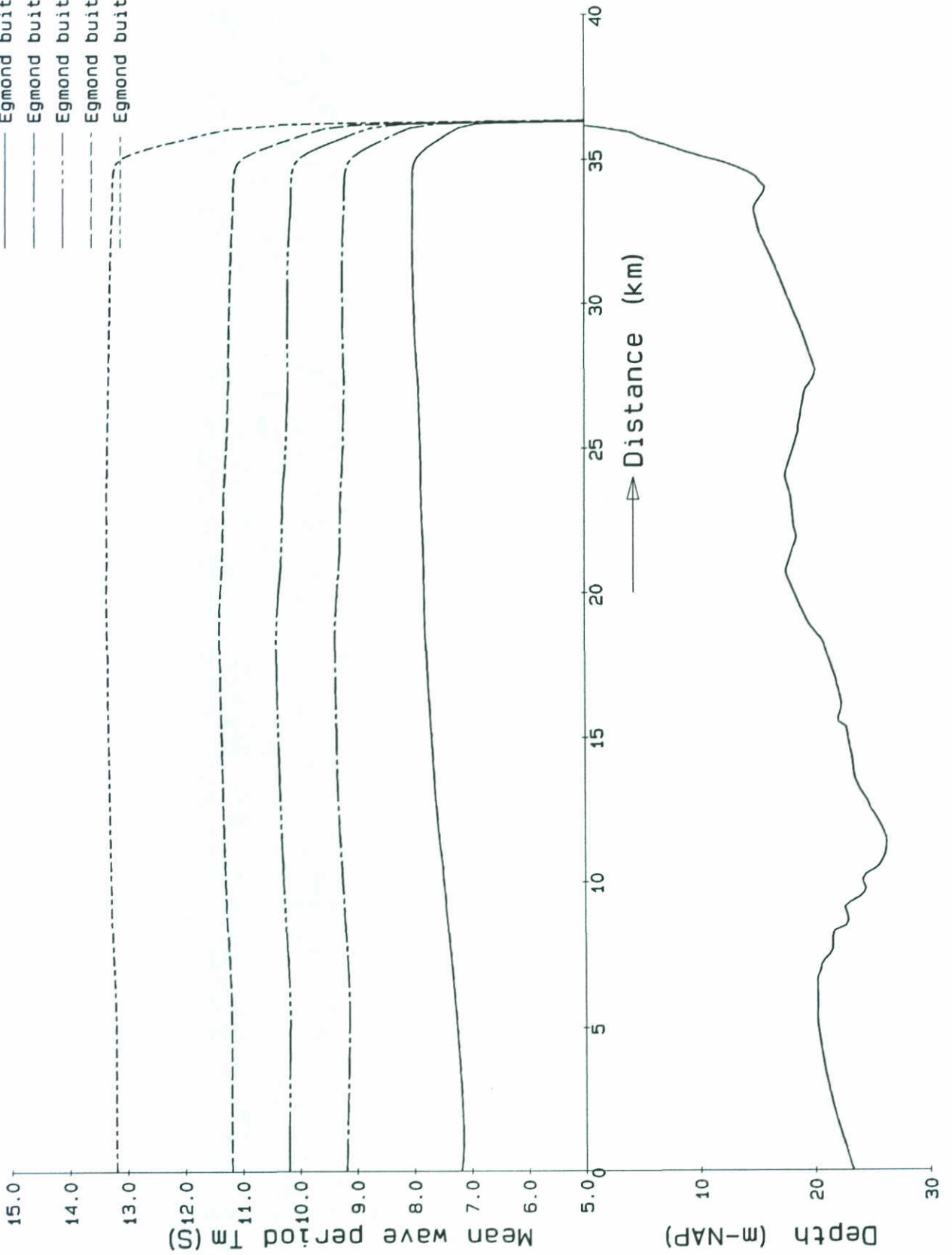
- Egmond buiten Tm1
- - - Egmond buiten Tm2
- · - · - Egmond buiten Sss
- - - Egmond buiten Tm3
- - - Egmond buiten Tm4



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA TMBUEG

— Egmond buiten Tm1
 - - - Egmond buiten Tm2
 - · - · - Egmond buiten Sss
 - - - Egmond buiten Tm3
 - - - Egmond buiten Tm4



MEAN WAVE PERIOD EGMOND PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA

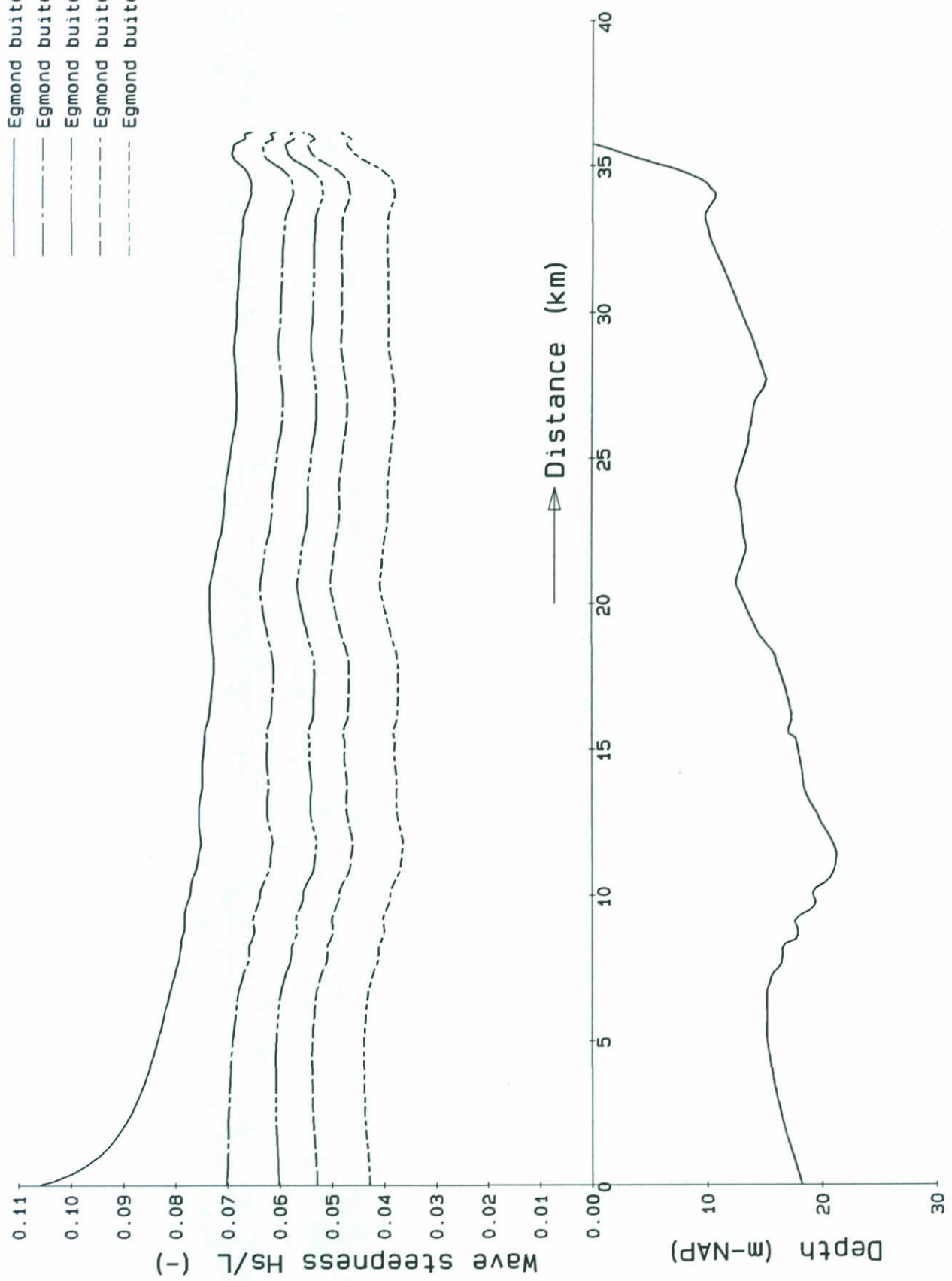
TMBUEG

DELFT HYDRAULICS

H1355

FIG. 4.27b

Egmond buiten Tm1
 Egmond buiten Tm2
 Egmond buiten Sss
 Egmond buiten Tm3
 Egmond buiten Tm4



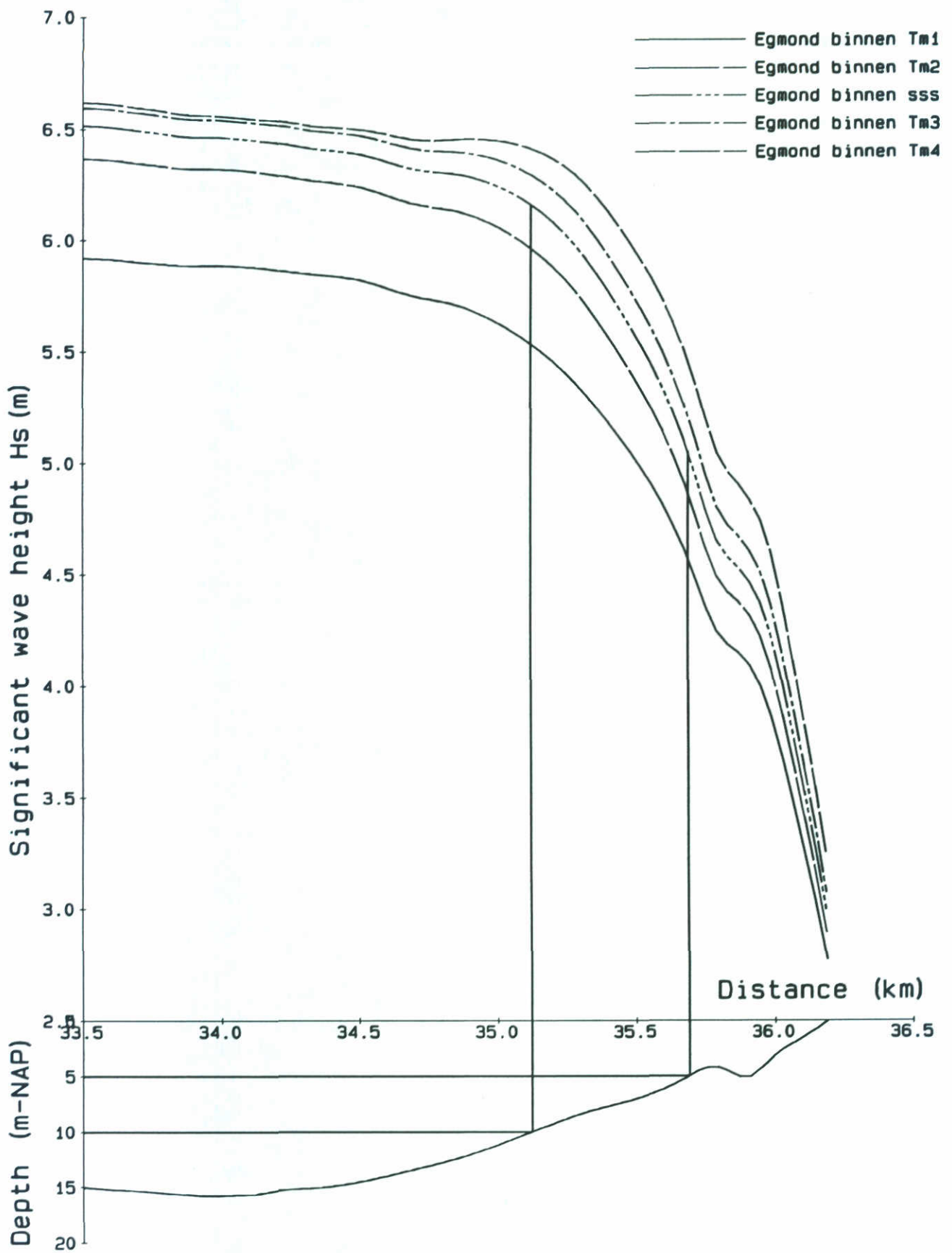
WAVE STEEPNESS EGMOND PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA TMBUEG

DELFT HYDRAULICS

H1355

FIG. 4.27c



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WAVE PERIOD

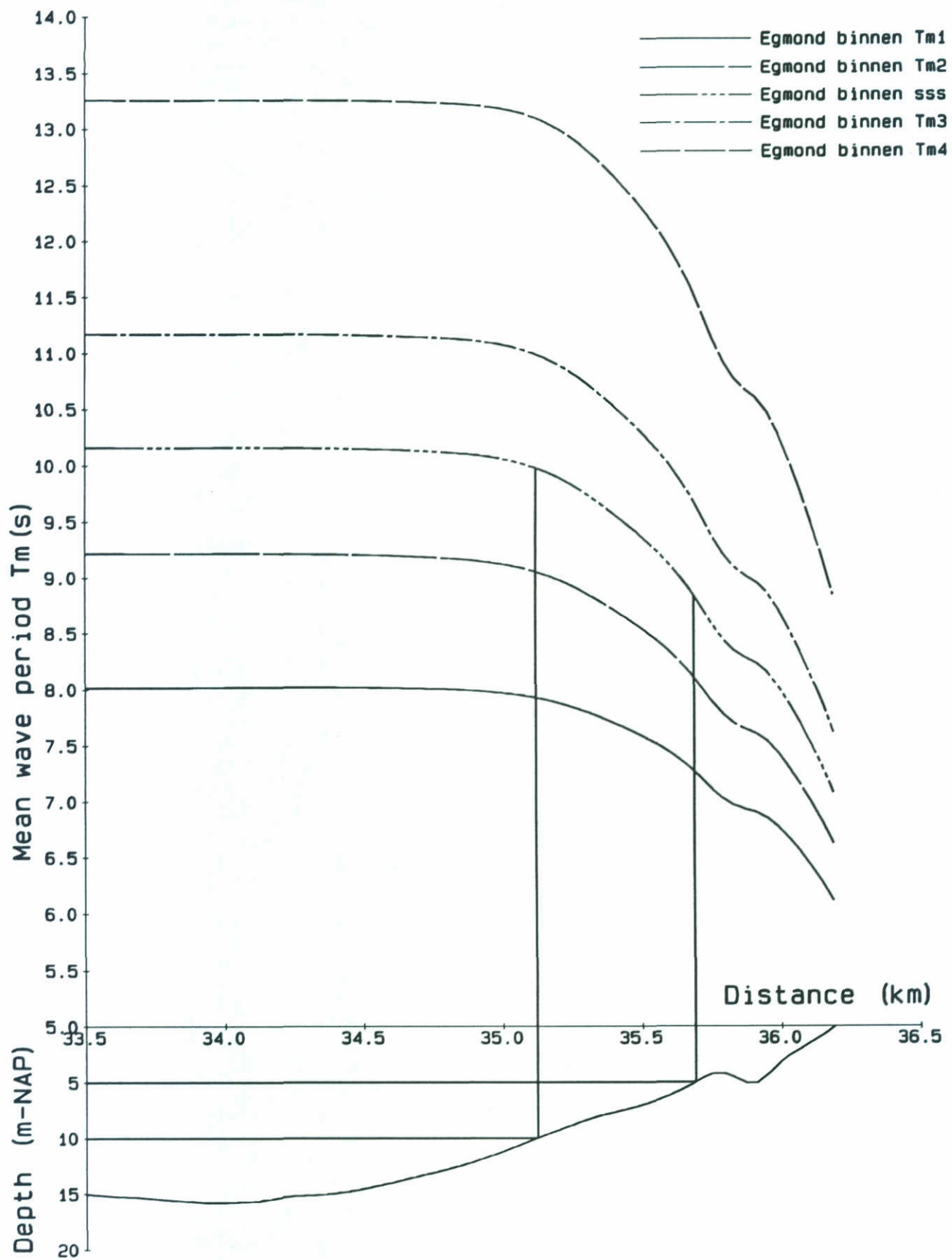
HYDRA-HISWA

TM1TM4

DELFT HYDRAULICS

H1355

FIG. 4.27d



MEAN WAVE PERIOD EGMOND PROFILE
 VARYING WAVE PERIOD

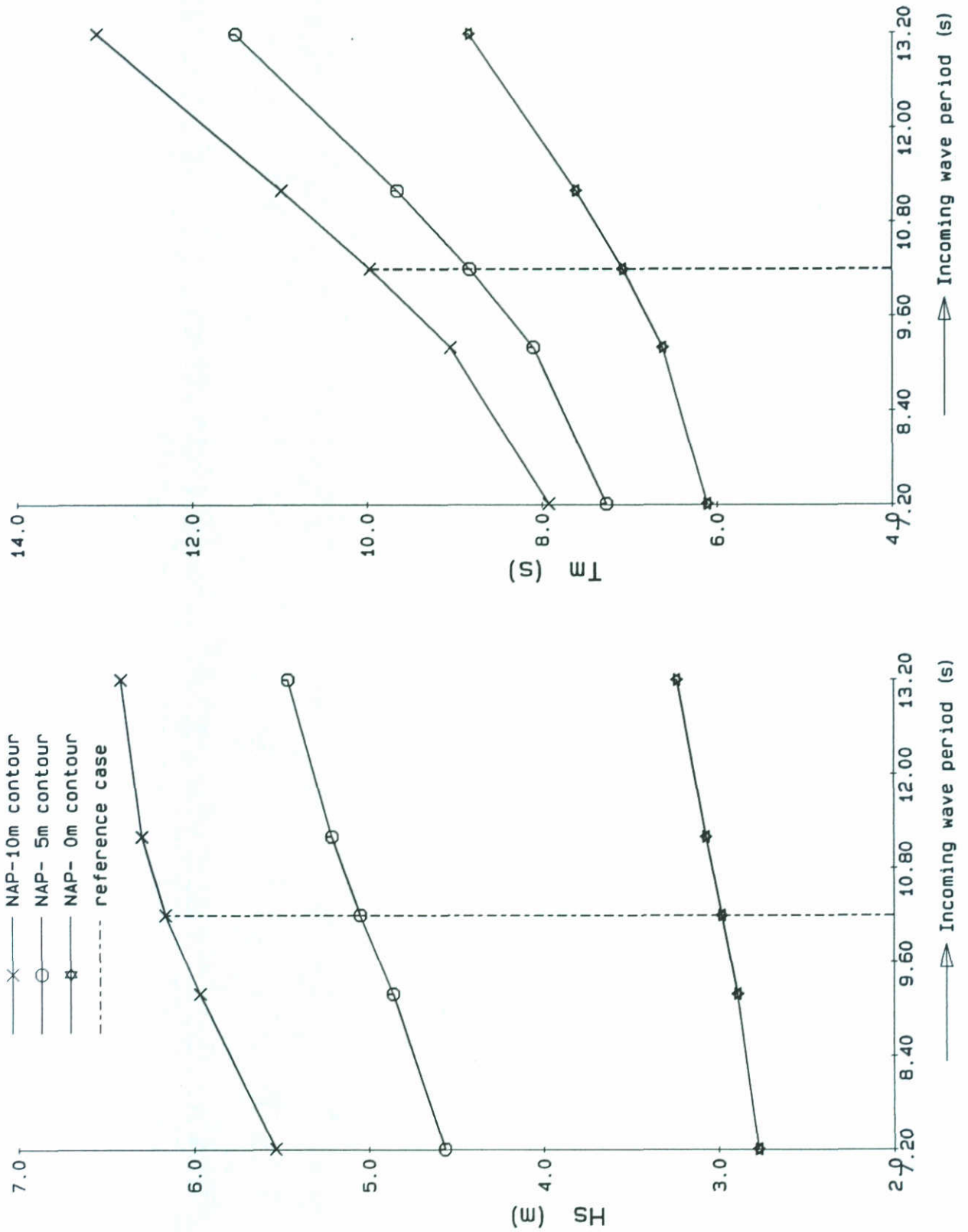
HYDRA-HISWA

TM1TM4

DELFT HYDRAULICS

H1355

FIG. 4.27e



EFFECT OF WAVE PERIOD VARIATION
EGMOND PROFILE

HYDRA-HISWA

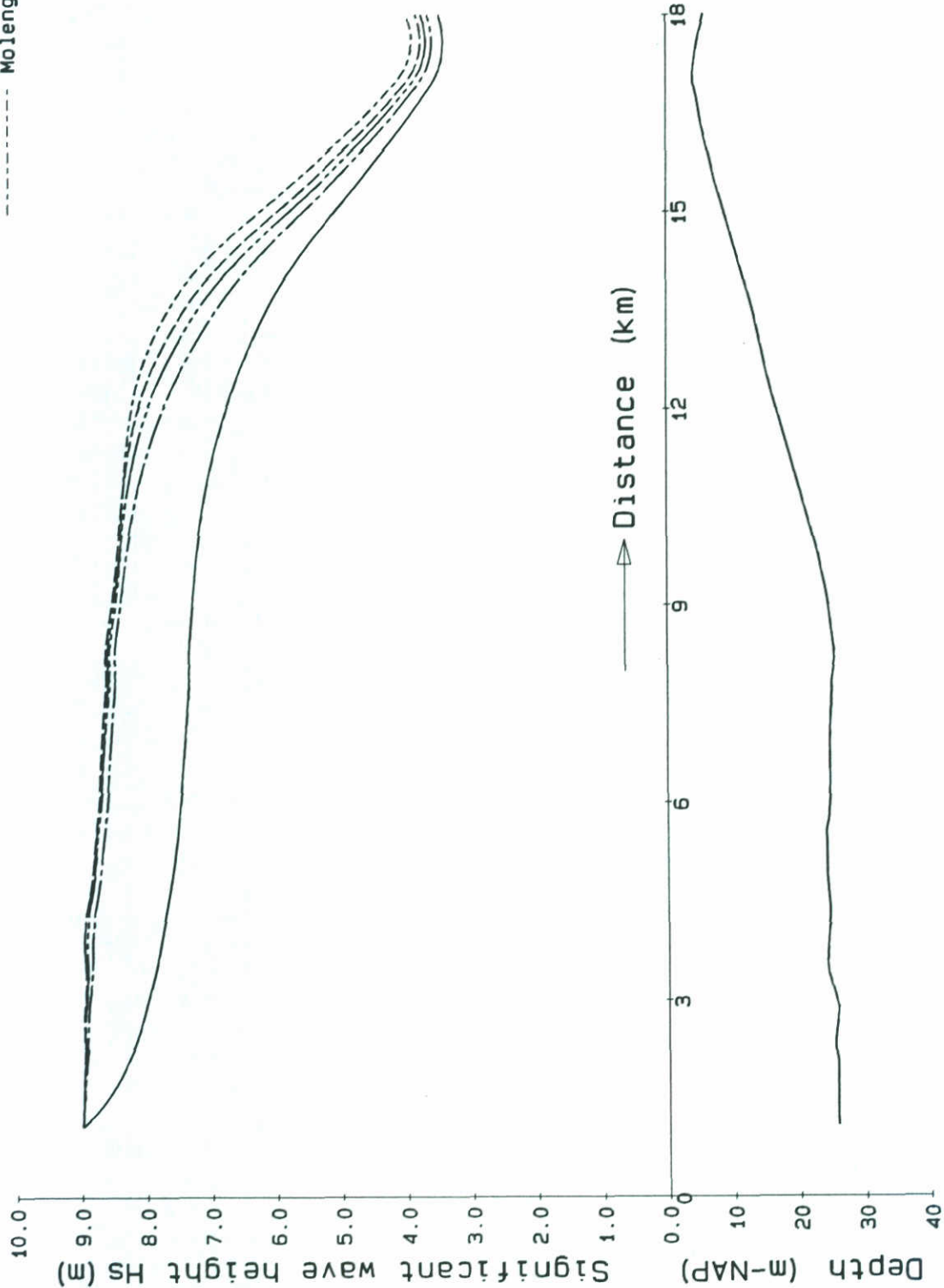
TM1TM4

DELFT HYDRAULICS

H1355

FIG. 4.27f

- Molengat buiten Tm1
- - - Molengat buiten Tm2
- Molengat buiten Sss
- - - Molengat buiten Tm3
- - - Molengat buiten Tm4



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WAVE PERIOD

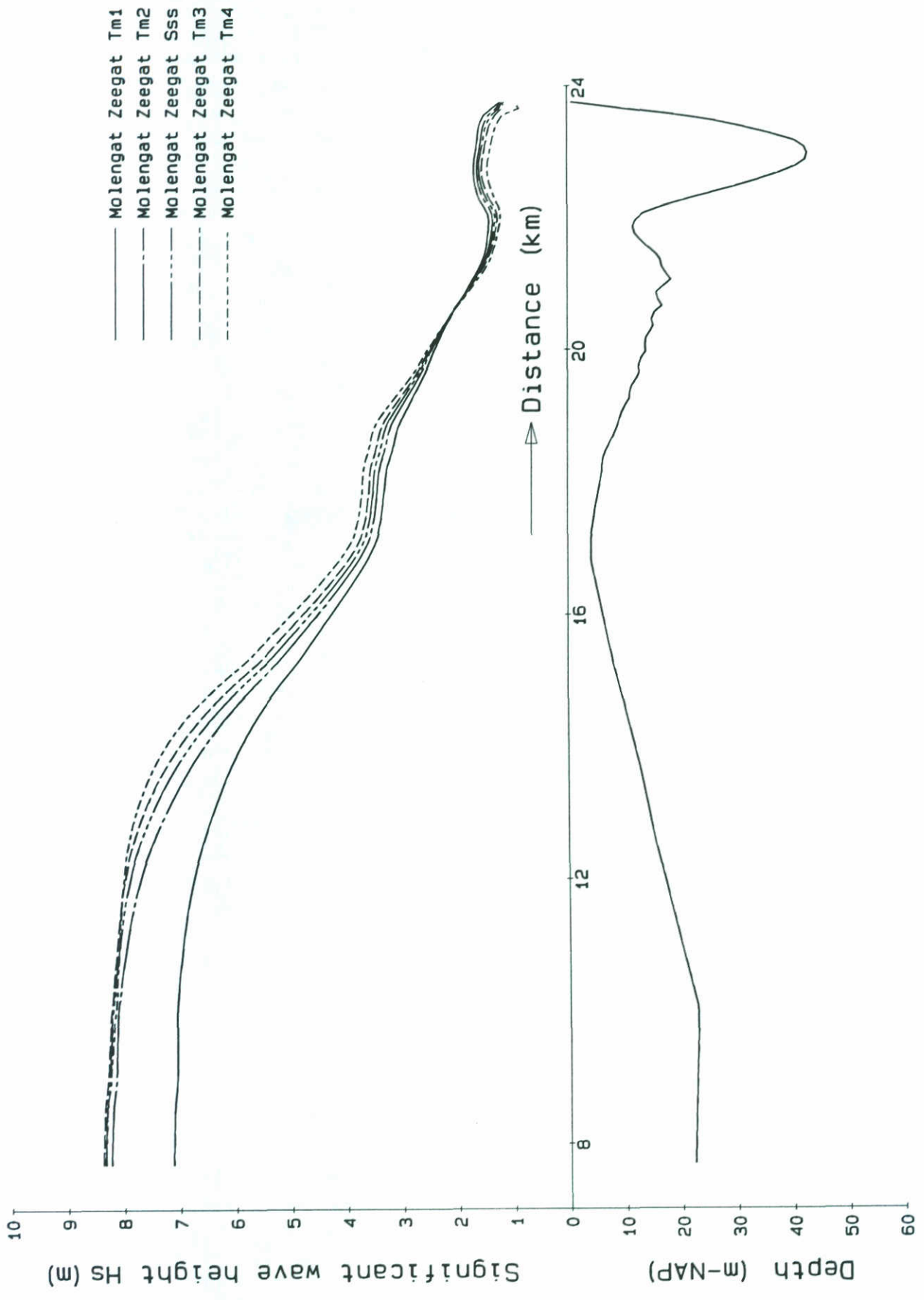
HYDRA-HISWA

TMBUMG

DELFT HYDRAULICS

H1355

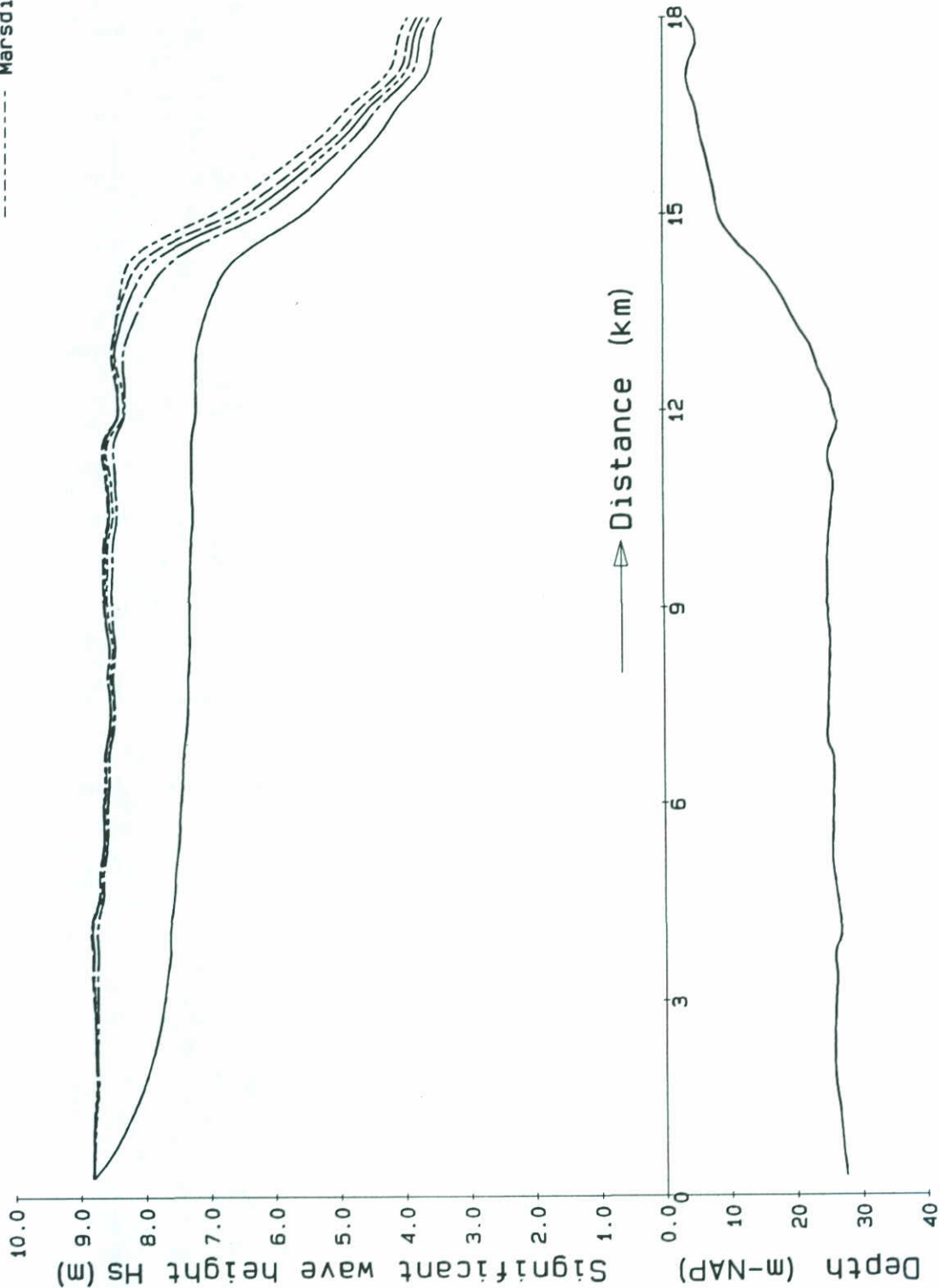
FIG.4.27g



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA	TMZGMG
-------------	--------

- Marsdiep buiten Tm1
- - - Marsdiep buiten Tm2
- · - Marsdiep buiten Sss
- - - Marsdiep buiten Tm3
- - - Marsdiep buiten Tm4



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA

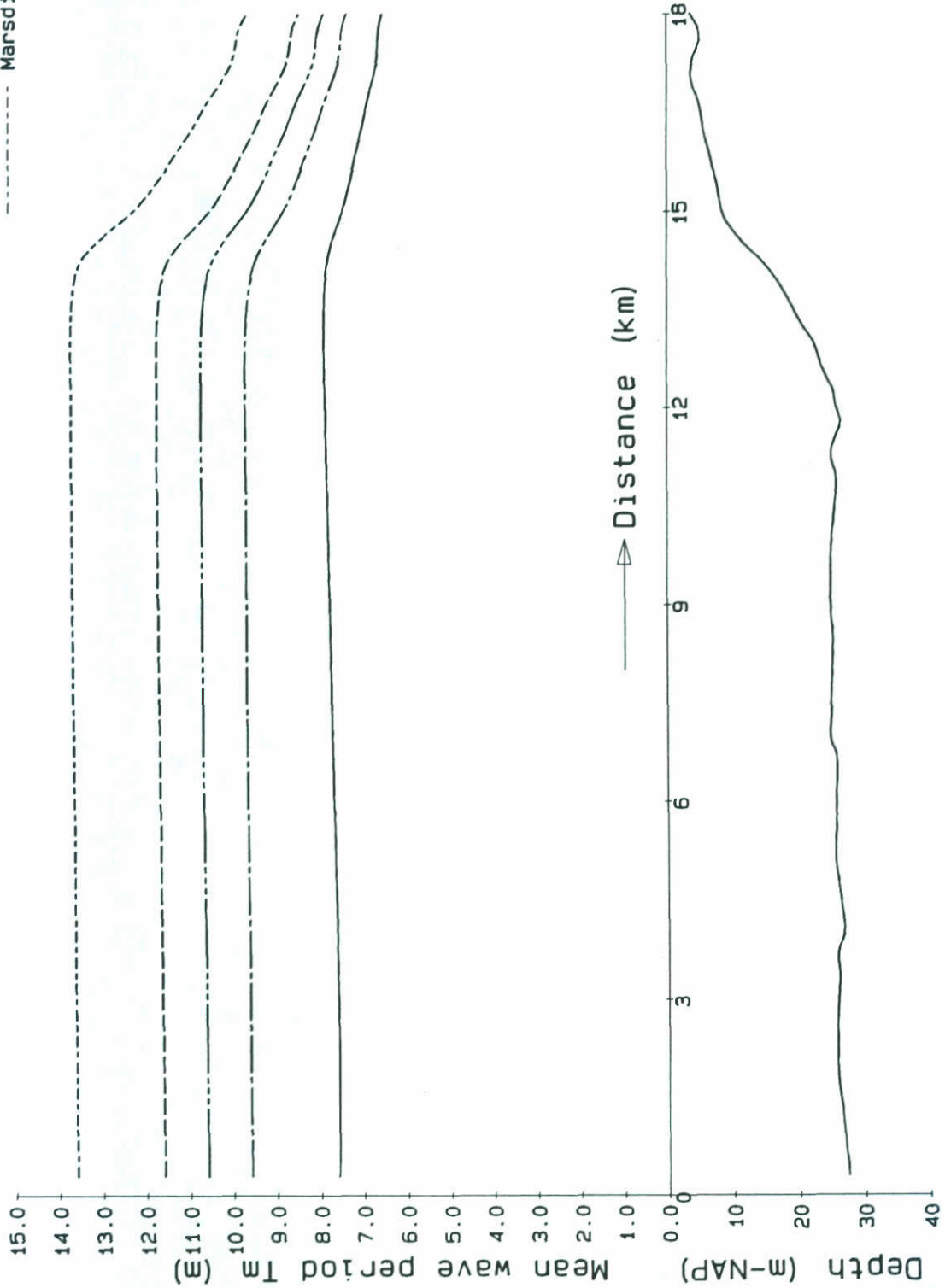
TMBUMG

DELFT HYDRAULICS

H1355

FIG. 4.27i

— Marsdiep buiten Tm1
 - - - Marsdiep buiten Tm2
 - · - Marsdiep buiten Sss
 - - - Marsdiep buiten Tm3
 - - - Marsdiep buiten Tm4



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WAVE PERIOD

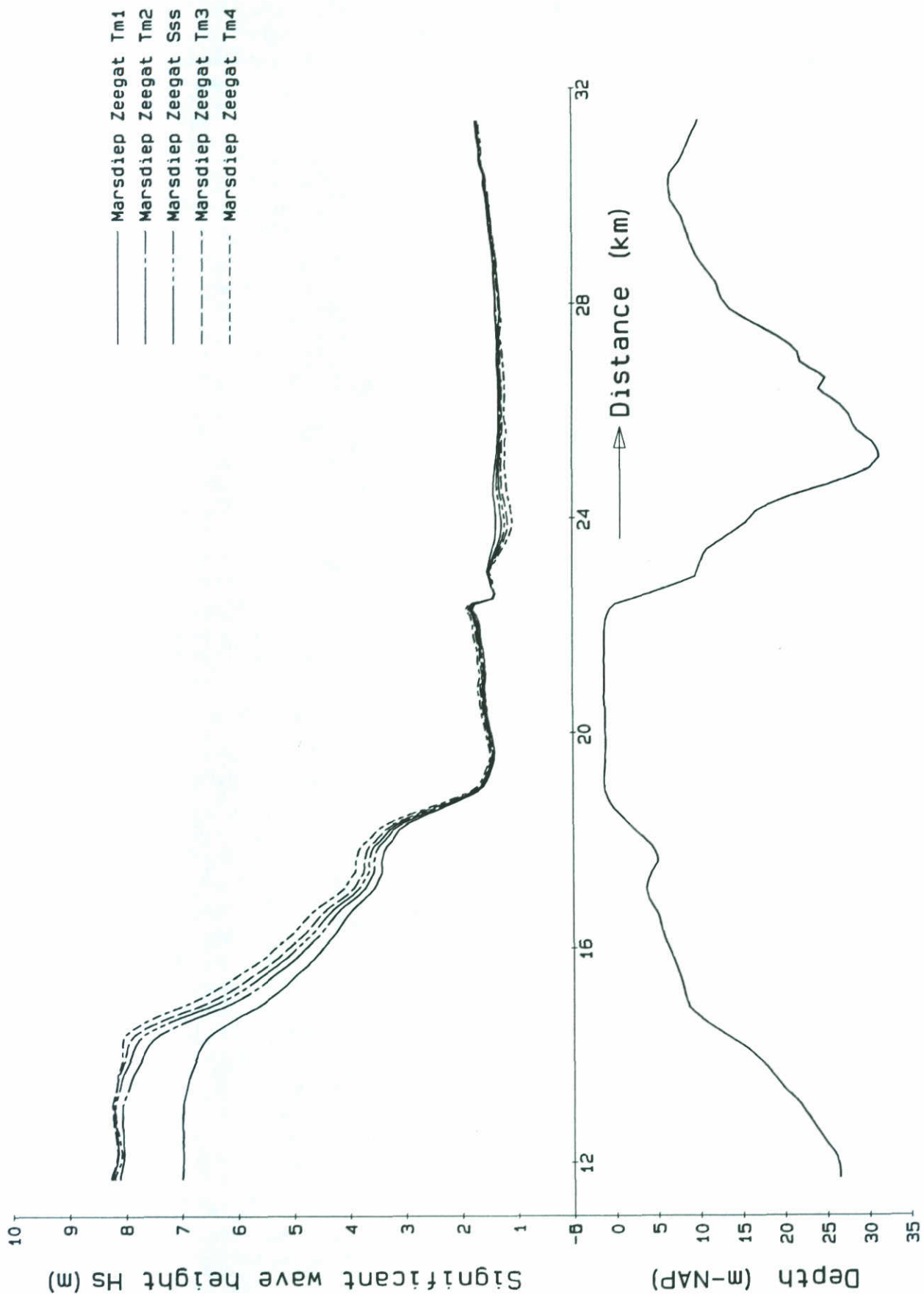
HYDRA-HISWA

TMBUMG

DELFT HYDRAULICS

H1355

FIG. 4.27j



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA

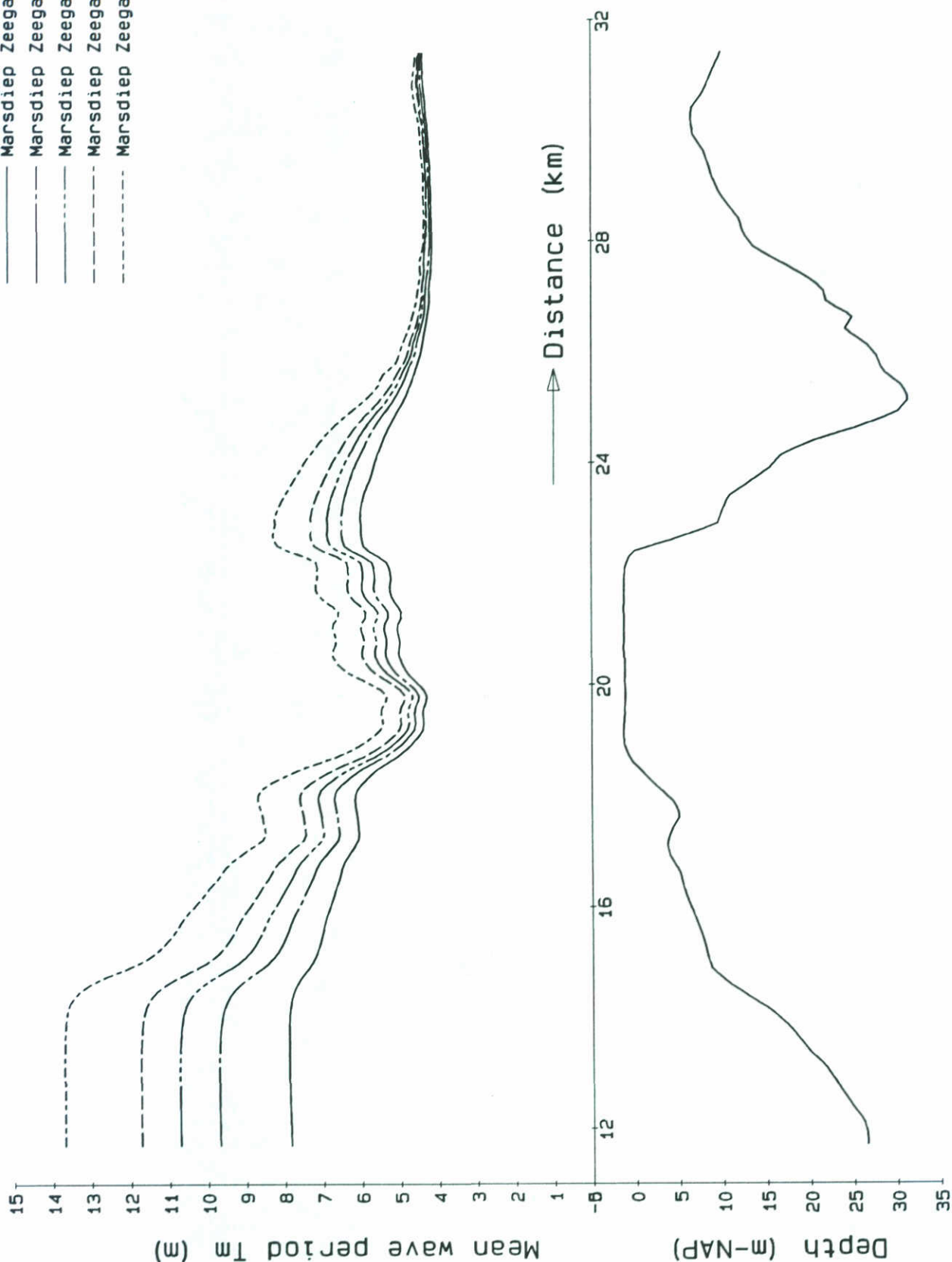
TMZGMD

DELFT HYDRAULICS

H1355

FIG. 4.27k

- Marsdiep Zeegat Tm1
- - - Marsdiep Zeegat Tm2
- · - Marsdiep Zeegat Sss
- - - Marsdiep Zeegat Tm3
- · - Marsdiep Zeegat Tm4



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA

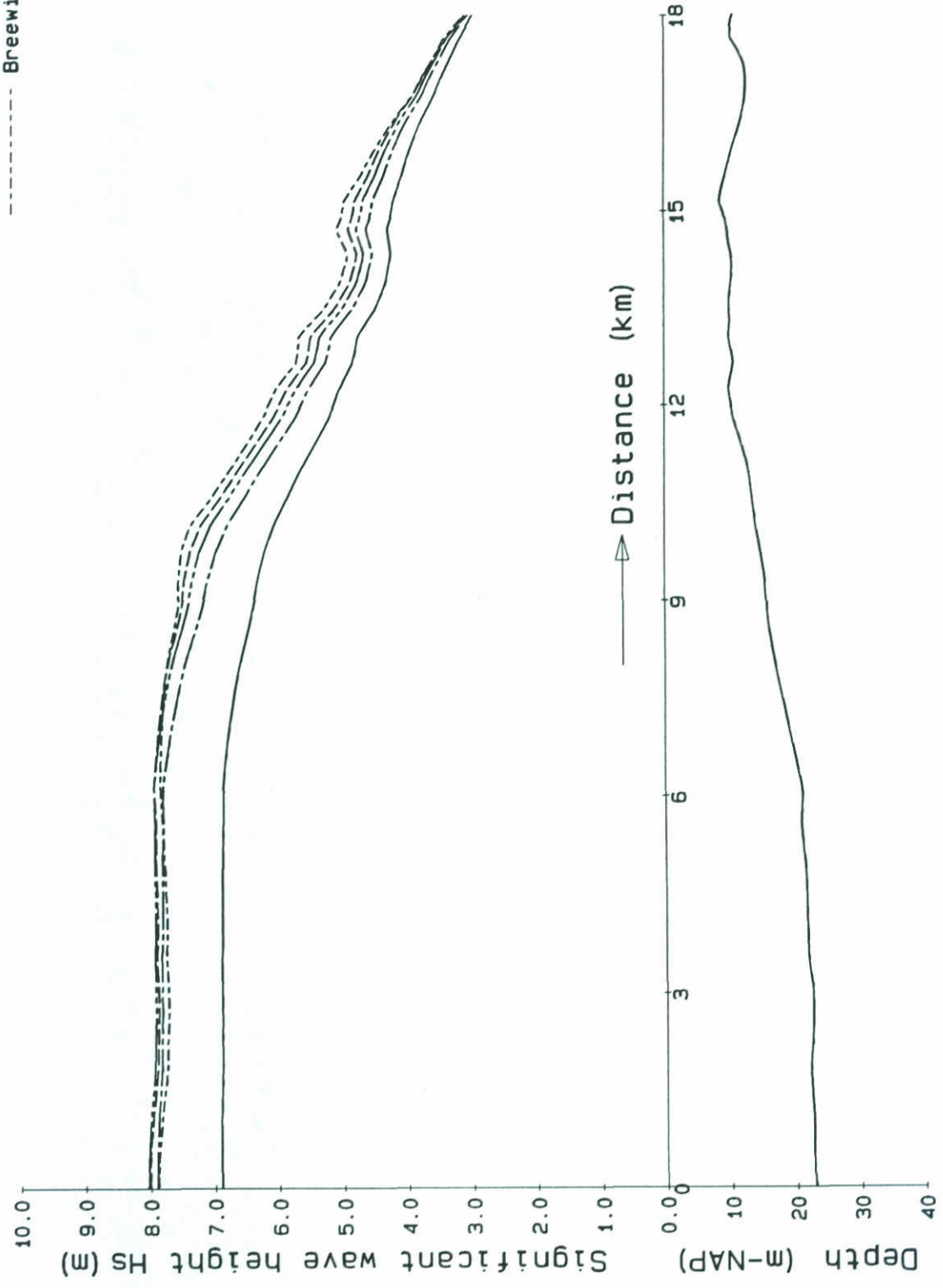
TMZGMD

DELFT HYDRAULICS

H1355

FIG. 4.271

- Breewijd buiten Tm1
- - - Breewijd buiten Tm2
- Breewijd buiten Sss
- - - Breewijd buiten Tm3
- - - Breewijd buiten Tm4

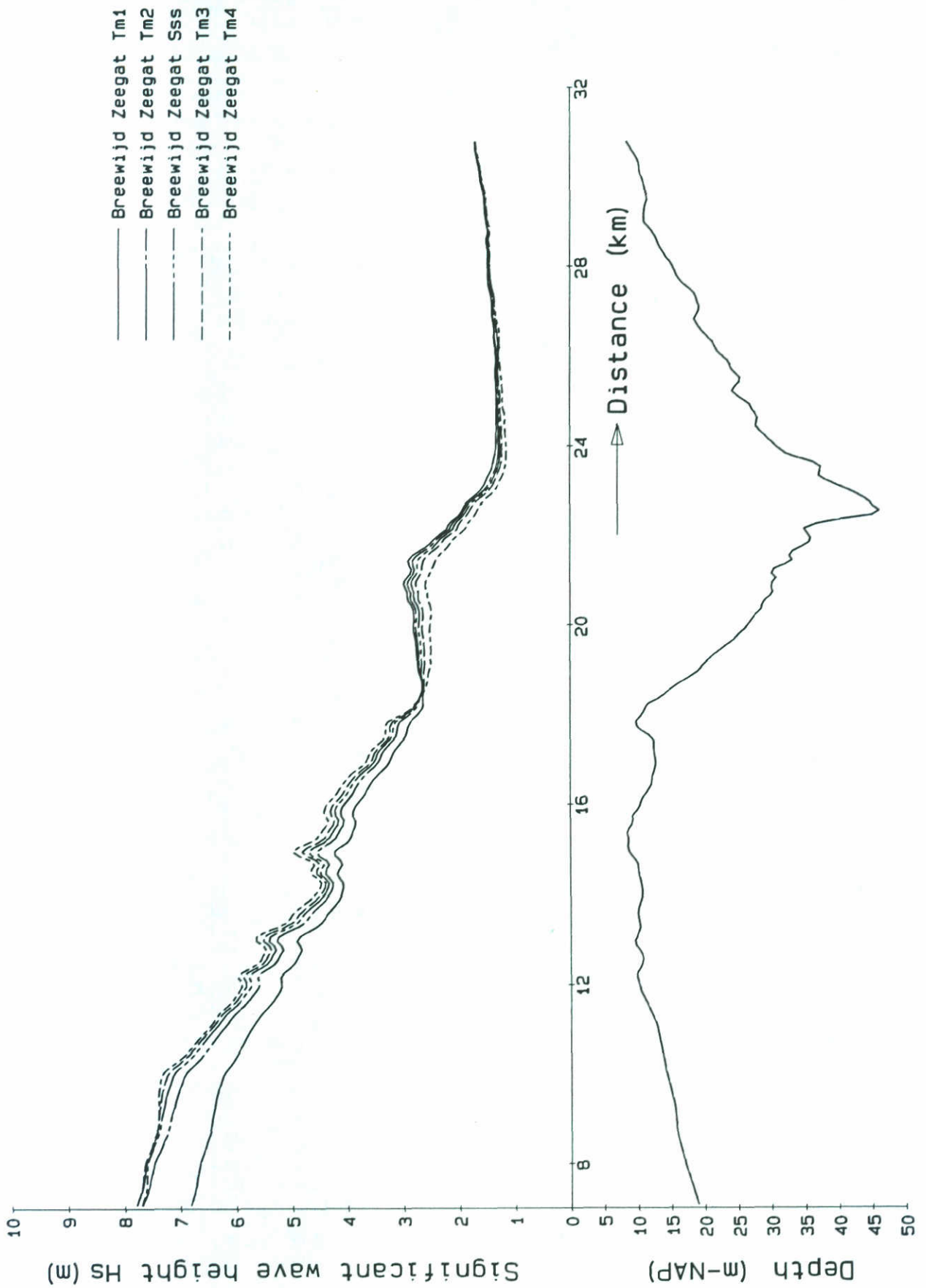


SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WAVE PERIOD

HYDRA-HISWA TMBUBW

DELFT HYDRAULICS

H1355 FIG.4.27m



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WAVE PERIOD

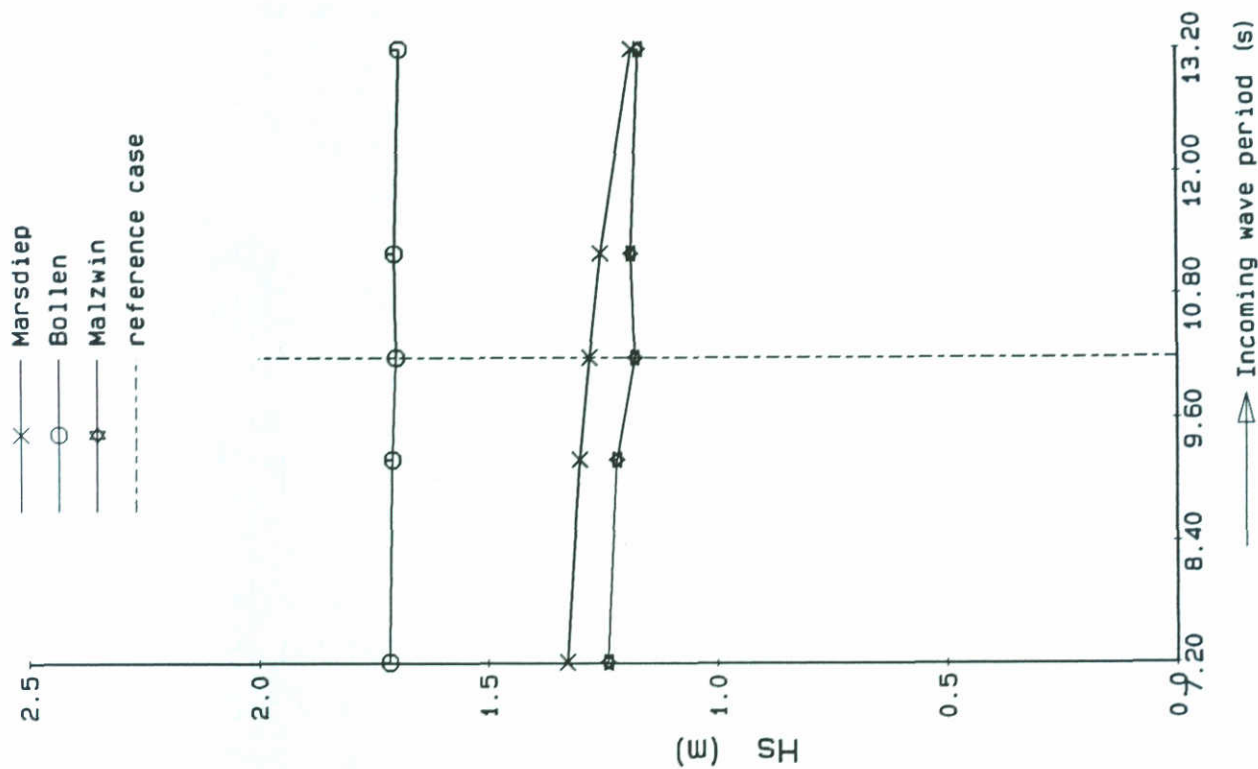
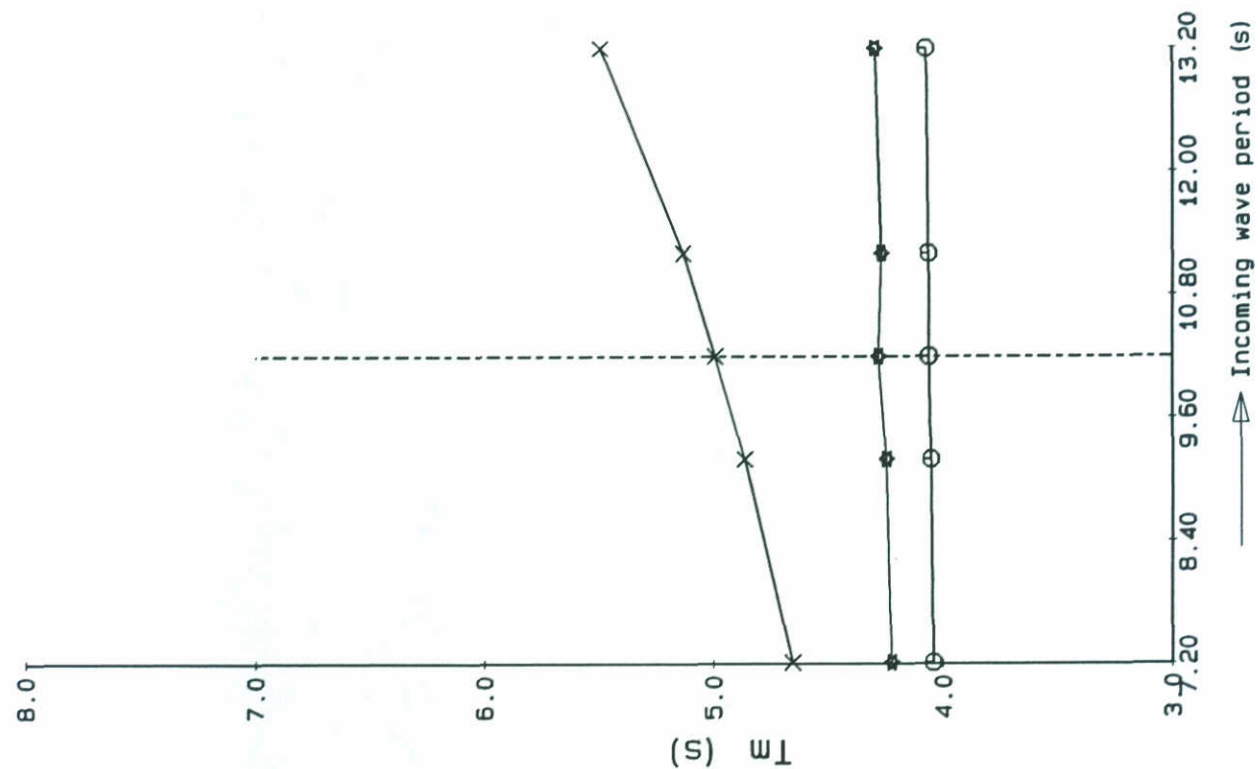
HYDRA-HISWA

BWZGMD

DELFT HYDRAULICS

H1355

FIG. 4.27n



EFFECT OF WAVE PERIOD VARIATION
ENTRANCE WADDEN SEA

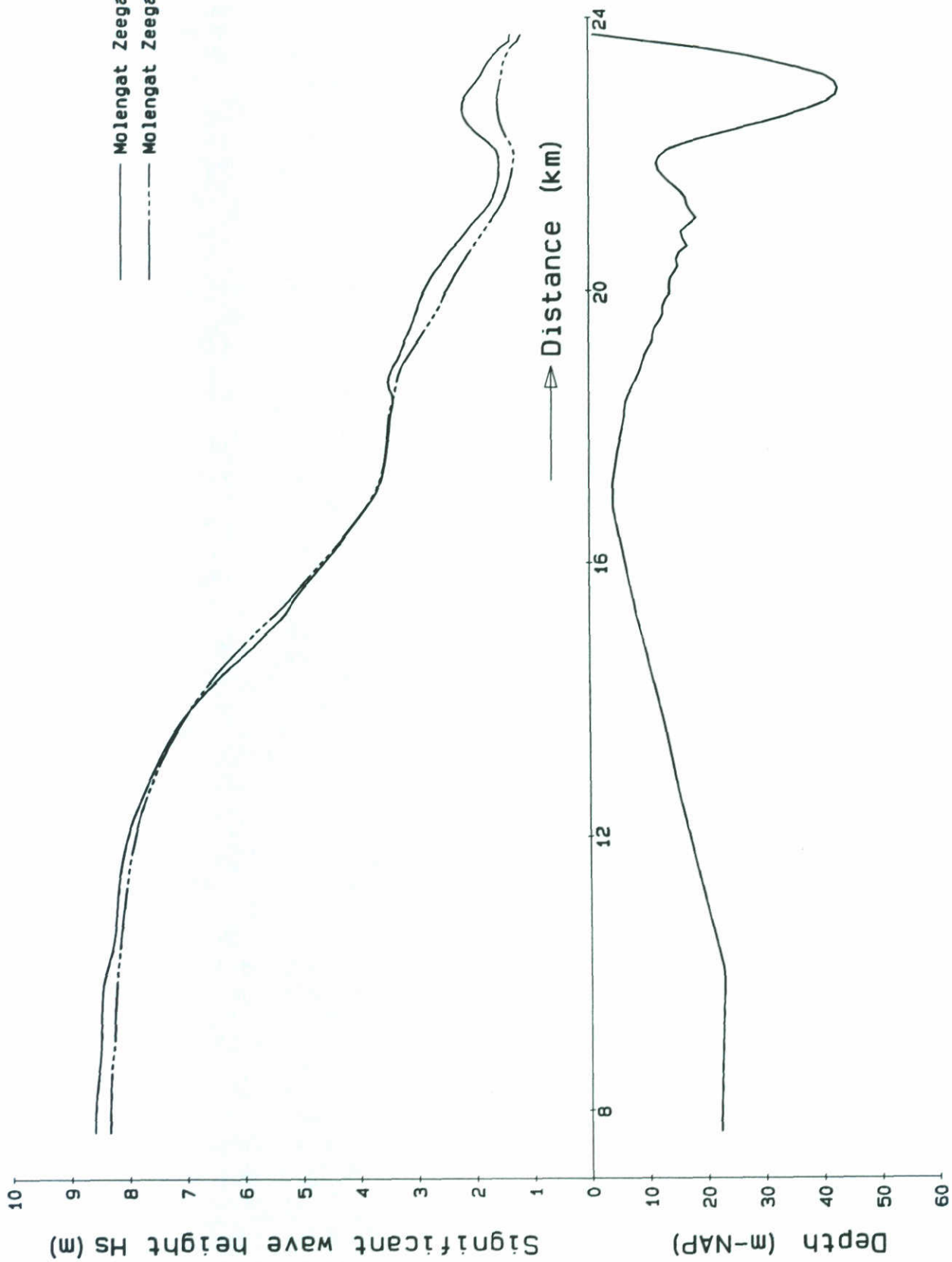
HYDRA-HISWA

TM1TM4

DELFT HYDRAULICS

H1355

FIG. 4.27o



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WAVE DIRECTION

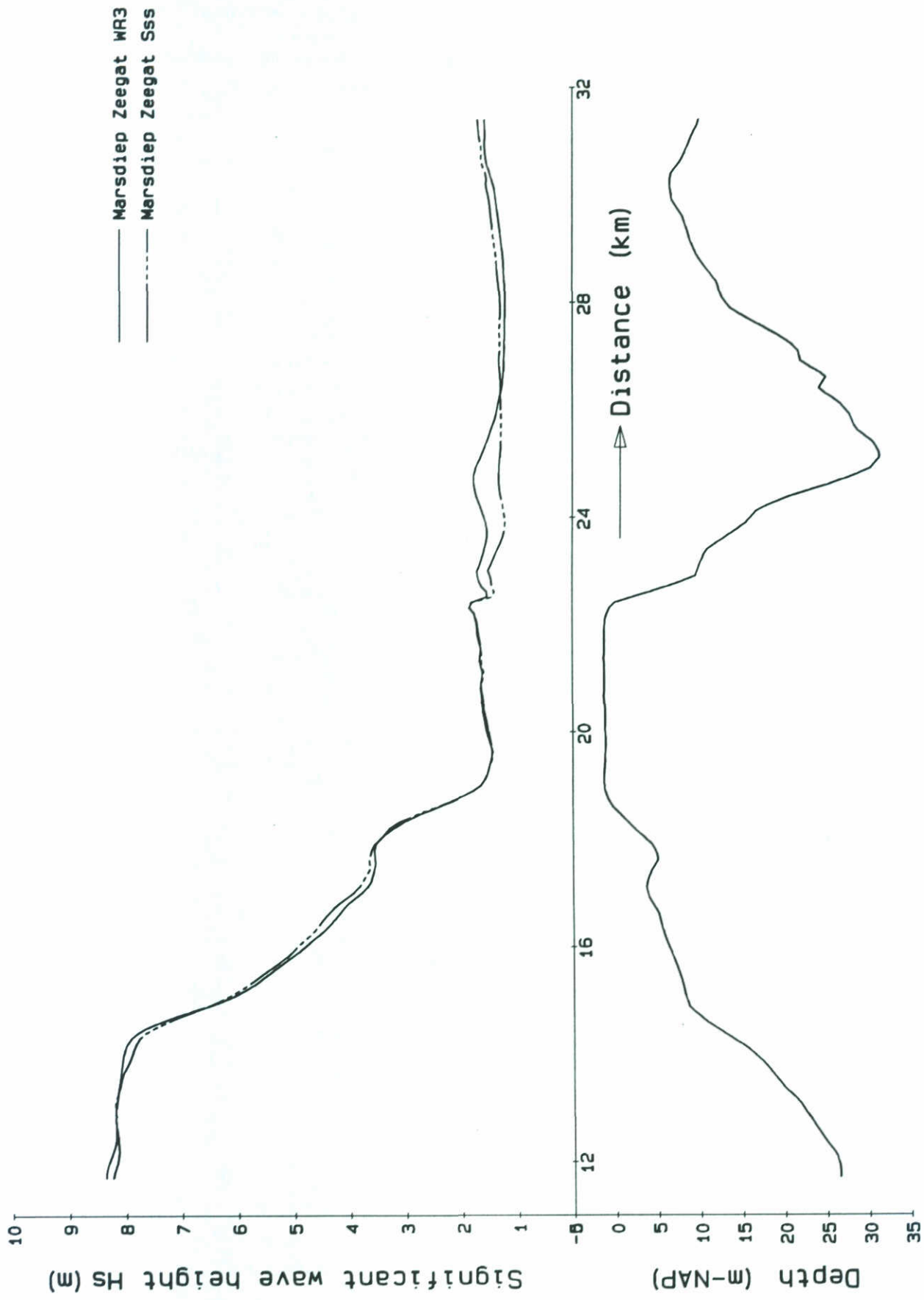
HYDRA-HISWA

WRZGMG

DELFT HYDRAULICS

H1355

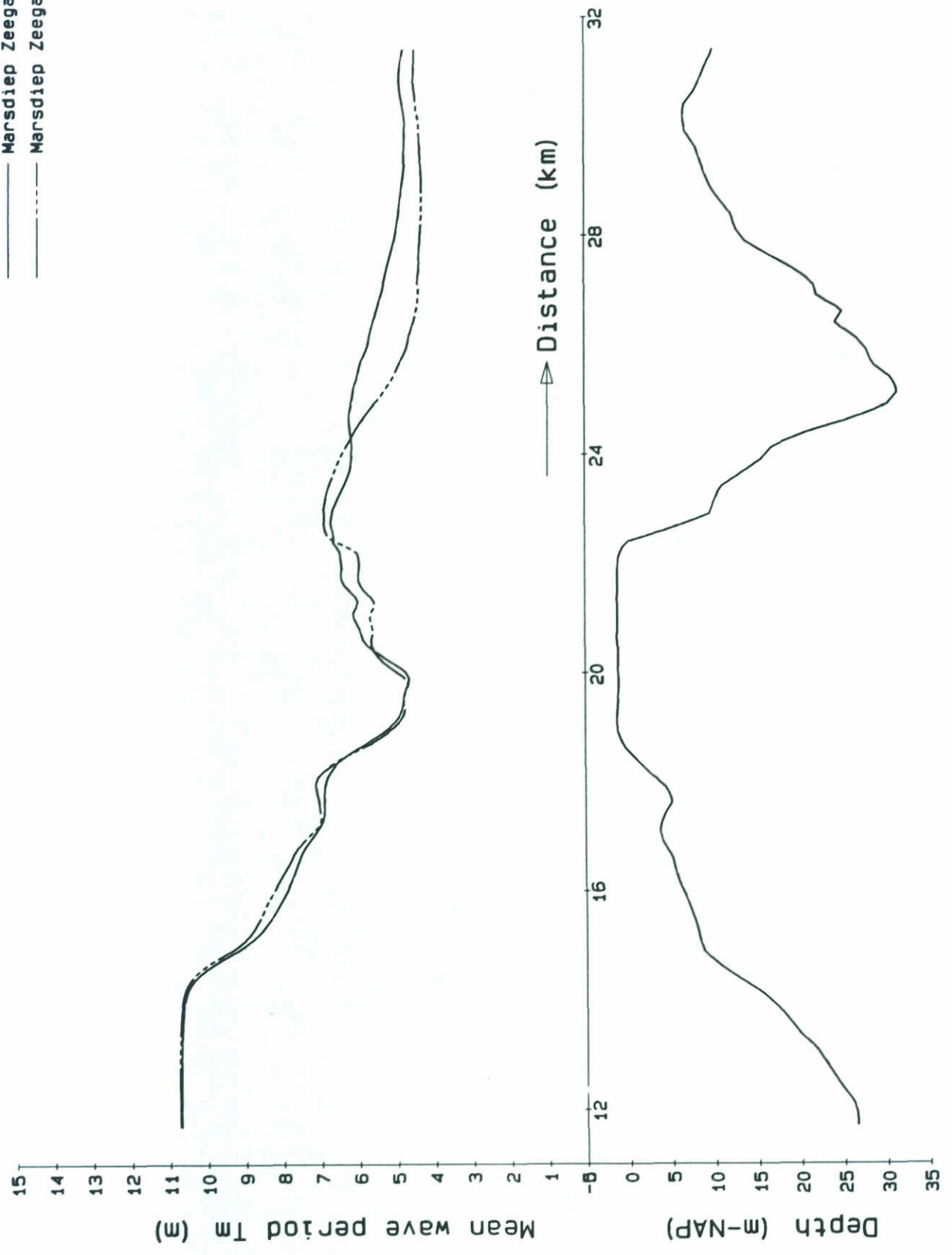
FIG. 4.28a



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WAVE DIRECTION

HYDRA-HISWA WR3ZGMD

— Marsdiep Zeegat WR3
 - - - Marsdiep Zeegat Sss

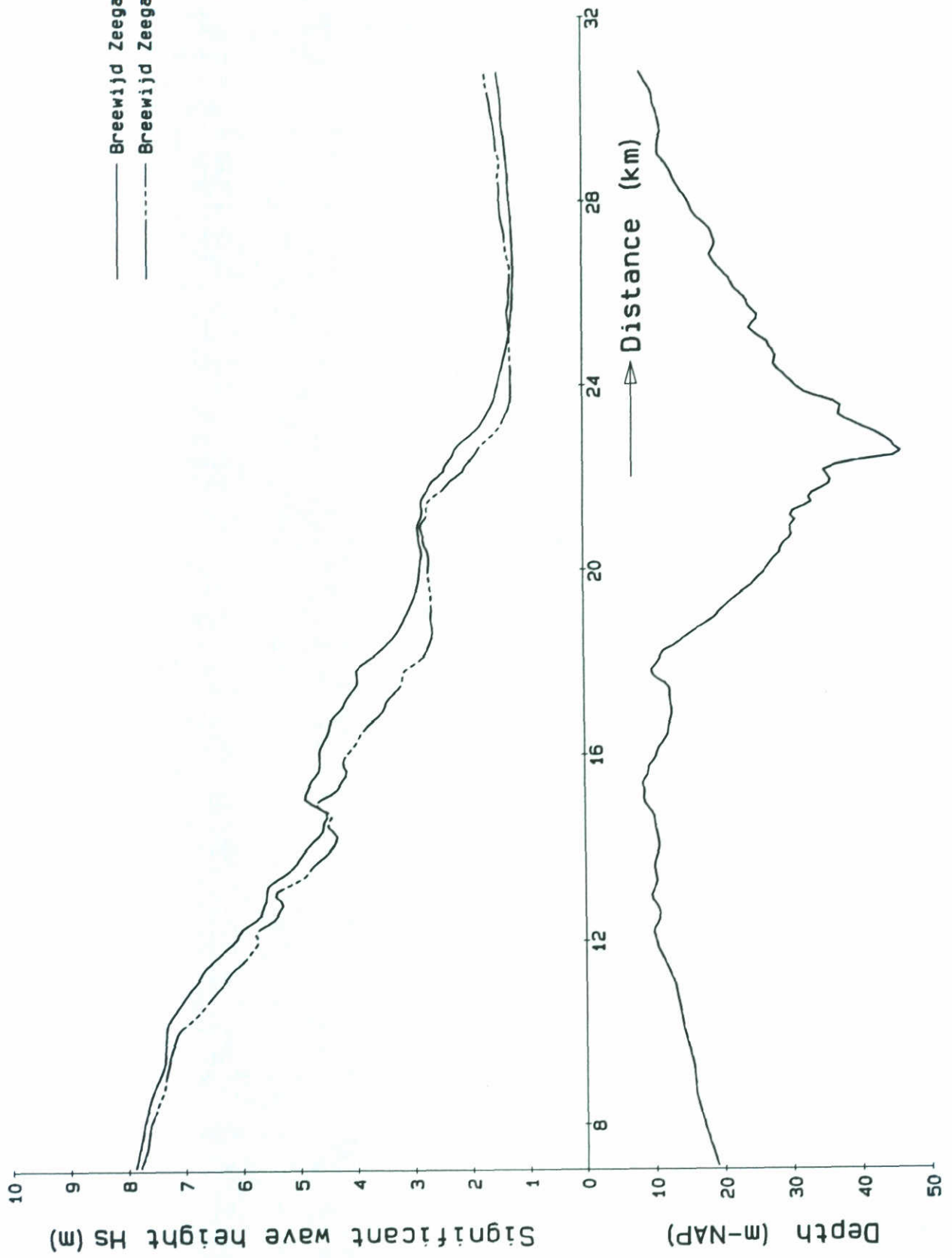


MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WAVE DIRECTION

HYDRA-HISWA WR3ZGMD

DELFT HYDRAULICS

H1355 FIG. 4.28c



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WAVE DIRECTION

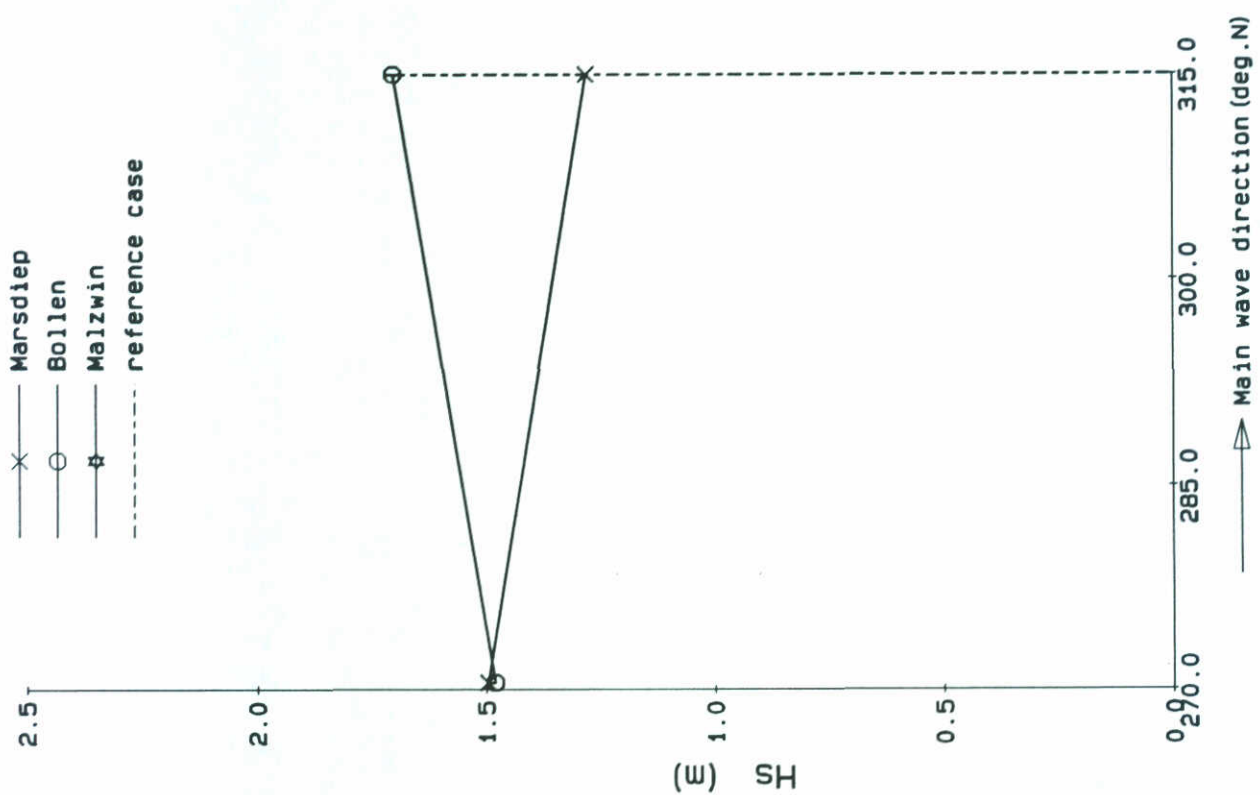
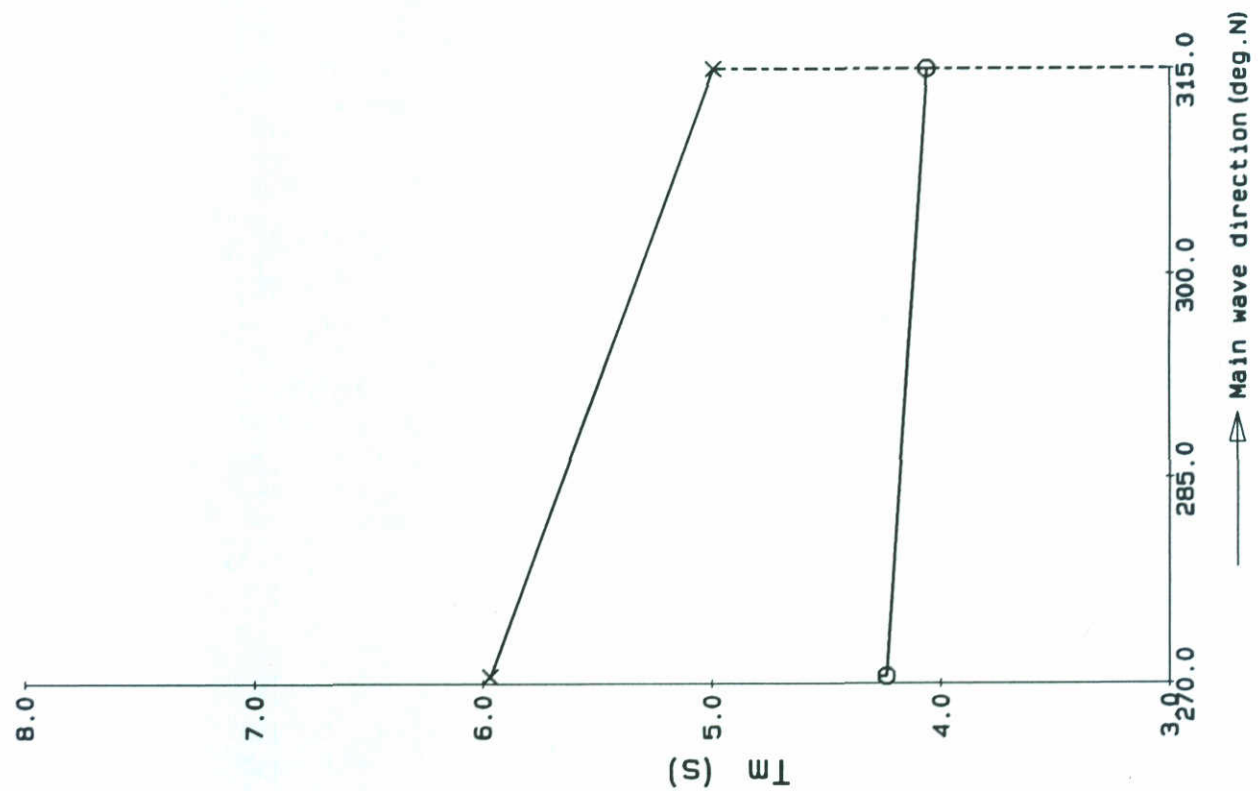
HYDRA-HISWA

WR3ZGBW

DELFT HYDRAULICS

H1355

FIG. 4.28d



x — Marsdiep
 o — Bollen
 — Malzwin
 - - - - - reference case

EFFECT OF MAIN WAVE DIRECTION
ENTRANCE WADDEN SEA

HYDRA-HISWA

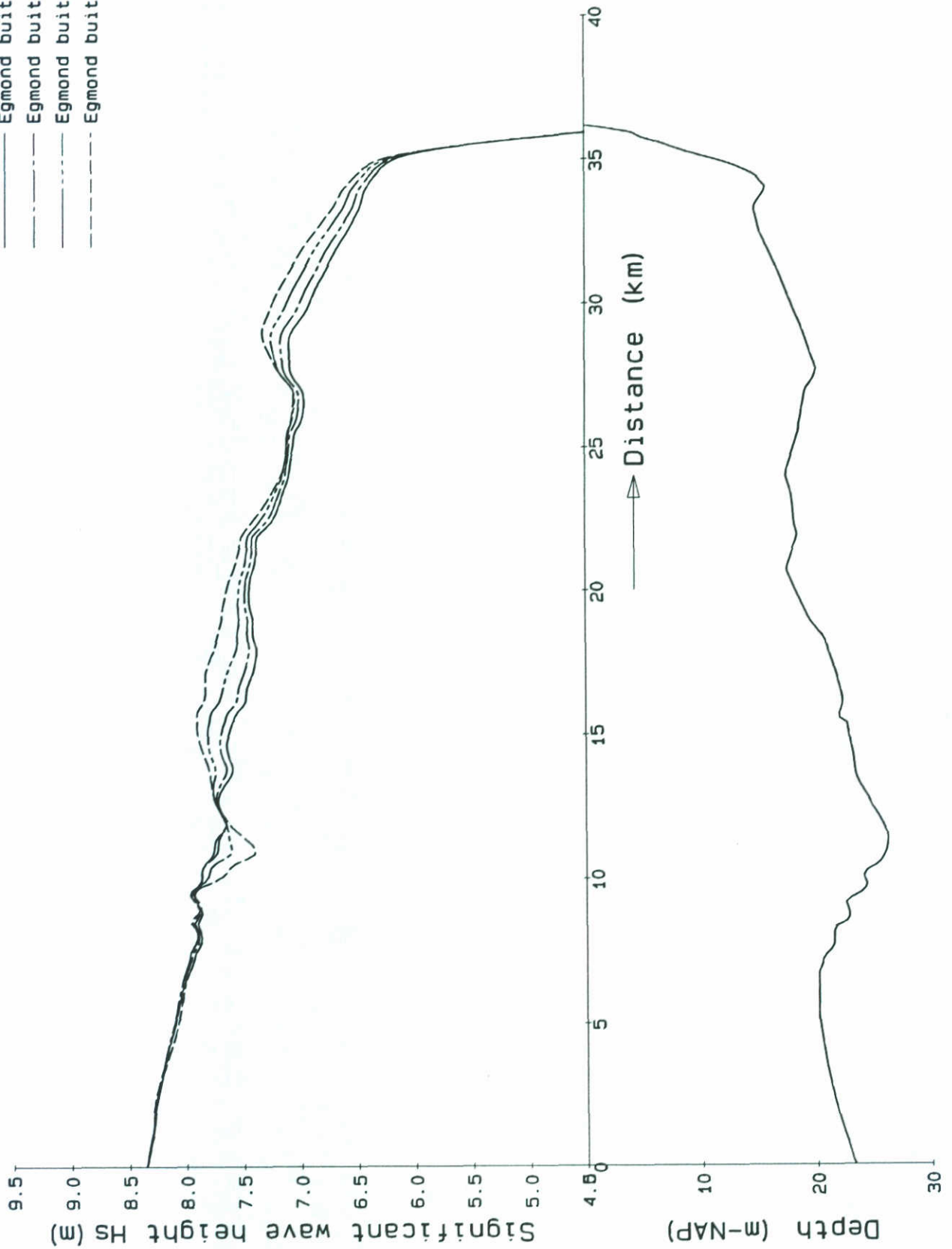
WR3

DELFT HYDRAULICS

H1355

FIG. 4.28e

— Egmond buiten Sd1
 - - - Egmond buiten Sss
 - · - · - Egmond buiten Sd2
 - - - - - Egmond buiten Sd3



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING DIRECTIONAL SPREADING

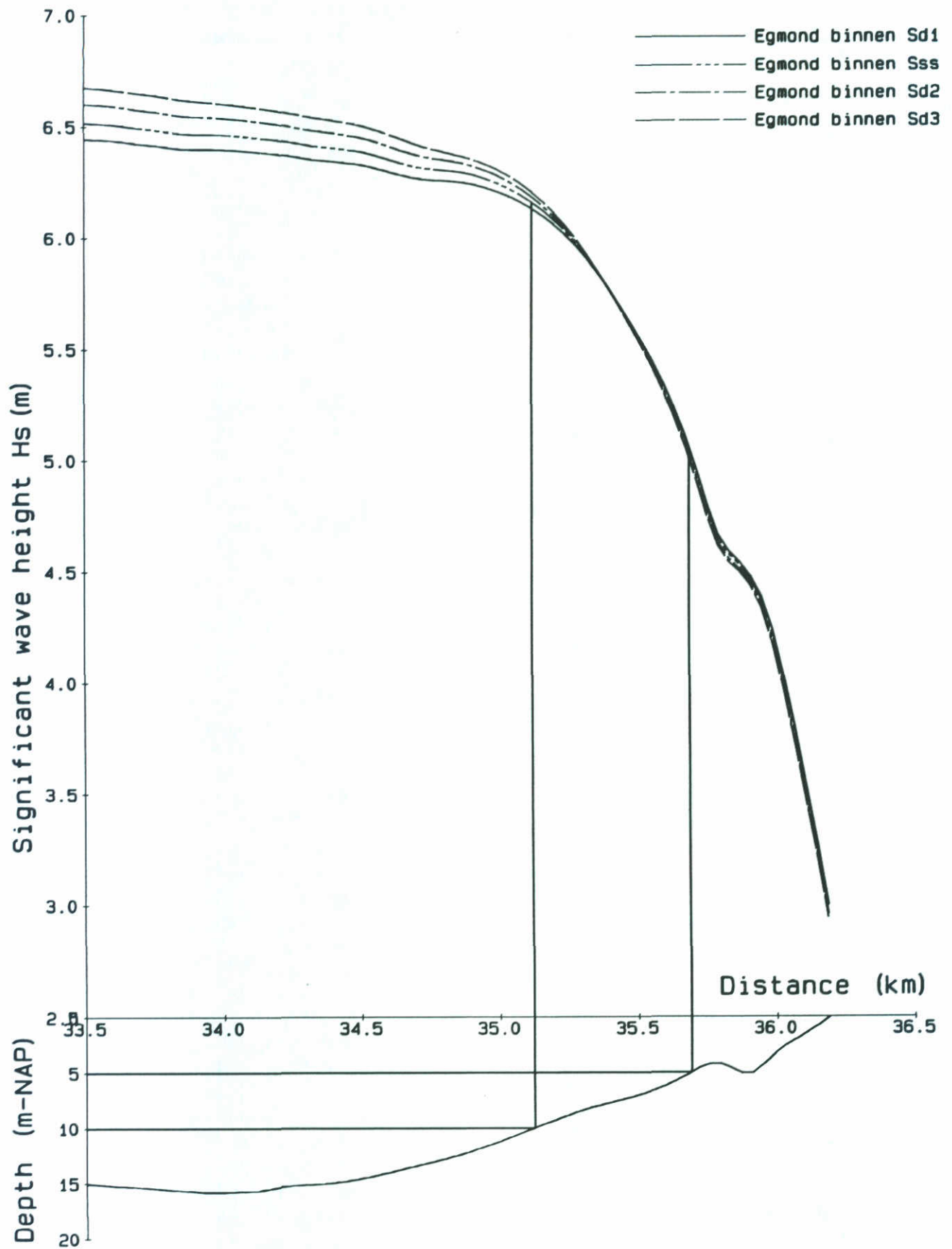
HYDRA-HISWA

SDBUEG

DELFT HYDRAULICS

H1355

FIG.4.29a



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING DIRECTIONAL SPREADING

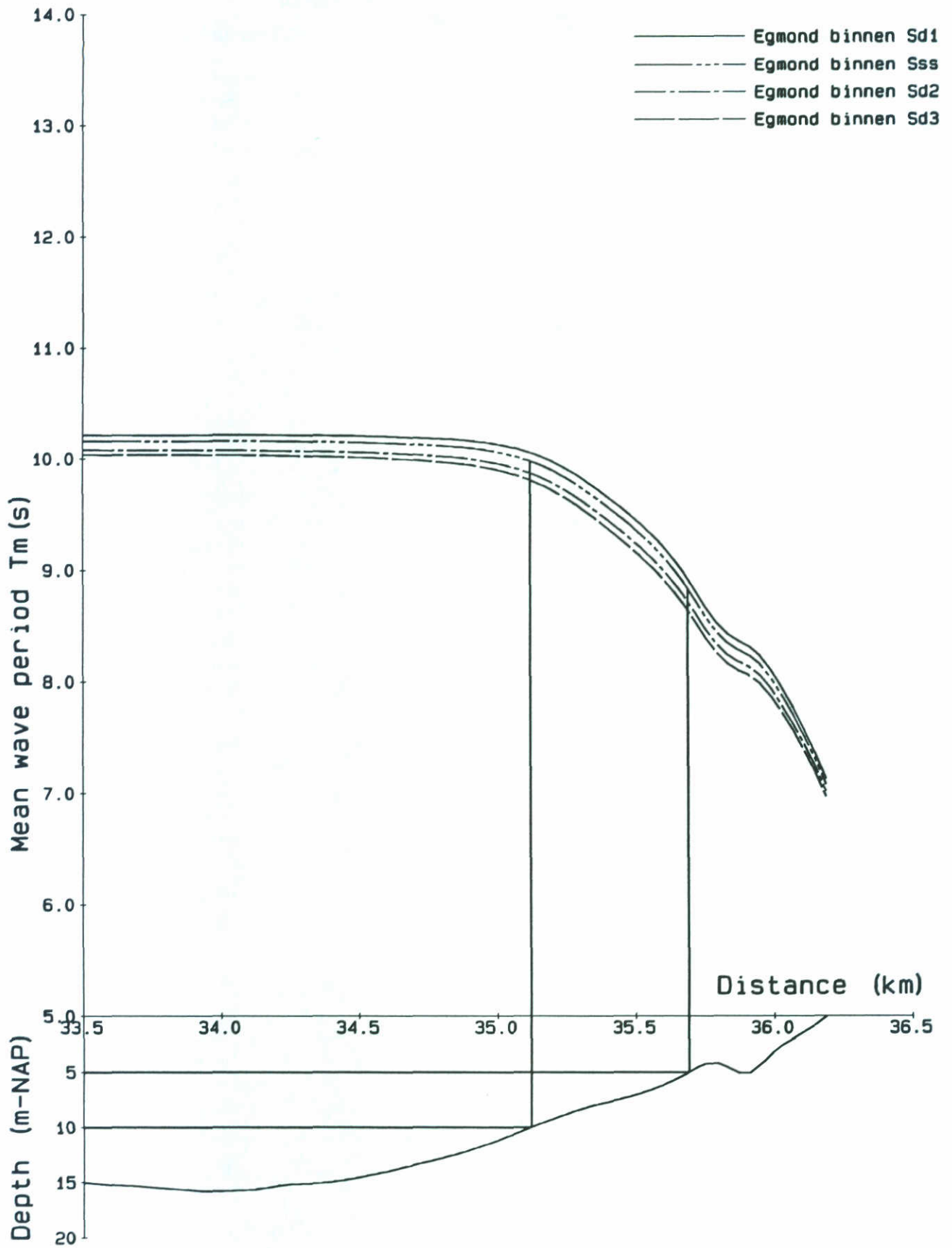
HYDRA-HISWA

SD1SD4

DELFT HYDRAULICS

H1355

FIG. 4.29b



MEAN WAVE PERIOD EGMOND PROFILE
 VARYING DIRECTIONAL SPREADING

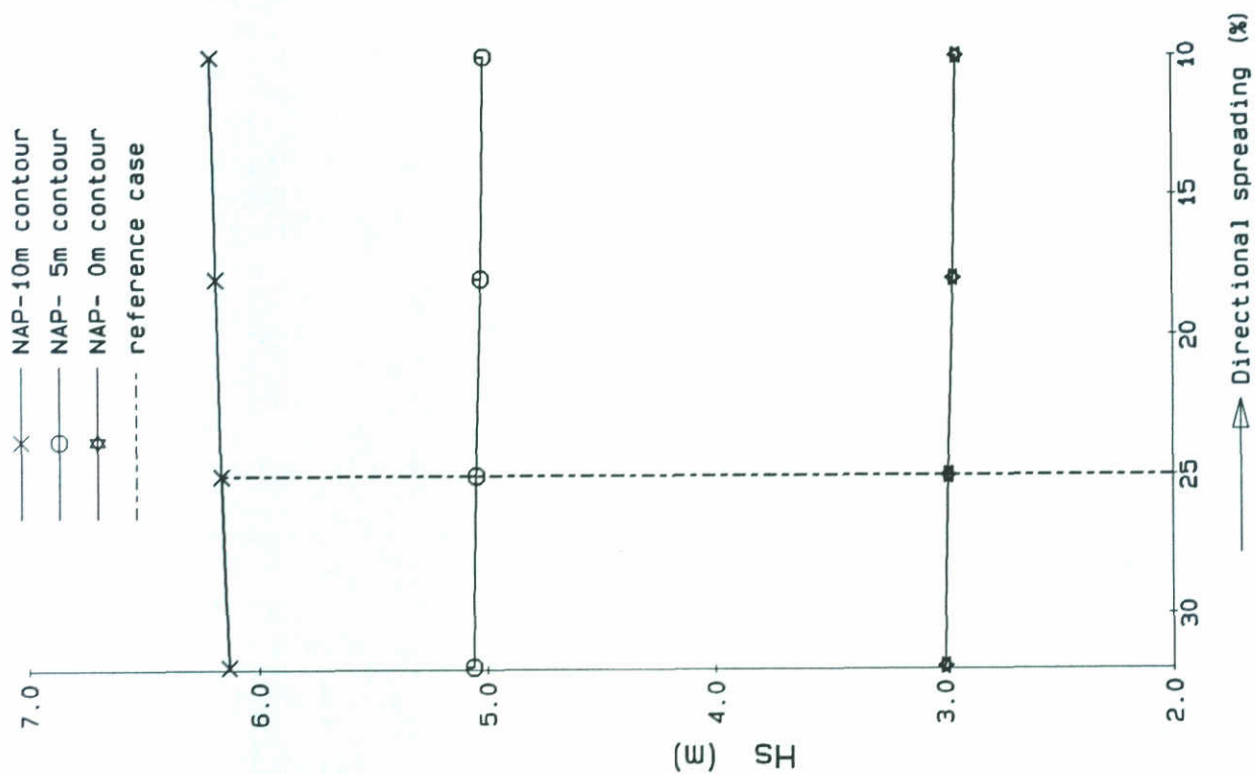
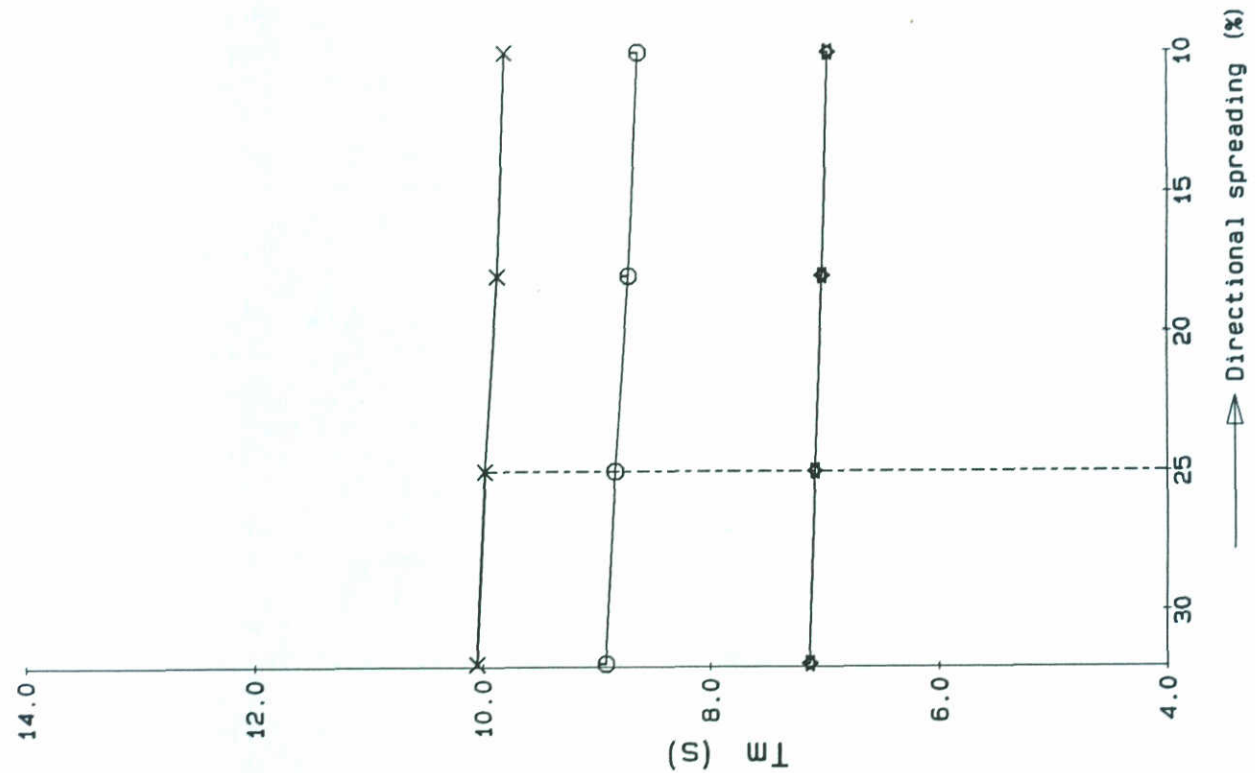
HYDRA-HISWA

SD1SD4

DELFT HYDRAULICS

H1355

FIG. 4.29c



EFFECT OF DIRECTIONAL SPREADING
EGMOND PROFILE

HYDRA-HISWA

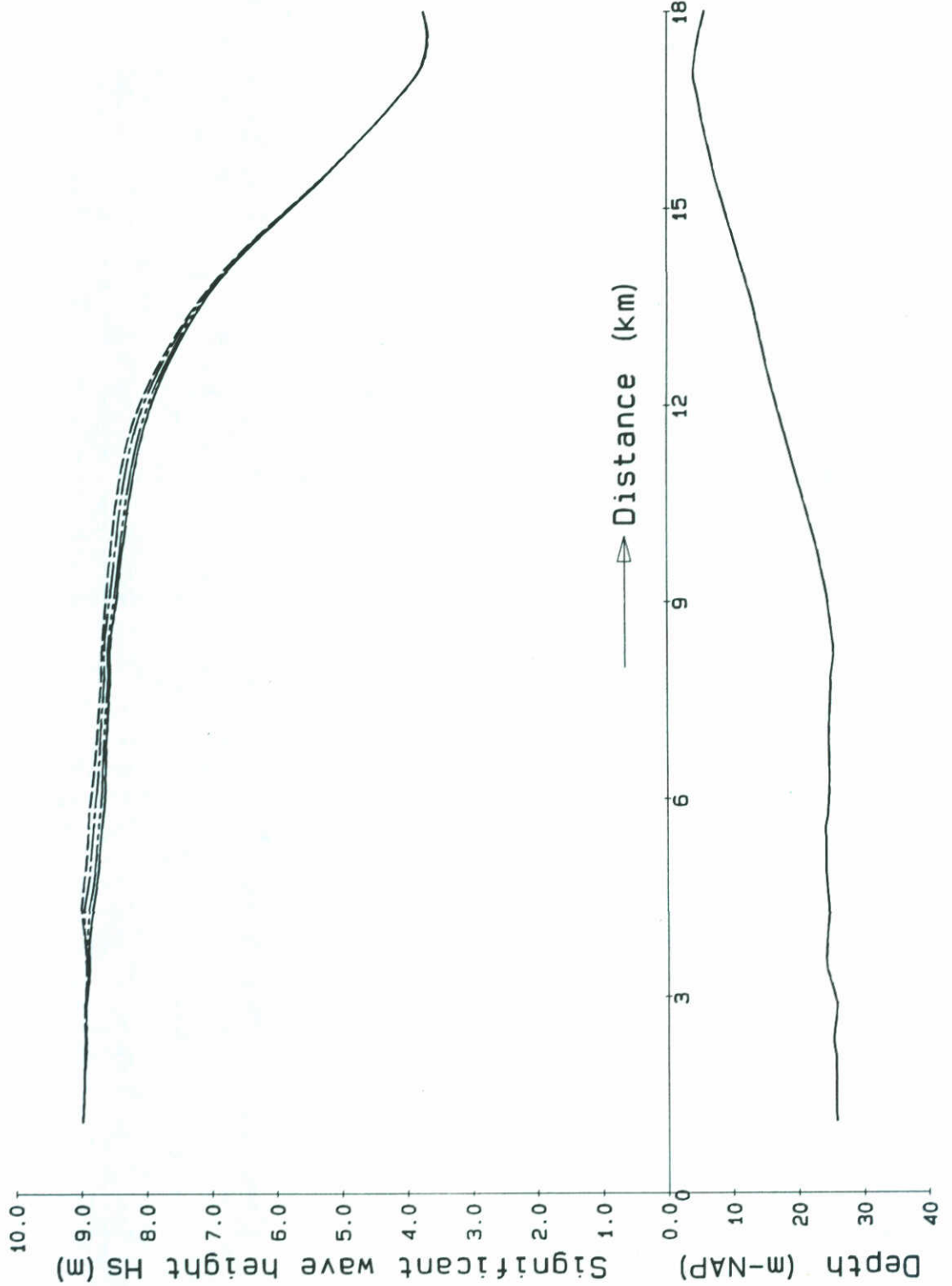
SD1SD3

DELFT HYDRAULICS

H1355

FIG. 4.29d

- Molengat buiten Sd1
- - - Molengat buiten Sd2
- · - Molengat buiten Sss
- - - Molengat buiten Sd3



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING DIRECTIONAL SPREADING

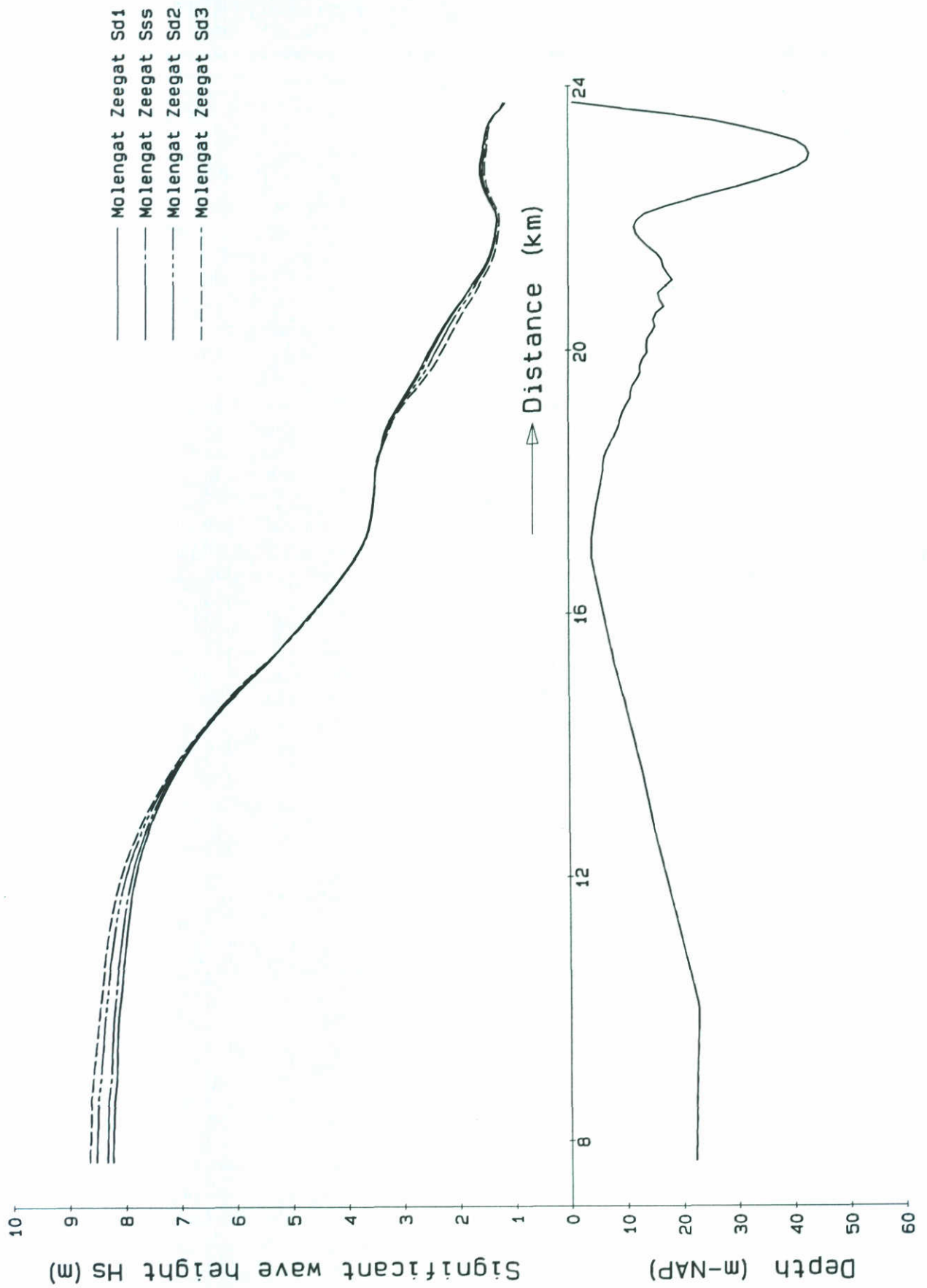
HYDRA-HISWA

SDBUMG

DELFT HYDRAULICS

H1355

FIG. 4.29e



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING DIRECTIONAL SPREADING

HYDRA-HISWA

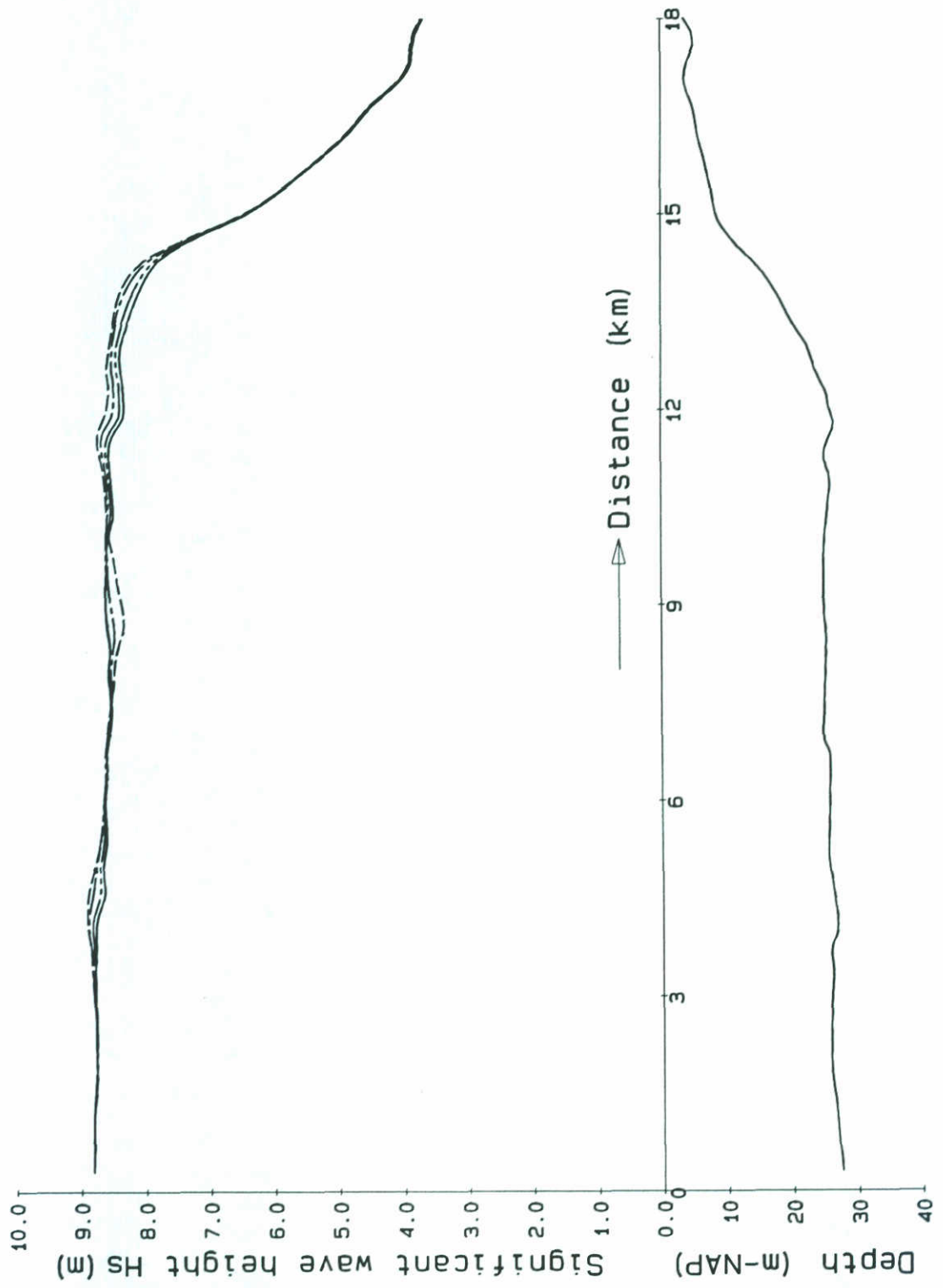
SDZGMG

DELFT HYDRAULICS

H1355

FIG.4.29f

— Marsdiep buiten Sd1
 - - Marsdiep buiten Sd2
 - · - Marsdiep buiten Ss3
 - - - Marsdiep buiten Sd3



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING DIRECTIONAL SPREADING

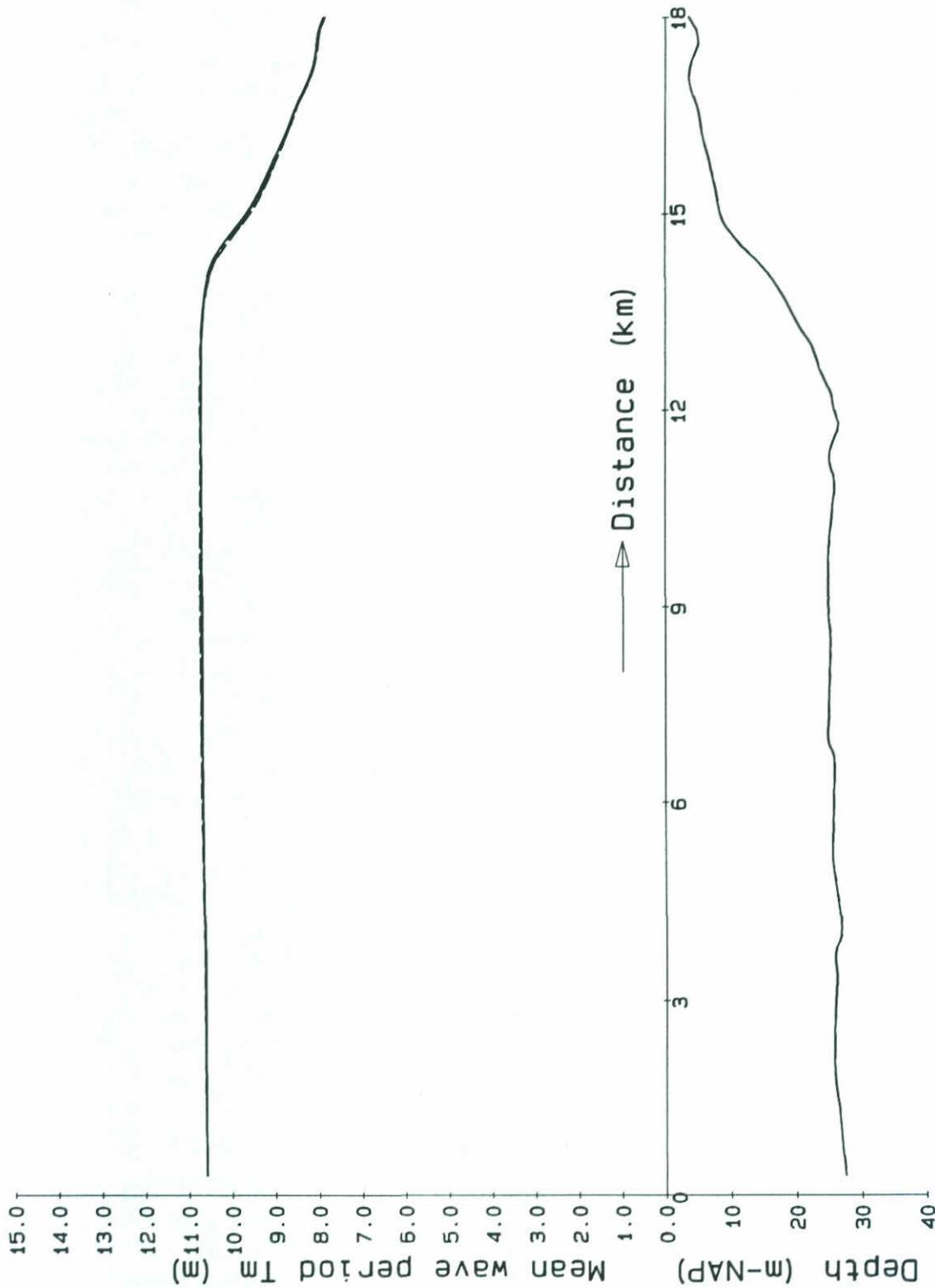
HYDRA-HISWA SDBUMD

DELFT HYDRAULICS

H1355

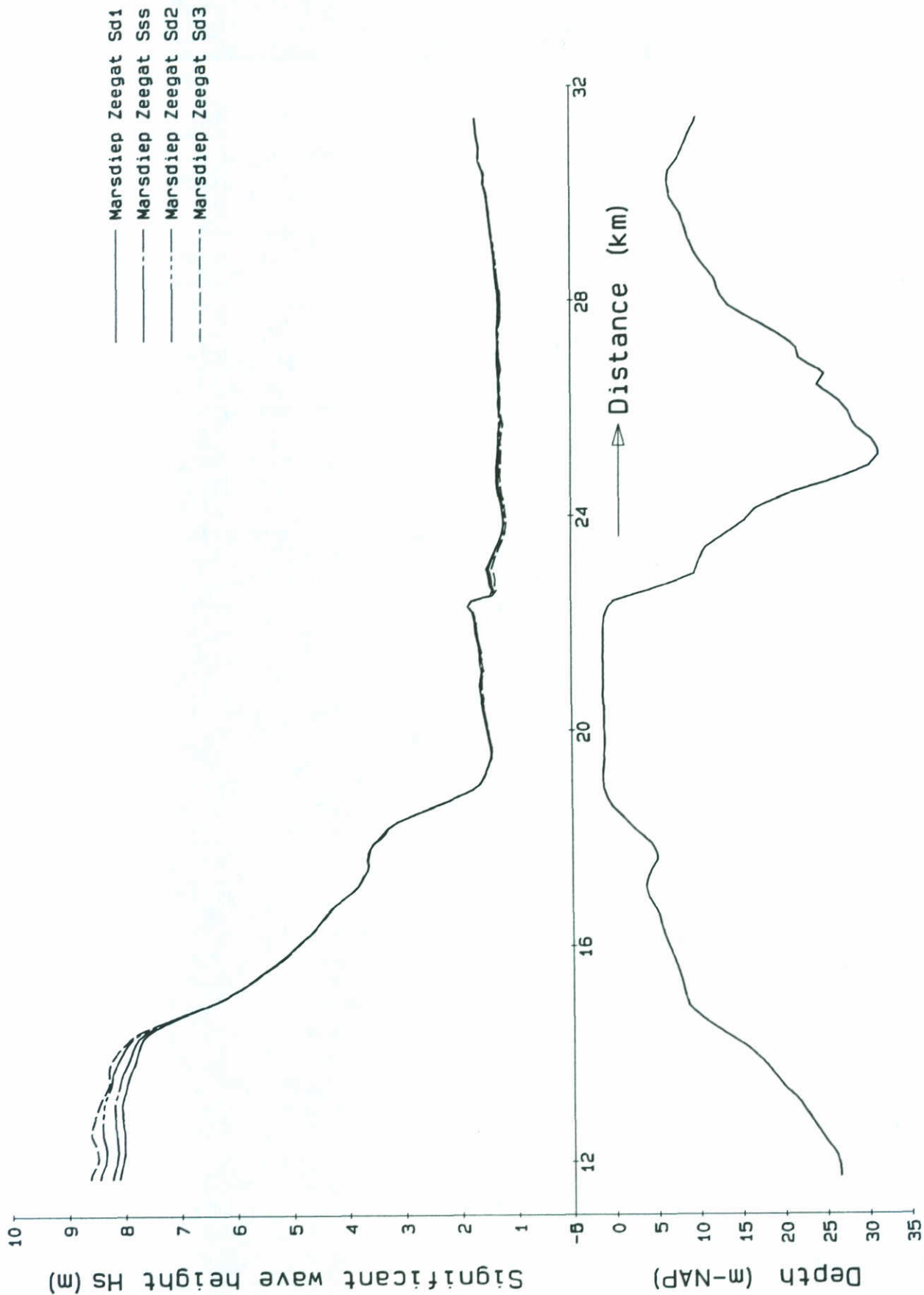
FIG.4.29g

- Marsdiep buiten Sd1
- - - Marsdiep buiten Sd2
- . - Marsdiep buiten Sss
- - - Marsdiep buiten Sd3



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING DIRECTIONAL SPREADING

HYDRA-HISWA SDBUMD



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING DIRECTIONAL SPREADING

HYDRA-HISWA

SDZGMD

DELFT HYDRAULICS

H1355

FIG.4.29i

— Marsdiep Zeegat Sd1
 - - - Marsdiep Zeegat Sss
 - - - Marsdiep Zeegat Sd2
 - - - Marsdiep Zeegat Sd3



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING DIRECTIONAL SPREADING

HYDRA-HISWA

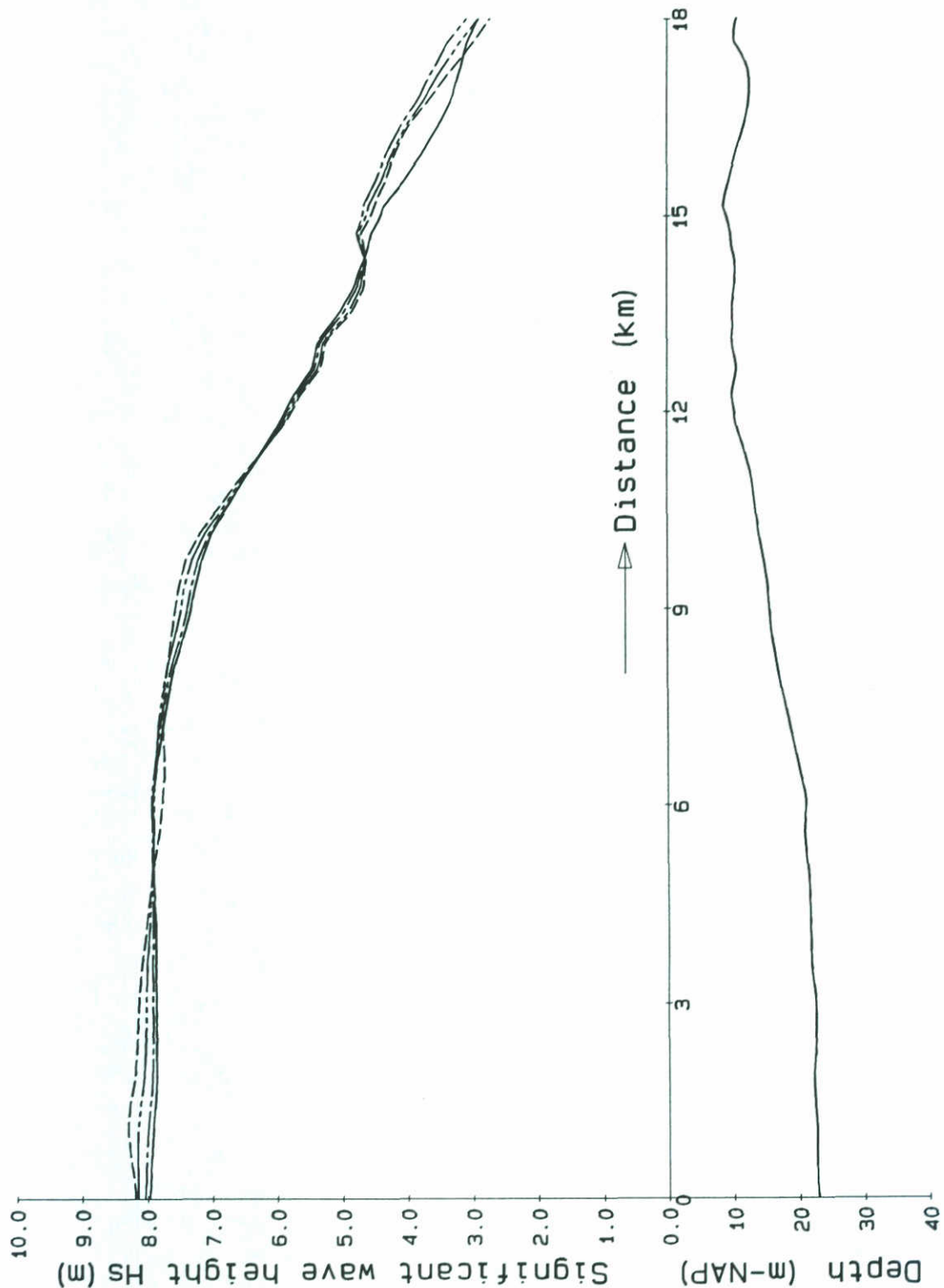
SDZGMD

DELFT HYDRAULICS

H1355

FIG. 4.29j

- Breewijd buiten Sd1
- - - Breewijd buiten Sss
- · - Breewijd buiten Sd2
- - - Breewijd buiten Sd3



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING DIRECTIONAL SPREADING

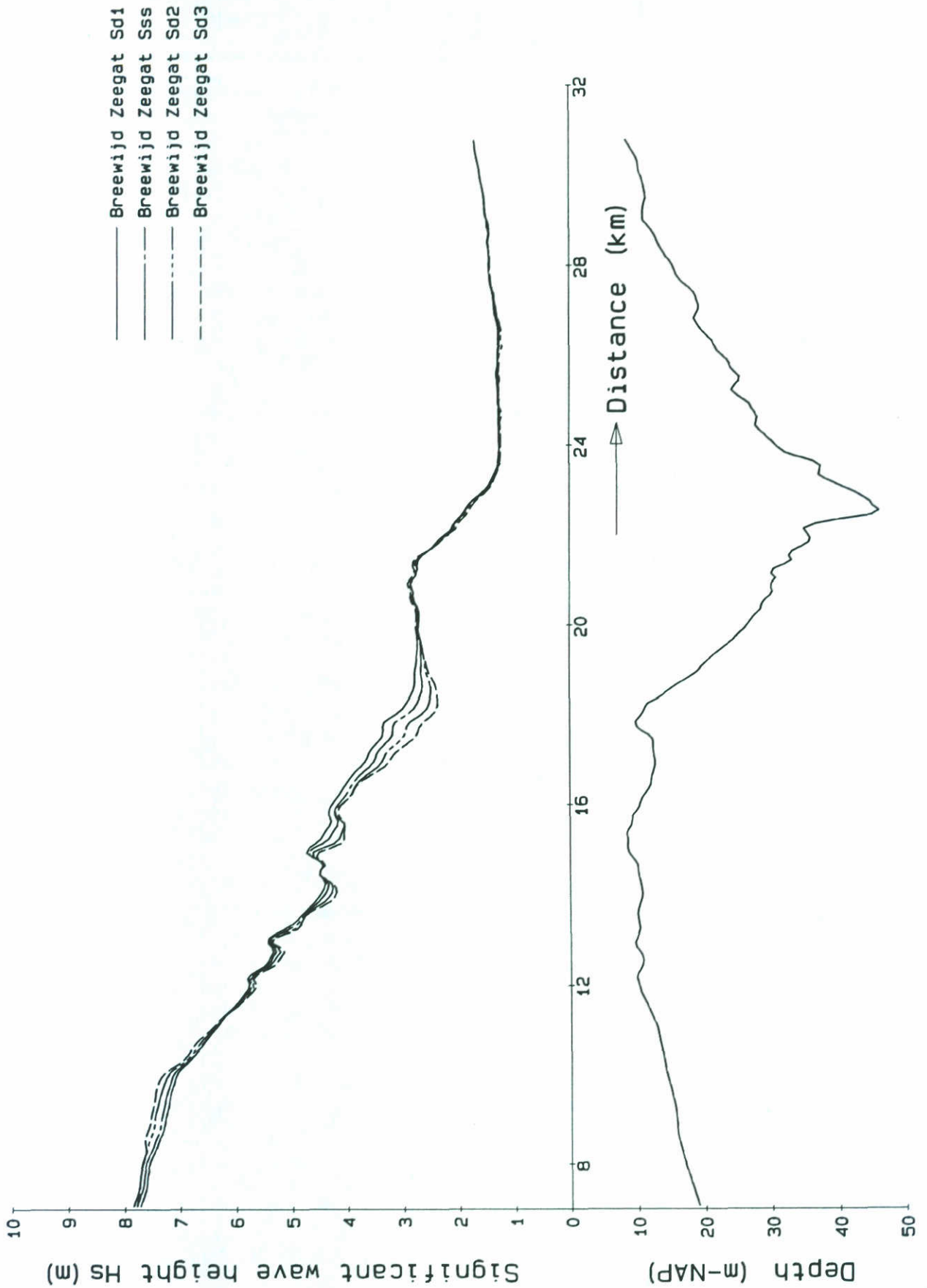
HYDRA-HISWA

SDBUBW

DELFT HYDRAULICS

H1355

FIG. 4.29k



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING DIRECTIONAL SPREADING

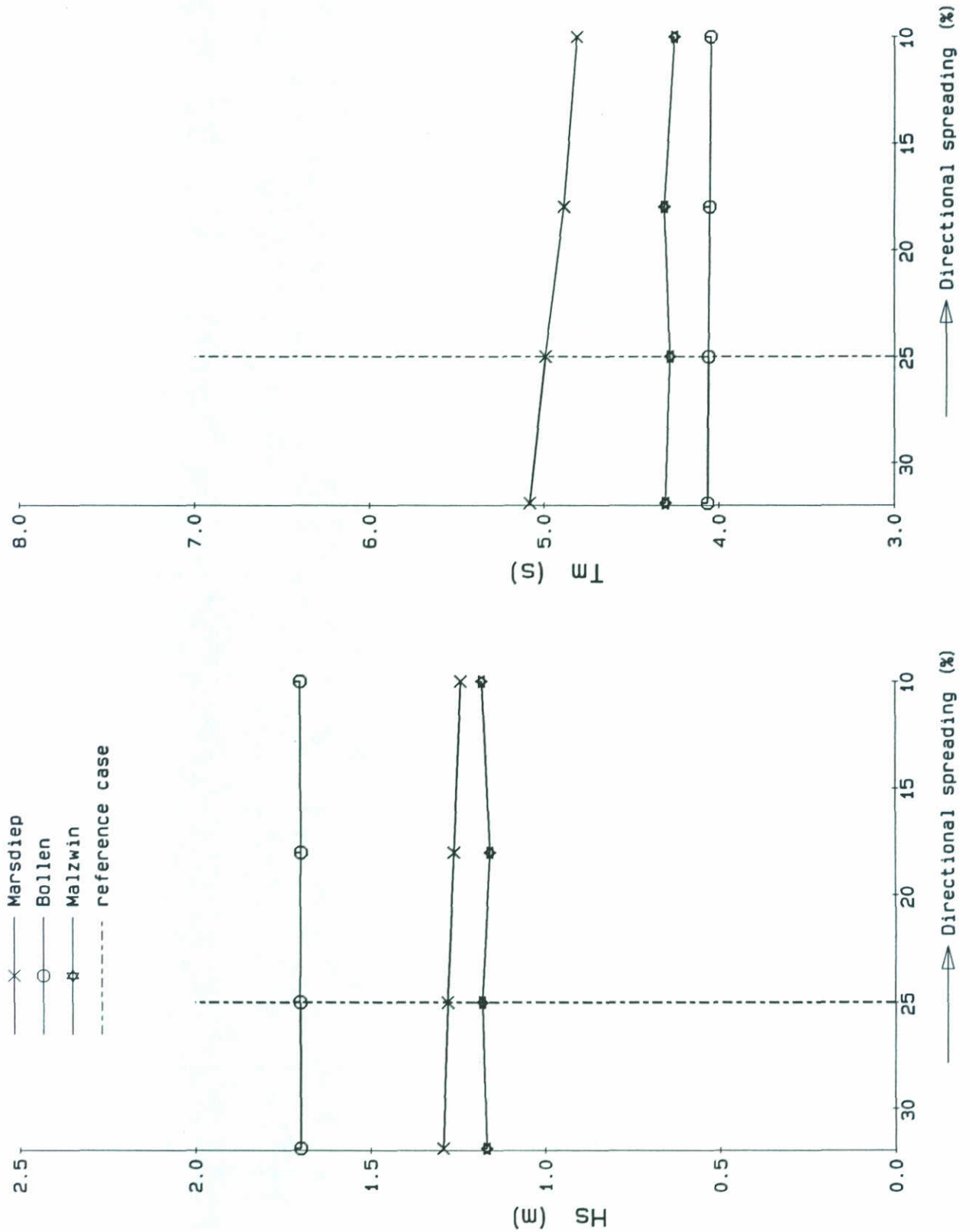
HYDRA-HISWA

SDZGBW

DELFT HYDRAULICS

H1355

FIG. 4.29I



EFFECT OF DIRECTIONAL SPREADING
ENTRANCE WADDEN SEA

HYDRA-HISWA

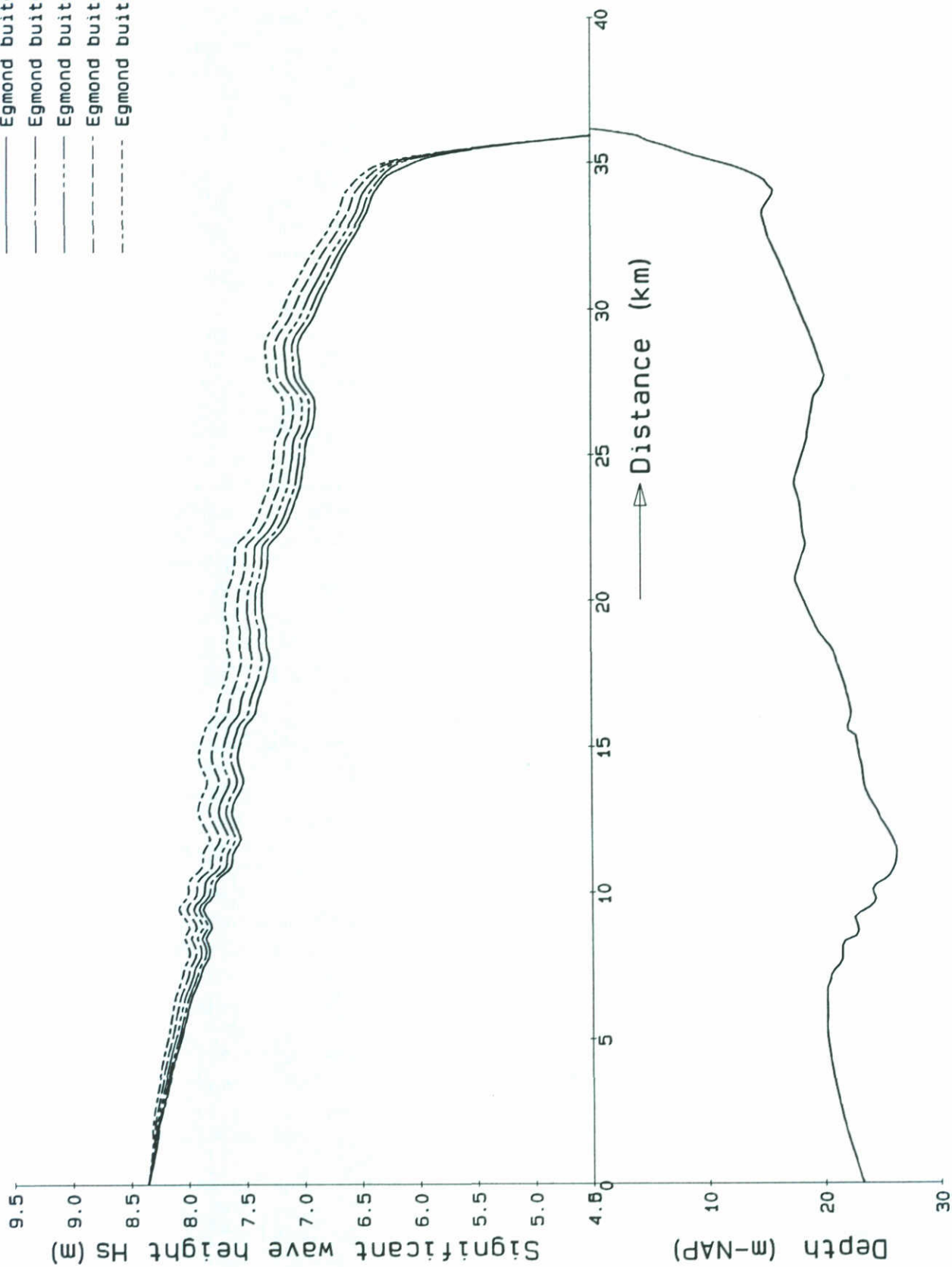
SD1SD3

DELFT HYDRAULICS

H1355

FIG.4.29m

- Egmond buiten Wi1
- - - Egmond buiten Wi2
- · - · - Egmond buiten Sss
- - - Egmond buiten Wi3
- - - Egmond buiten Wi4



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WIND SPEED

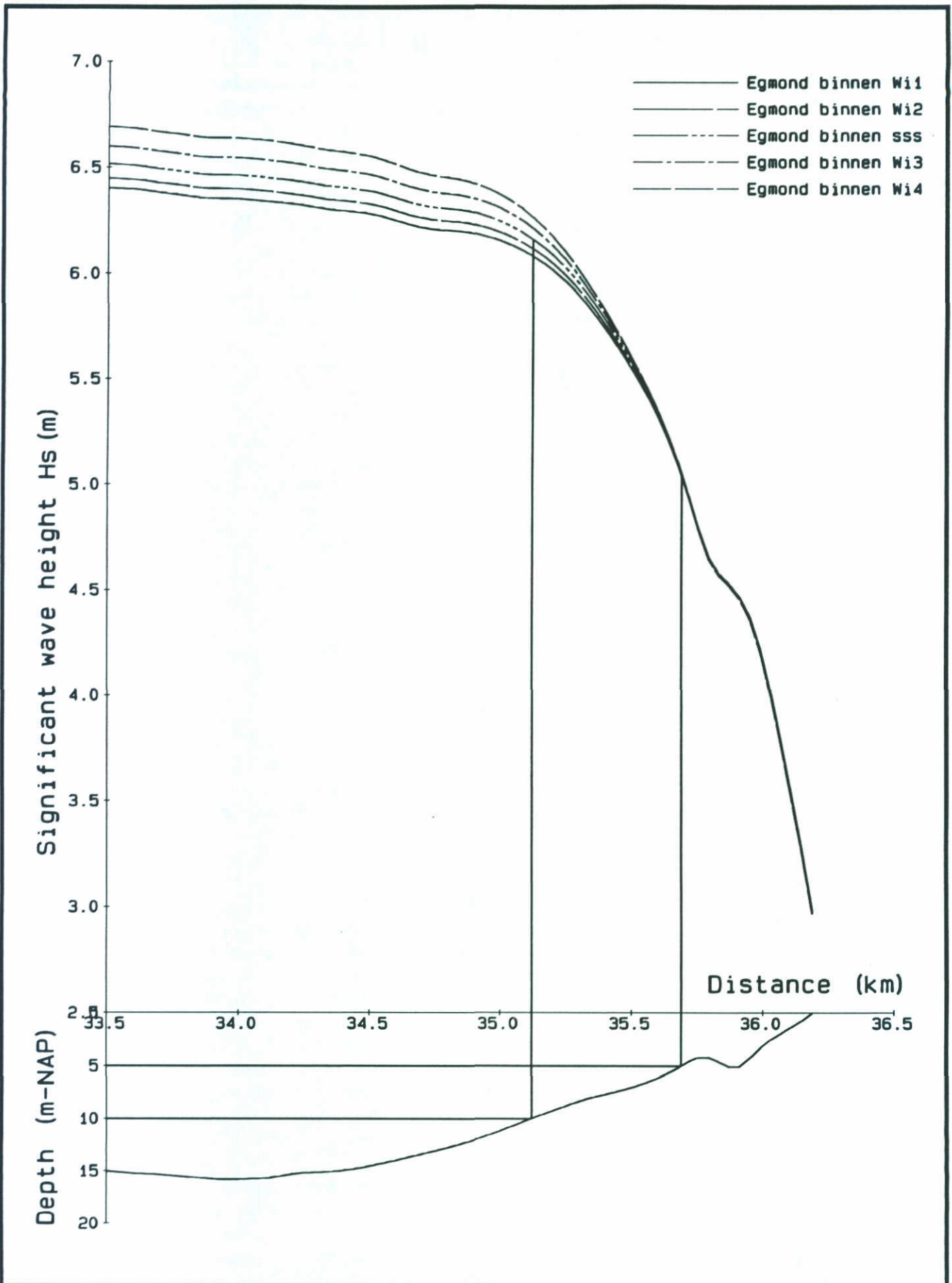
HYDRA-HISWA

WIBUEG

DELFT HYDRAULICS

H1355

FIG. 4.30a



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WIND SPEED

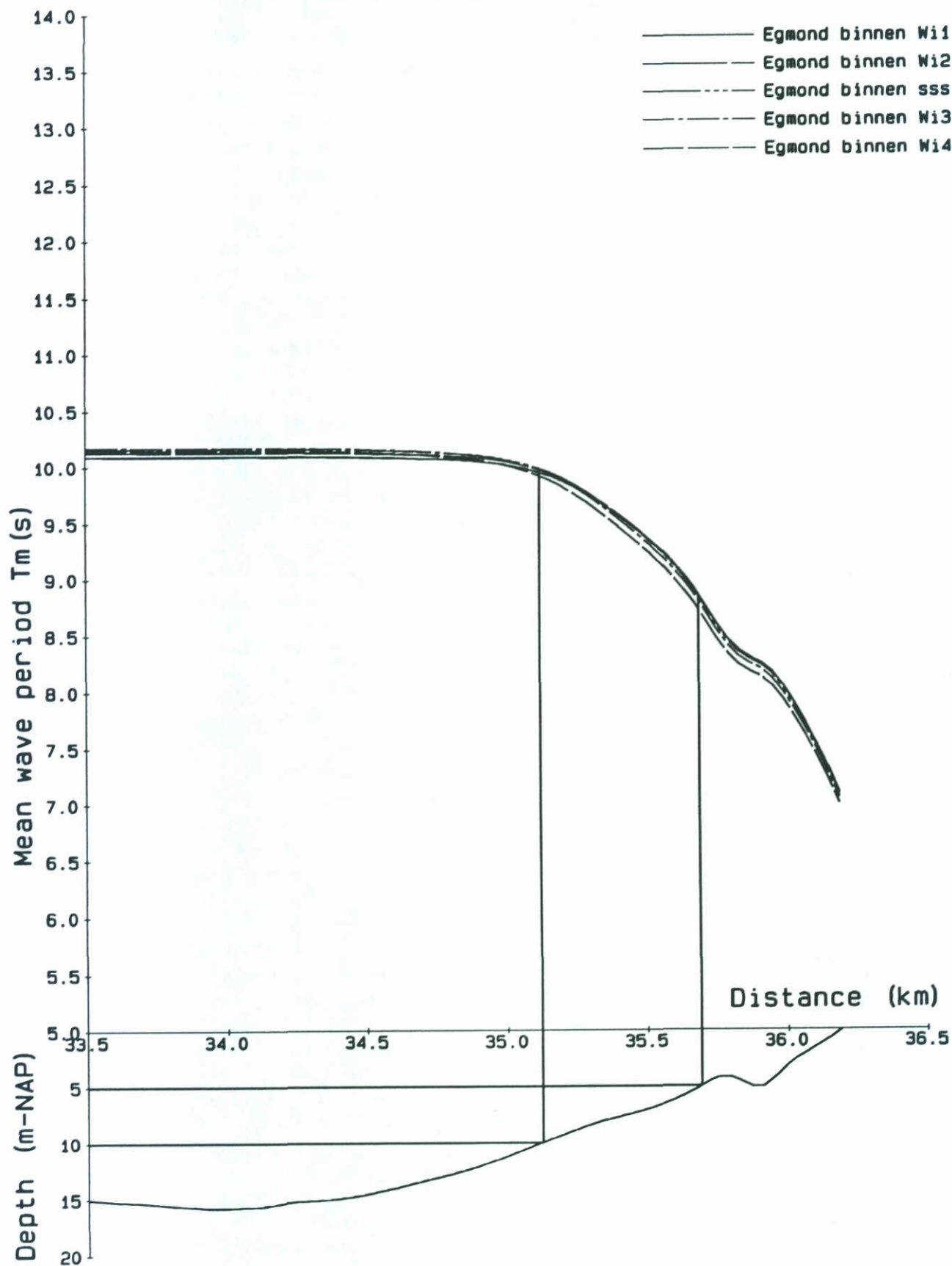
HYDRA-HISWA

WI1WI4

DELFT HYDRAULICS

H1355

FIG. 4.30b



MEAN WAVE PERIOD EGMOND PROFILE
 VARYING WIND SPEED

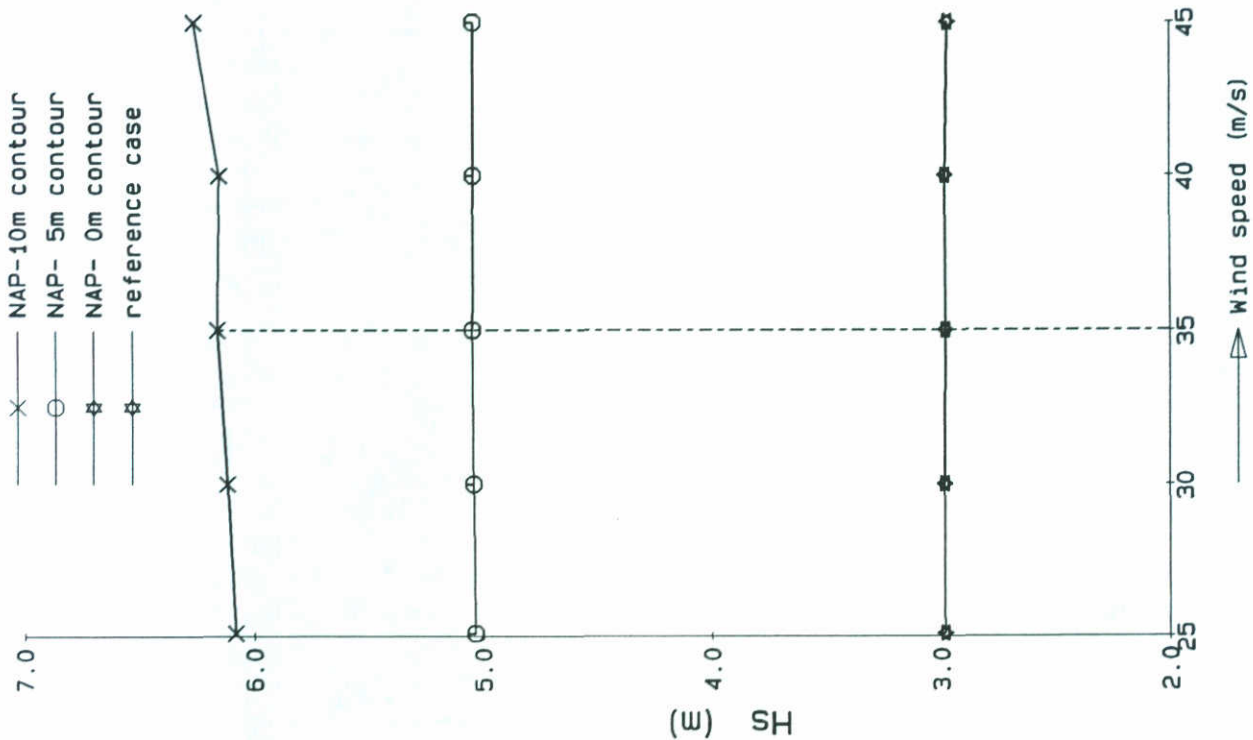
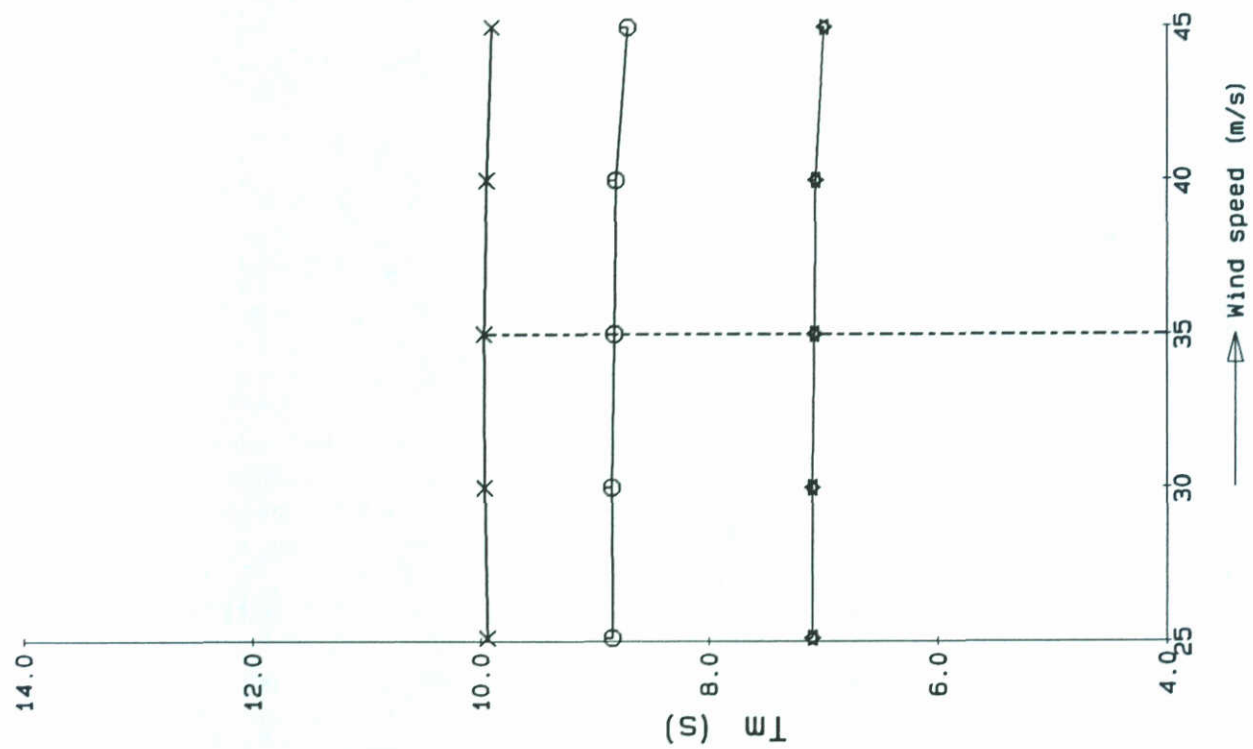
HYDRA-HISWA

WI1WI4

DELFT HYDRAULICS

H1355

FIG. 4.30c



EFFECT OF WIND SPEED VARIATION
EGMOND PROFILE

HYDRA-HISWA

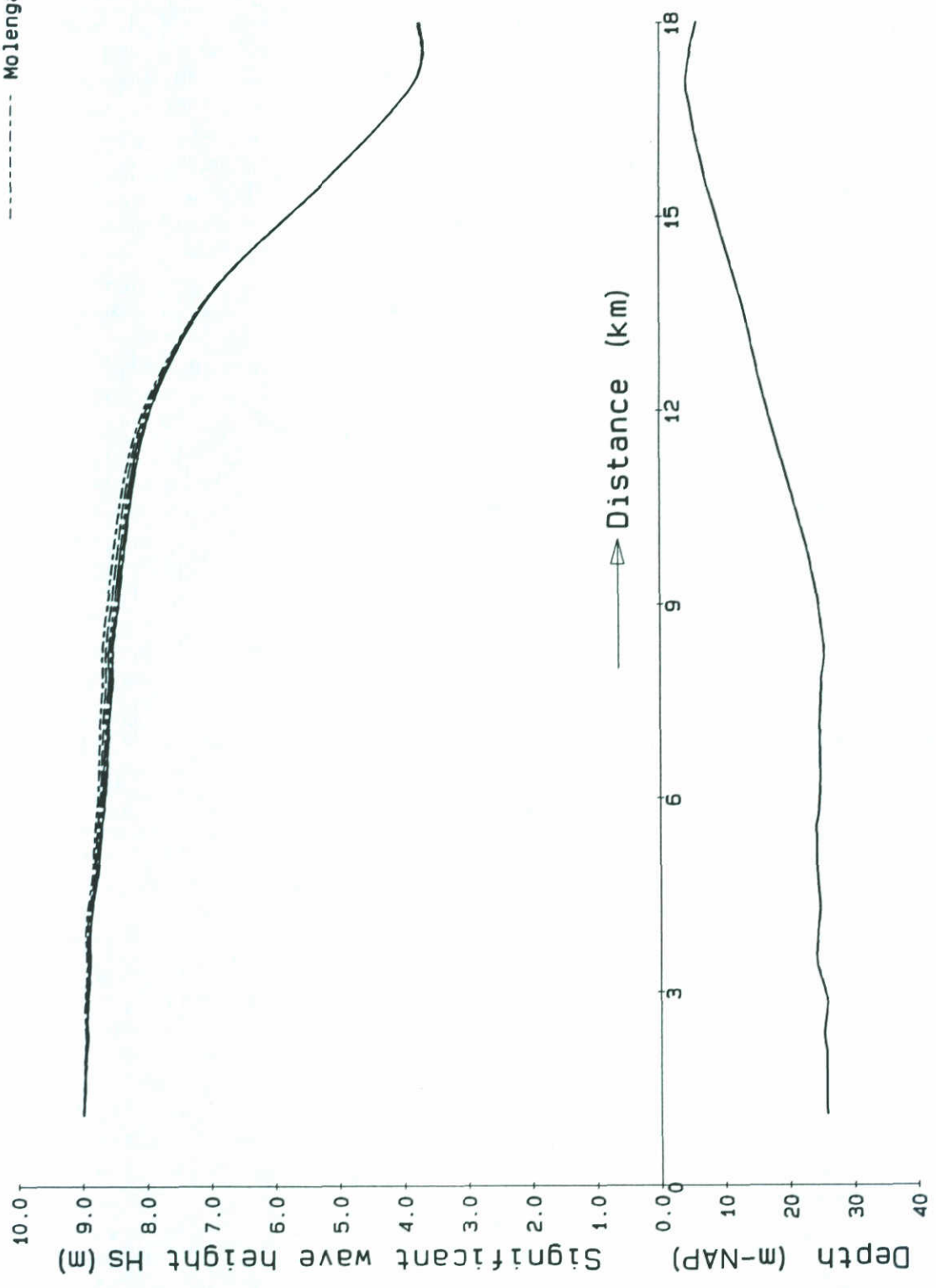
WI1WI4

DELFT HYDRAULICS

H1355

FIG.4.30d

- Molengat buiten Wi1
- - Molengat buiten Wi2
- . Molengat buiten Sss
- - - Molengat buiten Wi3
- - - Molengat buiten Wi4

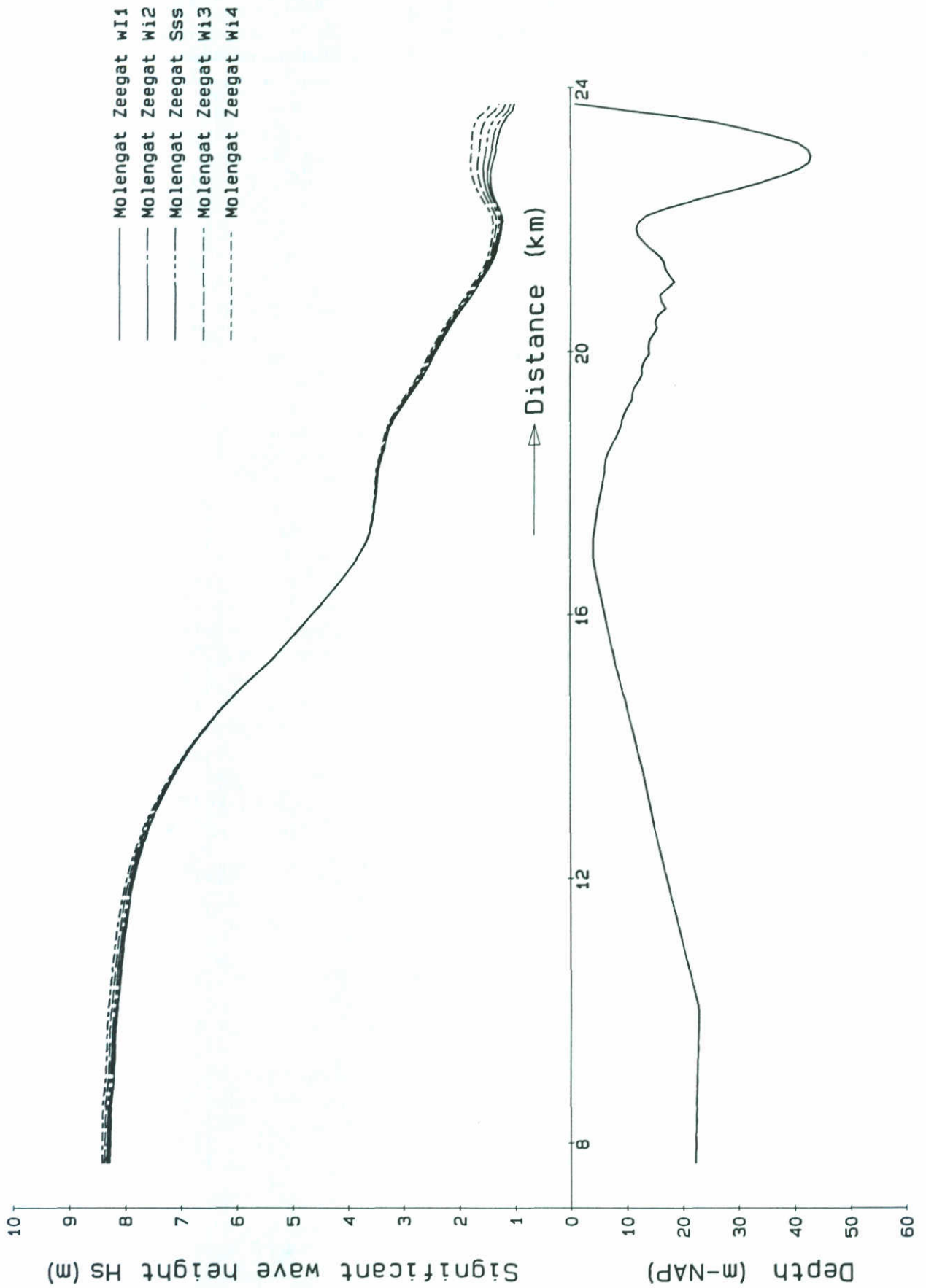


SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WIND SPEED

HYDRA-HISWA WIBUMG

DELFT HYDRAULICS

H1355 FIG. 4.30e



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WIND SPEED

HYDRA-HISWA

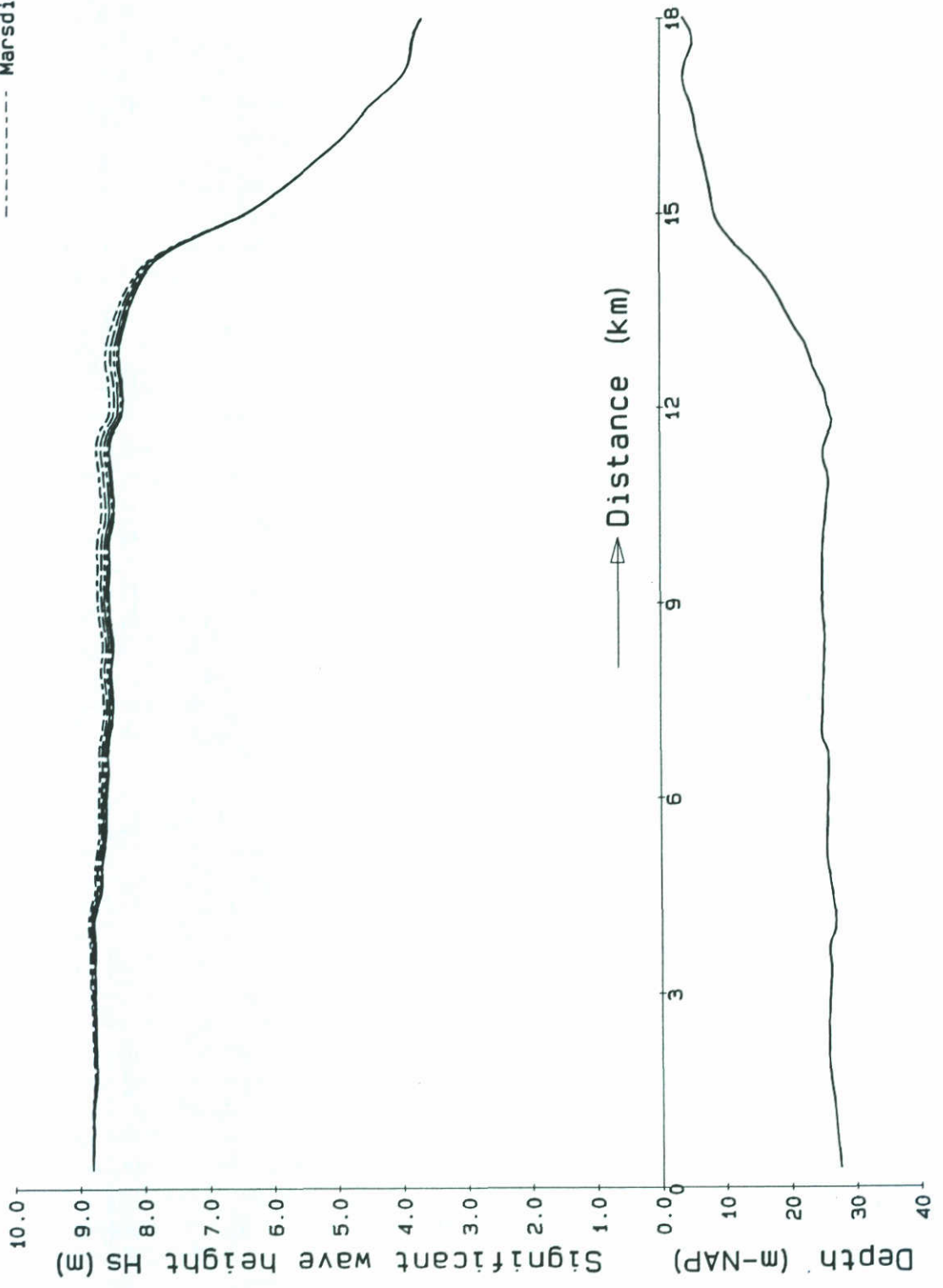
WIZGMG

DELFT HYDRAULICS

H1355

FIG. 4.30f

- Marsdiep buiten Wi1
- - - Marsdiep buiten Wi2
- · · Marsdiep buiten Sss
- - - Marsdiep buiten Wi3
- - - Marsdiep buiten Wi4



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WIND SPEED

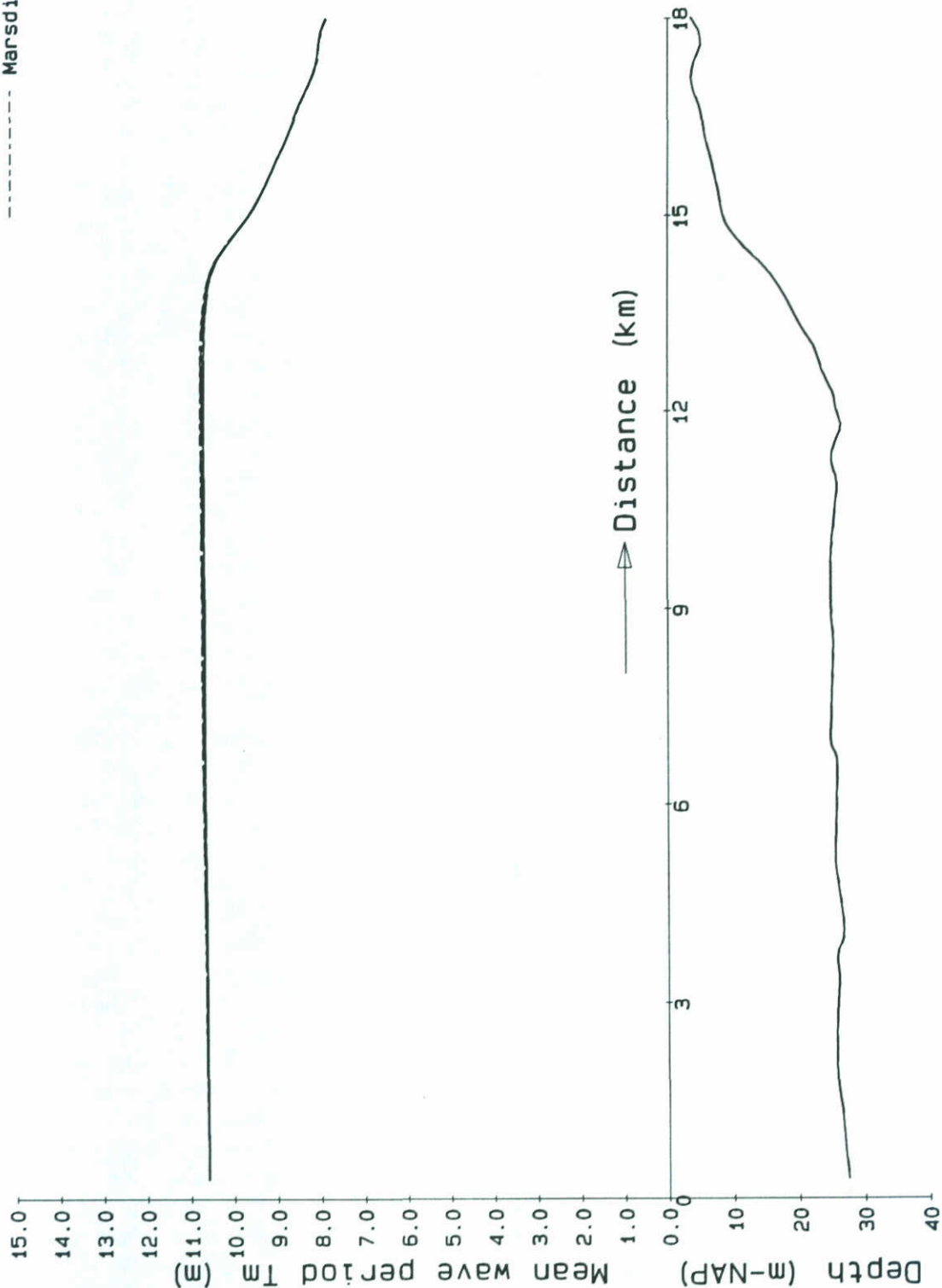
HYDRA-HISWA WIBUMD

DELFT HYDRAULICS

H1355

FIG. 4.30g

- Marsdiep buiten Wi1
- - - Marsdiep buiten Wi2
- · - Marsdiep buiten Sss
- - - Marsdiep buiten Wi3
- · - Marsdiep buiten Wi4



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WIND SPEED

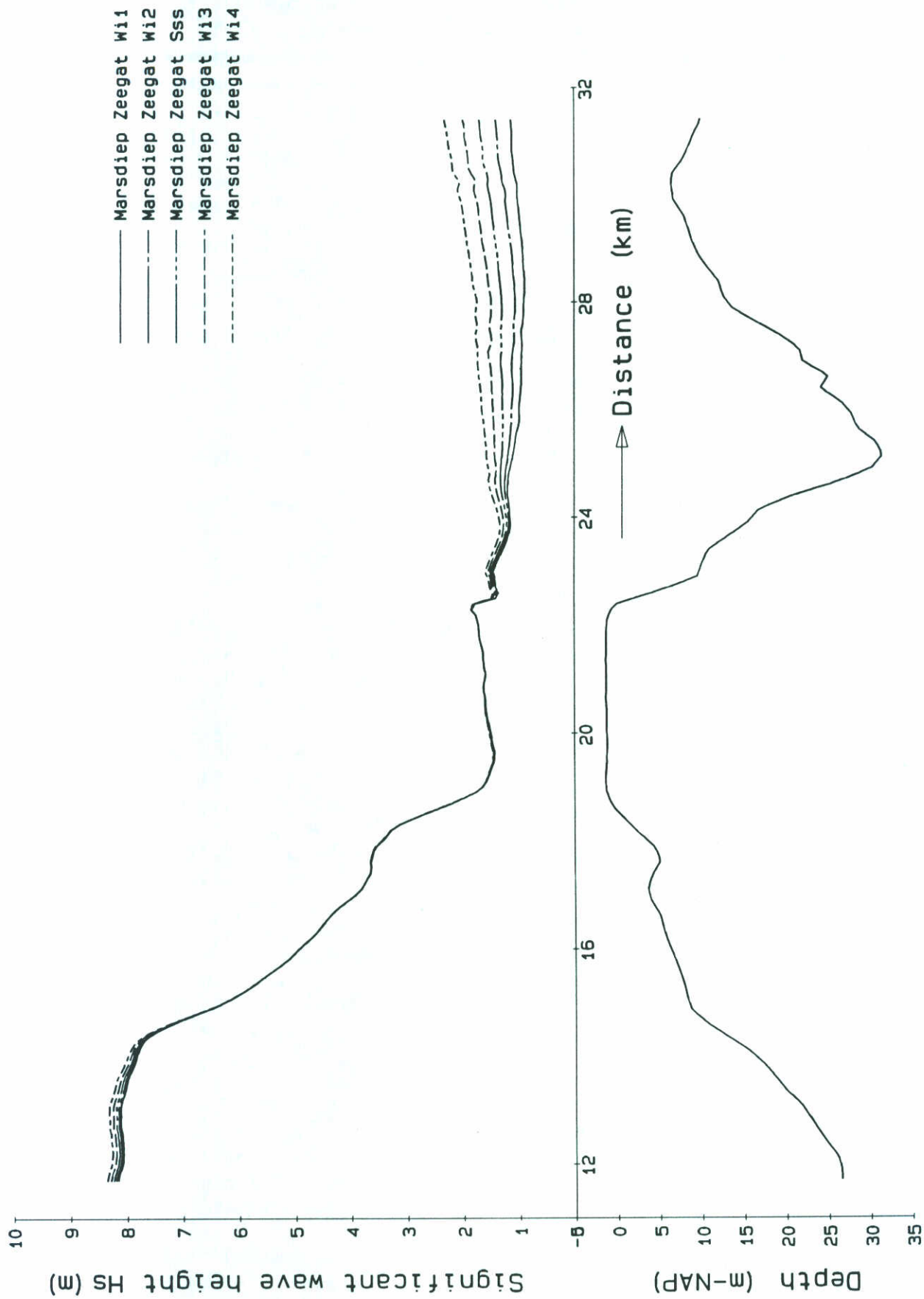
HYDRA-HISWA

WIBUMD

DELFT HYDRAULICS

H1355

FIG. 4.30h



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WIND SPEED

HYDRA-HISWA

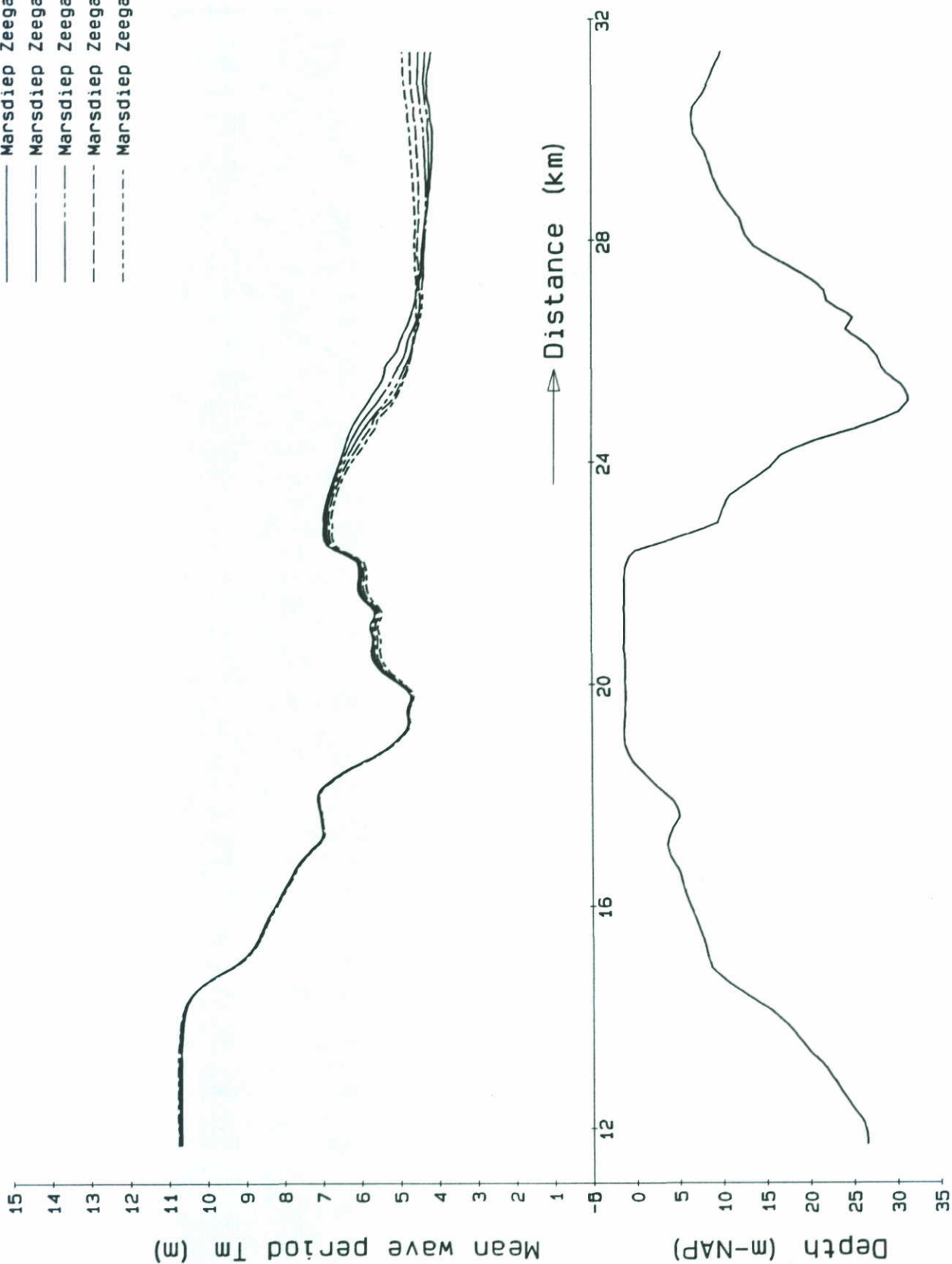
WIZGMD

DELFT HYDRAULICS

H1355

FIG. 4.30i

- Marsdiep Zeegat W11
- Marsdiep Zeegat W12
- Marsdiep Zeegat Sss
- - Marsdiep Zeegat W13
- - Marsdiep Zeegat W14



MEAN WAVE PERIOD MARSDIEP PROFILE
VARYING WIND SPEED

HYDRA-HISWA

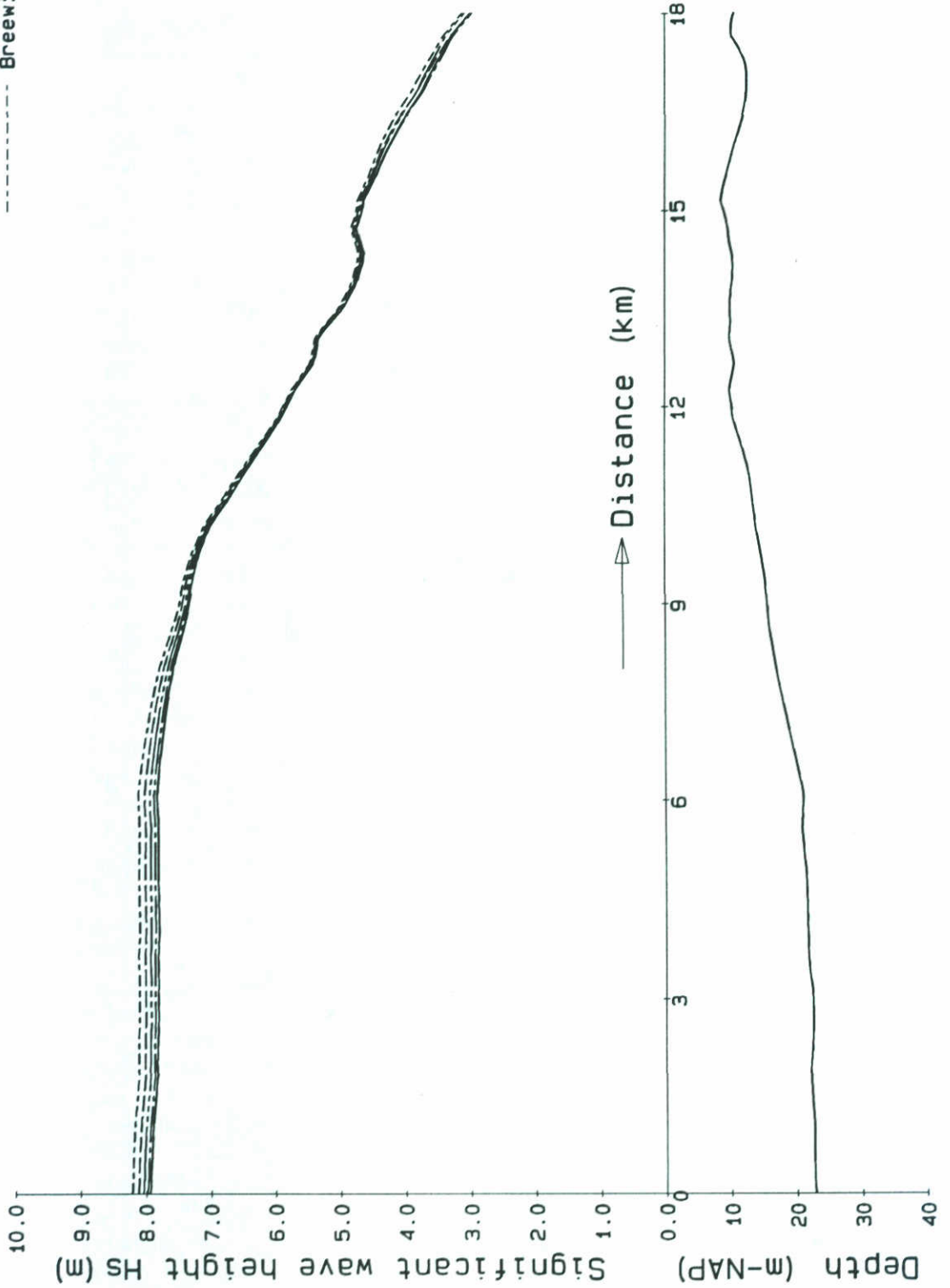
WIZGMD

DELFT HYDRAULICS

H1355

FIG. 4.30j

— Breewijd buiten Wi1
 — Breewijd buiten Wi2
 — Breewijd buiten Sss
 - - Breewijd buiten Wi3
 - - Breewijd buiten Wi4



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WIND SPEED

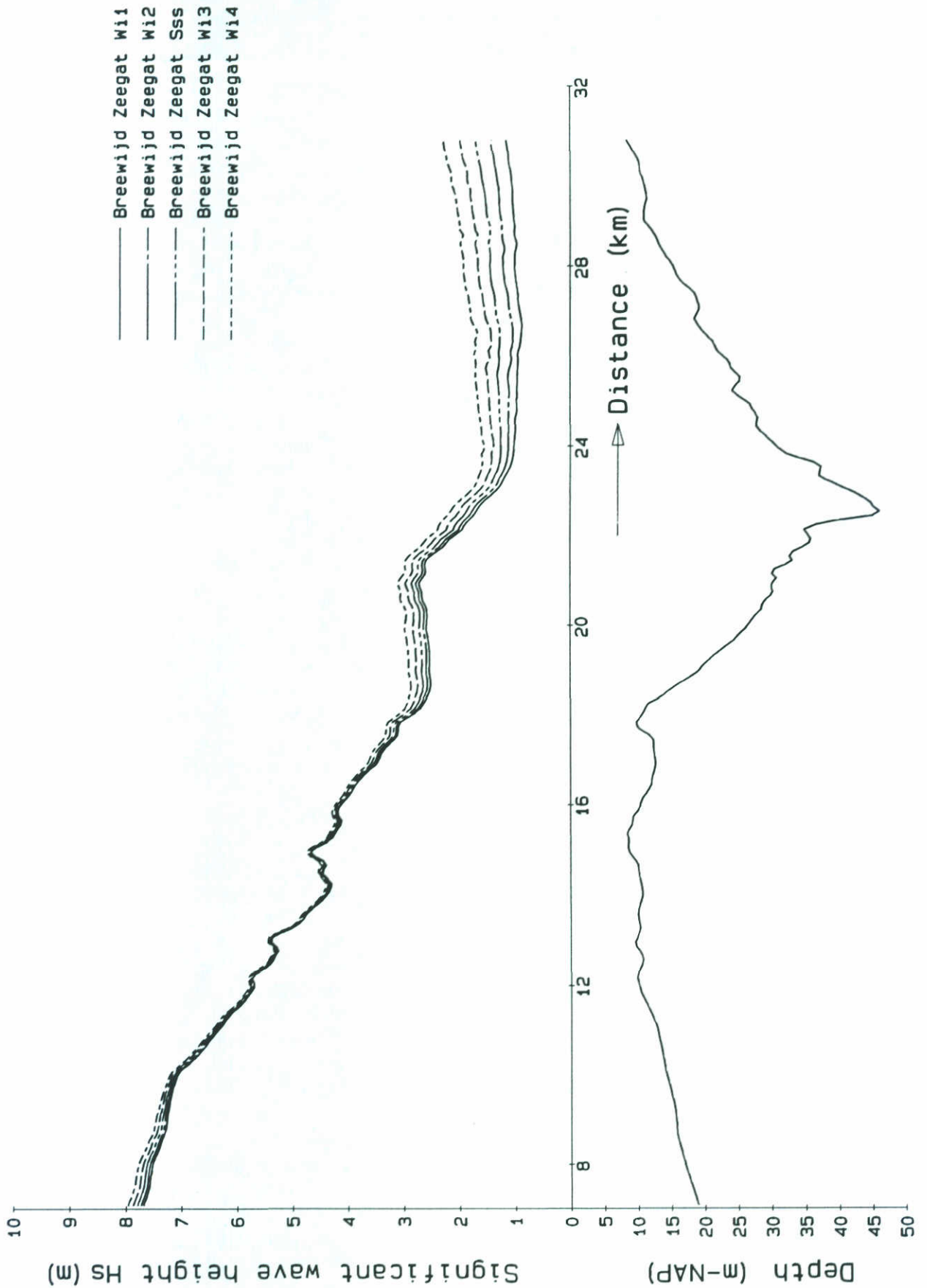
HYDRA-HISWA

WIBUBW

DELFT HYDRAULICS

H1355

FIG. 4.30k



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WIND SPEED

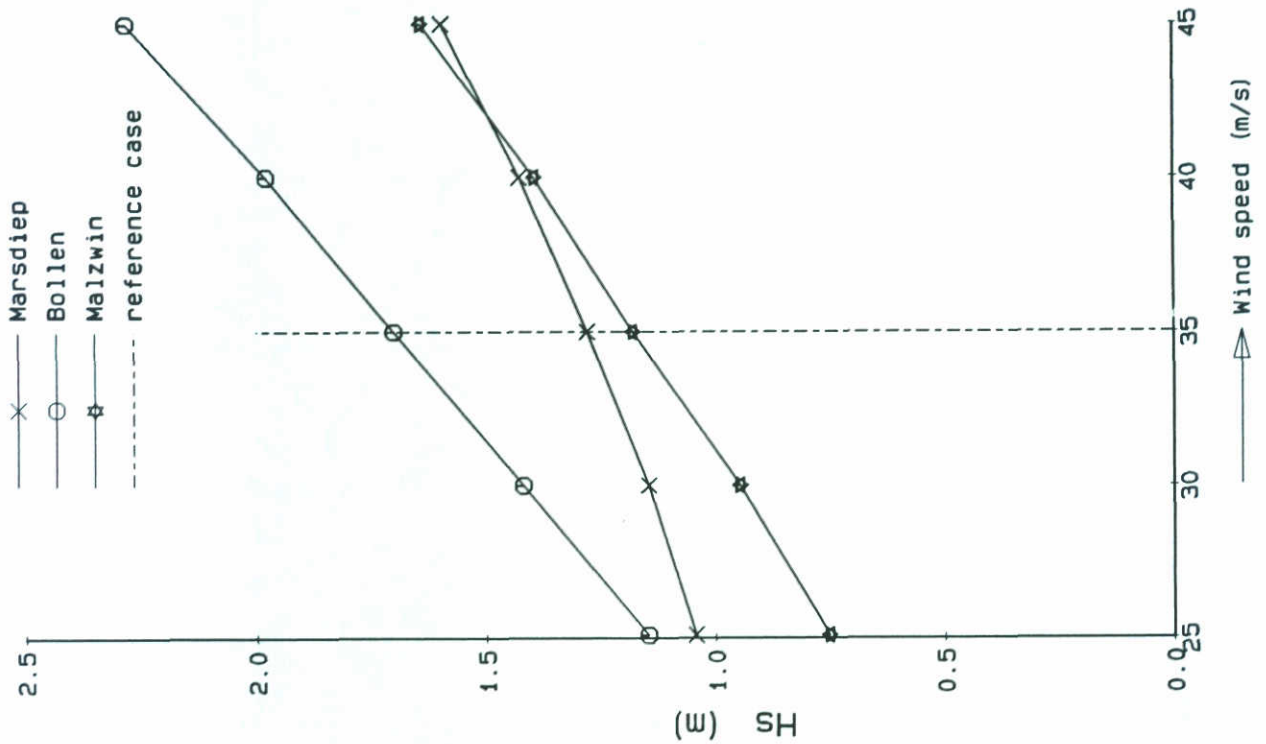
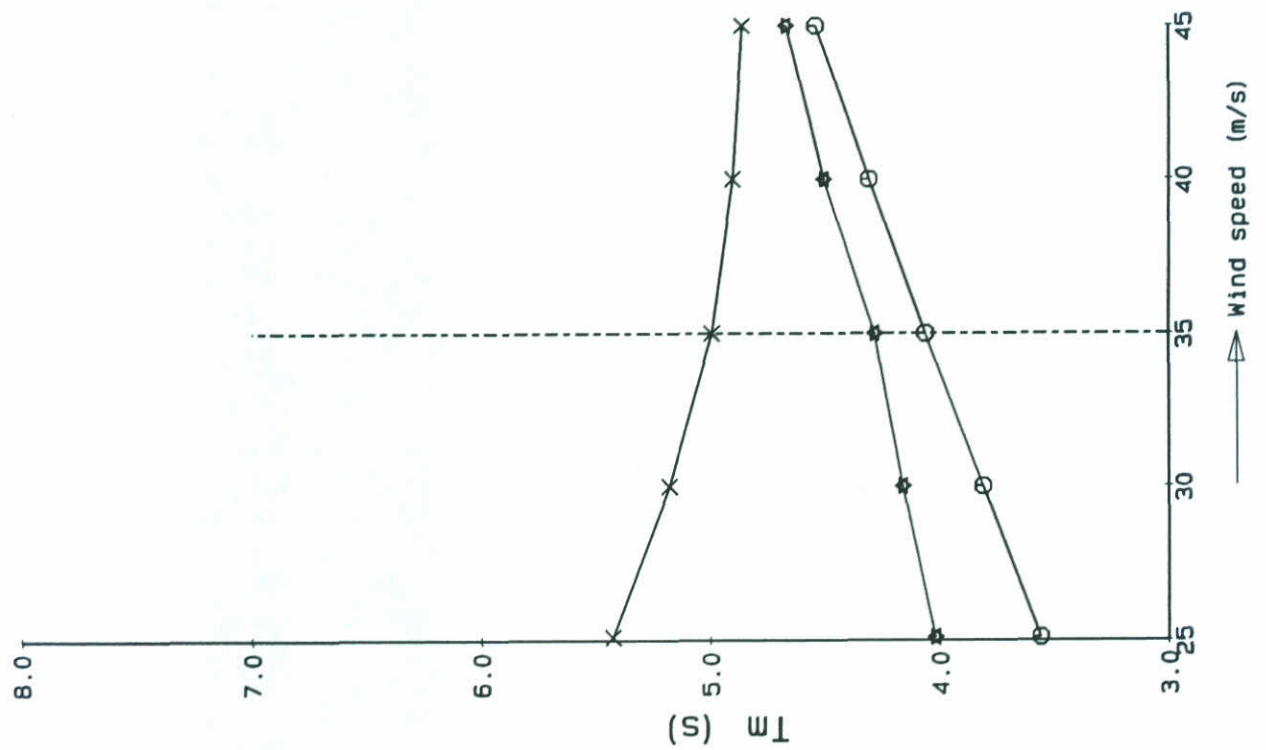
HYDRA-HISWA

WIZGBW

DELFT HYDRAULICS

H1355

FIG. 4.301



EFFECT OF WIND SPEED VARIATION
ENTRANCE WADDEN SEA

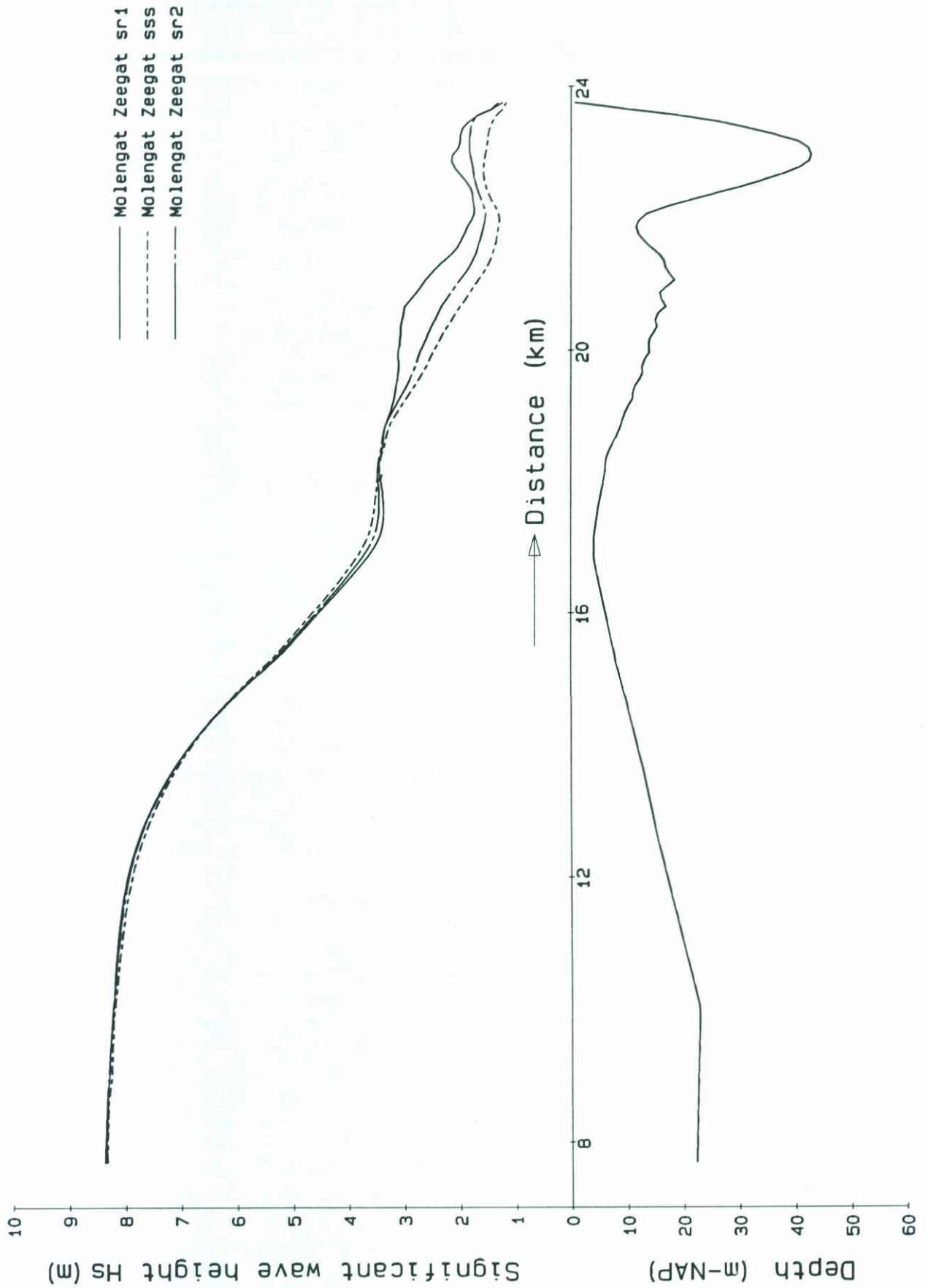
HYDRA-HISWA

WI1WI4

DELFT HYDRAULICS

H1355

FIG. 4.30m



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING CURRENT CONDITIONS

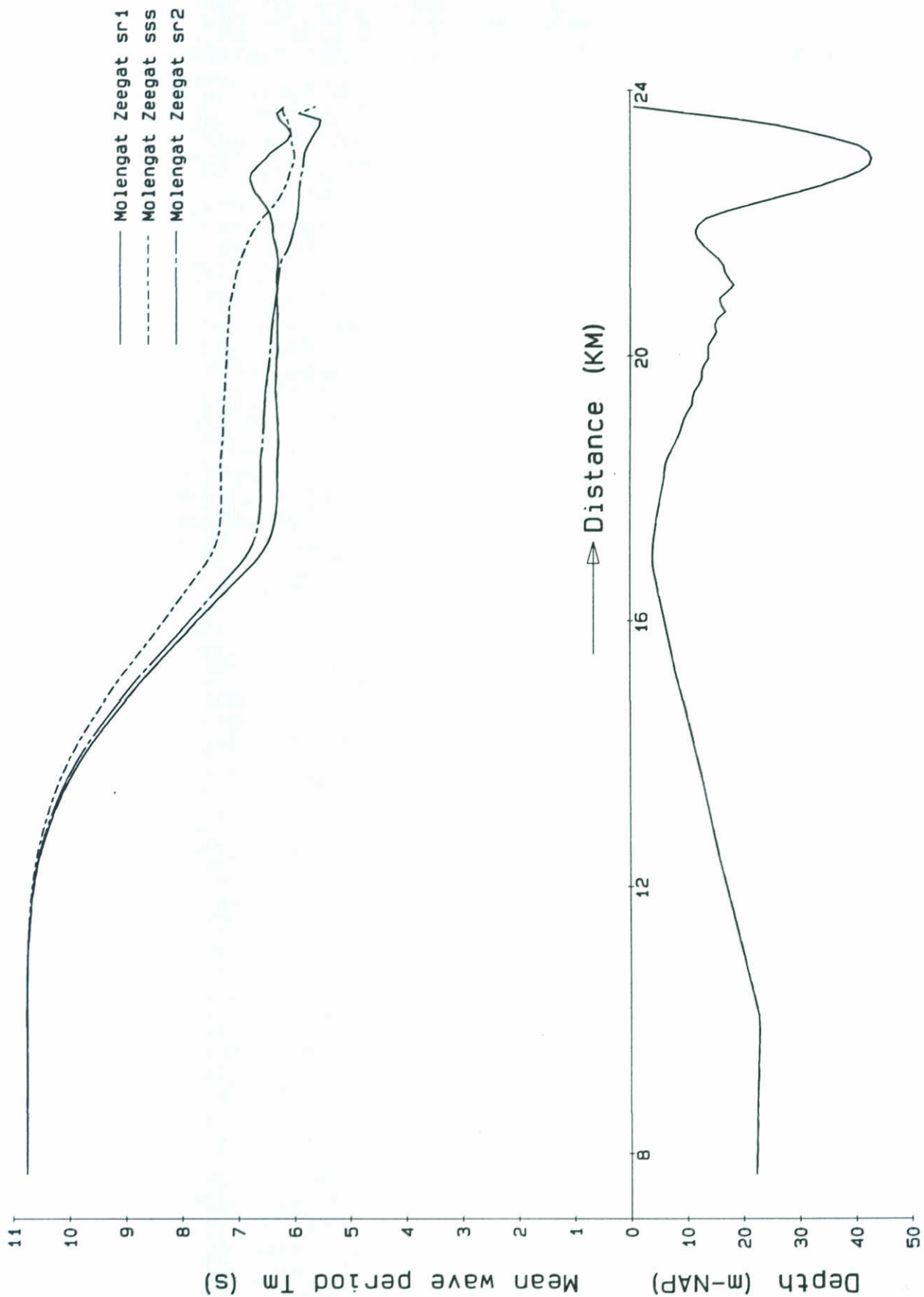
HYDRA-HISWA

MGZGHS

DELFT HYDRAULICS

H1355

FIG. 4.31 o



MEAN WAVE PERIOD MOLENGAT PROFILE
 VARYING CURRENT CONDITIONS

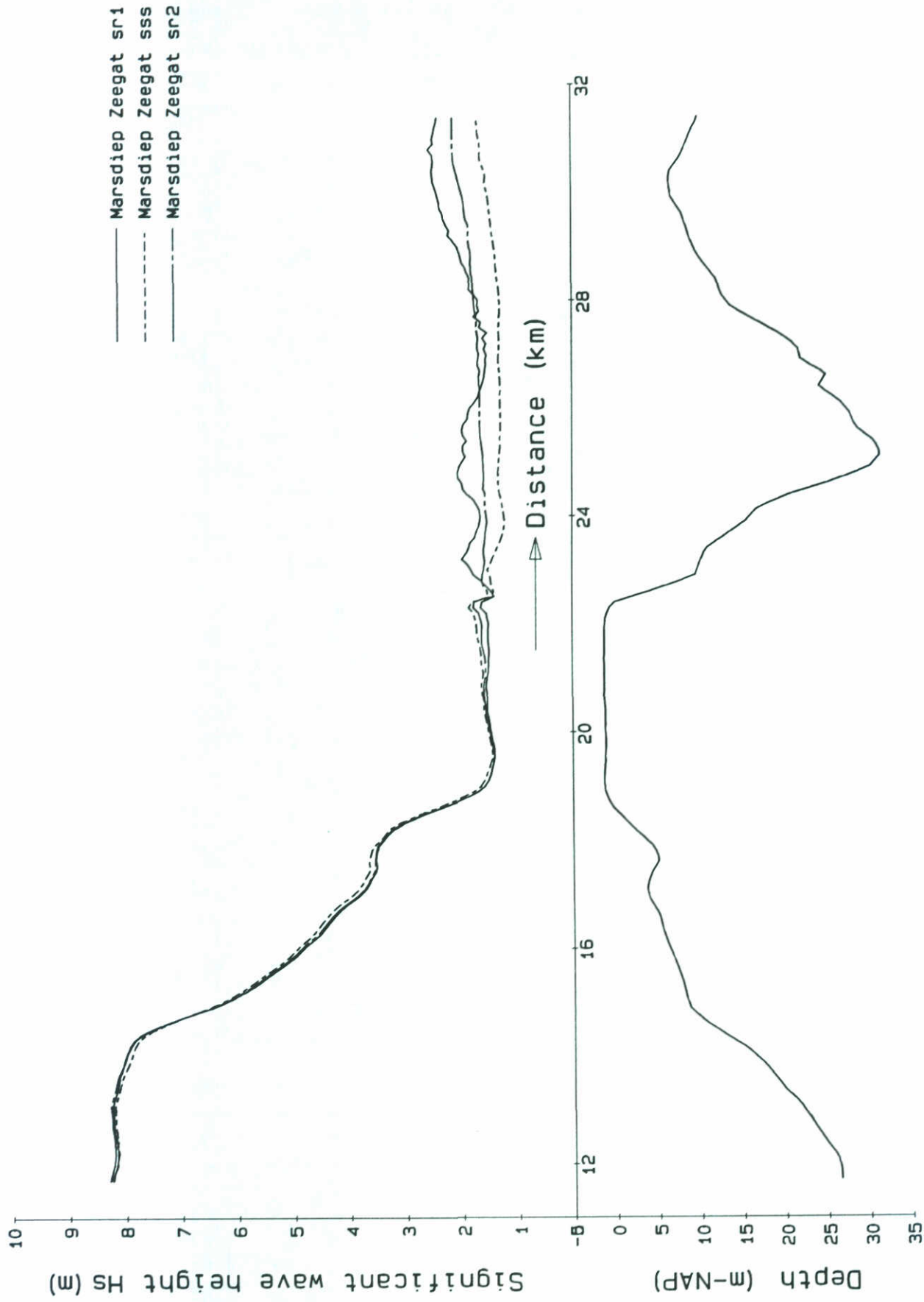
HYDRA-HISWA

MGZGTM

DELFT HYDRAULICS

H1355

FIG. 4.31 b



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING CURRENT CONDITIONS

HYDRA-HISWA

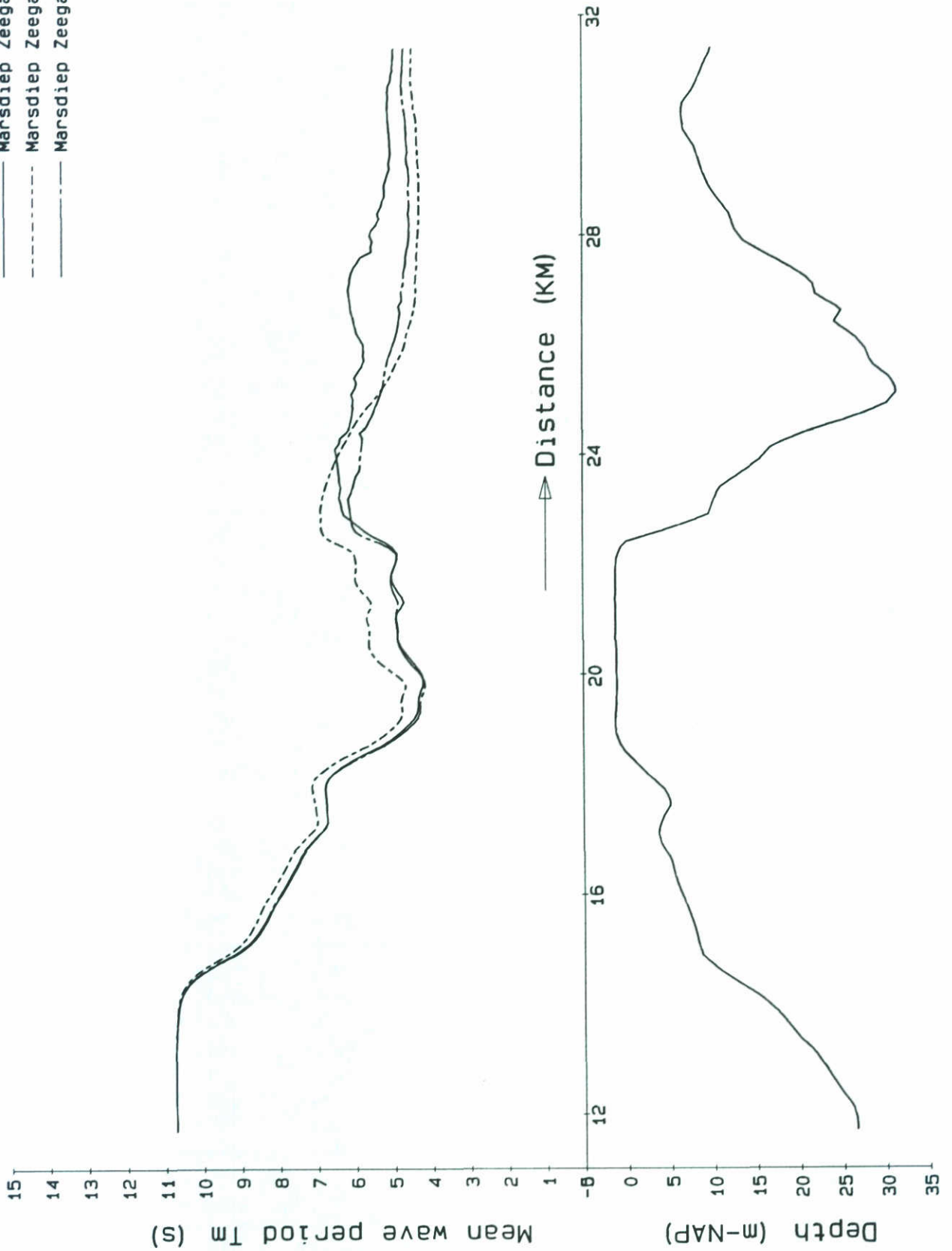
MDZGHS

DELFT HYDRAULICS

H1355

FIG. 4.31 c

- Marsdiep Zeegat sr1
- - - Marsdiep Zeegat sss
- Marsdiep Zeegat sr2



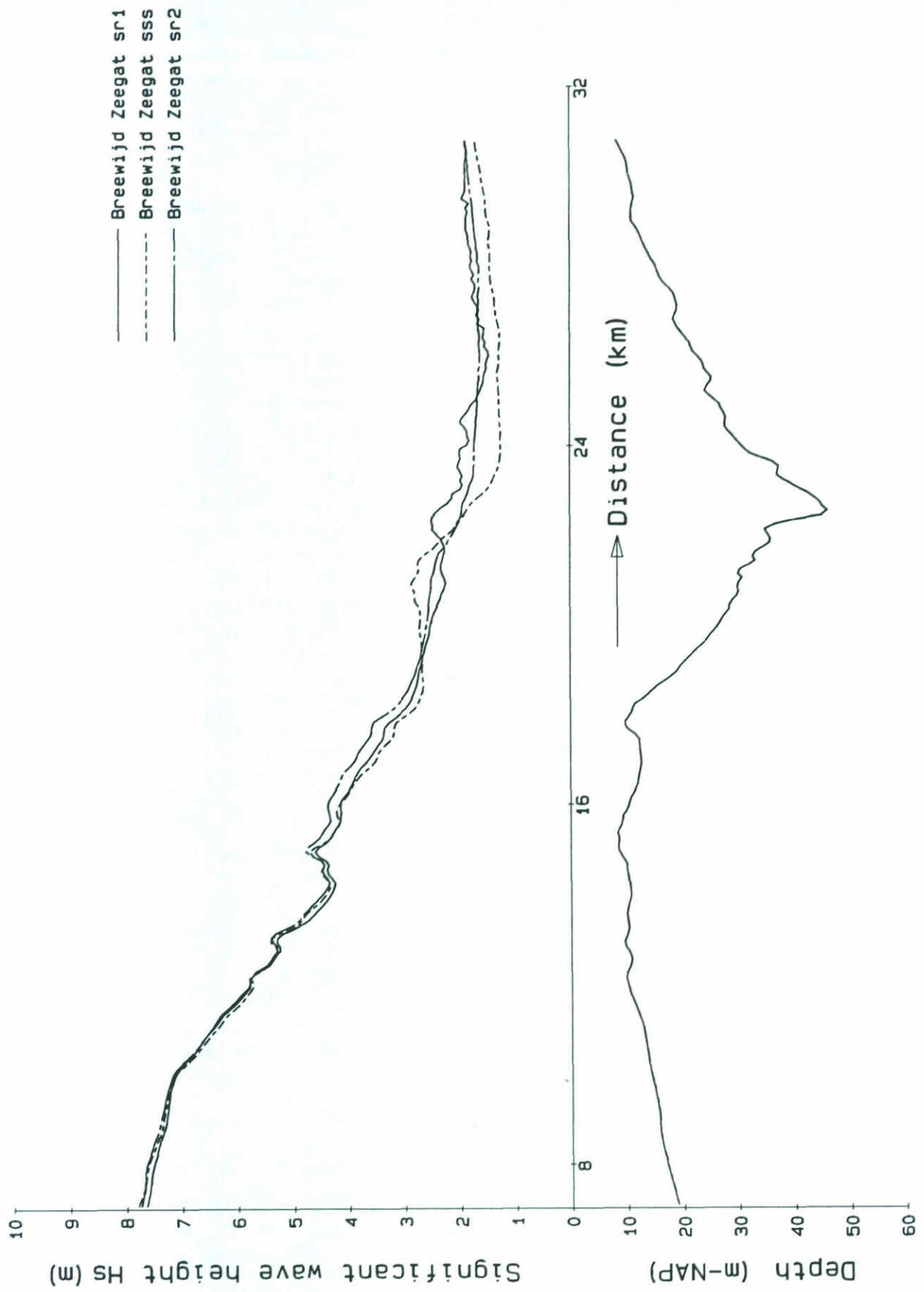
MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING CURRENT CONDITIONS

HYDRA-HISWA MDZGTM

DELFT HYDRAULICS

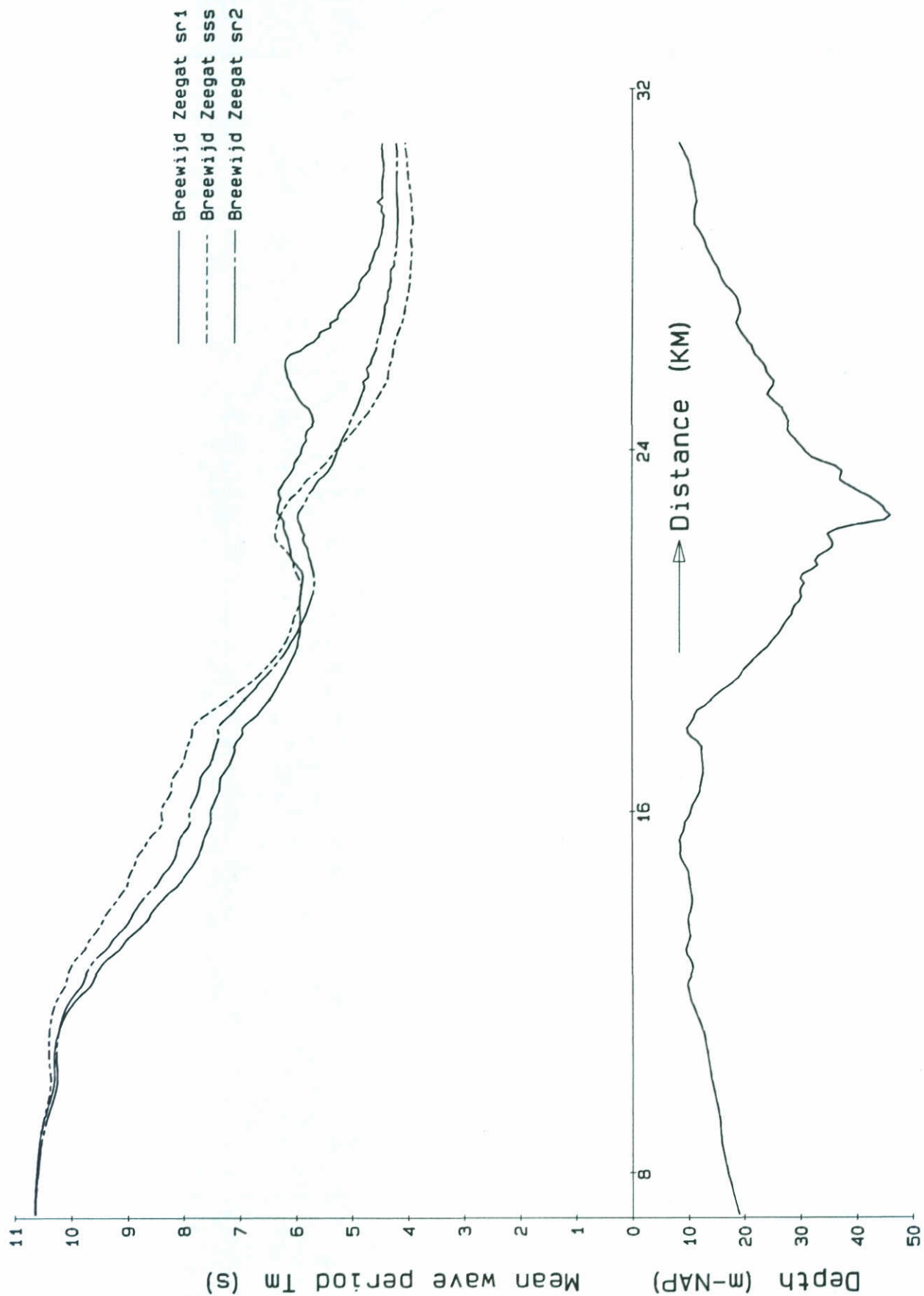
H1355

FIG. 4.31 d



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING CURRENT CONDITIONS

HYDRA-HISWA BWZGHS



MEAN WAVE PERIOD BREEWIJD PROFILE
 VARYING CURRENT CONDITIONS

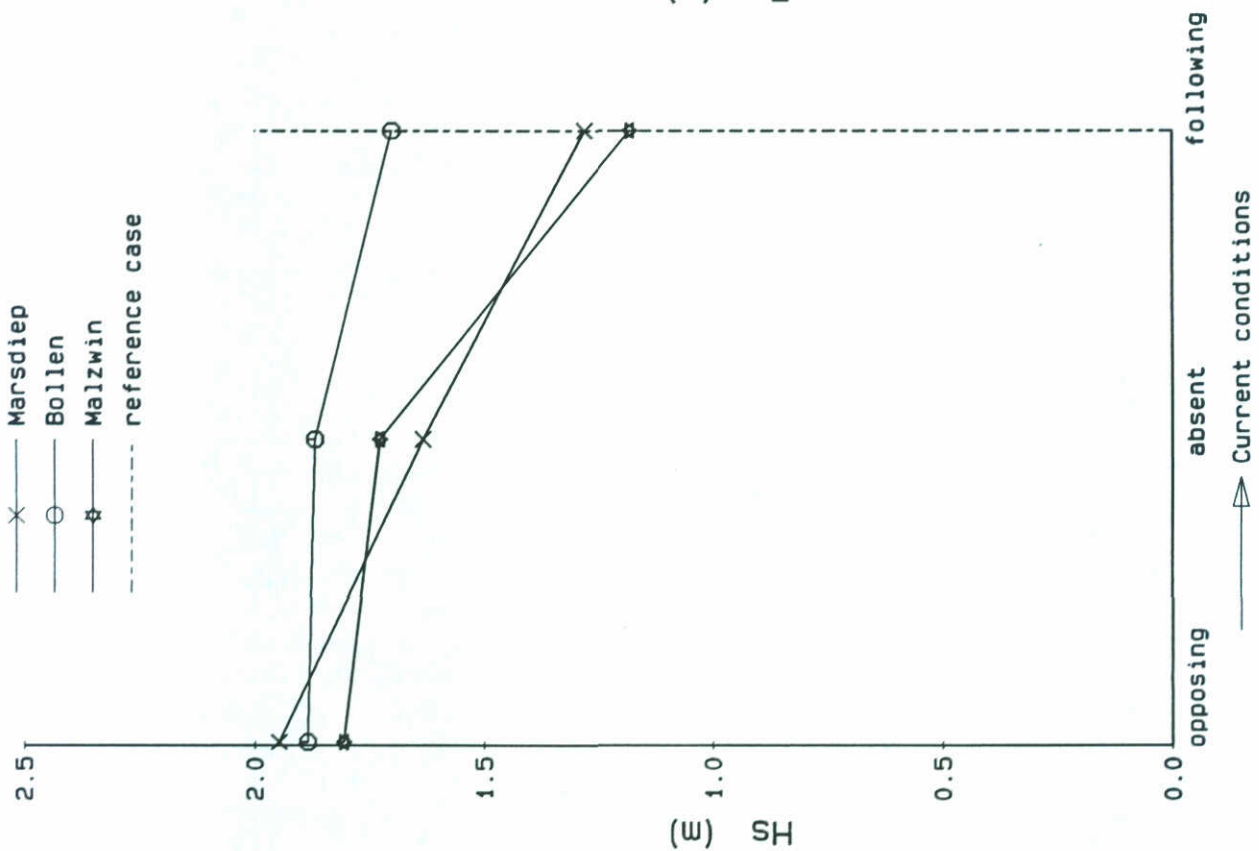
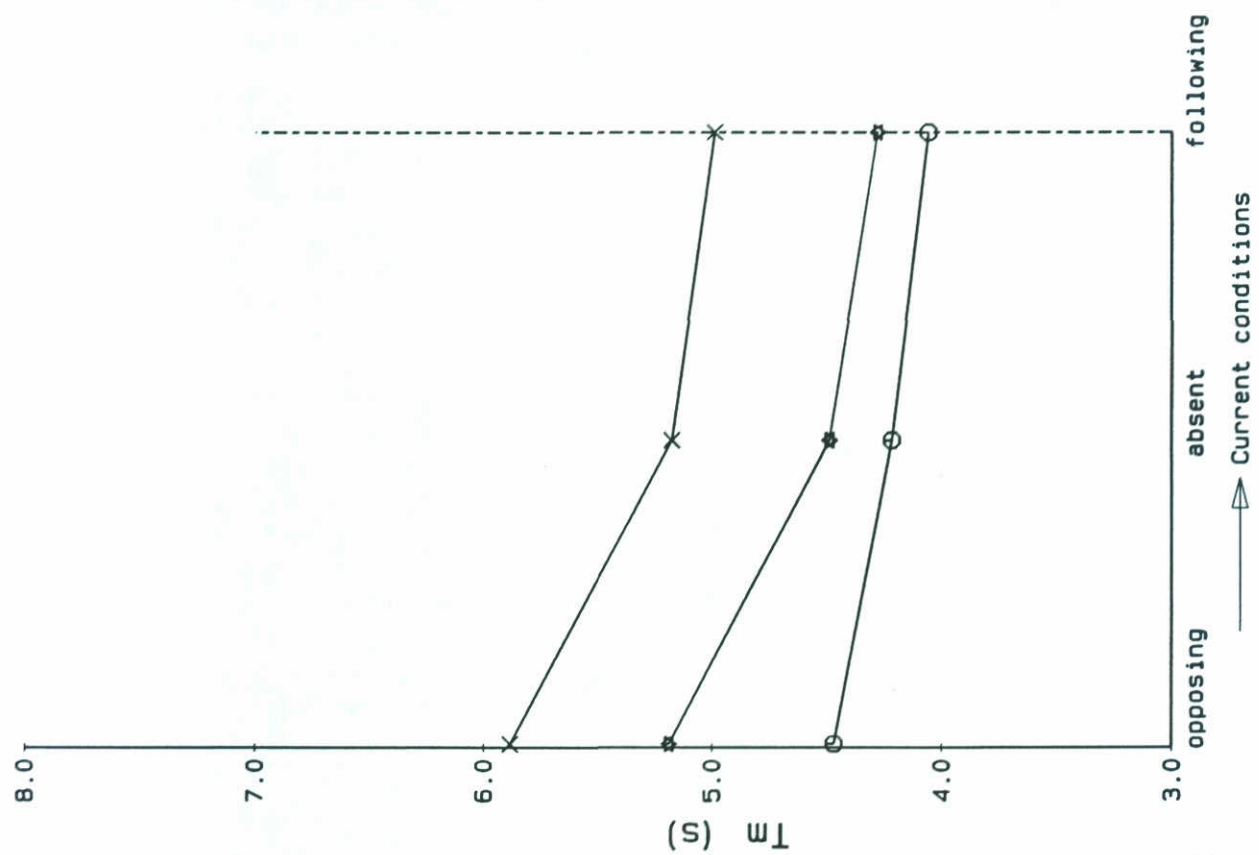
HYDRA-HISWA

BWZGTM

DELFT HYDRAULICS

H1355

FIG. 4.31 f



- x Marsdiep
- o Bollen
- * Malzwin
- reference case

EFFECT OF CURRENT CONDITIONS
ENTRANCE WADDEN SEA

HYDRA-HISWA

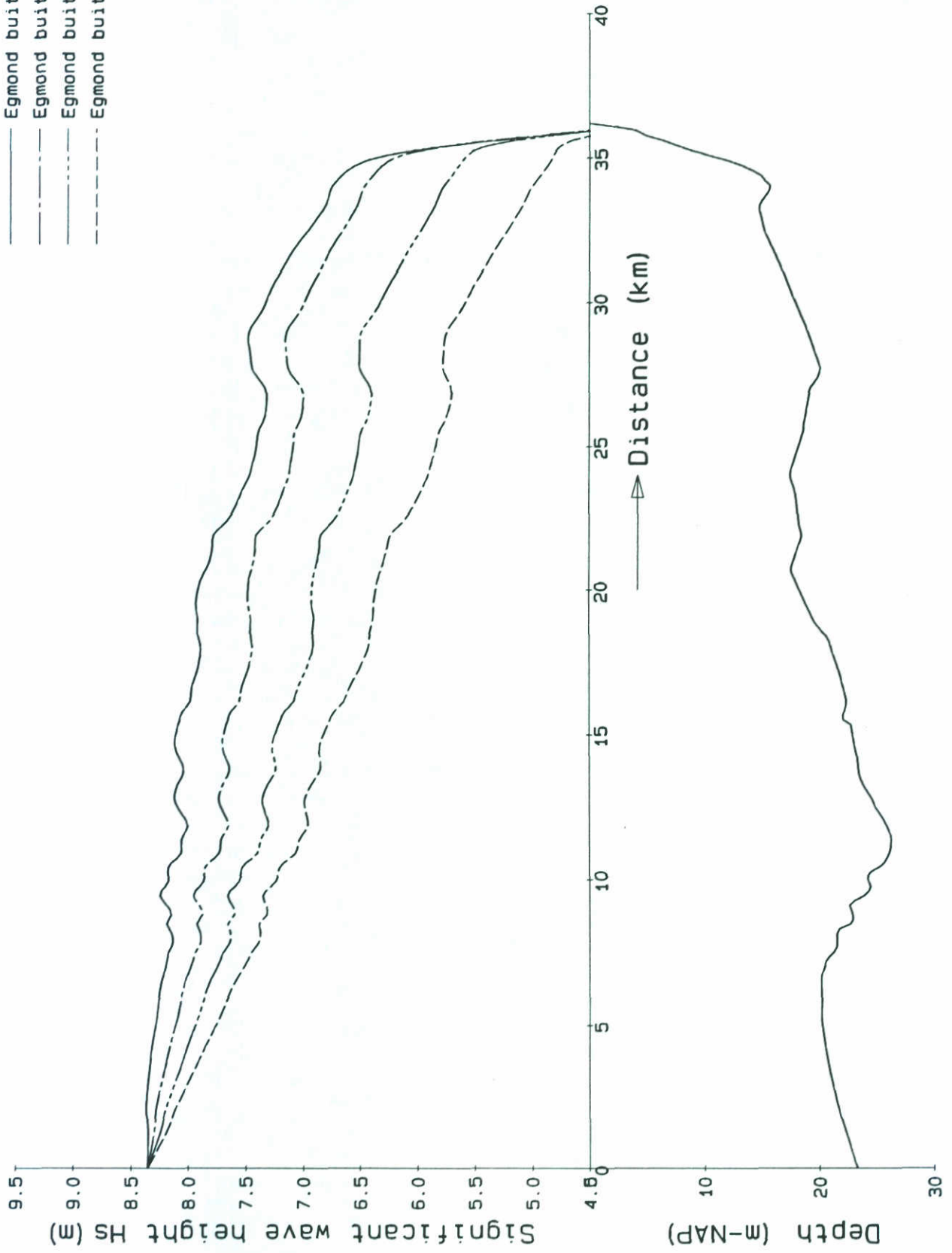
SR1SR2

DELFT HYDRAULICS

H1355

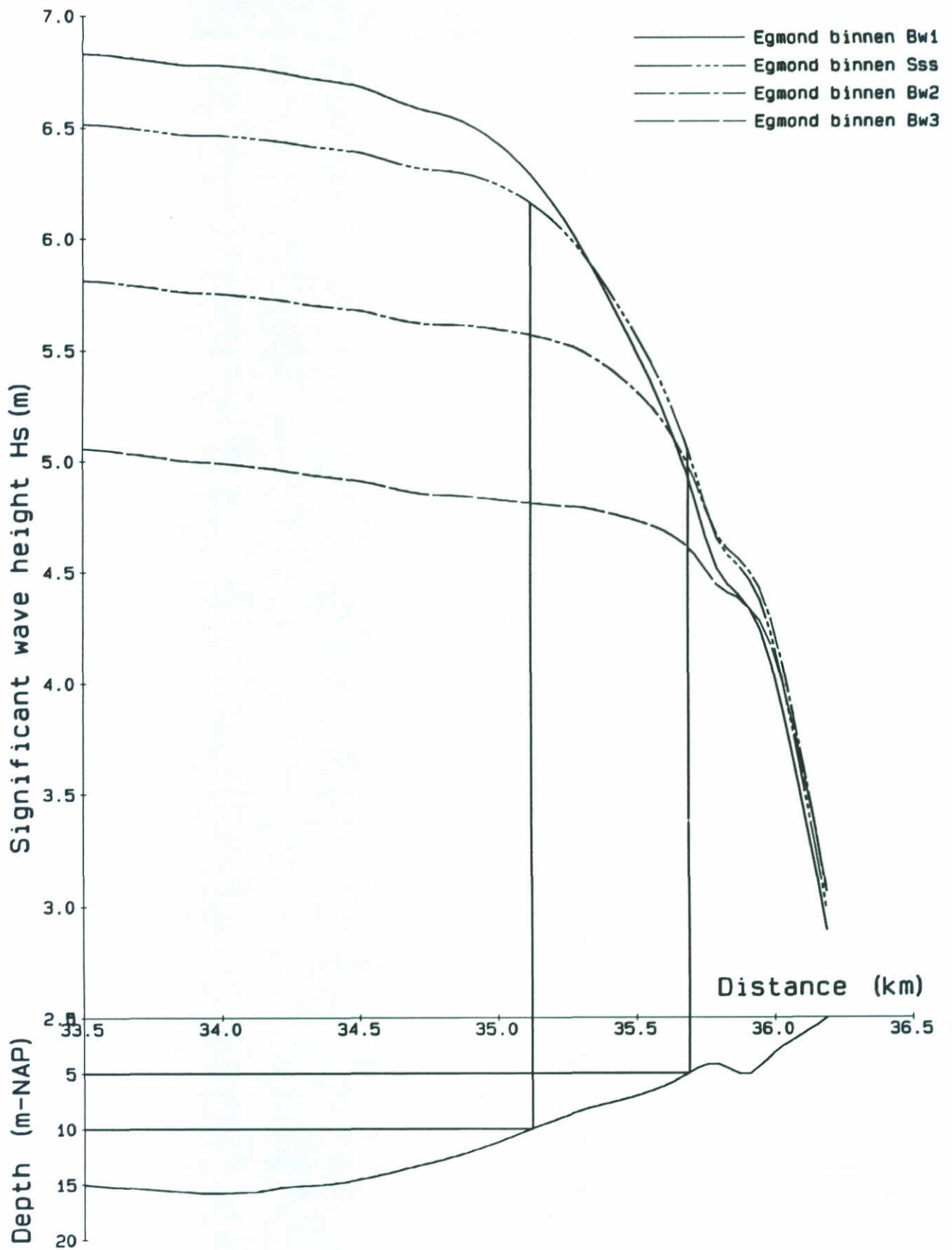
FIG. 4.31 g

- Egmond buiten Bw1
- - - Egmond buiten Sss
- Egmond buiten Bw2
- - - Egmond buiten Bw3



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

HYDRA-HISWA	BWBUEG
H1355	FIG.4.32a



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING BOTTOM FRICTION

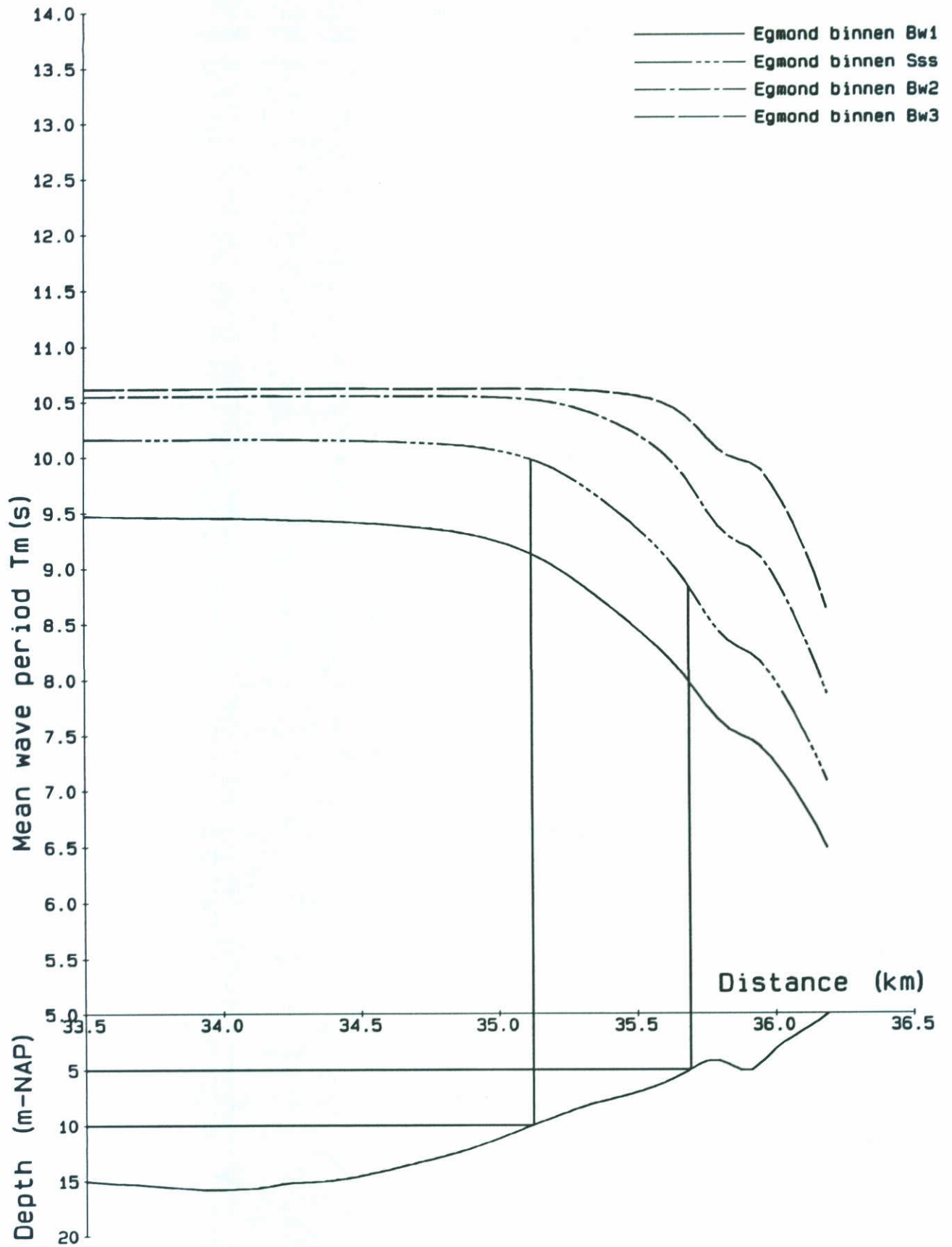
HYDRA-HISWA

BW1BW4

DELFT HYDRAULICS

H1355

FIG. 4.32b



MEAN WAVE PERIOD EGMOND PROFILE
 VARYING BOTTOM FRICTION

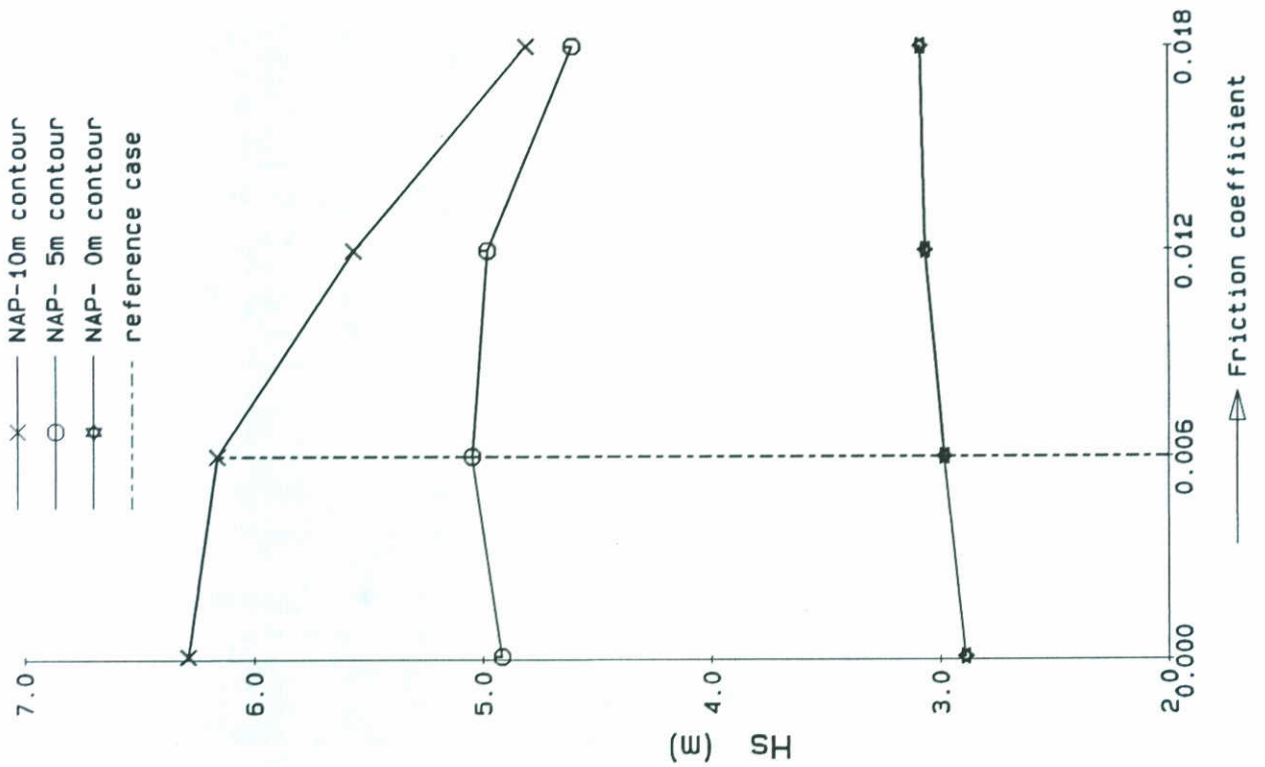
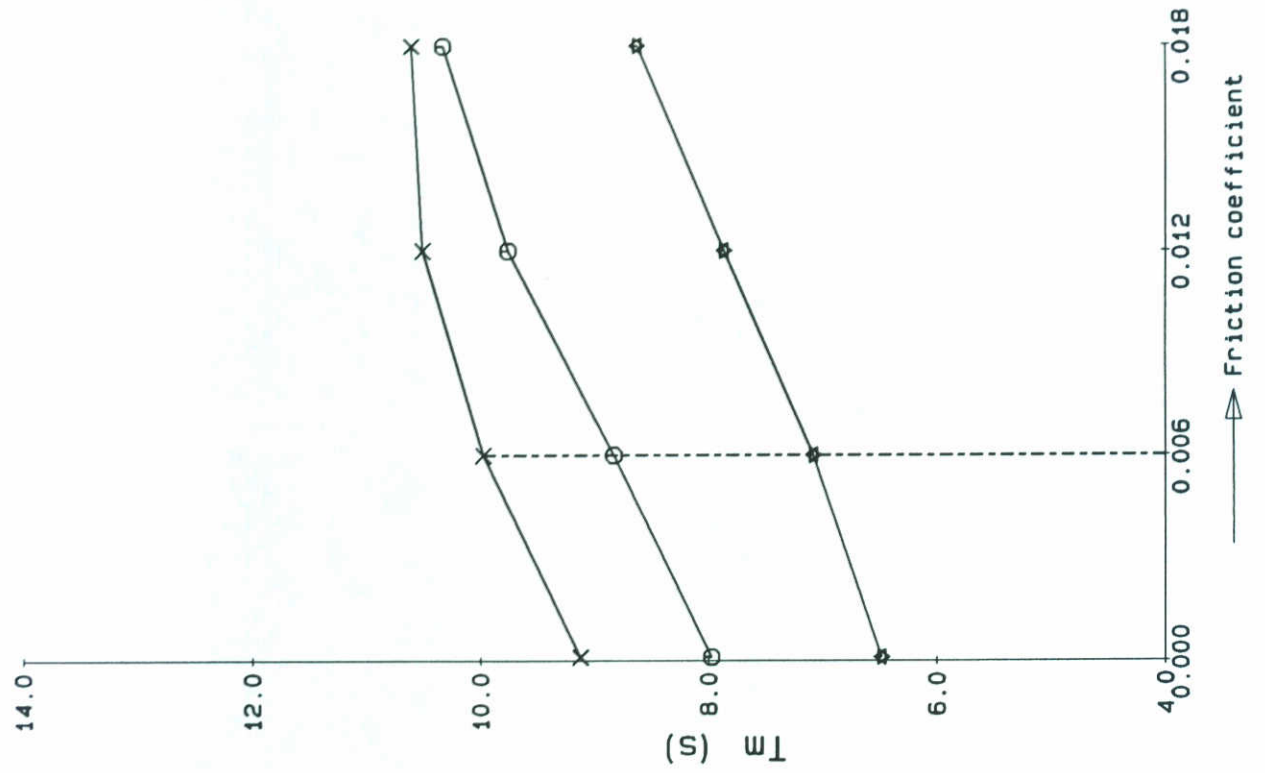
HYDRA-HISWA

BW1BW4

DELFT HYDRAULICS

H1355

FIG.4.32c



EFFECT OF FRICTION COEFFICIENT
EGMOND PROFILE

HYDRA-HISWA

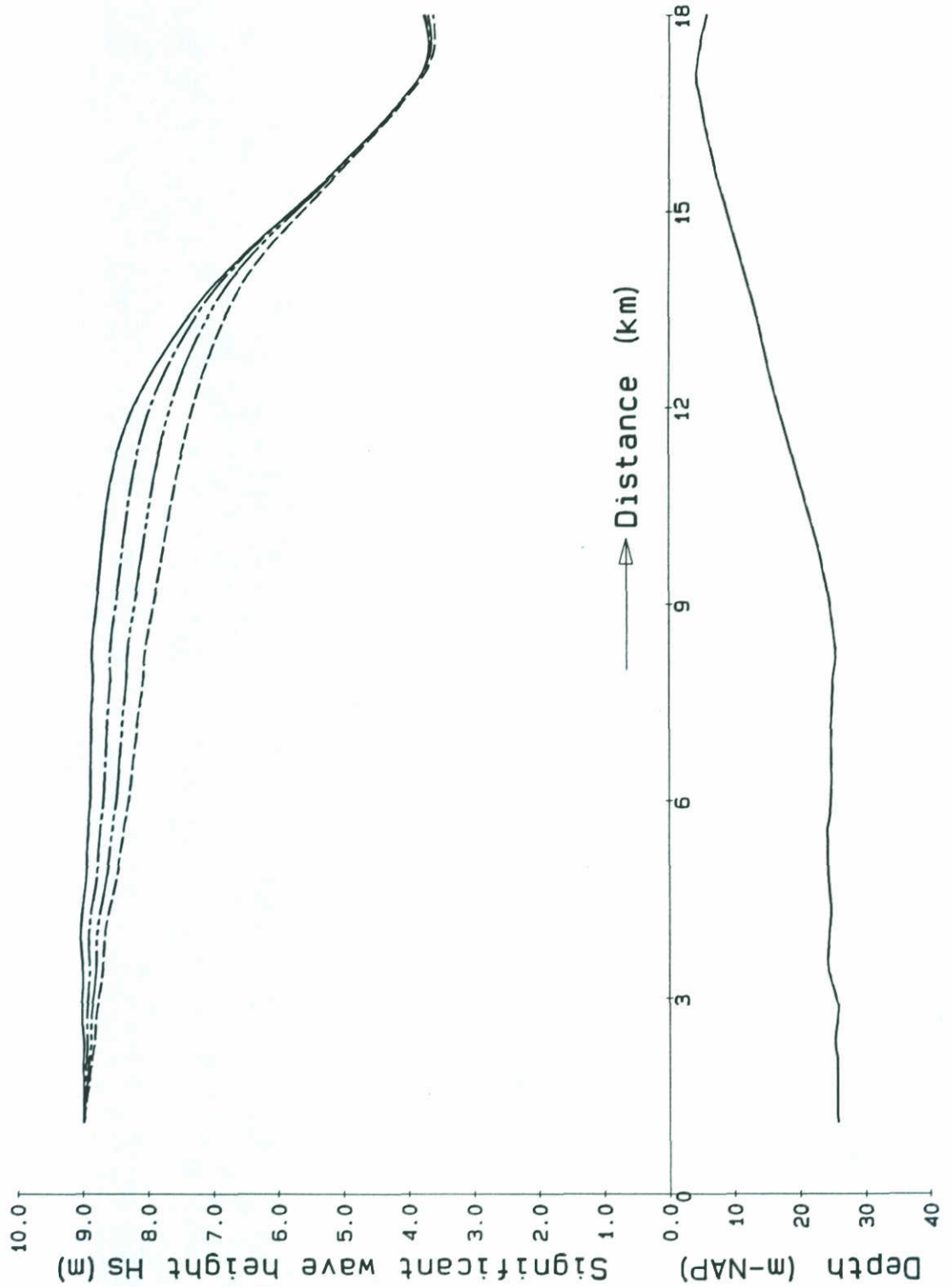
BW1BW3

DELFT HYDRAULICS

H1355

FIG. 4.32d

- Molengat buiten BW1
- - - Molengat buiten Sss
- · - Molengat buiten BW2
- - - Molengat buiten BW3



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

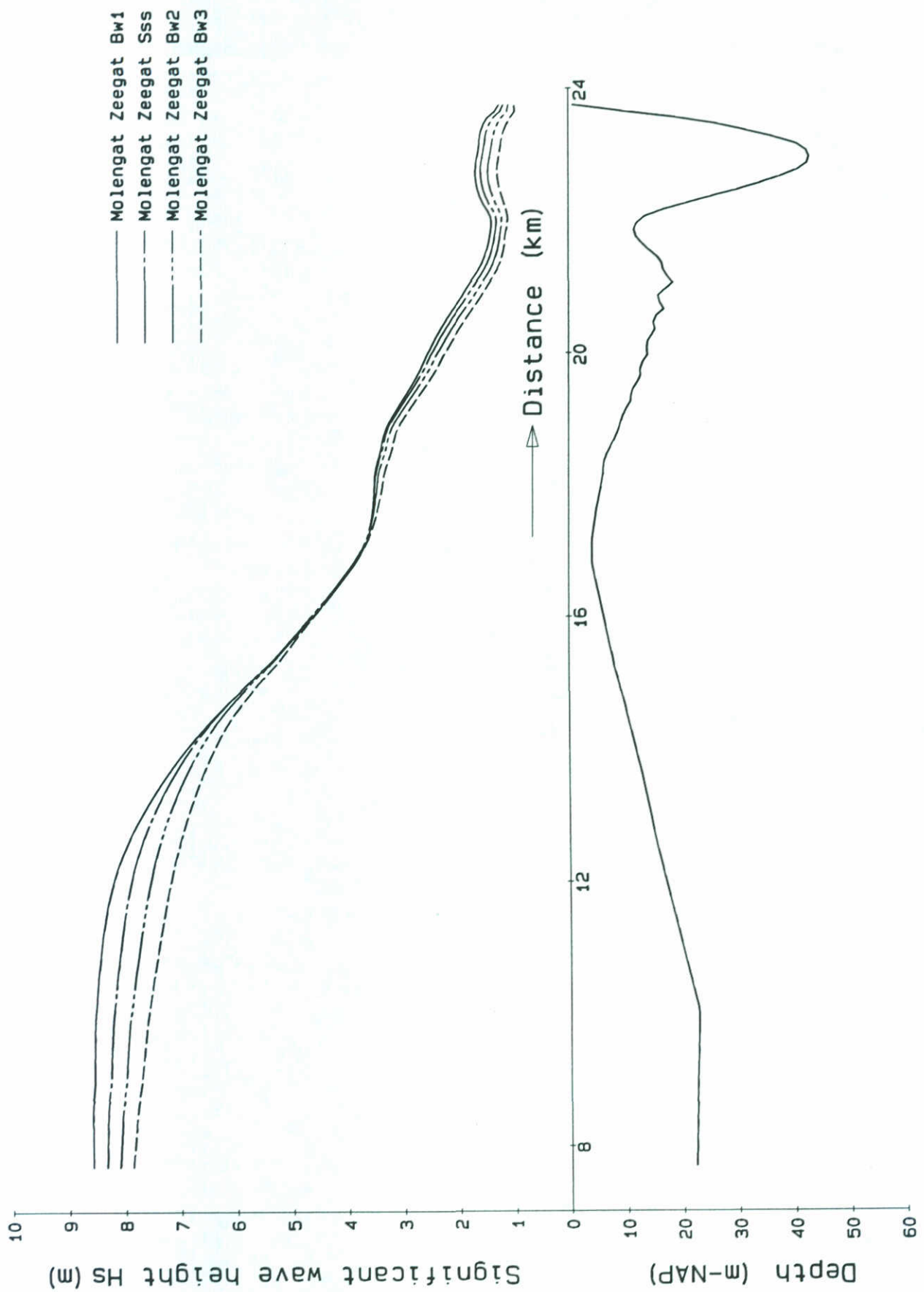
HYDRA-HISWA

BWBUMG

DELFT HYDRAULICS

H1355

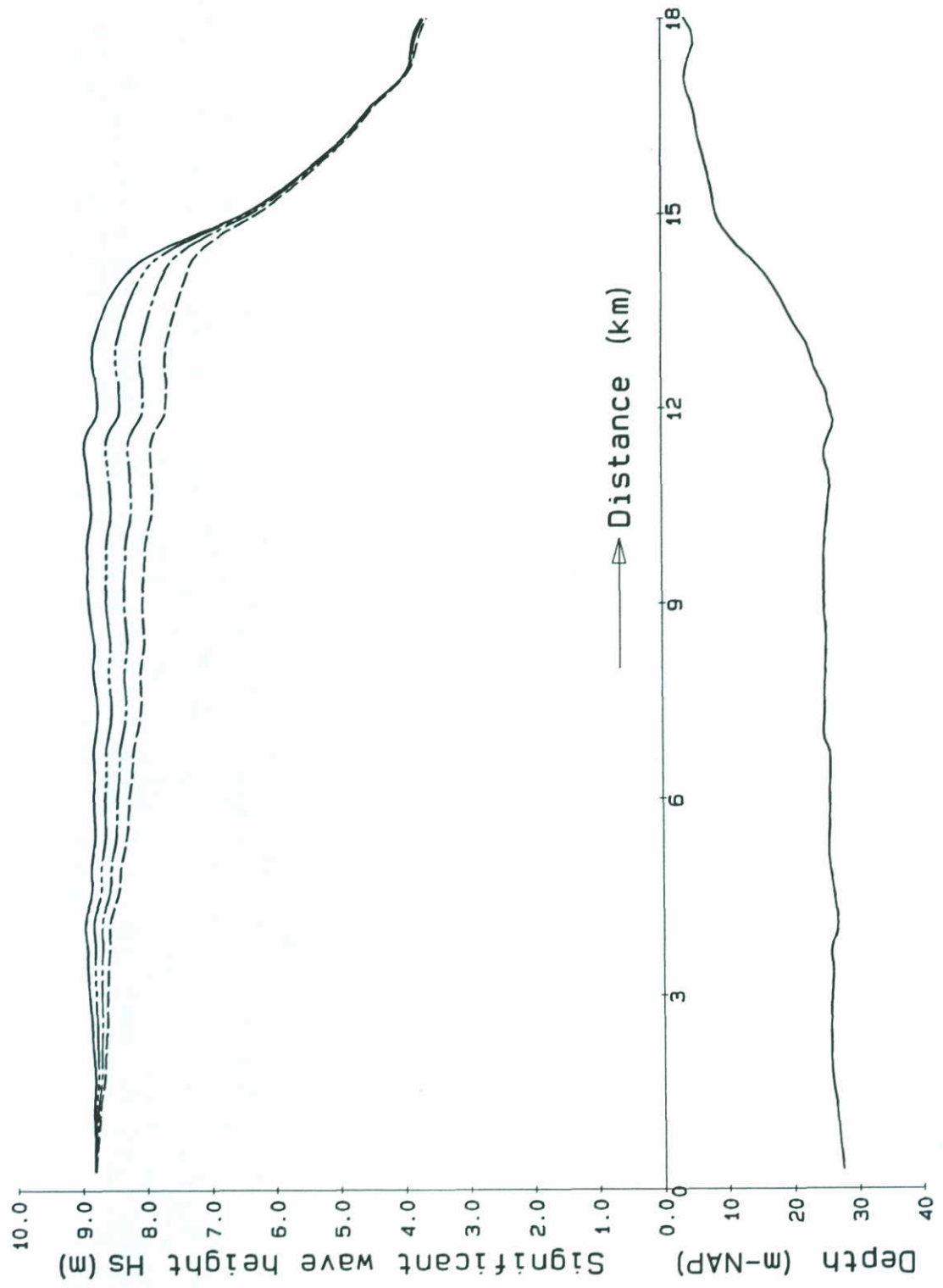
FIG. 4.32e



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

HYDRA-HISWA	BWZGMG
H1355	FIG. 4.32f

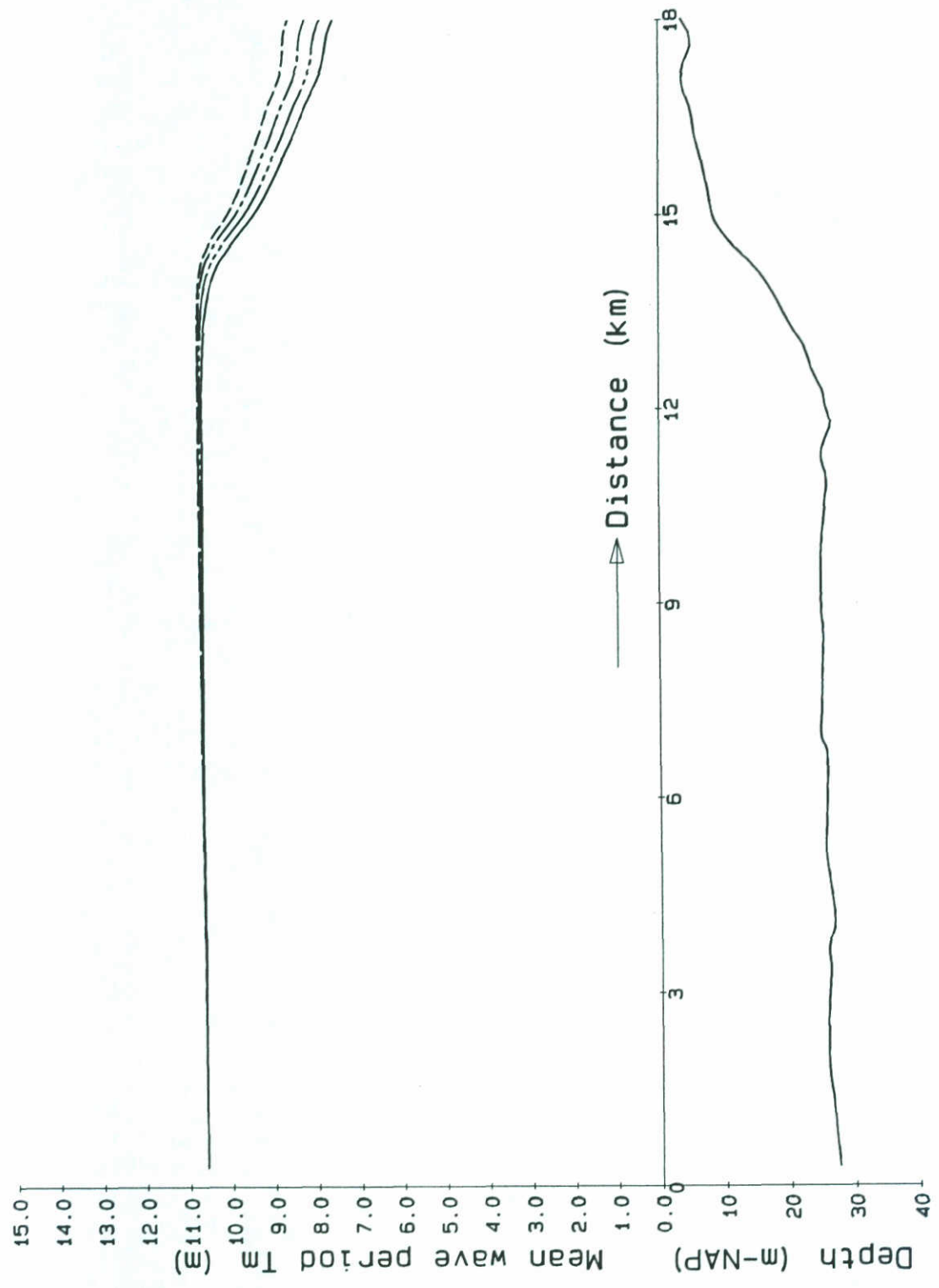
- Marsdiep buiten Bw1
- - Marsdiep buiten Bw2
- · - Marsdiep buiten Sss
- - - Marsdiep buiten Bw3



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

HYDRA-HISWA	BWBUMD
H1355	FIG.4.32g

- Marsdiep buiten Bw1
- - - Marsdiep buiten Bw2
- · - Marsdiep buiten Sss
- - - Marsdiep buiten Bw3



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

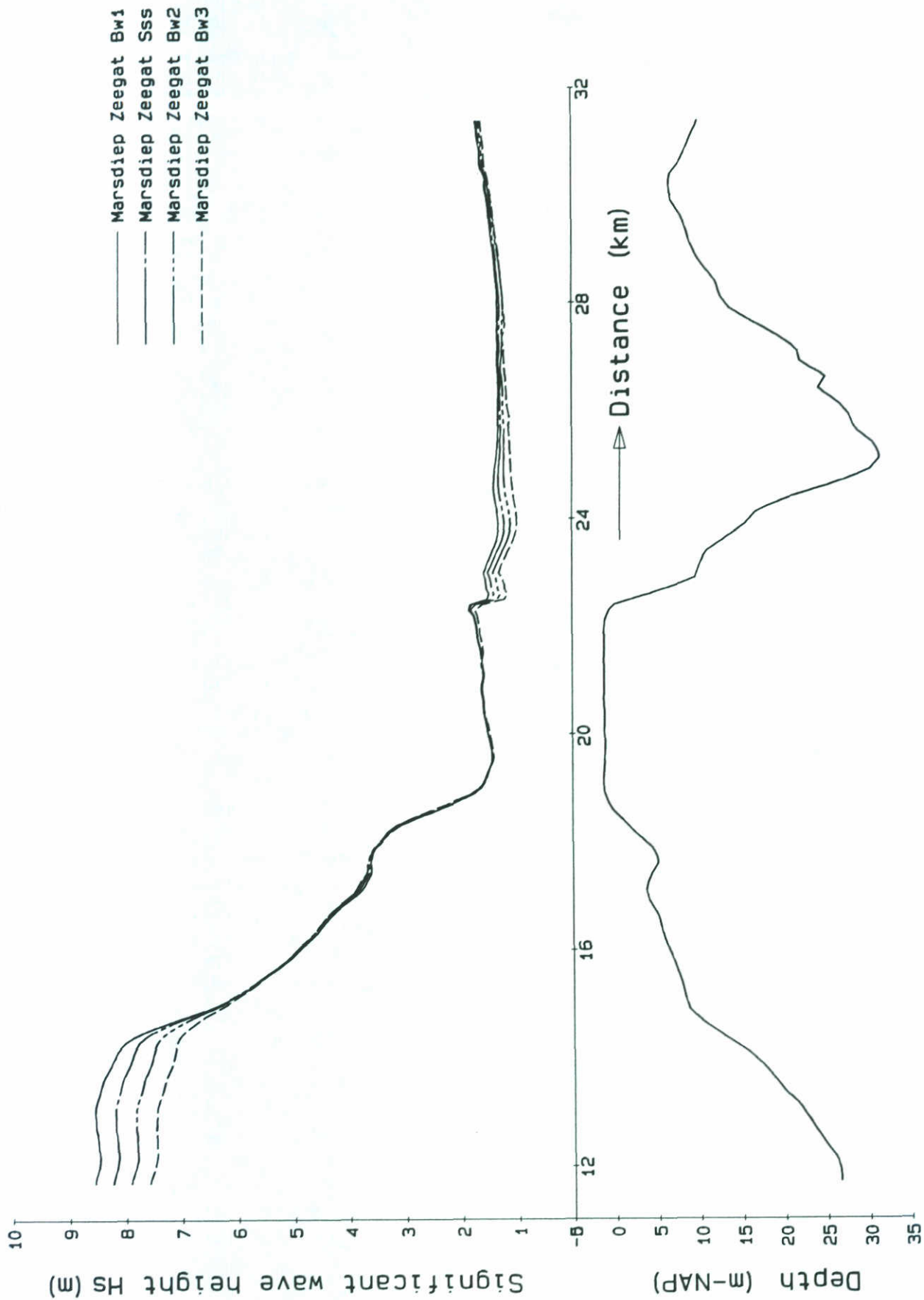
HYDRA-HISWA

BWBUMD

DELFT HYDRAULICS

H1355

FIG.4.32h



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

HYDRA-HISWA

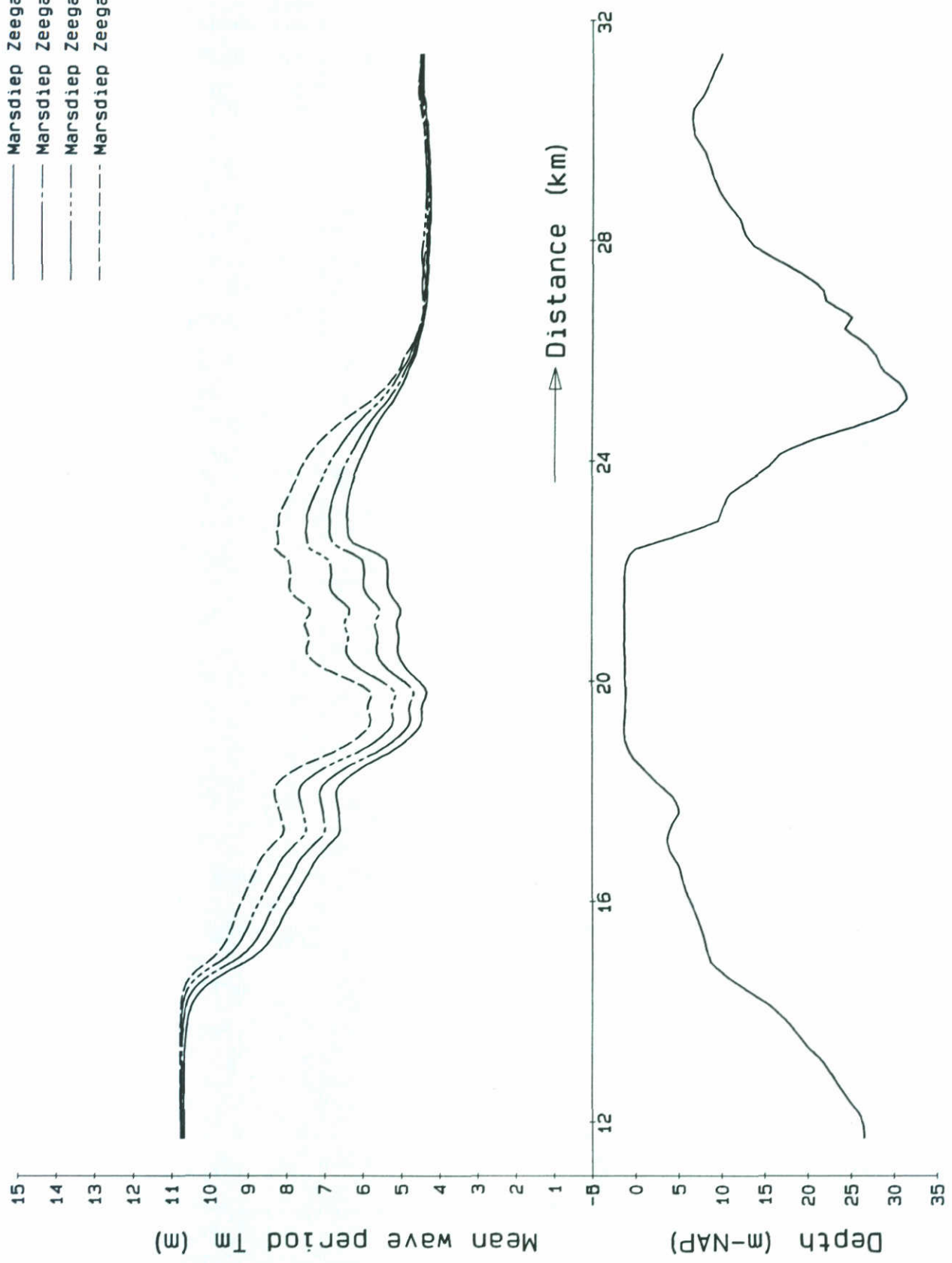
BWZGMD

DELFT HYDRAULICS

H1355

FIG. 4.32i

- Marsdiep Zeegat Bw1
- - - Marsdiep Zeegat Sss
- · - · Marsdiep Zeegat Bw2
- - - Marsdiep Zeegat Bw3



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

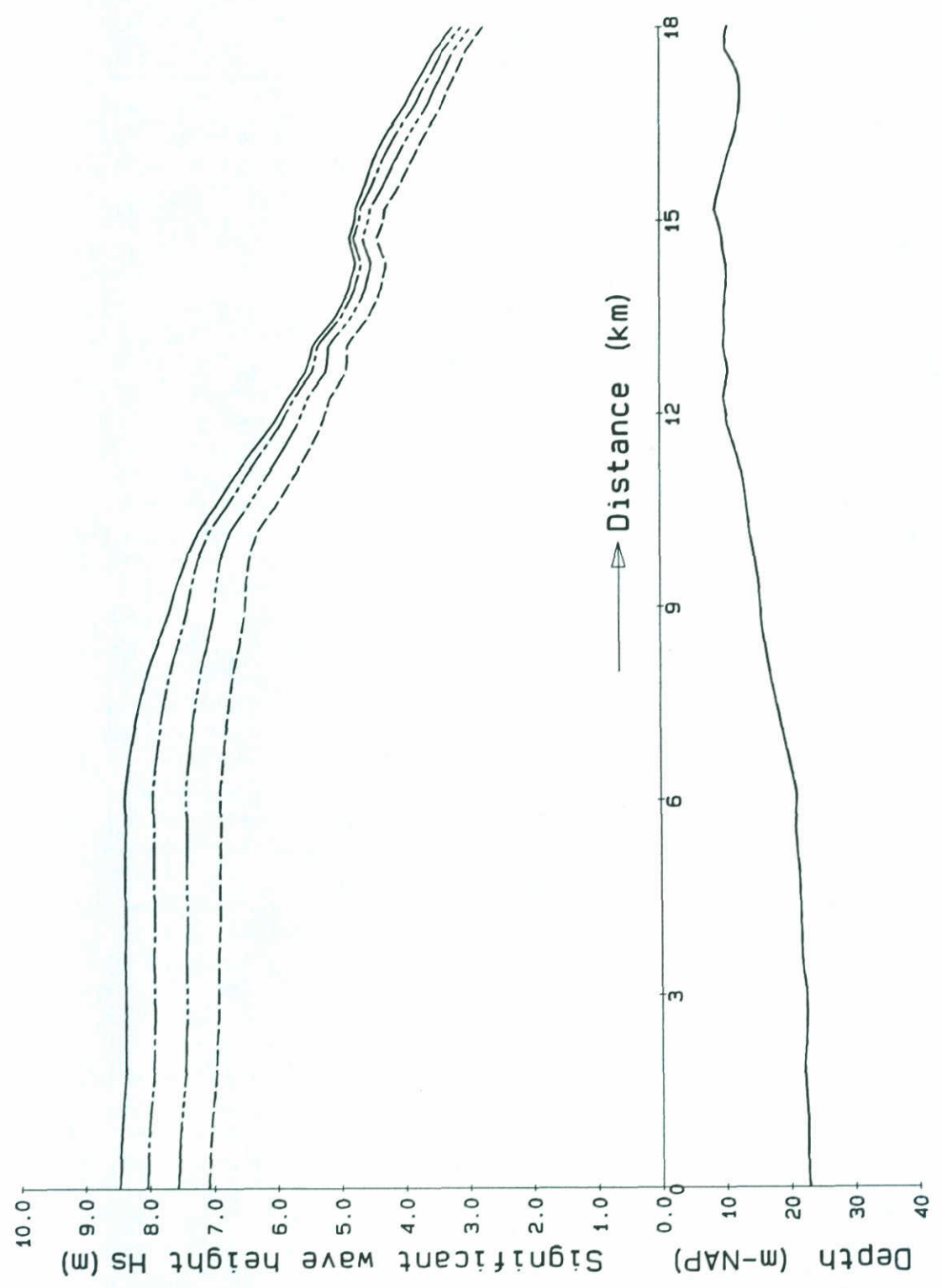
HYDRA-HISWA BWZGMD

DELFT HYDRAULICS

H1355

FIG. 4.32j

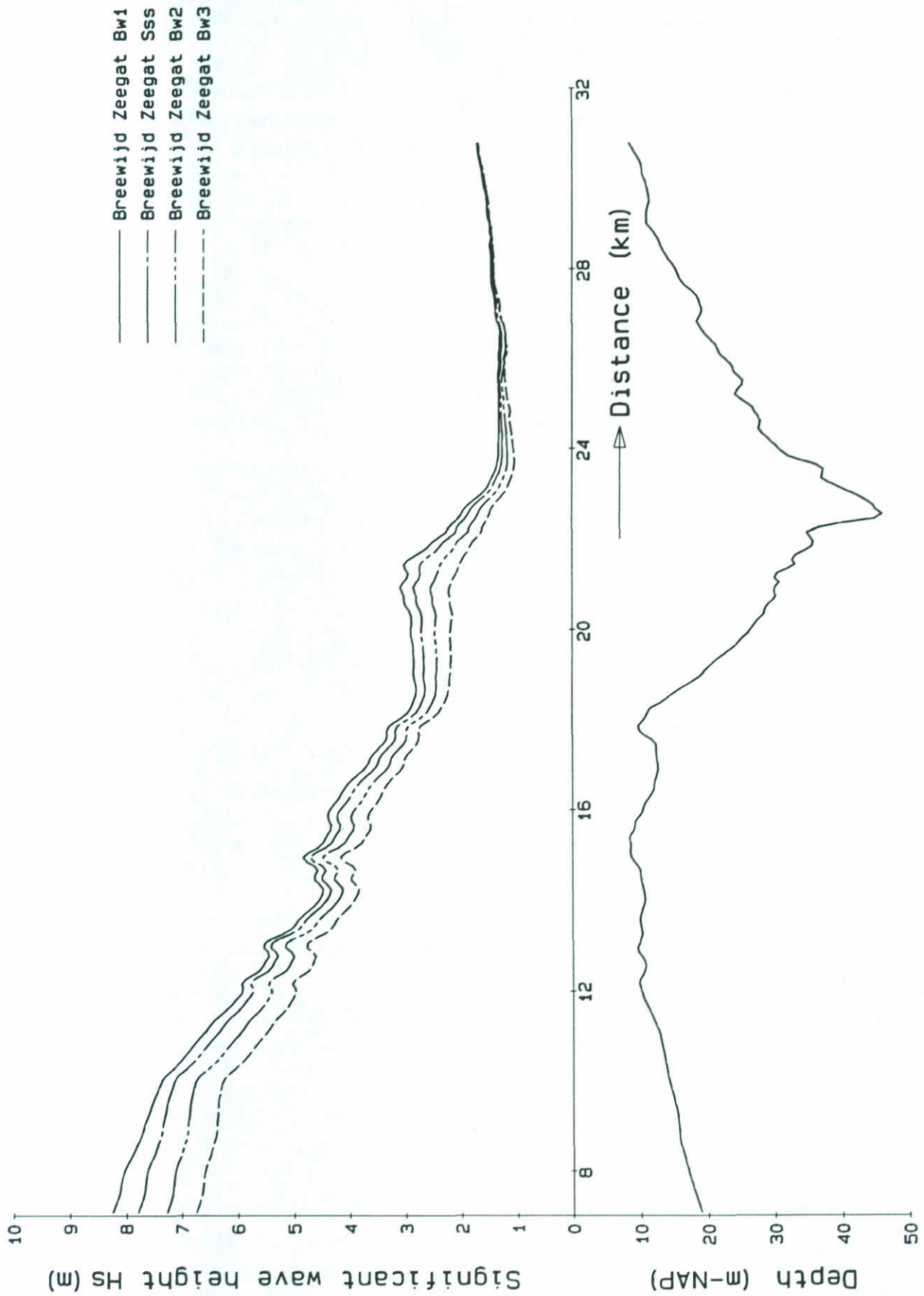
- Breewijd buiten Bw1
- - - Breewijd buiten Sss
- Breewijd buiten Bw2
- - - Breewijd buiten Bw3



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

HYDRA-HISWA	BWBUBW
H1355	FIG. 4.32k

DELFT HYDRAULICS



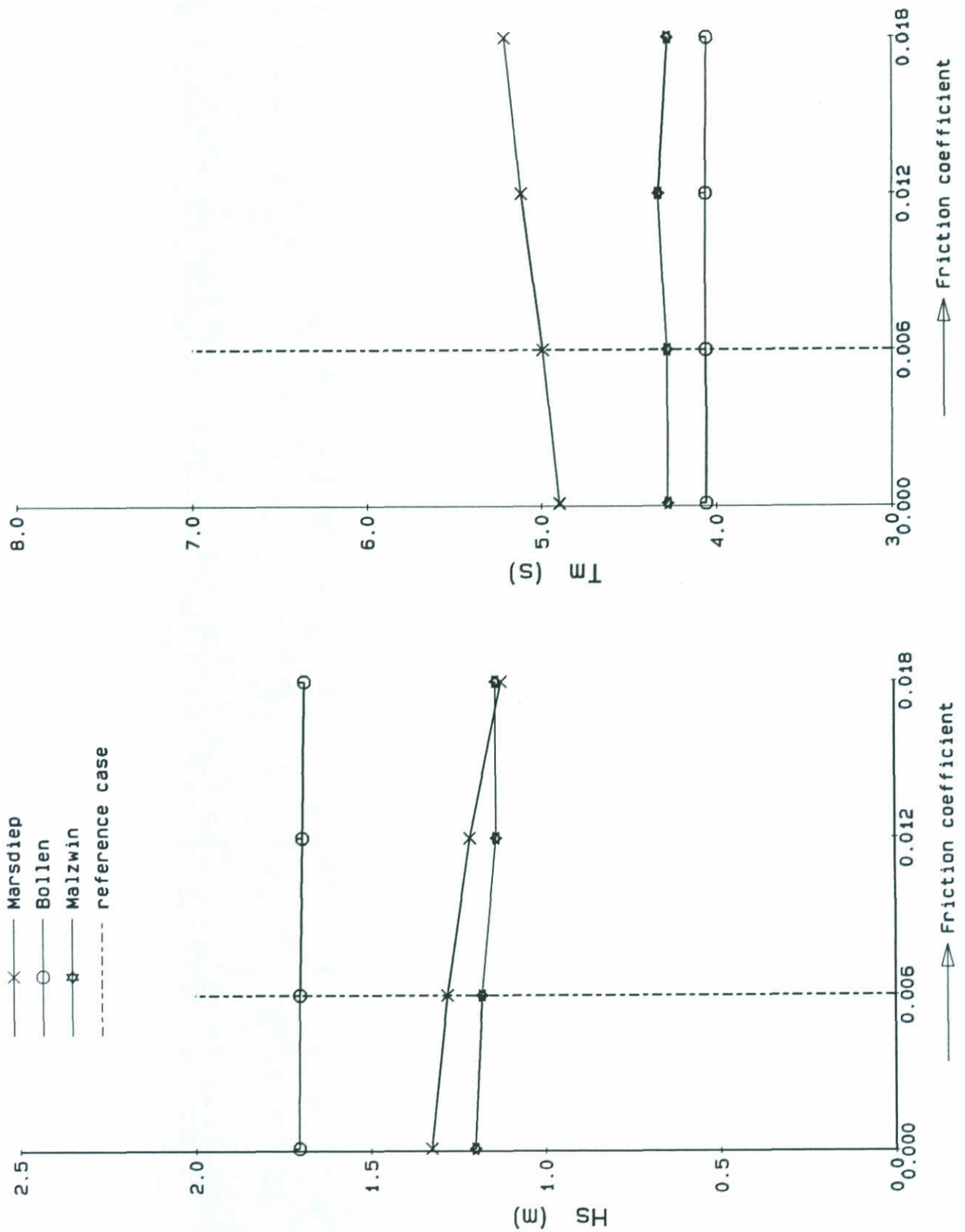
SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING BOTTOM FRICTION COEFFICIENT

HYDRA-HISWA BWZGBW

DELFT HYDRAULICS

H1355

FIG. 4.32I



EFFECT OF FRICTION COEFFICIENT
ENTRANCE WADDEN SEA

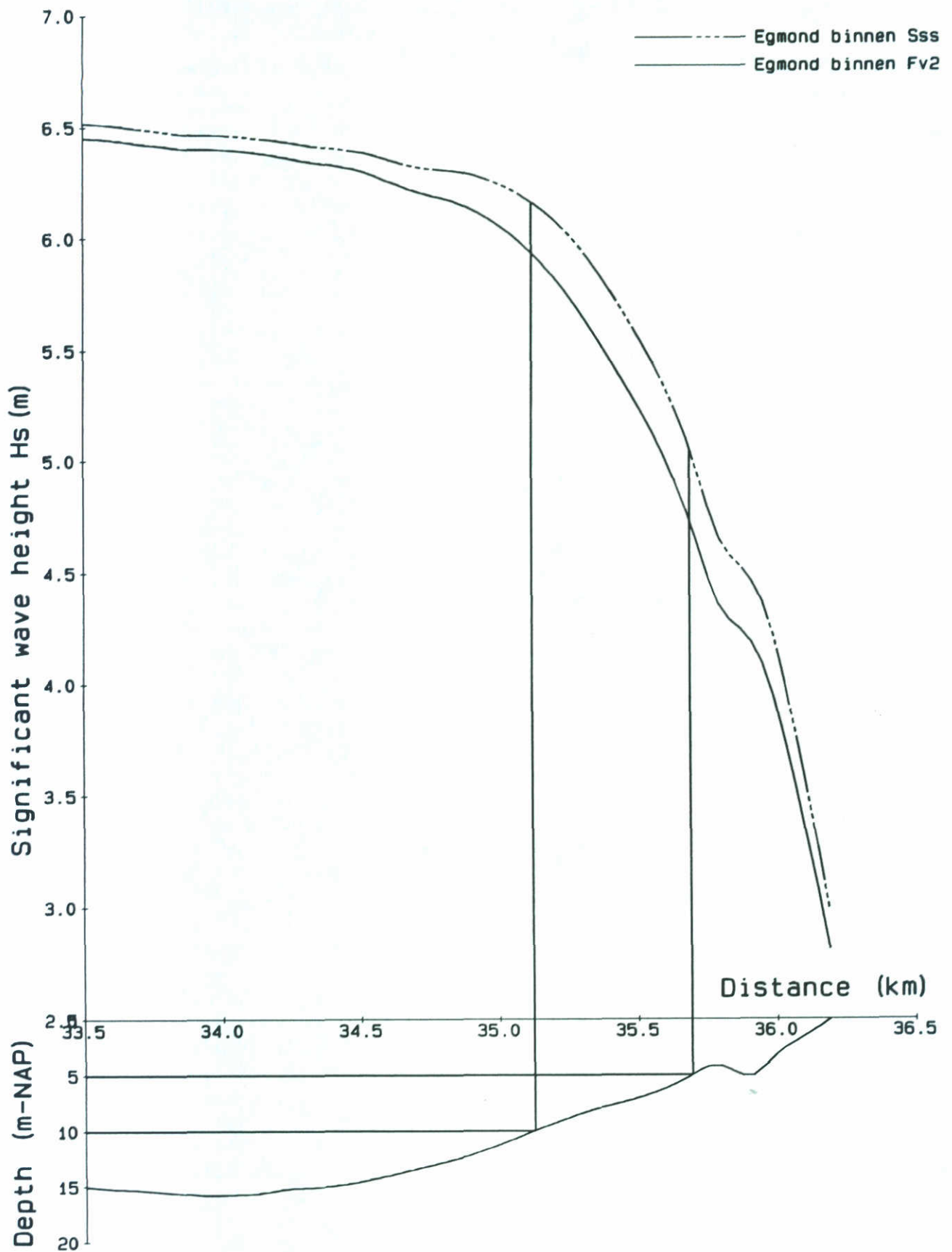
HYDRA-HISWA

BW1BW3

DELFT HYDRAULICS

H1355

FIG. 4.32m



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 FREQUENCY CHANGE FRICTION ON/OFF

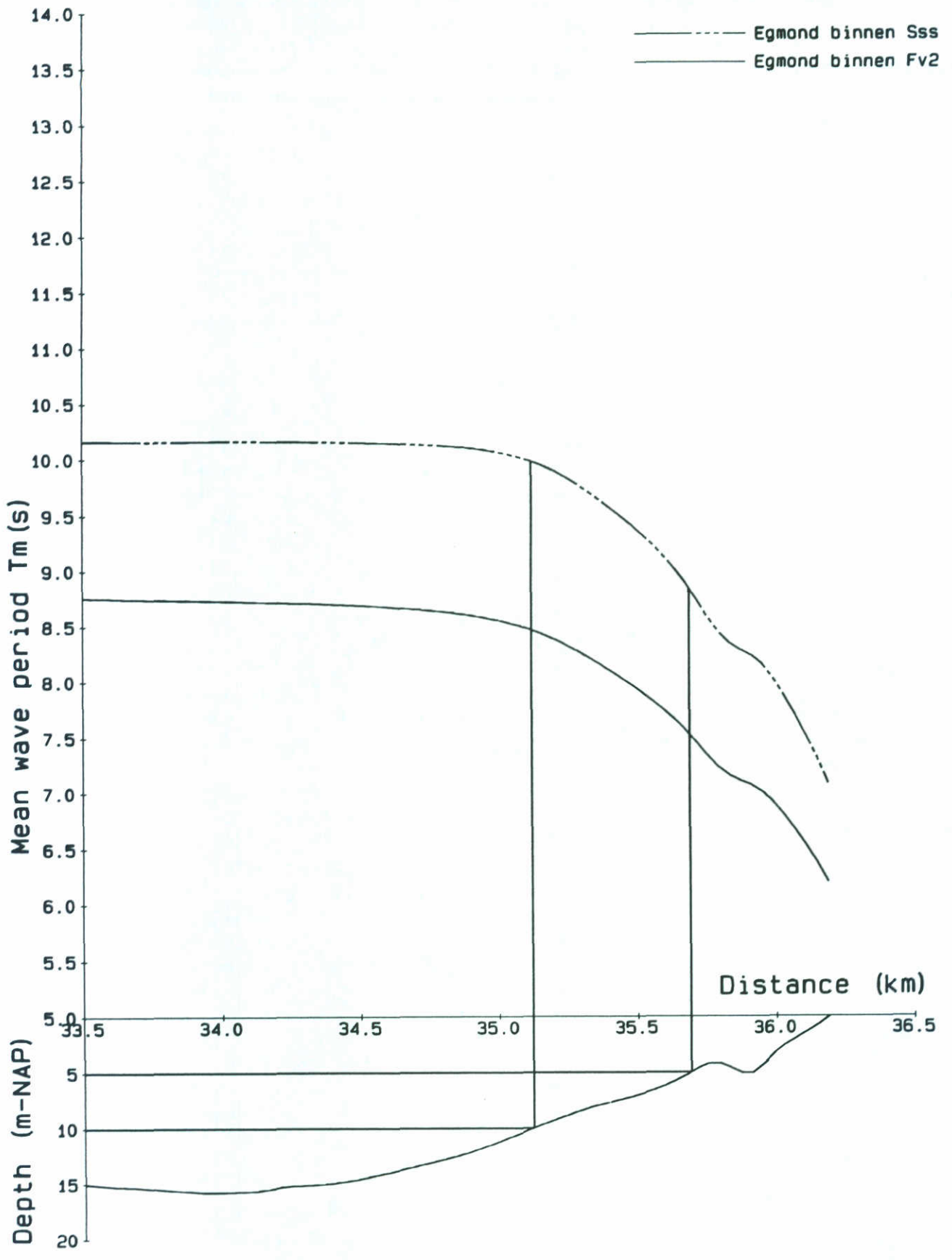
HYDRA-HISWA

FV2

DELFT HYDRAULICS

H1355

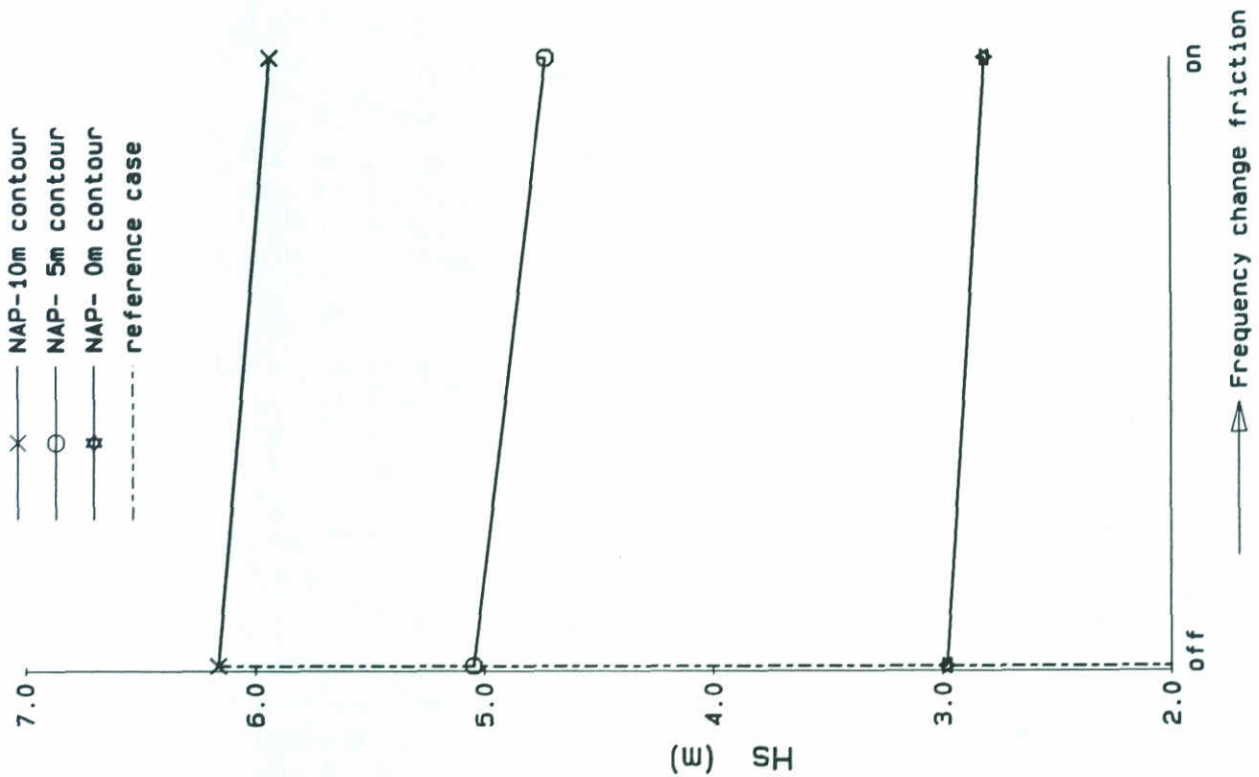
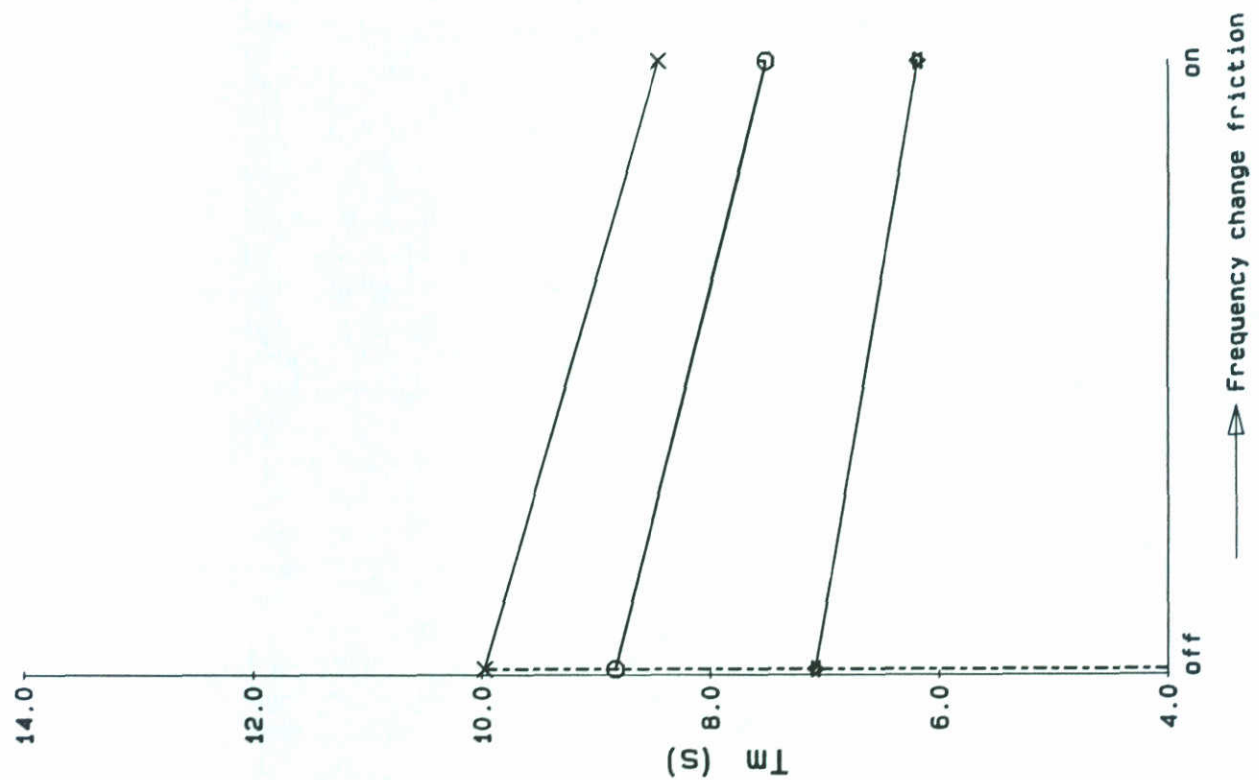
FIG. 4.33a



MEAN WAVE PERIOD EGMOND PROFILE
 FREQUENCY CHANGE FRICTION ON/OFF

HYDRA-HISWA	FV2
H1355	FIG. 4.33b

DELFT HYDRAULICS



EFFECT OF FREQUENCY CHANGE FRICTION
EGMOND PROFILE

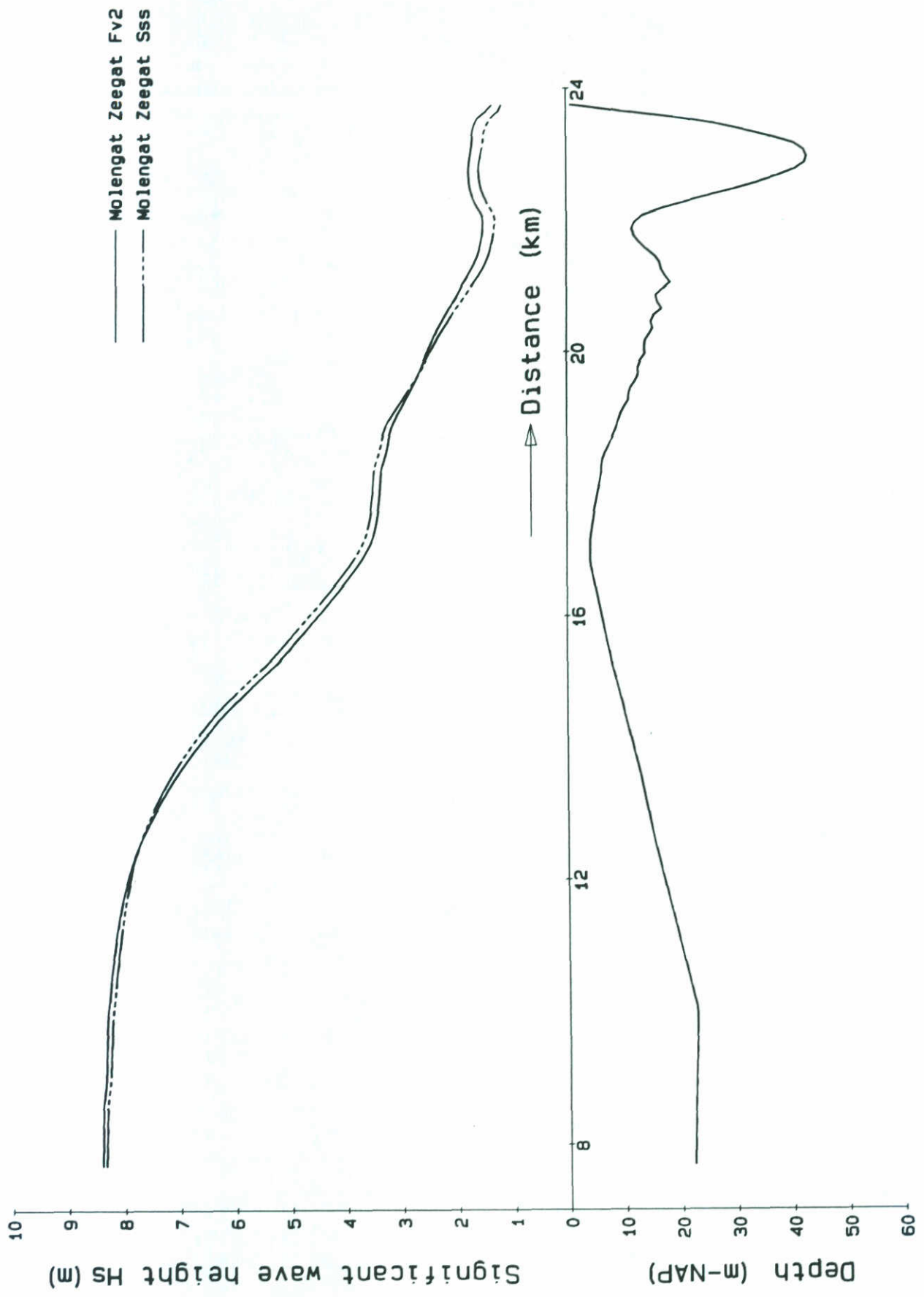
HYDRA-HISWA

FV2

DELFT HYDRAULICS

H1355

FIG. 4.33c



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 FREQUENCY CHANGE FRICTION ON/OFF

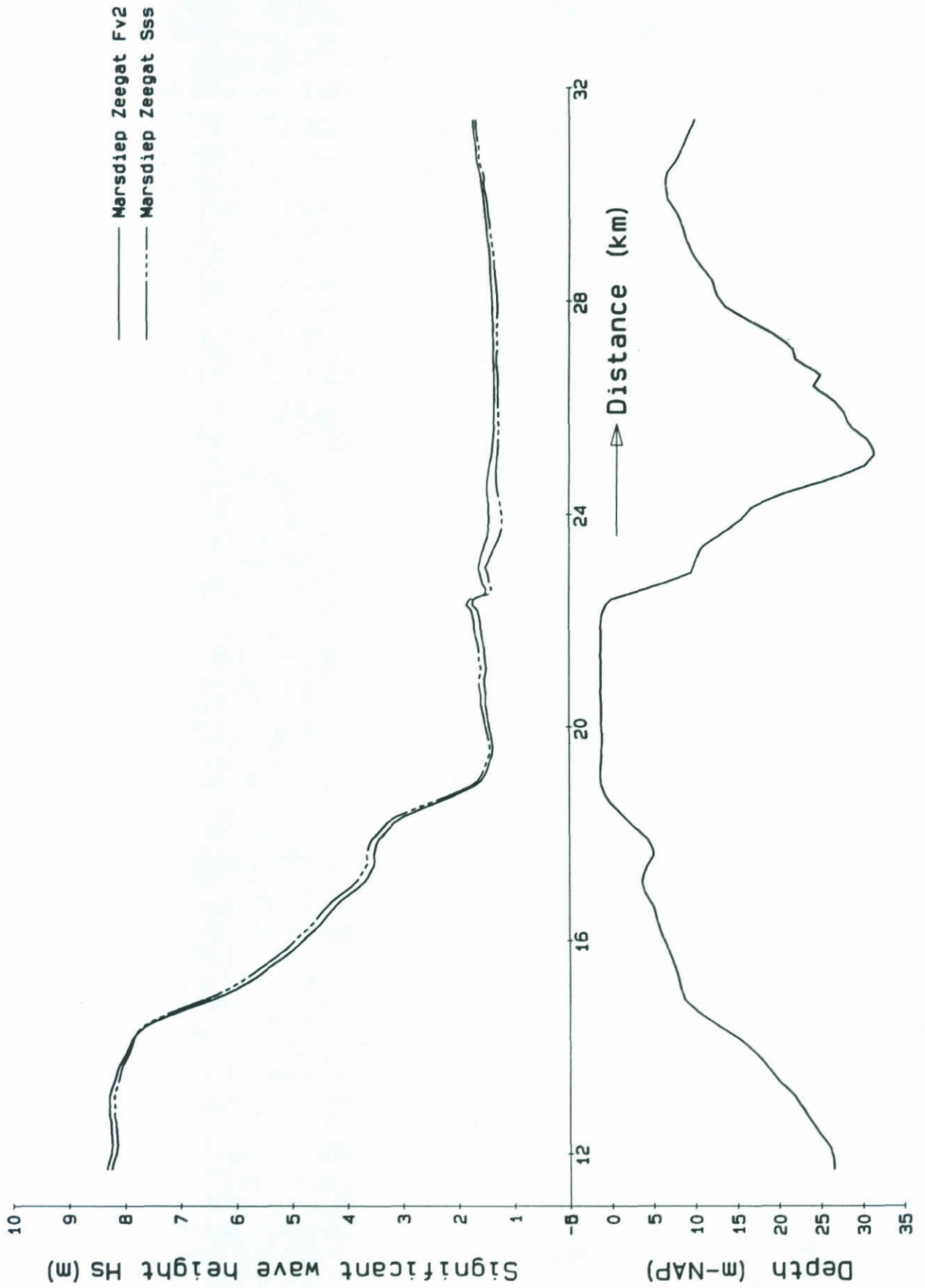
HYDRA-HISWA

FVZGMG

DELFT HYDRAULICS

H1355

FIG. 4.33d



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 FREQUENCY CHANGE FRICTION ON/OFF

HYDRA-HISWA

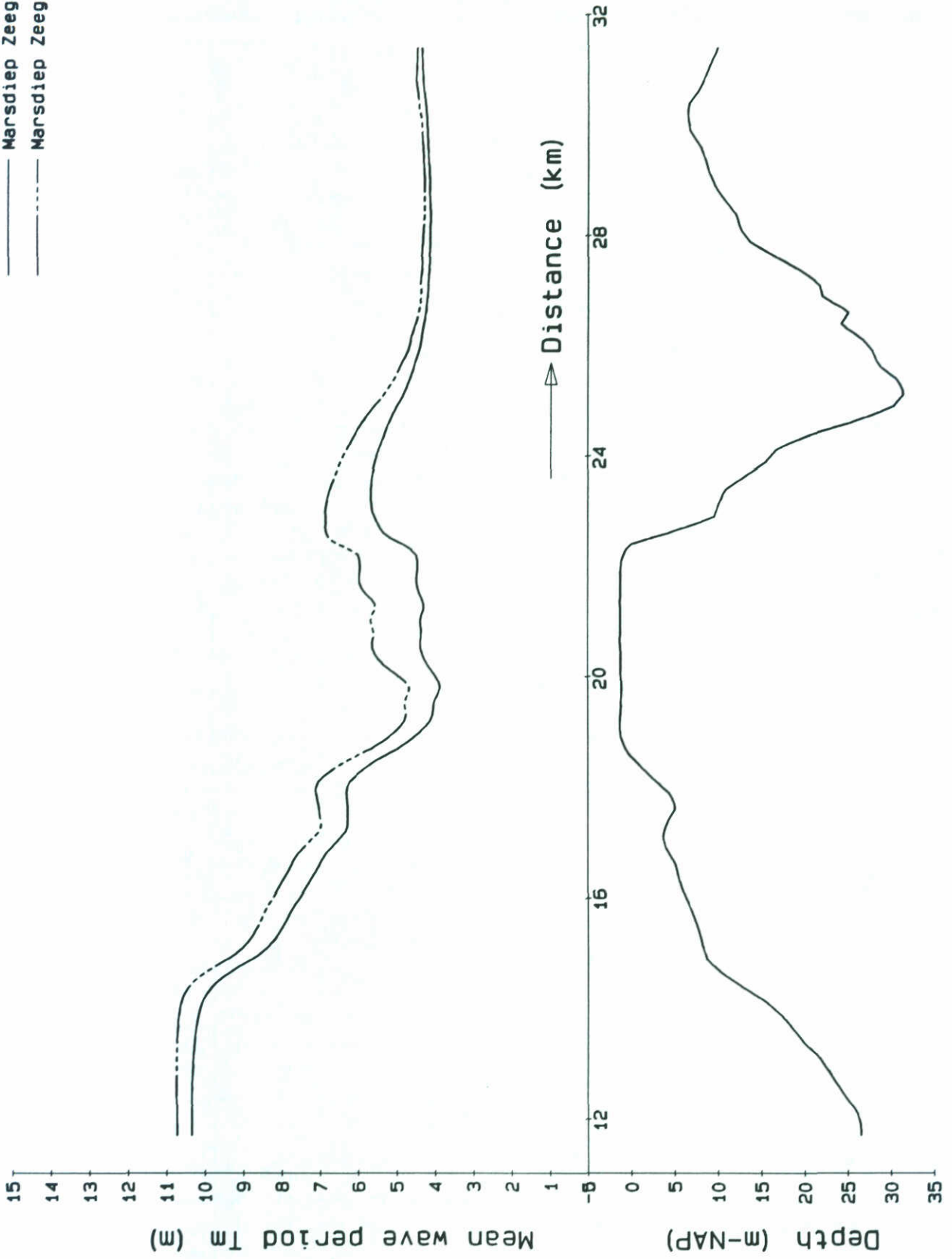
FV2ZGMD

DELFT HYDRAULICS

H1355

FIG. 4.33e

— Marsdiep Zeegat Fv2
 - - - Marsdiep Zeegat Sss



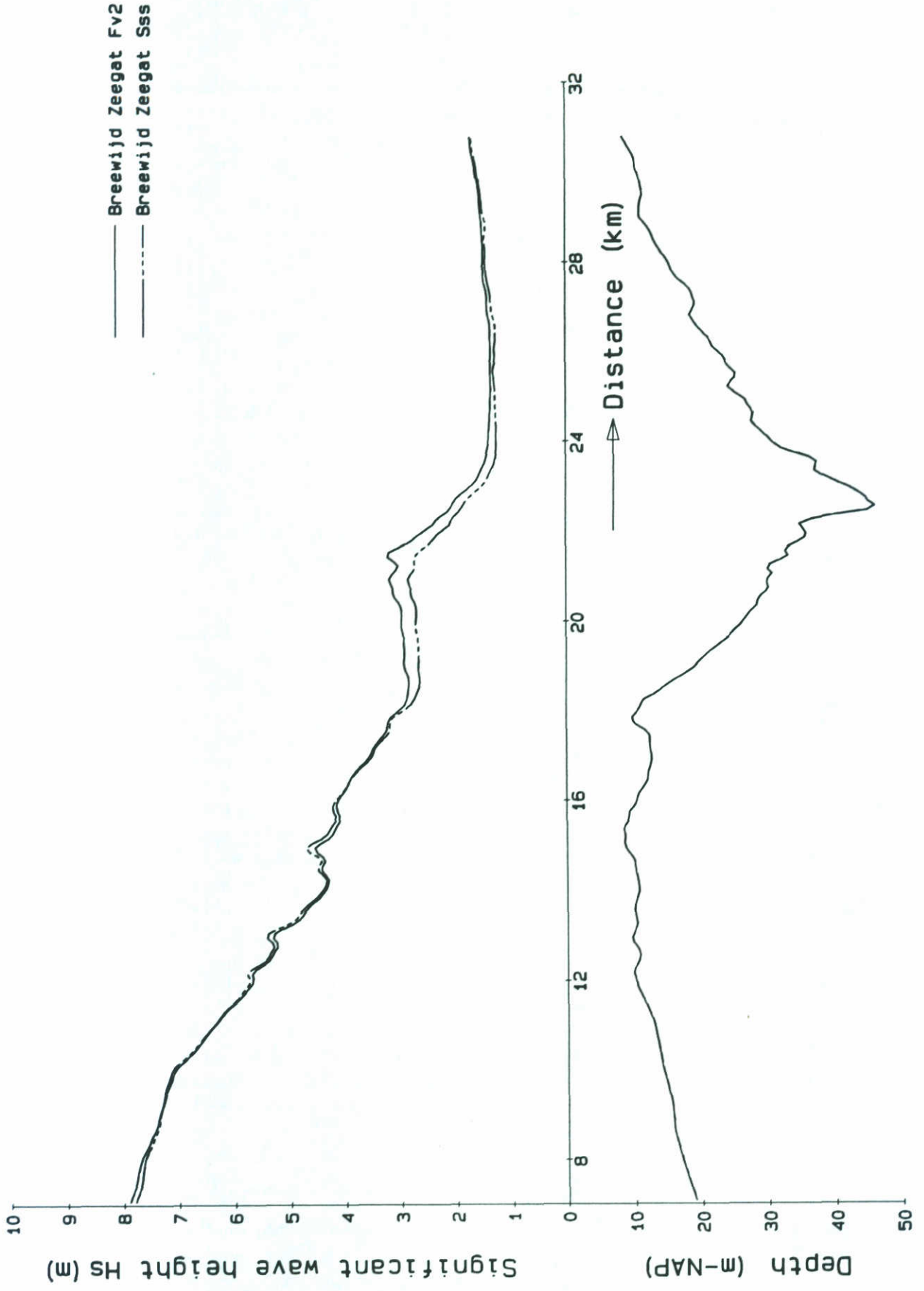
MEAN WAVE PERIOD MARSDIEP PROFILE
 FREQUENCY CHANGE FRICTION ON/OFF

HYDRA-HISWA FV22ZGMD

DELFT HYDRAULICS

H1355

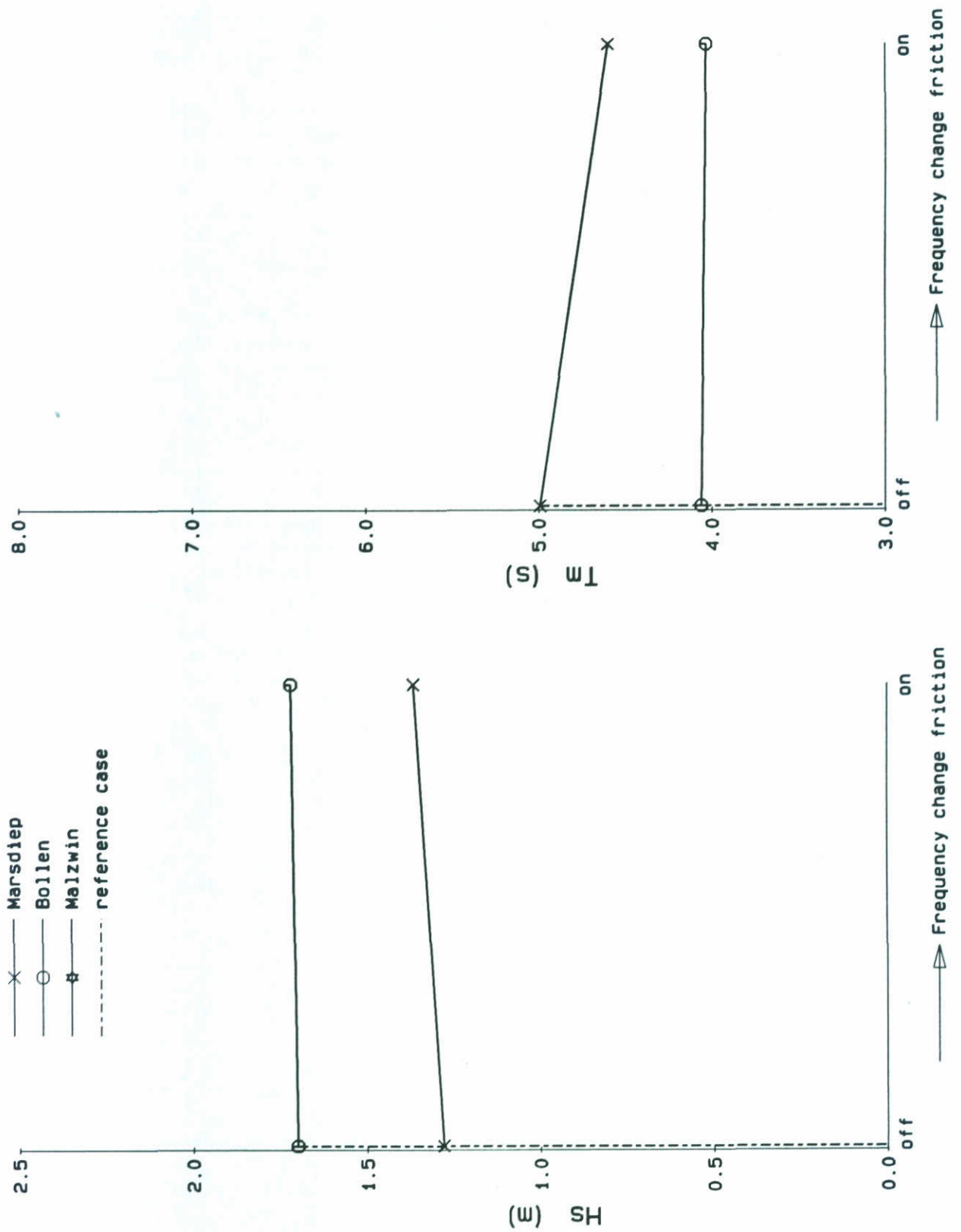
FIG.4.33f



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 FREQUENCY CHANGE FRICTION ON/OFF

HYDRA-HISWA	FV2ZGBW
H1355	FIG. 4.33g

DELFT HYDRAULICS



EFFECT OF FREQUENCY CHANGE FRICTION
ENTRANCE WADDEN SEA

HYDRA-HISWA

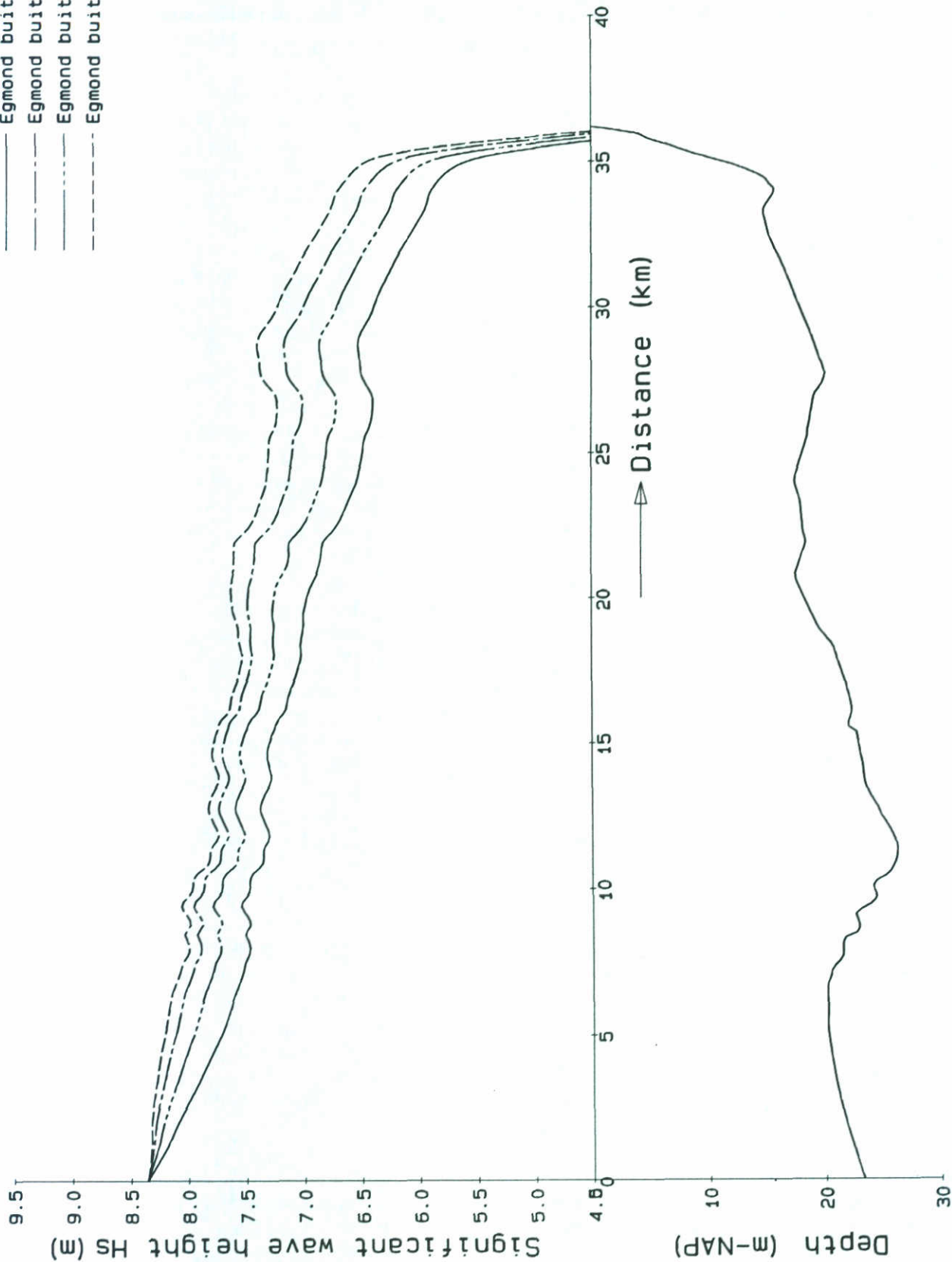
FV2

DELFT HYDRAULICS

H1355

FIG. 4.33h

- Egmond buiten Bc1
- - - Egmond buiten Sss
- · - · - Egmond buiten Bc2
- - - - - Egmond buiten Bc3



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WAVE BREAKING COEFFICIENT

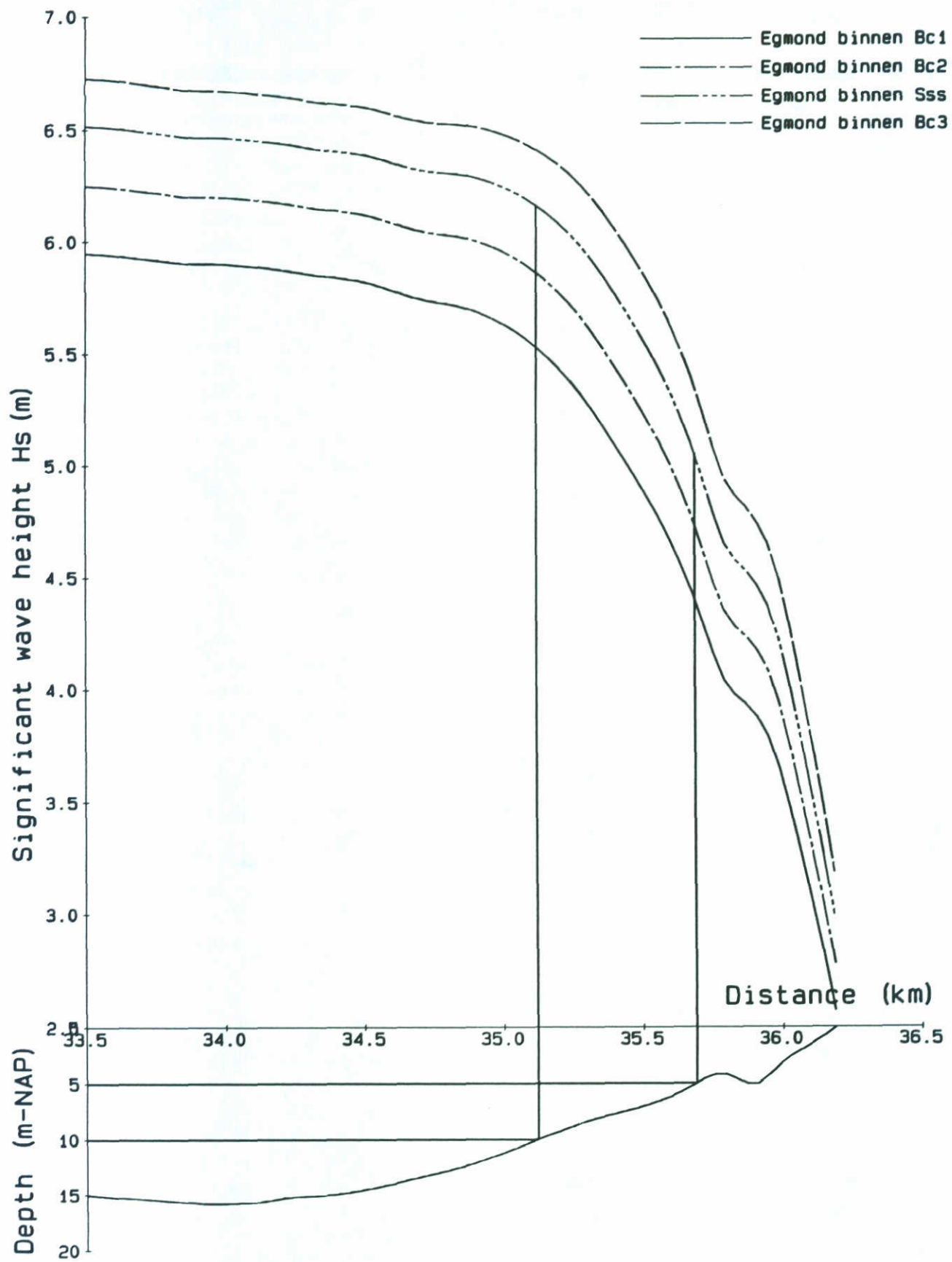
HYDRA-HISWA

BCBUEG

DELFT HYDRAULICS

H1355

FIG. 4.34a



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 VARYING WAVE BREAKING COEFFICIENT

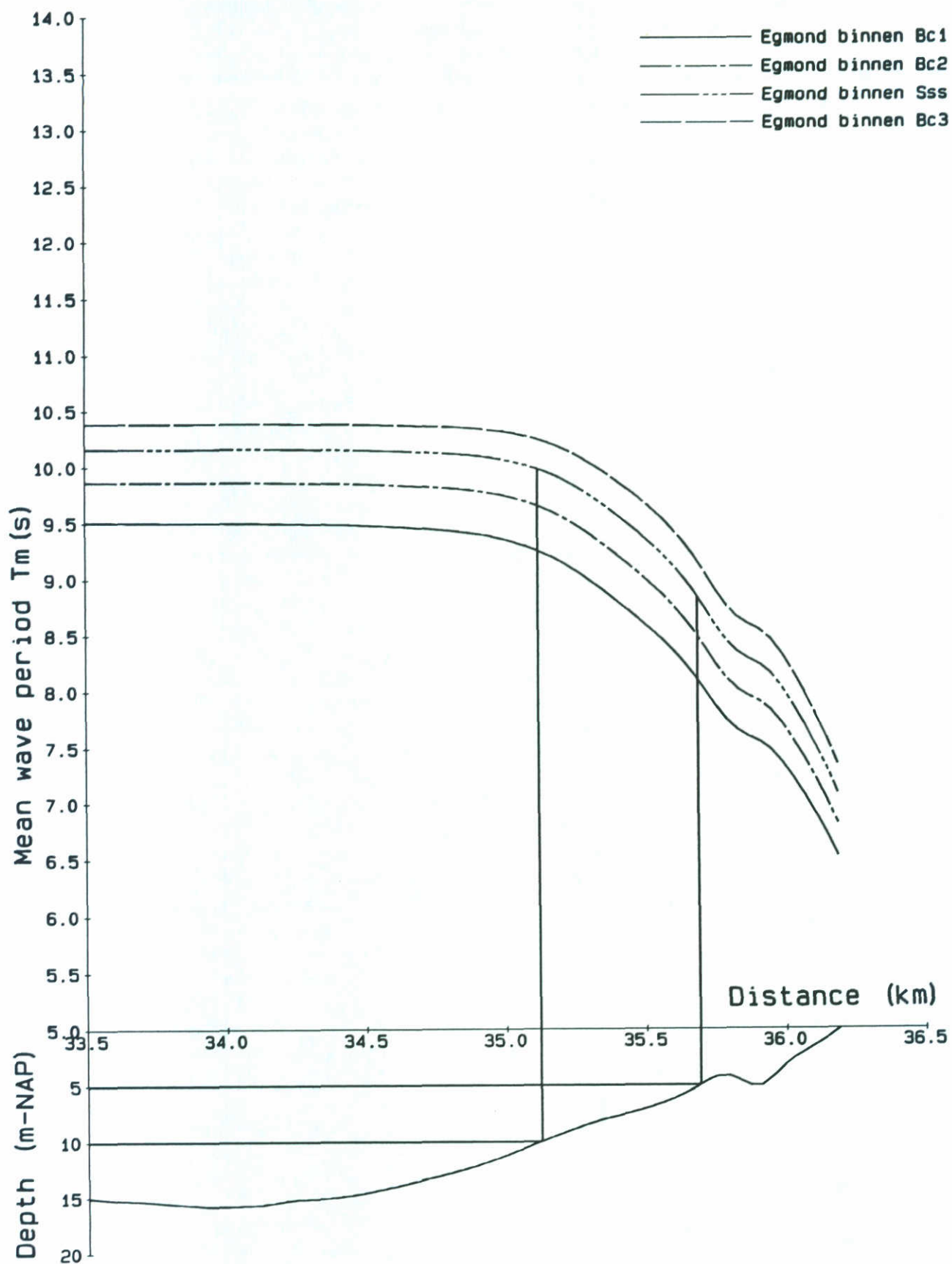
HYDRA-HISWA

BC1BC4

DELFT HYDRAULICS

H1355

FIG. 4.34b



MEAN WAVE PERIOD EGMOND PROFILE
 VARYING WAVE BREAKING COEFFICIENT

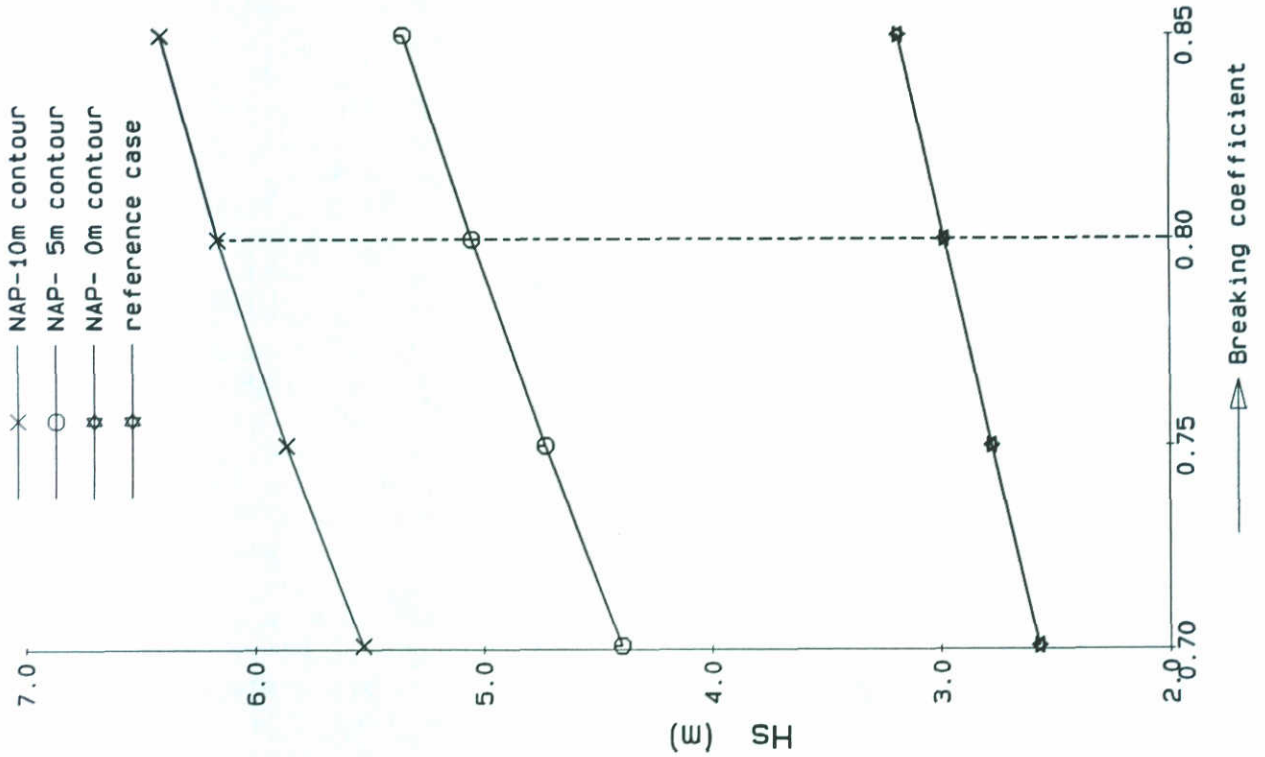
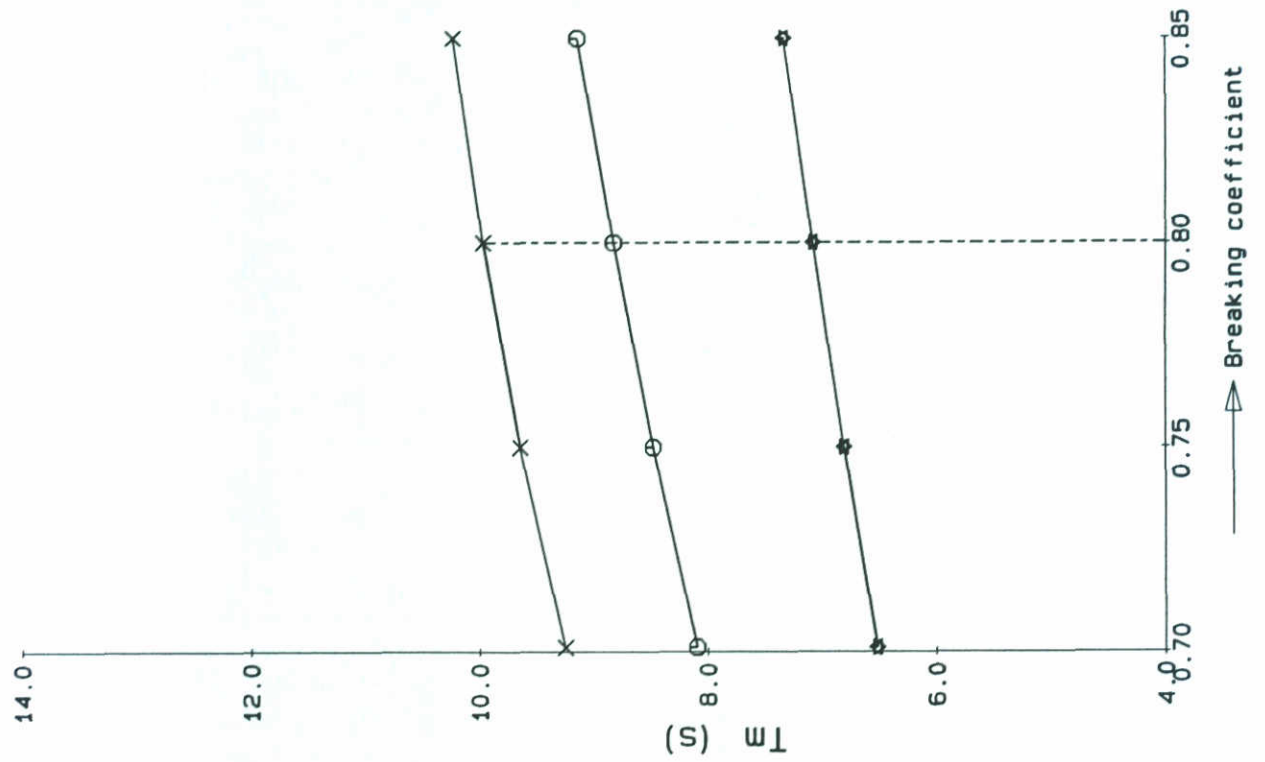
HYDRA-HISWA

BC1BC4

DELFT HYDRAULICS

H1355

FIG. 4.34c



EFFECT OF BREAKING COEFFICIENT
EGMOND PROFILE

HYDRA-HISWA

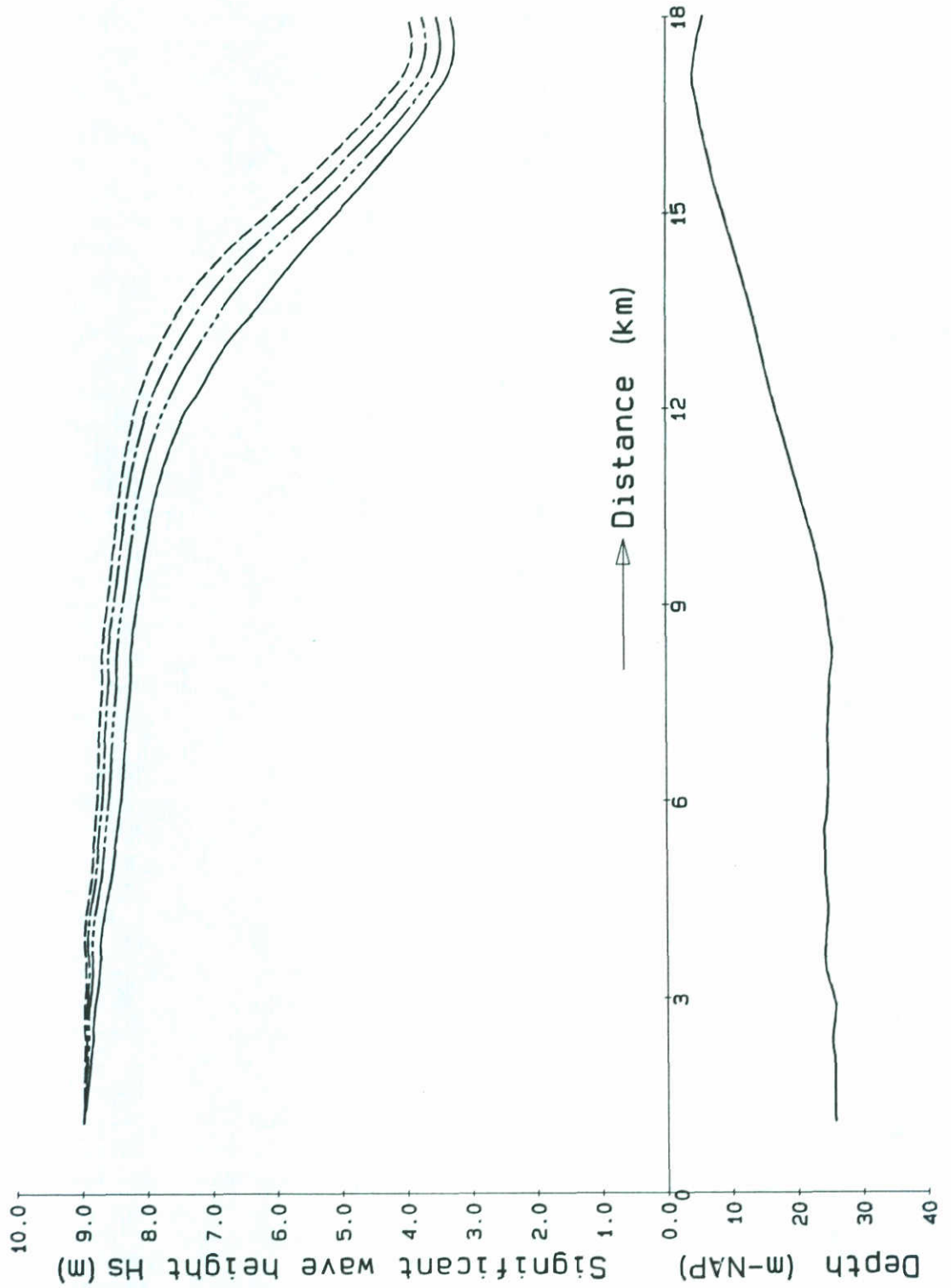
BC18C3

DELFT HYDRAULICS

H1355

FIG. 4.34d

- Molengat buiten Bc1
- - - Molengat buiten Sss
- · · Molengat buiten Bc2
- - - Molengat buiten Bc3



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WAVE BREAKING COEFFICIENT

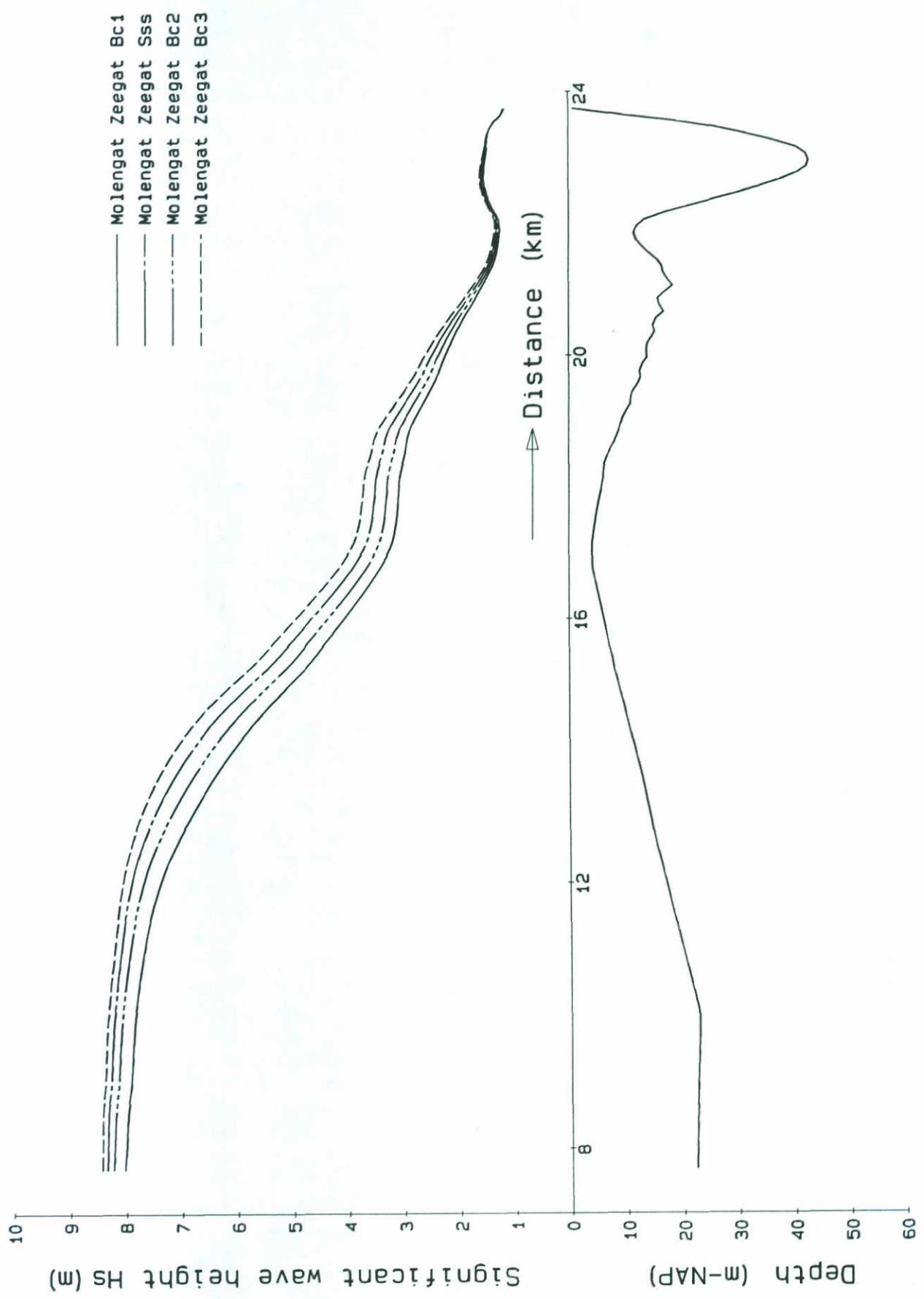
HYDRA-HISWA

BCBUMG

DELFT HYDRAULICS

H1355

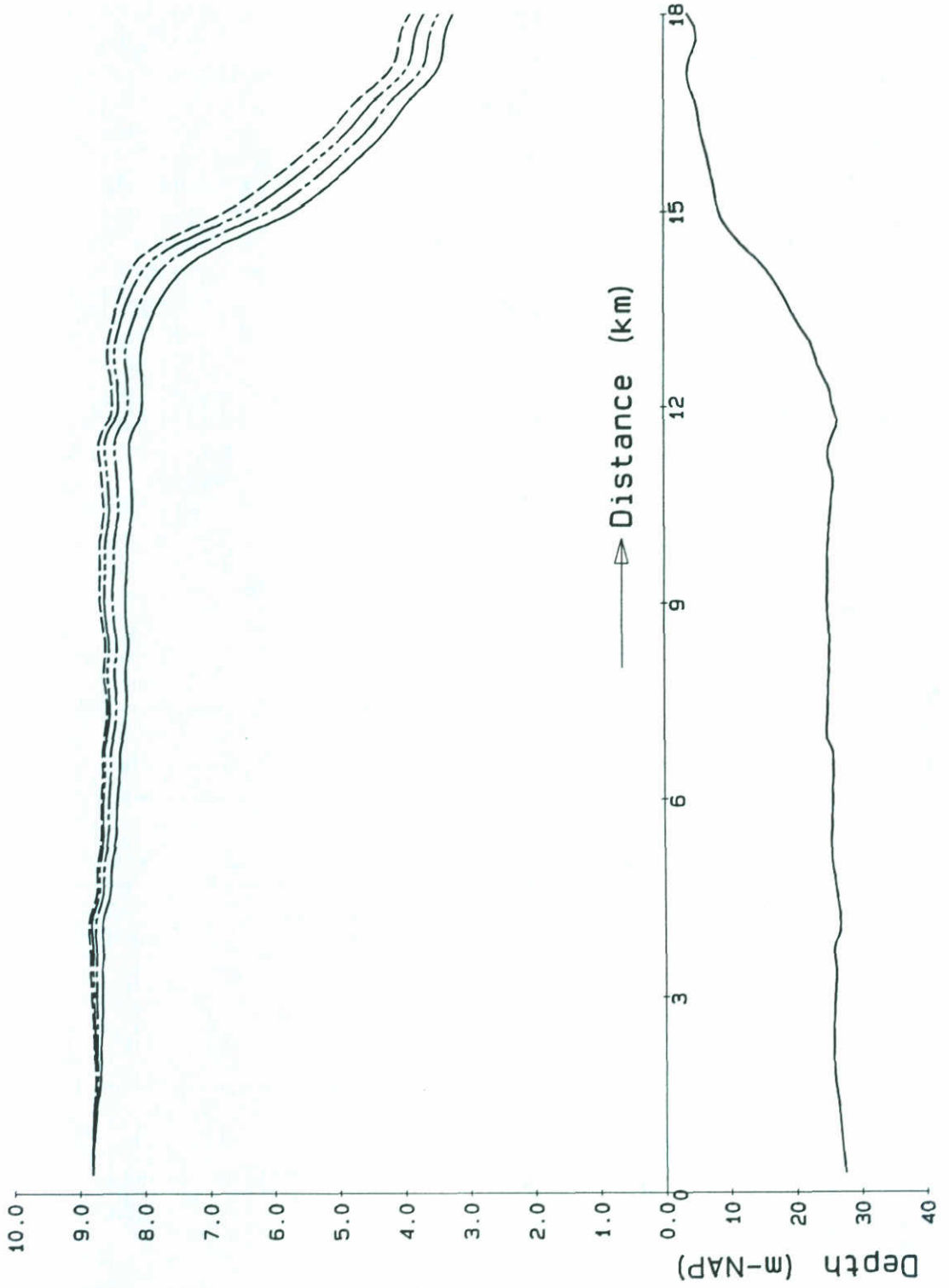
FIG. 4.34e



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 VARYING WAVE BREAKING COEFFICIENT

HYDRA-HISWA	BCZGMG
H1355	FIG. 4.34f

- Marsdiep buiten Bc1
- - Marsdiep buiten Bc2
- · - Marsdiep buiten Sss
- - - Marsdiep buiten Bc3



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WAVE BREAKING COEFFICIENT

HYDRA-HISWA

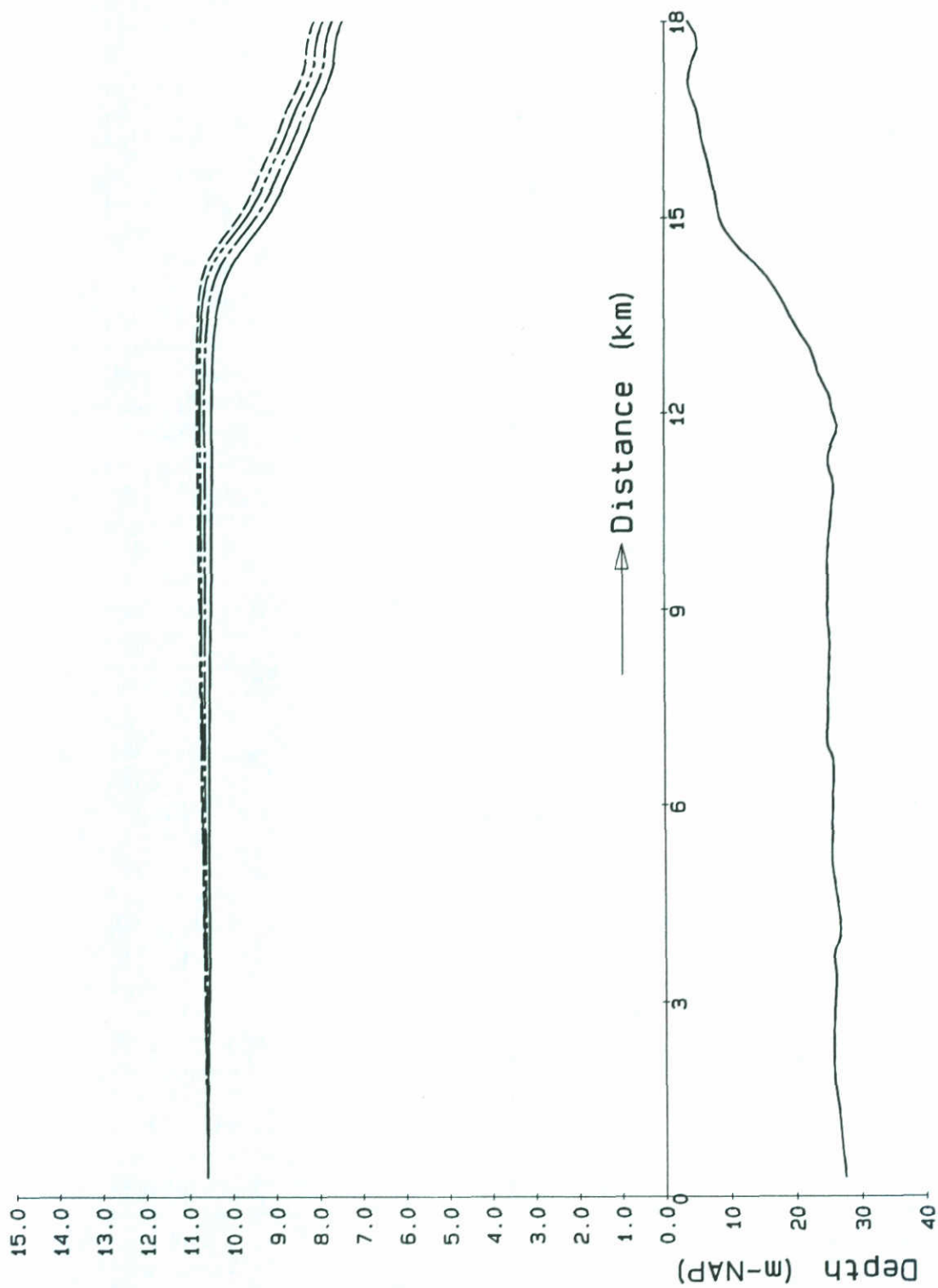
BCBUMD

DELFT HYDRAULICS

H1355

FIG.4.34g

- Marsdiep buiten Bc1
- - Marsdiep buiten Bc2
- · Marsdiep buiten Sss
- - Marsdiep buiten Bc3



MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WAVE BREAKING COEFFICIENT

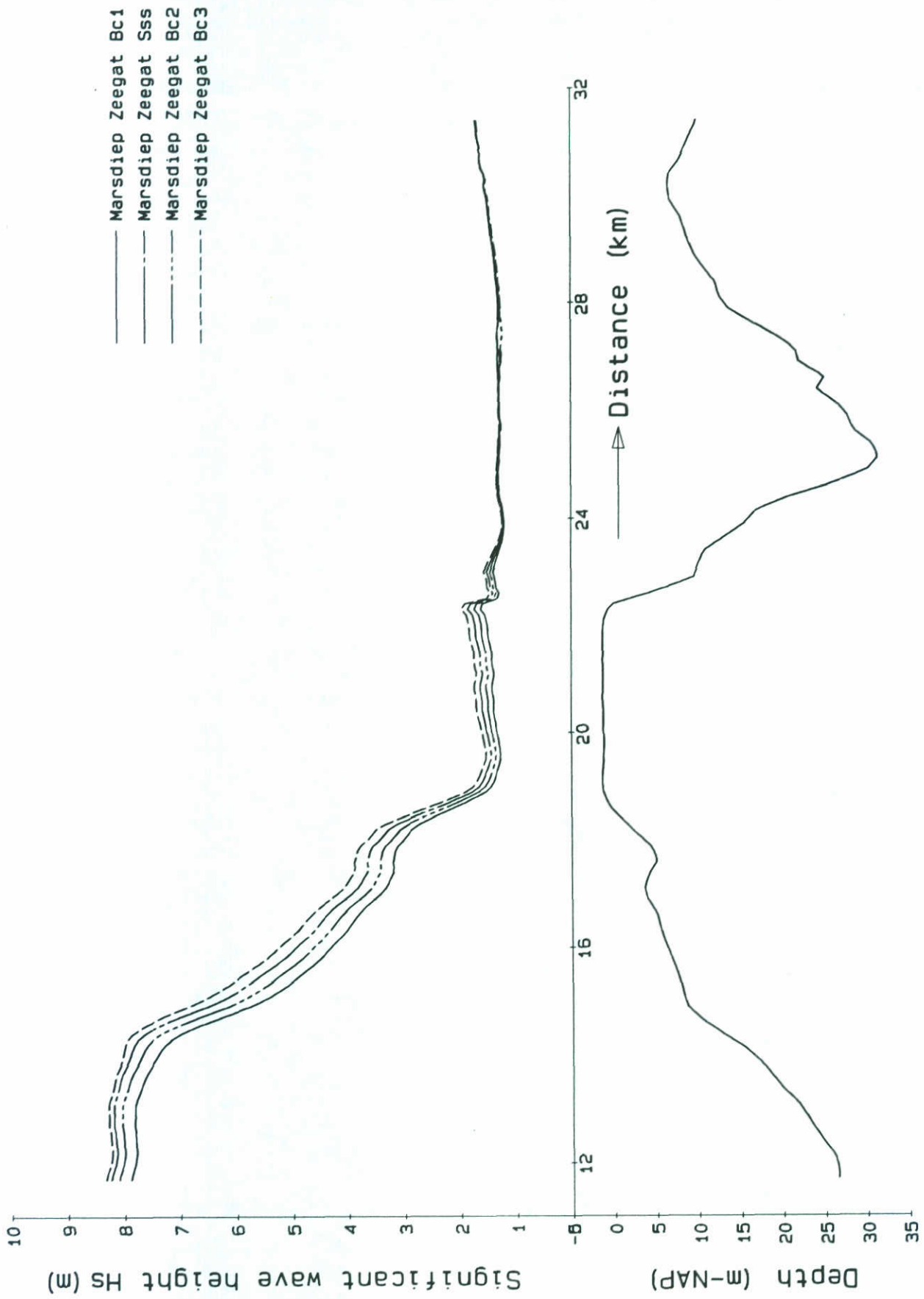
HYDRA-HISWA

BCBUMD

DELFT HYDRAULICS

H1355

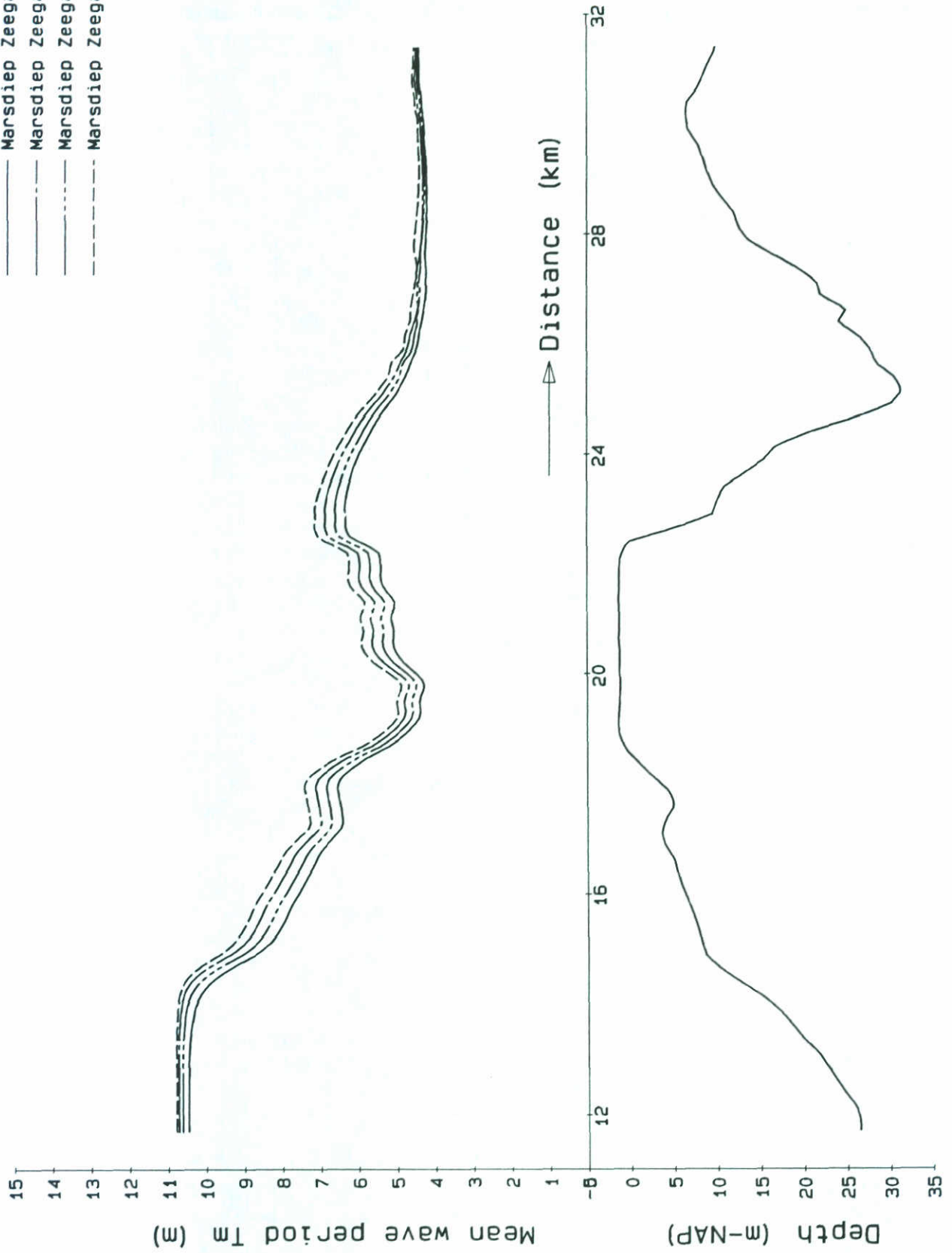
FIG. 4.34h



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 VARYING WAVE BREAKING COEFFICIENT

HYDRA-HISWA	BCZGMD
H1355	FIG. 4.34i

- Marsdiep Zeegat Bc1
- Marsdiep Zeegat Sss
- Marsdiep Zeegat Bc2
- Marsdiep Zeegat Bc3

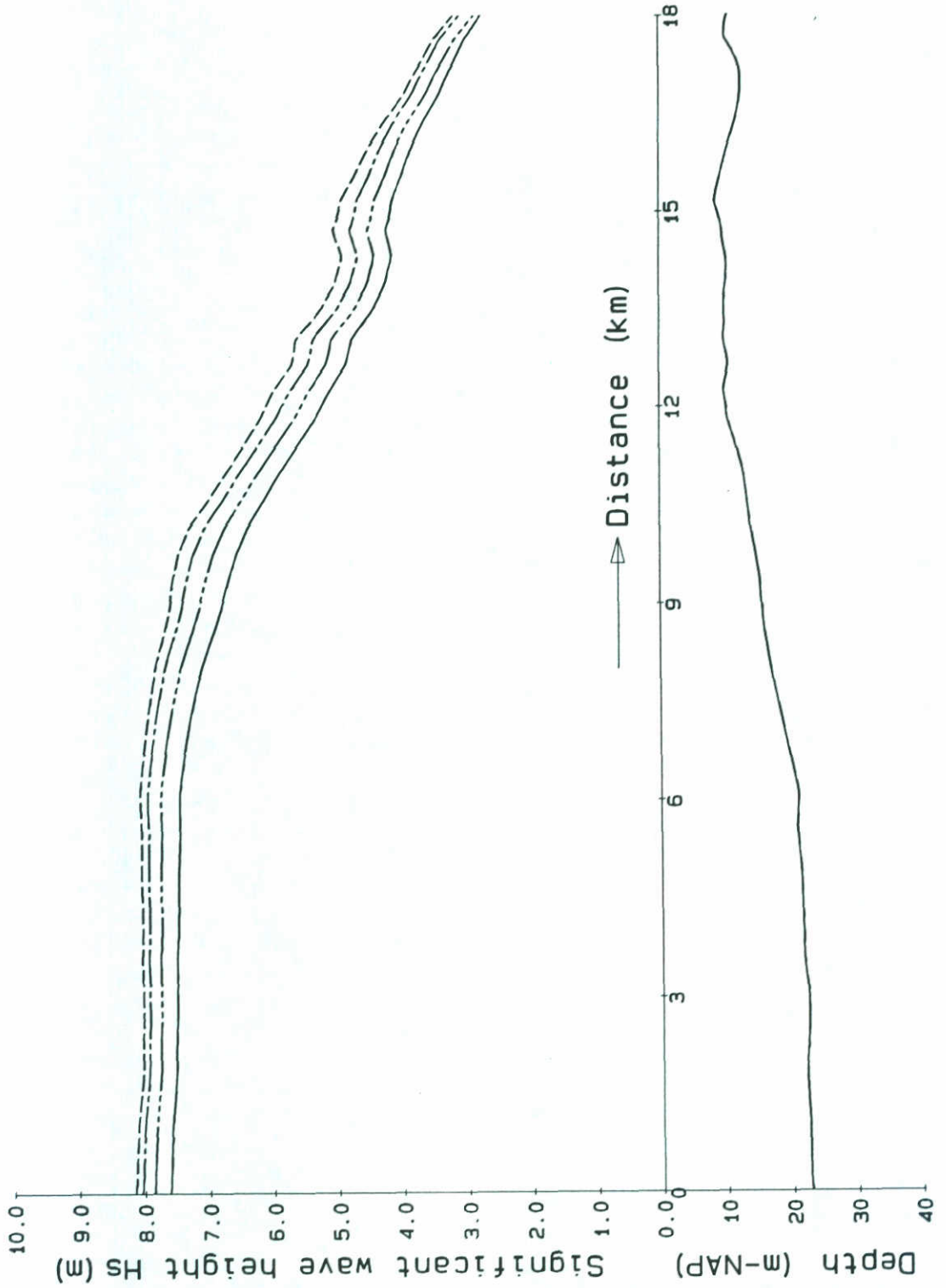


MEAN WAVE PERIOD MARSDIEP PROFILE
 VARYING WAVE BREAKING COEFFICIENT

HYDRA-HISWA	BCZGMD
H1355	FIG. 4.34j

DELFT HYDRAULICS

- Breewijd buiten Bc1
- - - Breewijd buiten Sss
- · - · Breewijd buiten Bc2
- - - Breewijd buiten Bc3



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WAVE BREAKING COEFFICIENT

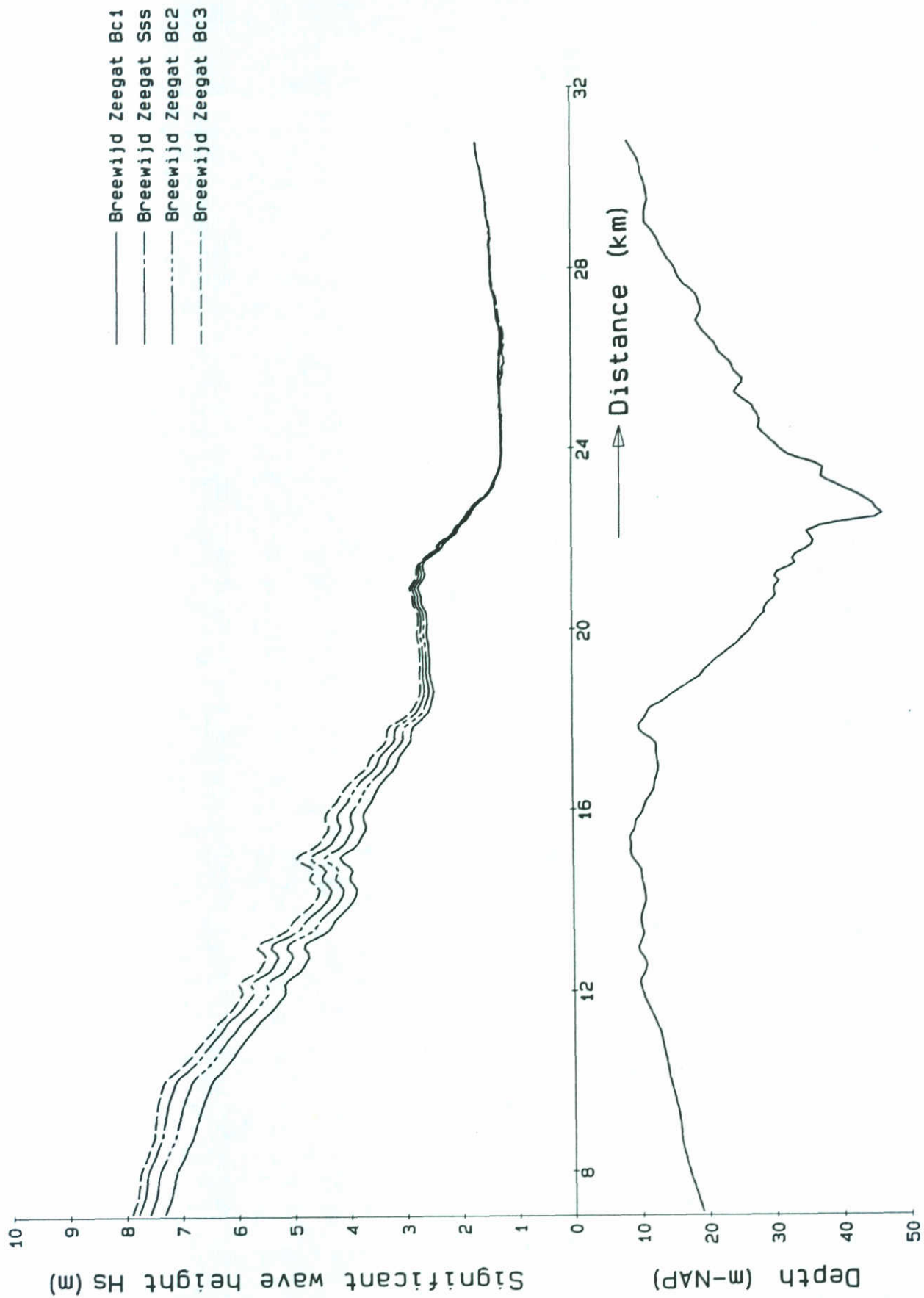
HYDRA-HISWA

BCBUBW

DELFT HYDRAULICS

H1355

FIG. 4.34k



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 VARYING WAVE BREAKING COEFFICIENT

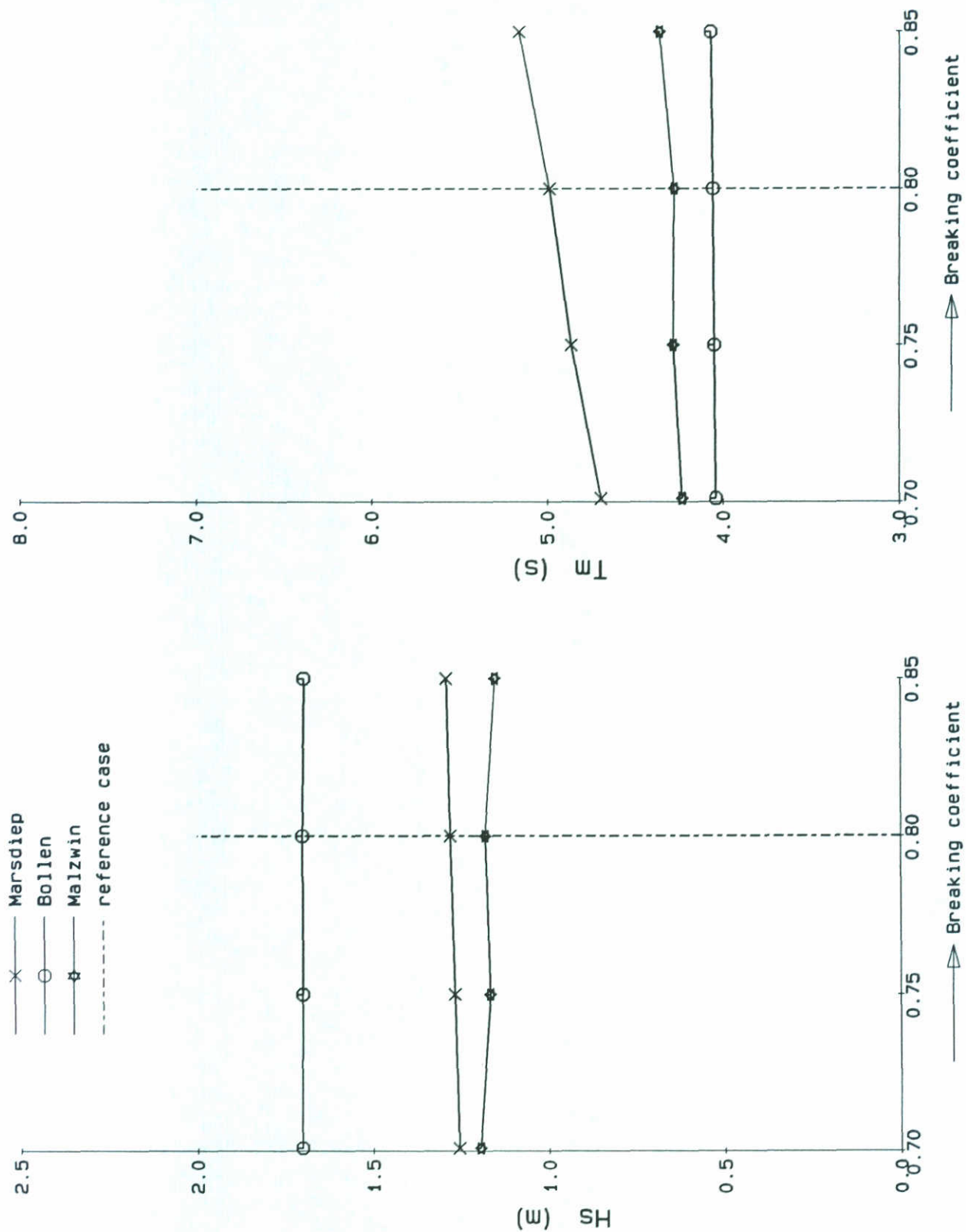
HYDRA-HISWA

BCZGBW

DELFT HYDRAULICS

H1355

FIG.4.34I



EFFECT OF BREAKING COEFFICIENT
ENTRANCE WADDEN SEA

HYDRA-HISWA

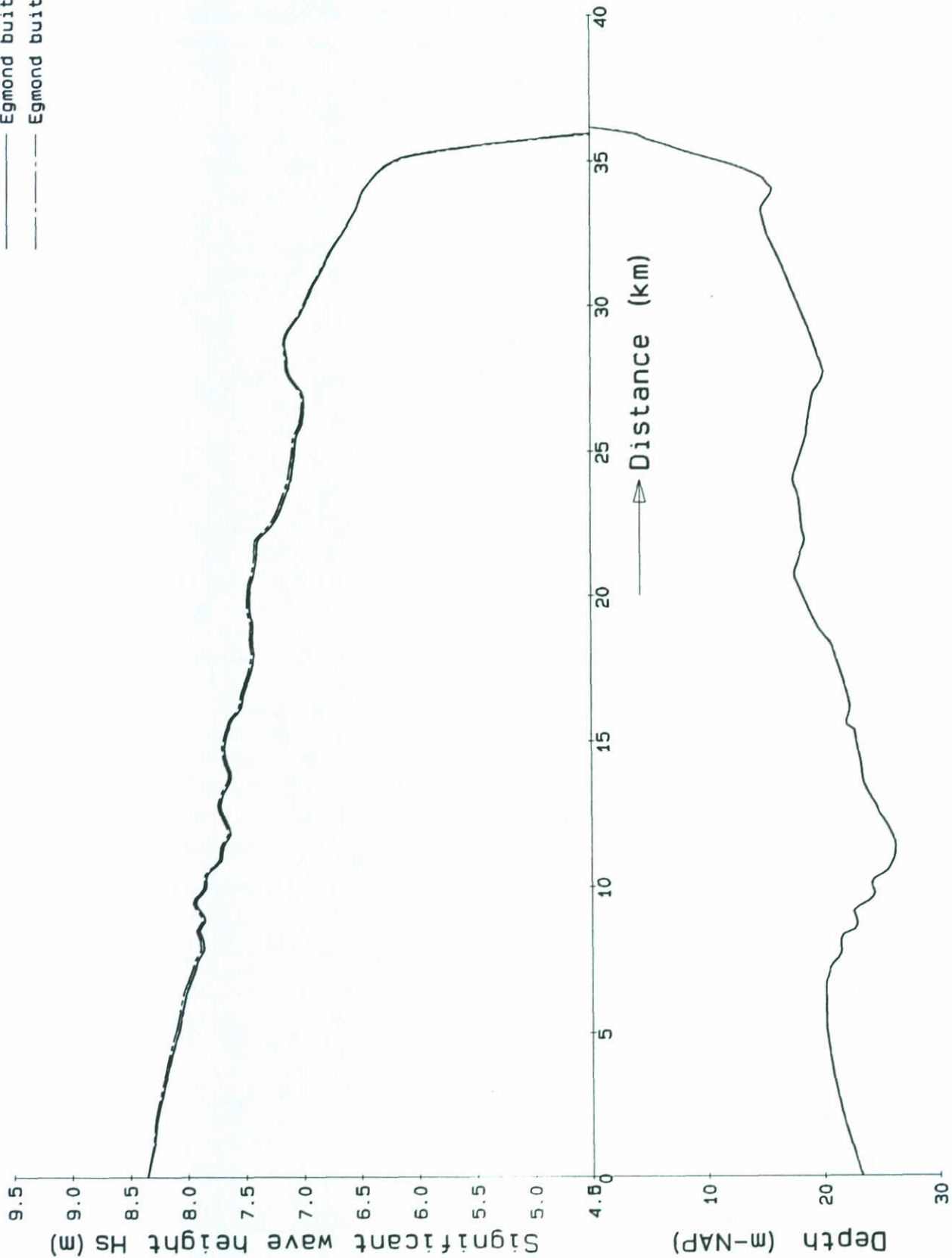
BC1BC3

DELFT HYDRAULICS

H1355

FIG. 4.34m

— Egmond buiten Fv1
 - - - - - Egmond buiten Sss



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

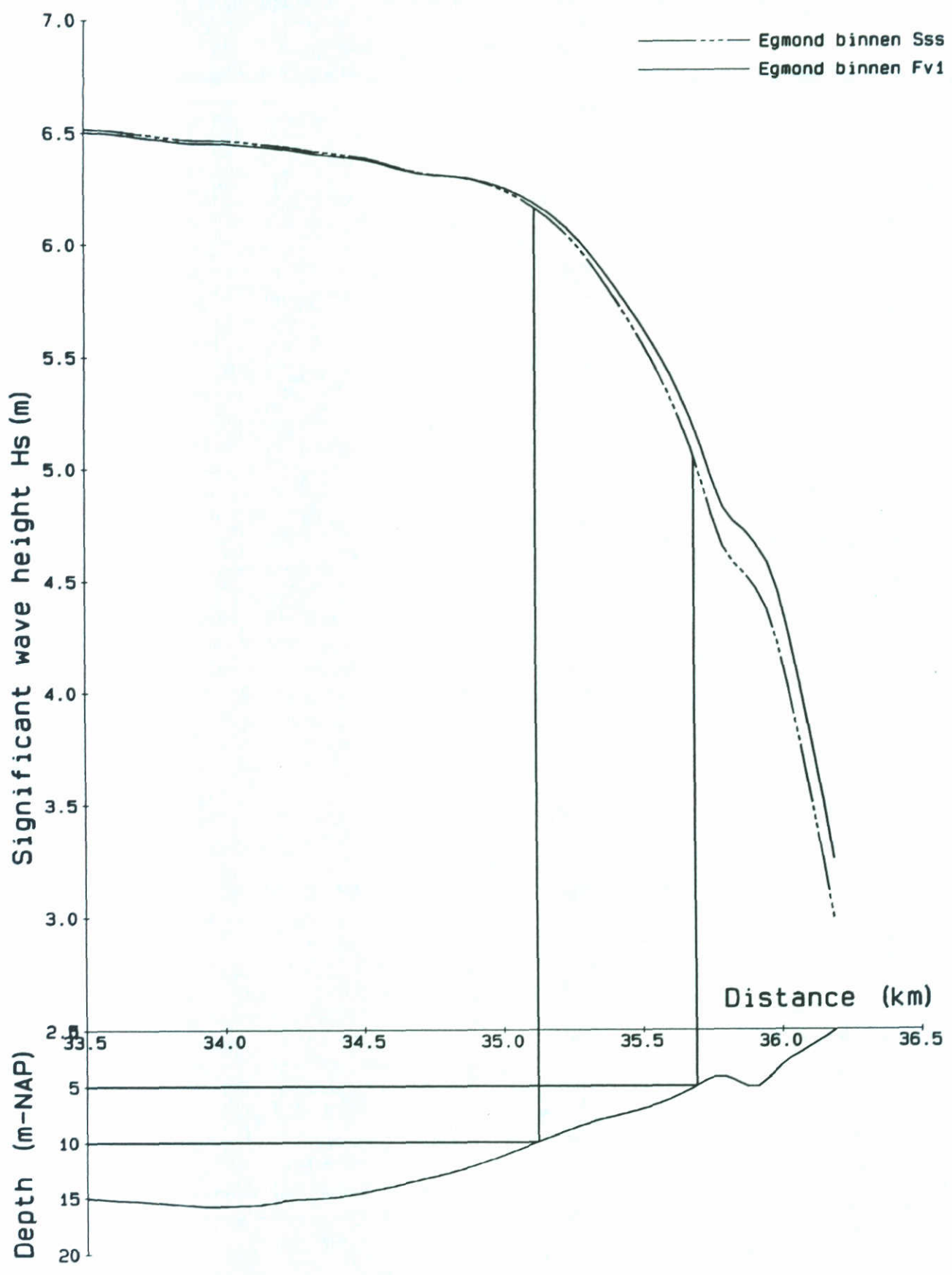
HYDRA-HISWA

FVBUEG

DELFT HYDRAULICS

H1355

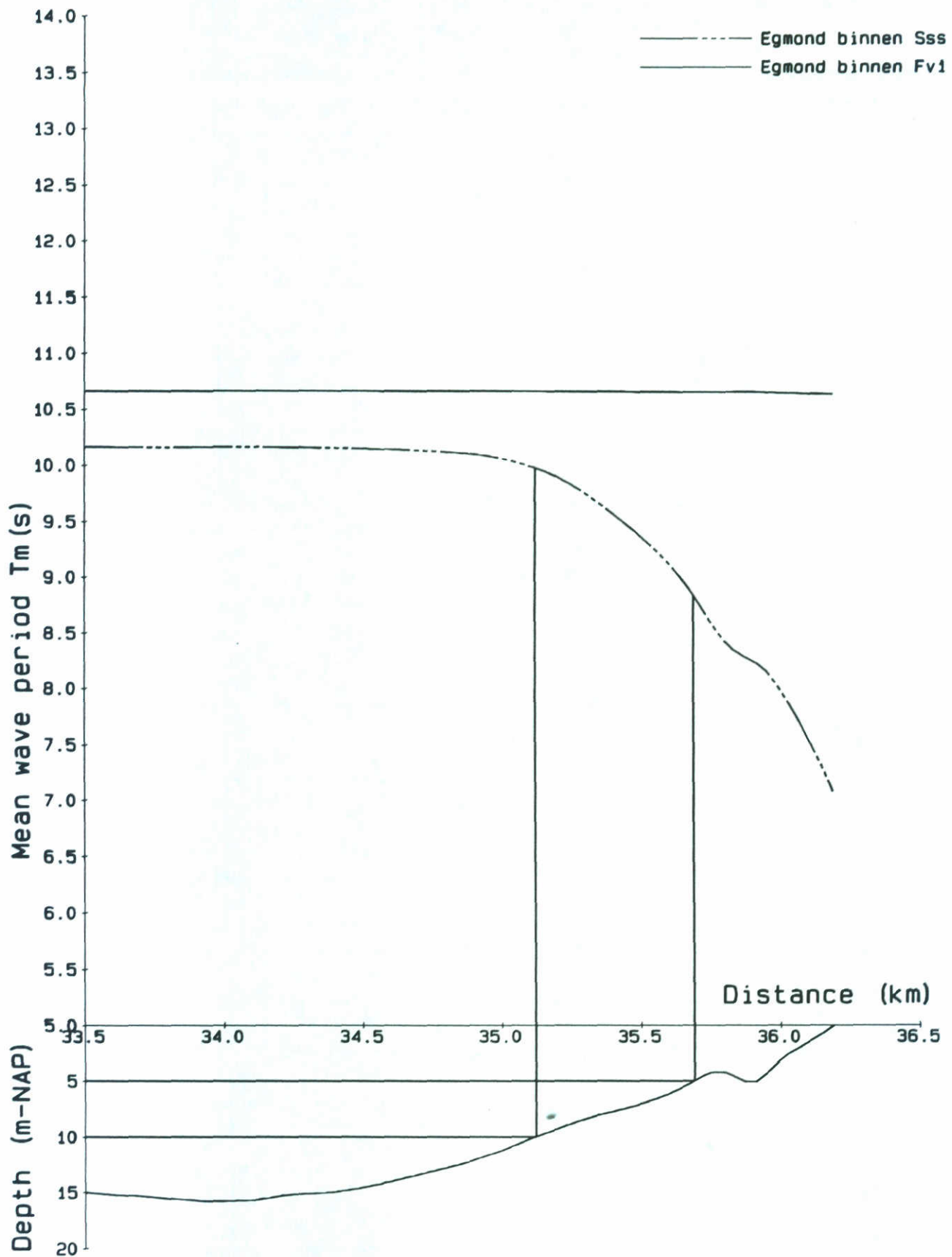
FIG. 4.35a



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

HYDRA-HISWA	FV1
H1355	FIG.4.35b

DELFT HYDRAULICS



MEAN WAVE PERIOD EGMOND PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

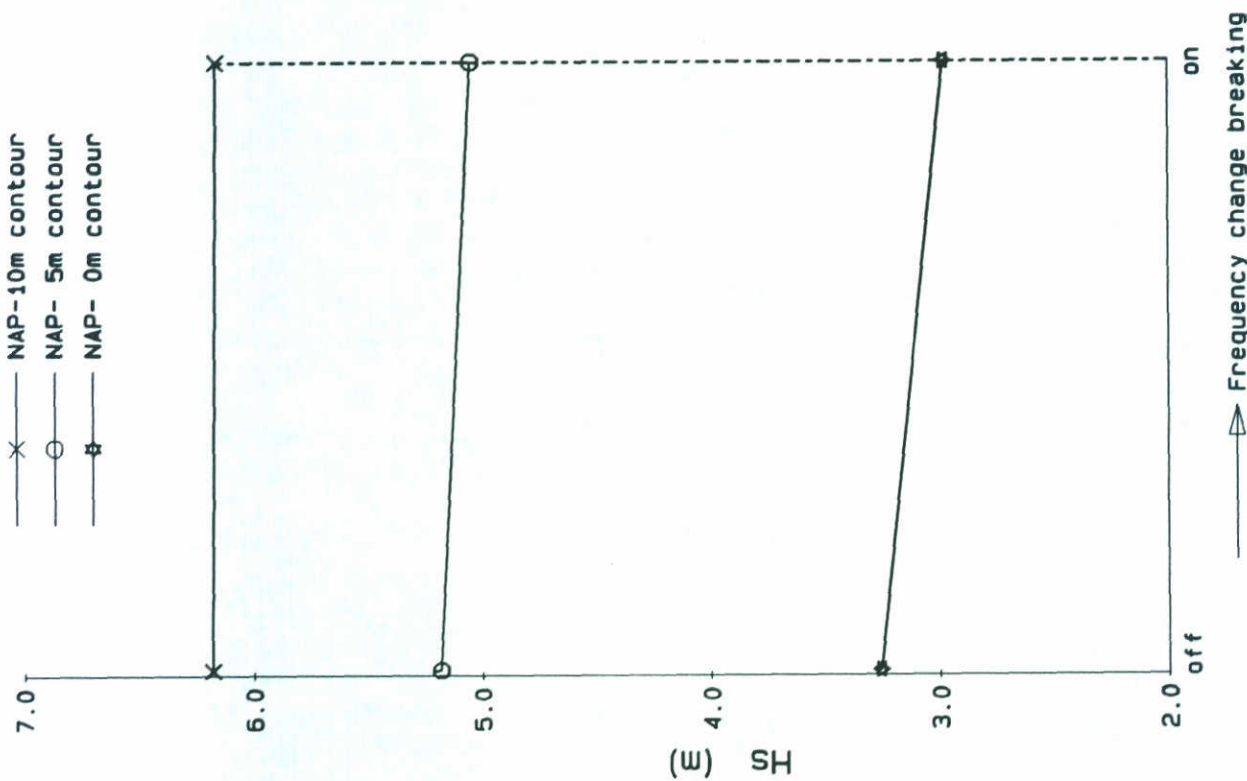
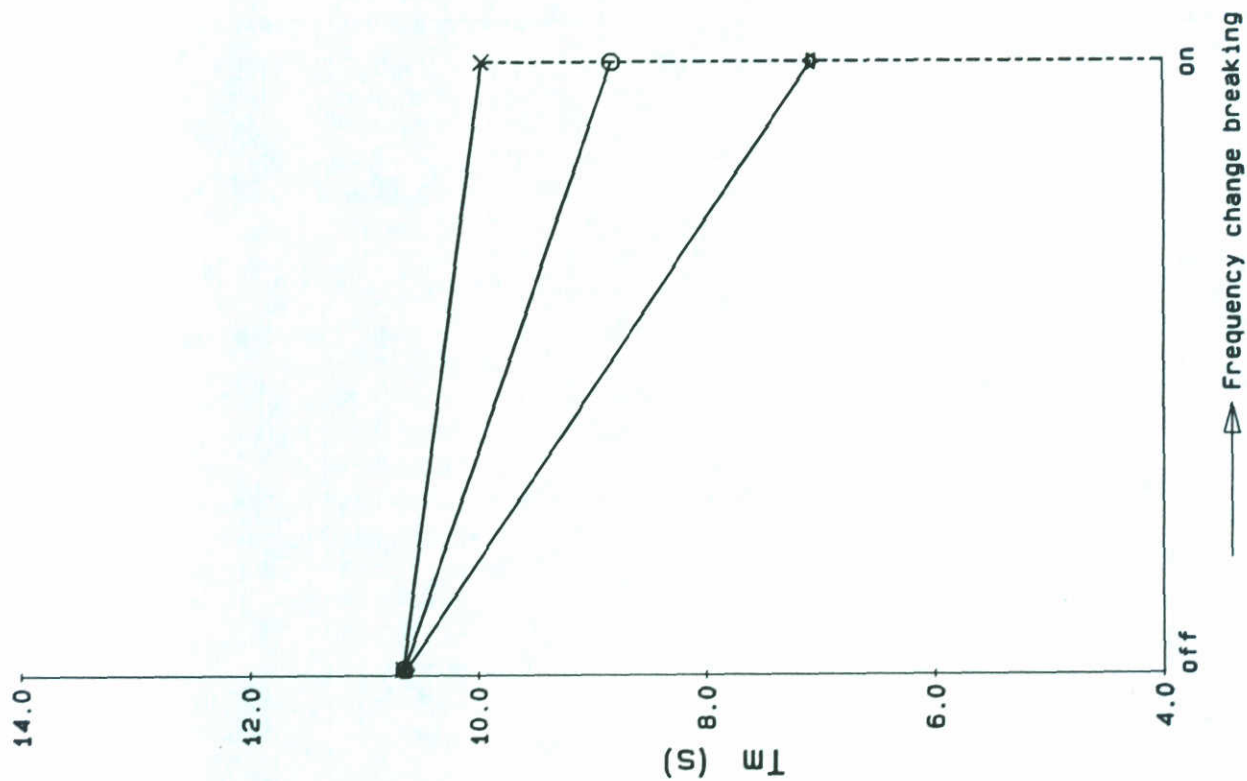
HYDRA-HISWA

FV1

DELFT HYDRAULICS

H1355

FIG. 4.35c



EFFECT OF FREQUENCY CHANGE BREAKING
EGMOND PROFILE

HYDRA-HISWA

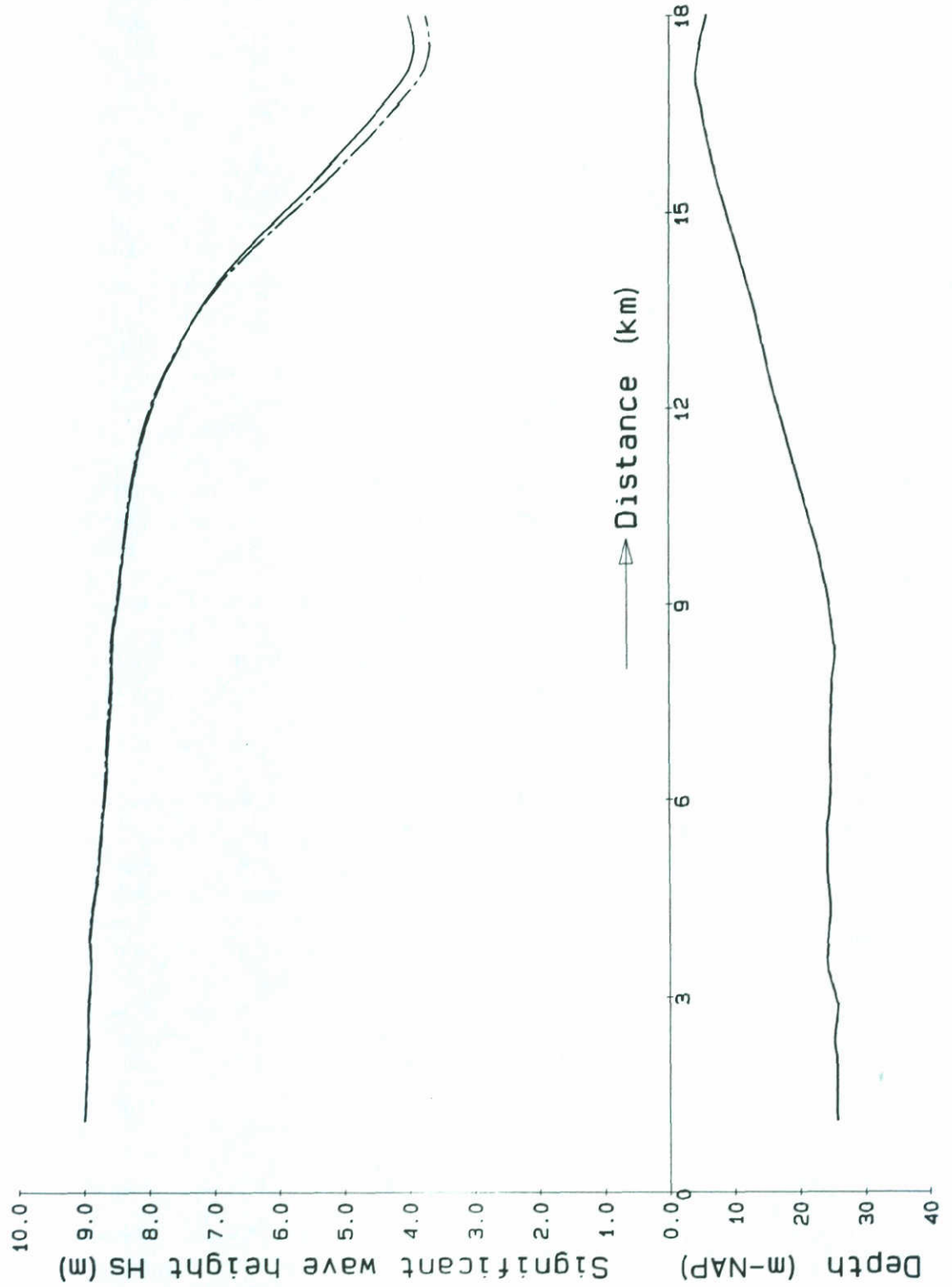
FV1

DELFT HYDRAULICS

H1355

FIG.4.35d

— Molengat buiten Fv1
 - - - Molengat buiten Sss



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

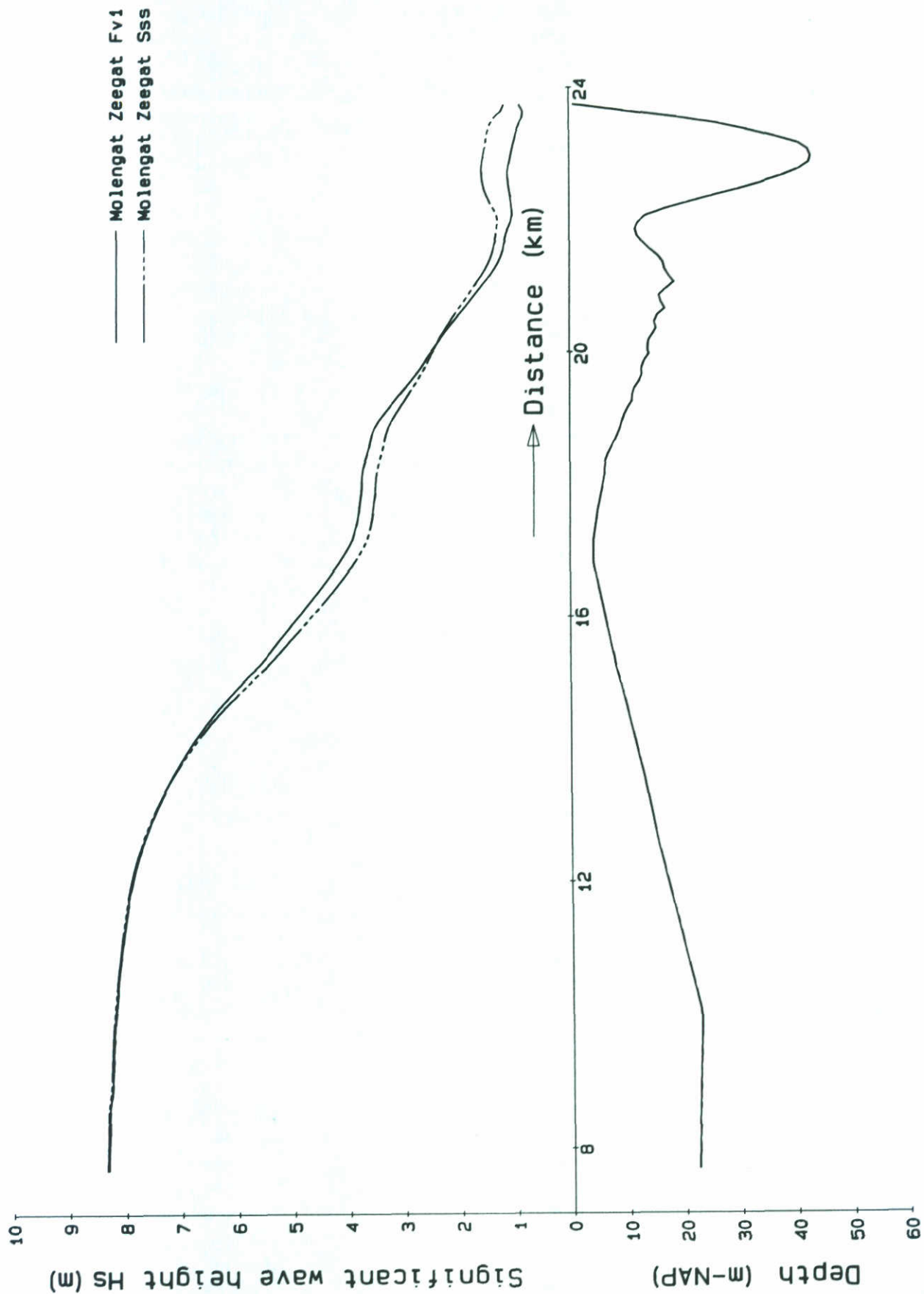
HYDRA-HISWA

FVBUMG

DELFT HYDRAULICS

H1355

FIG. 4.35e



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

HYDRA-HISWA

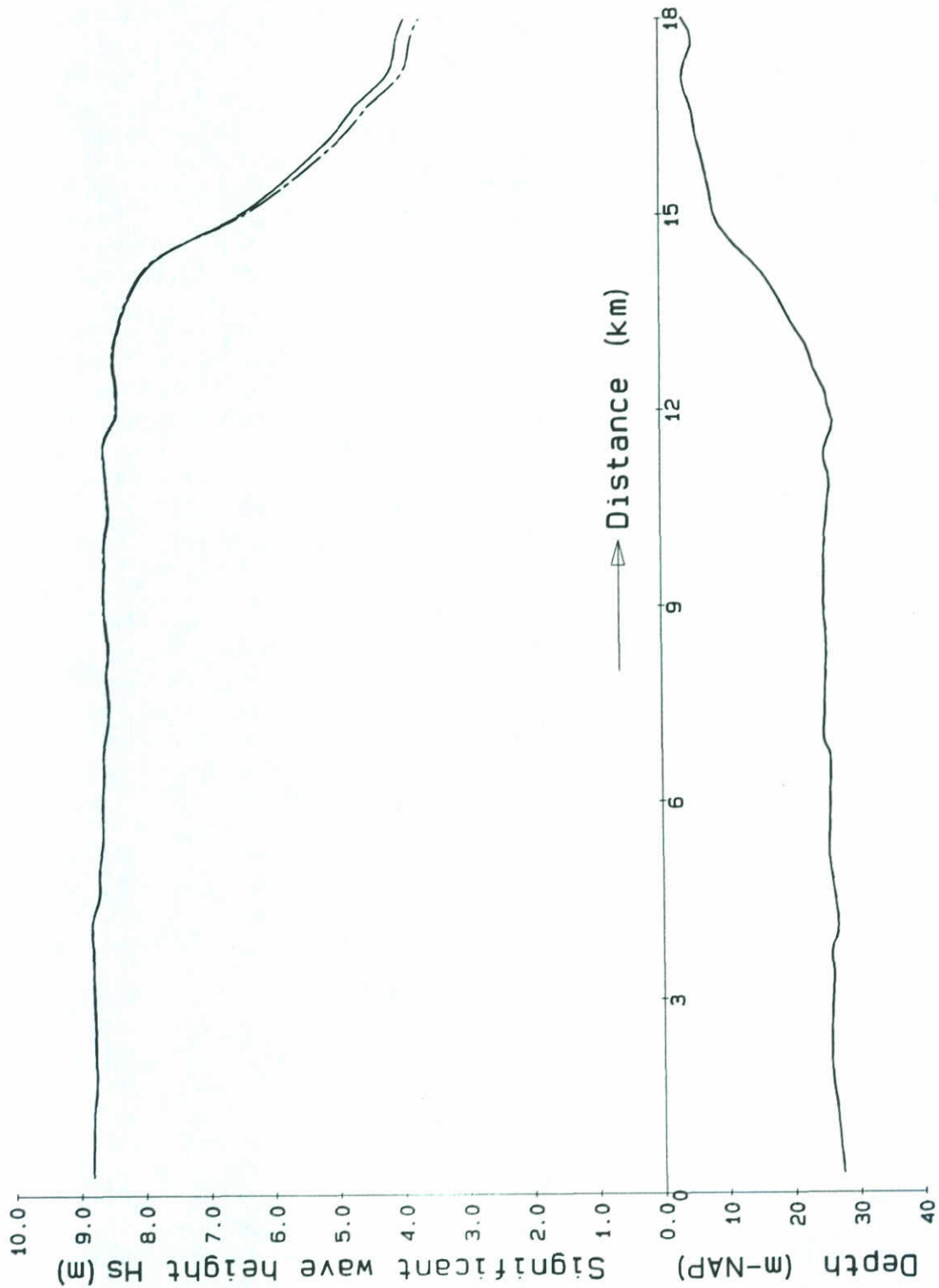
FVZGMG

DELFT HYDRAULICS

H1355

FIG. 4.35f

— Marsdiep buiten Fv1
 - - - Marsdiep buiten Sss



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

HYDRA-HISWA

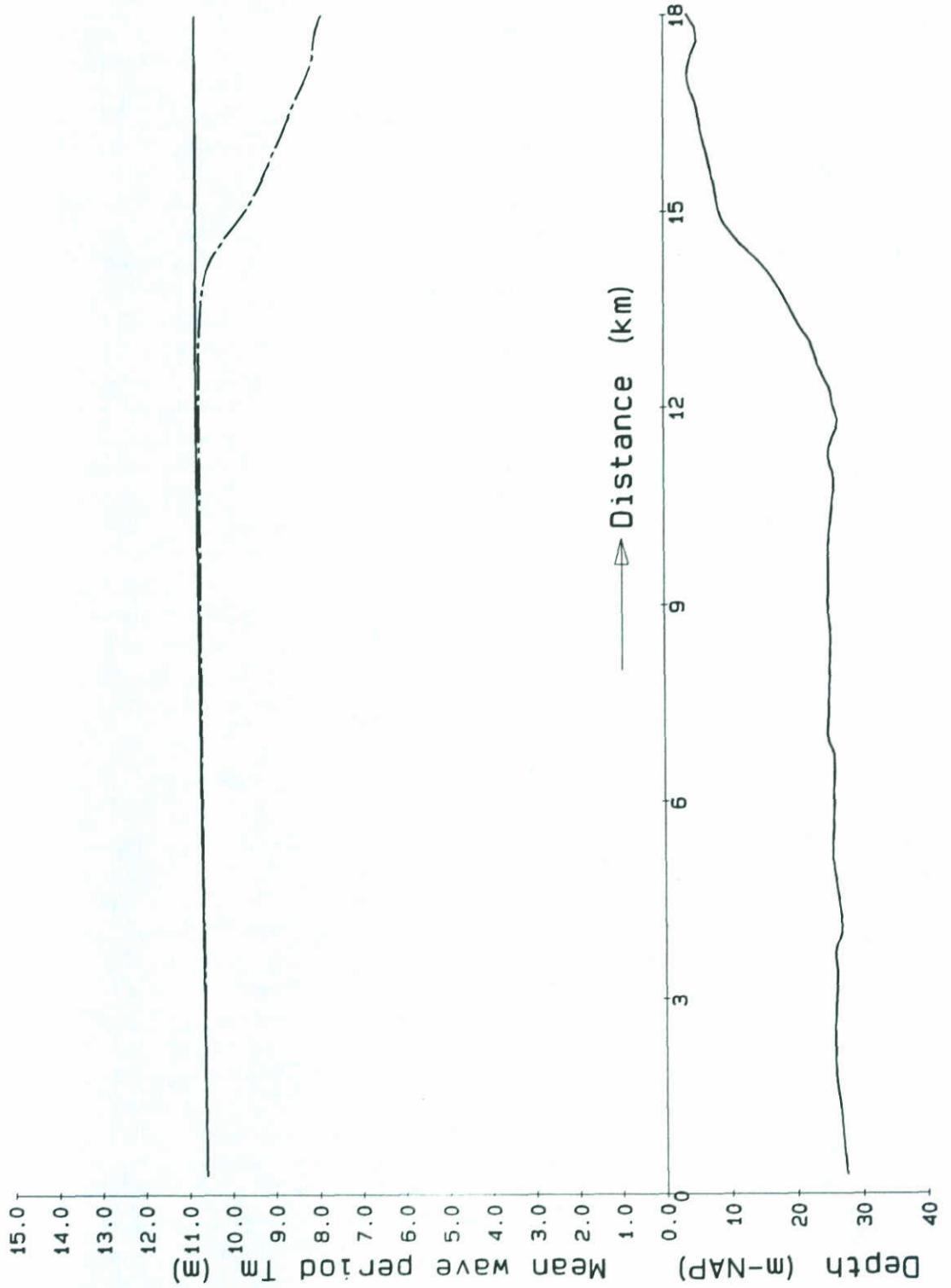
FVBUMD

DELFT HYDRAULICS

H1355

FIG.4.35g

— Marsdiep buiten Fv1
 - - - Marsdiep buiten Sss



MEAN WAVE PERIOD MARSDIEP PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

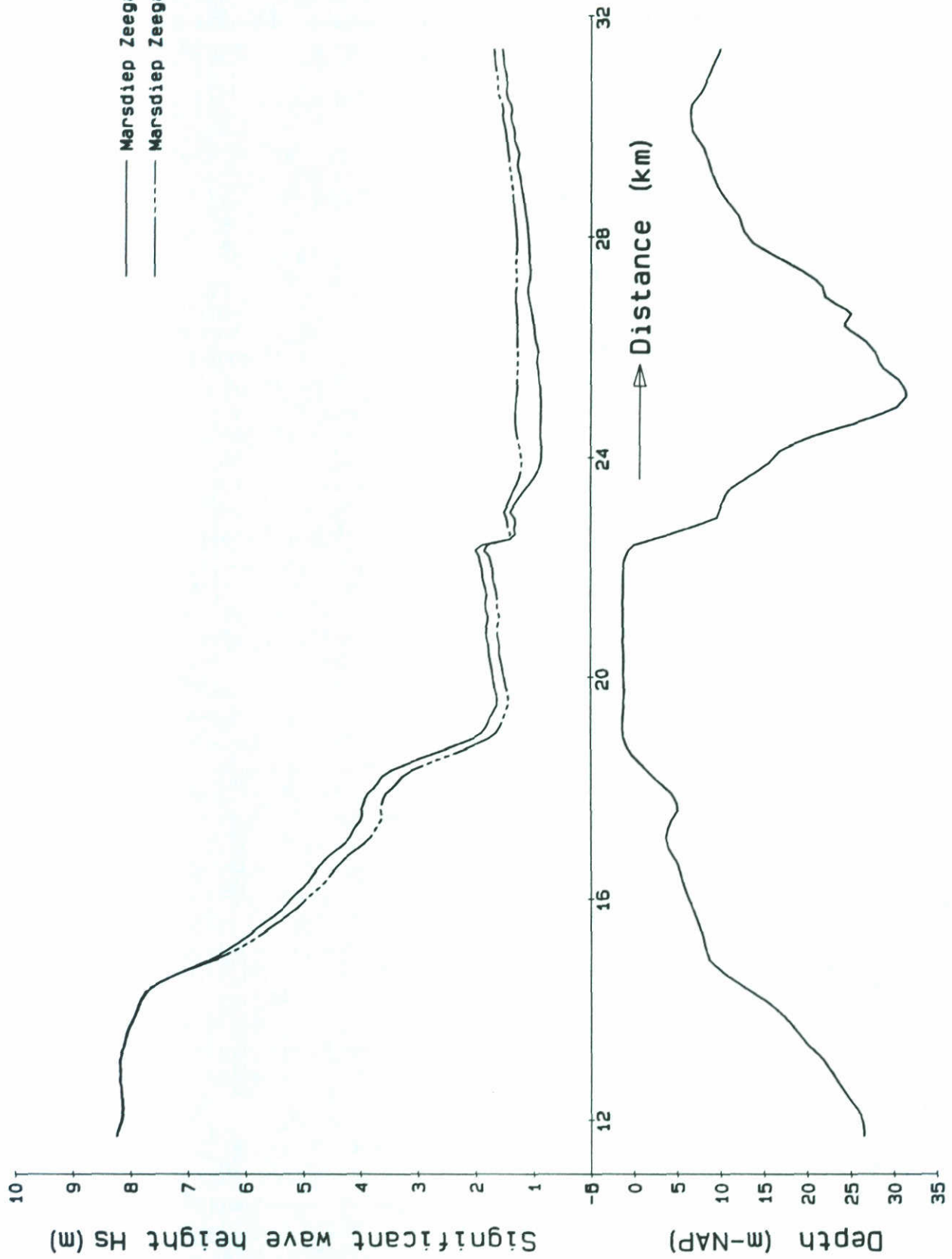
HYDRA-HISWA

FVBUMD

DELFT HYDRAULICS

H1355

FIG.4.35h



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

HYDRA-HISWA

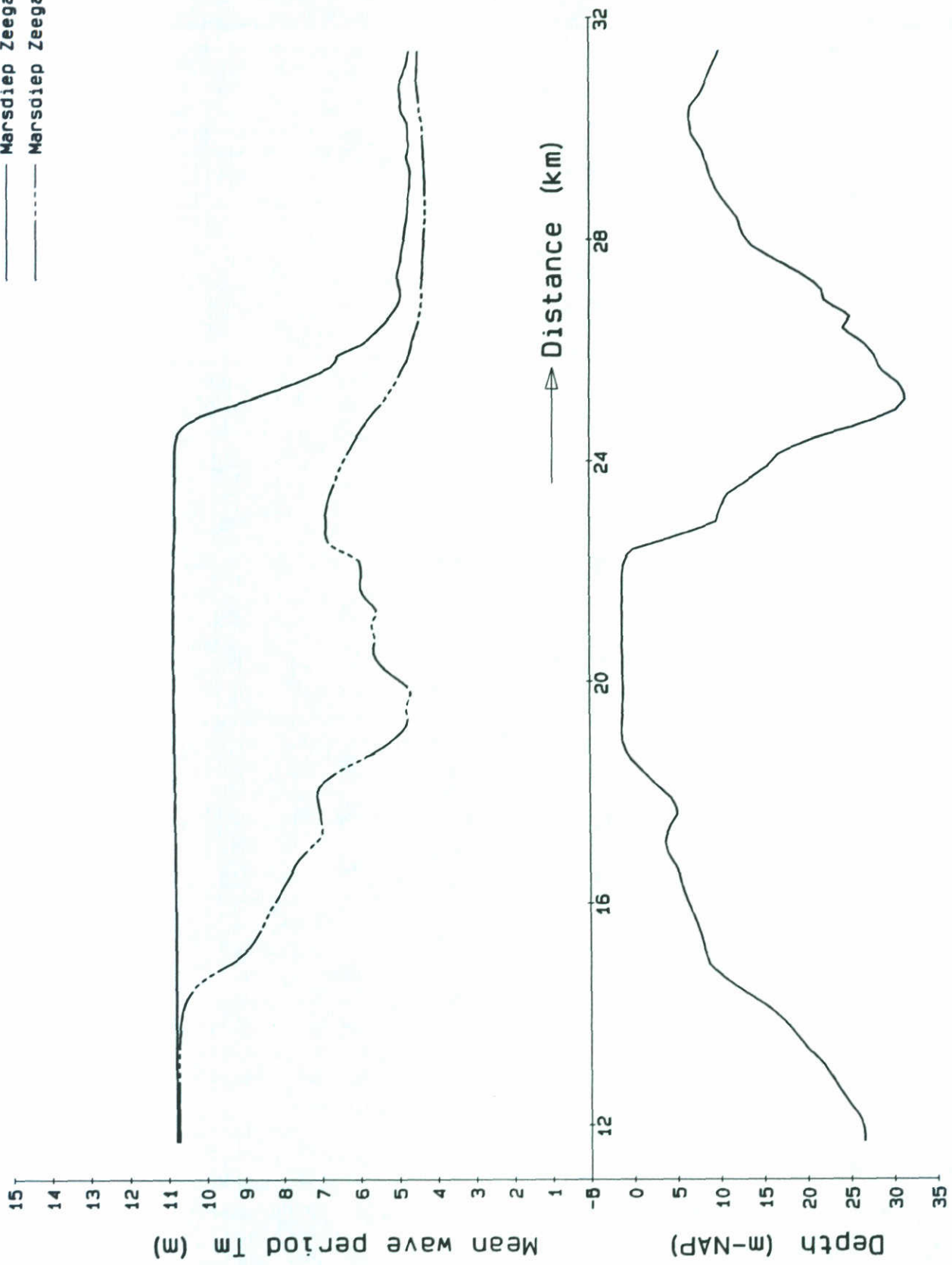
FVZGMD

DELFT HYDRAULICS

H1355

FIG. 4.35i

— Marsdiep Zeegat Fv1
 - - - Marsdiep Zeegat Sss



MEAN WAVE PERIOD MARSDIEP PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

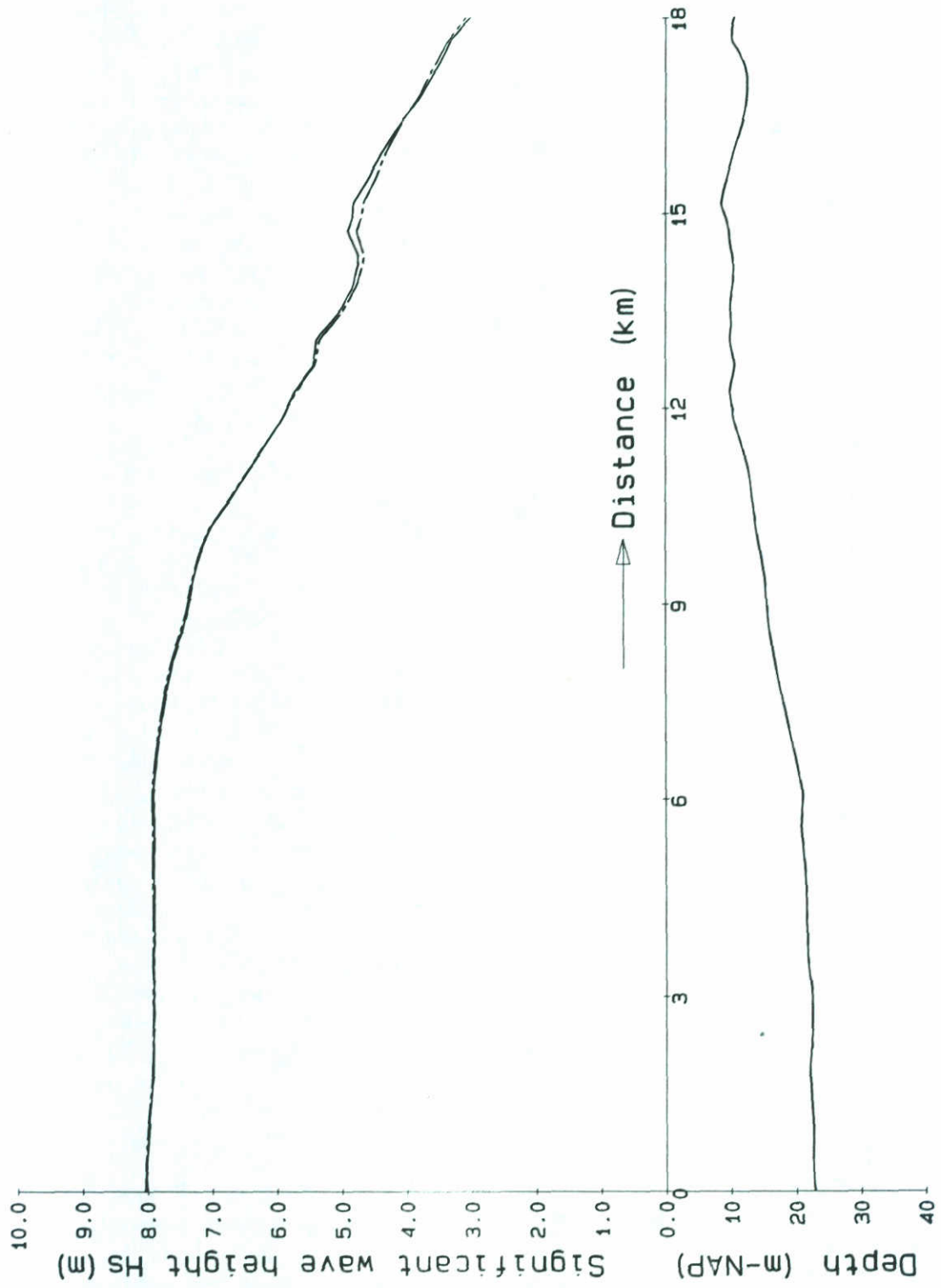
HYDRA-HISWA FVZGMD

DELFT HYDRAULICS

H1355

FIG. 4.35j

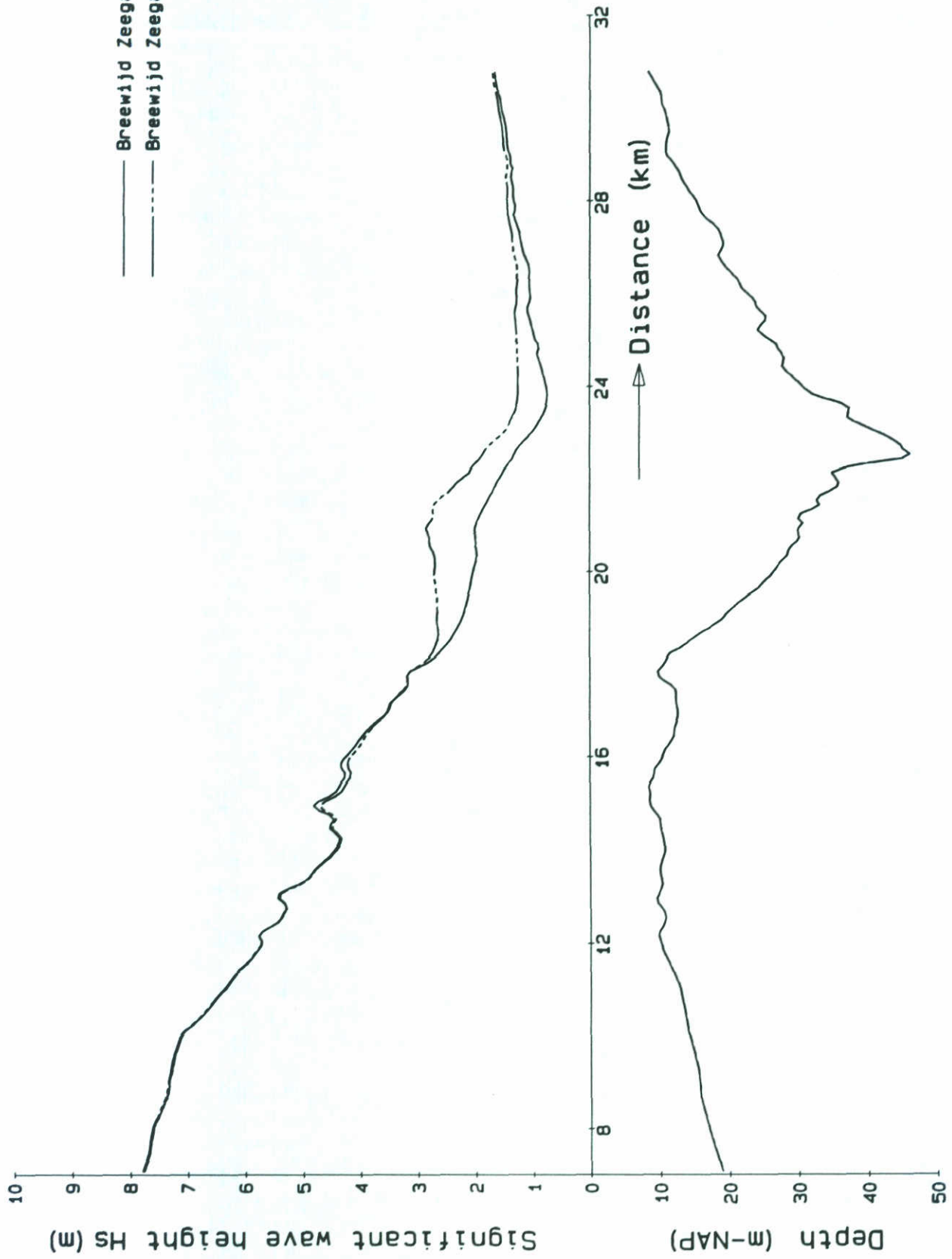
— Breewijd buiten Fv1
 - - - Breewijd buiten Sss



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

HYDRA-HISWA	FVBUBW
H1355	FIG. 4.35k

DELFT HYDRAULICS



SIGNIFICANT WAVE HEIGHT BREEWIJD PROFILE
 FREQUENCY CHANGE BREAKING ON/OFF

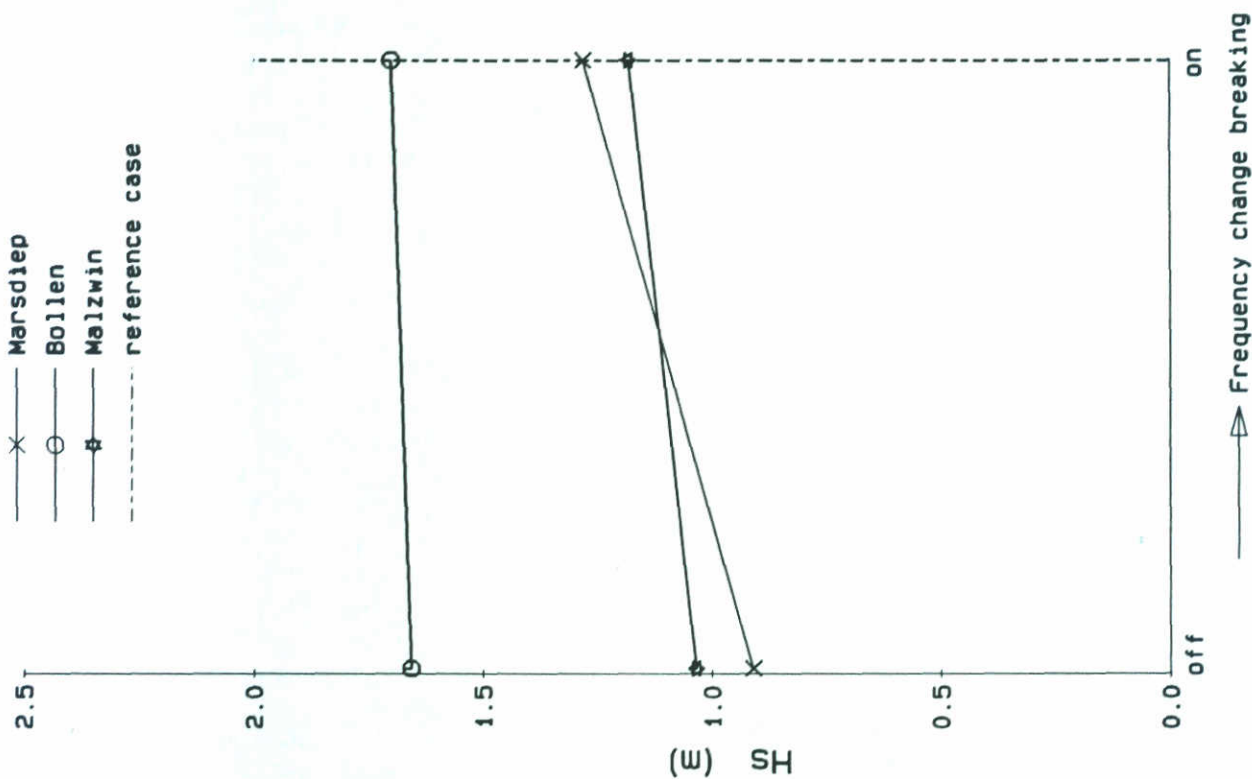
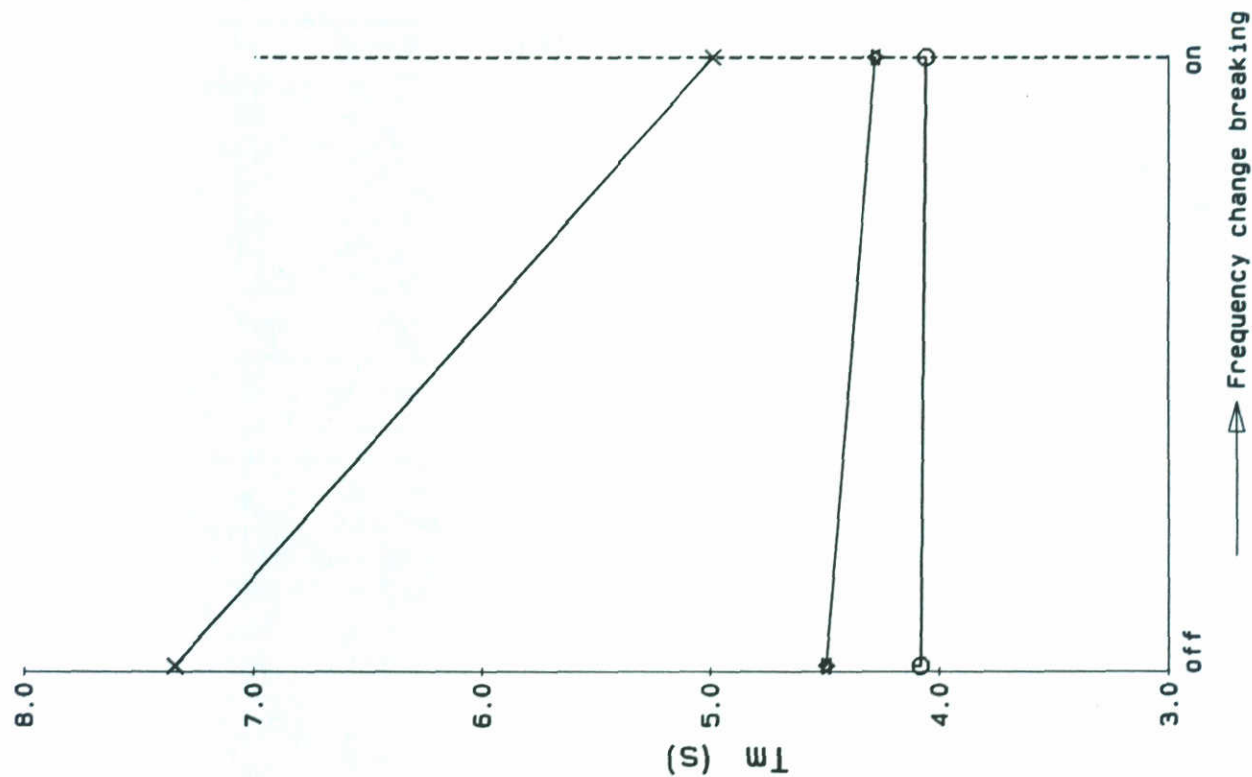
HYDRA-HISWA

FVZGBW

DELFT HYDRAULICS

H1355

FIG. 4.35I



EFFECT OF FREQUENCY CHANGE BREAKING
ENTRANCE WADDEN SEA

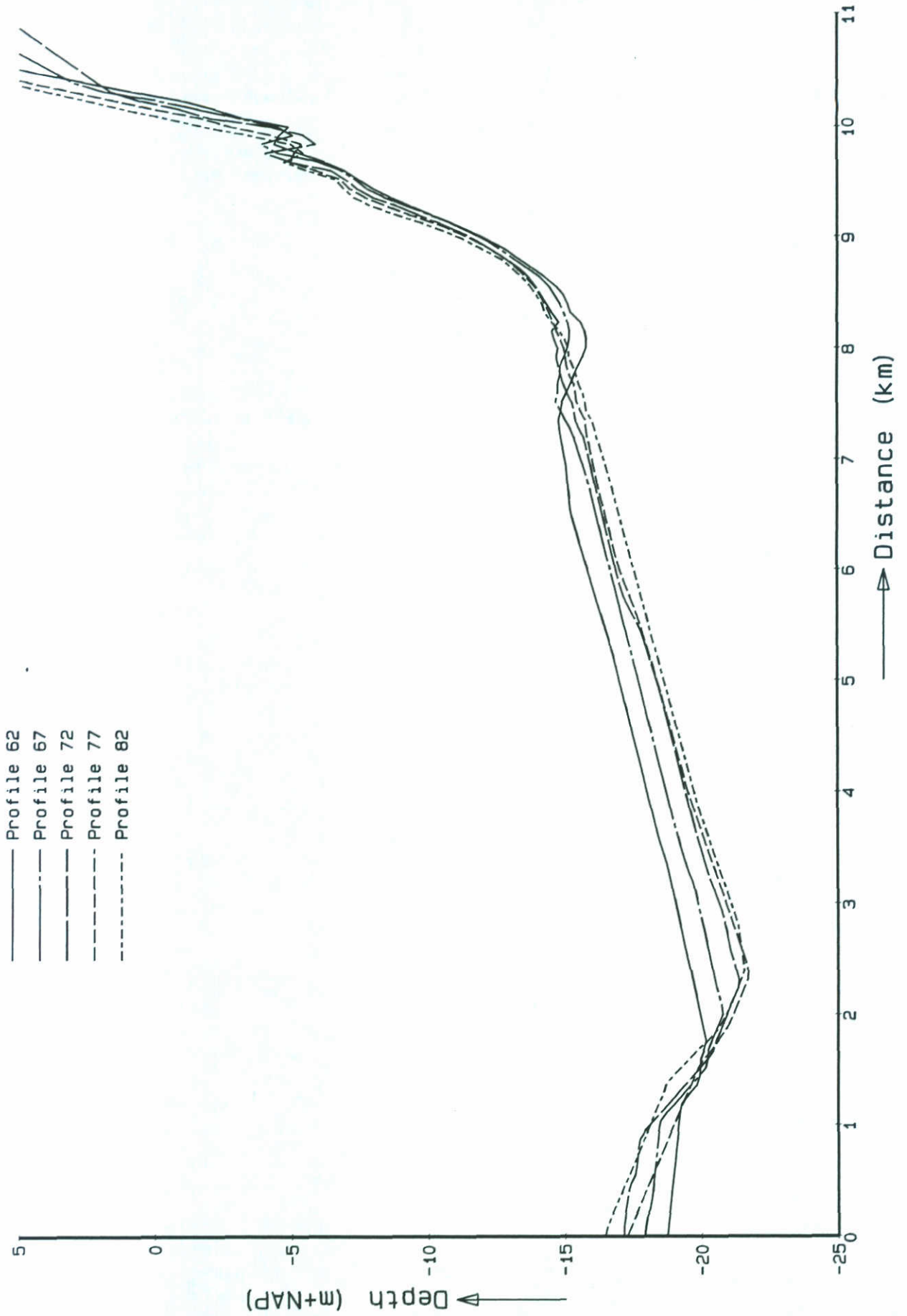
HYDRA-HISWA

FV1

DELFT HYDRAULICS

H1355

FIG.4.35m



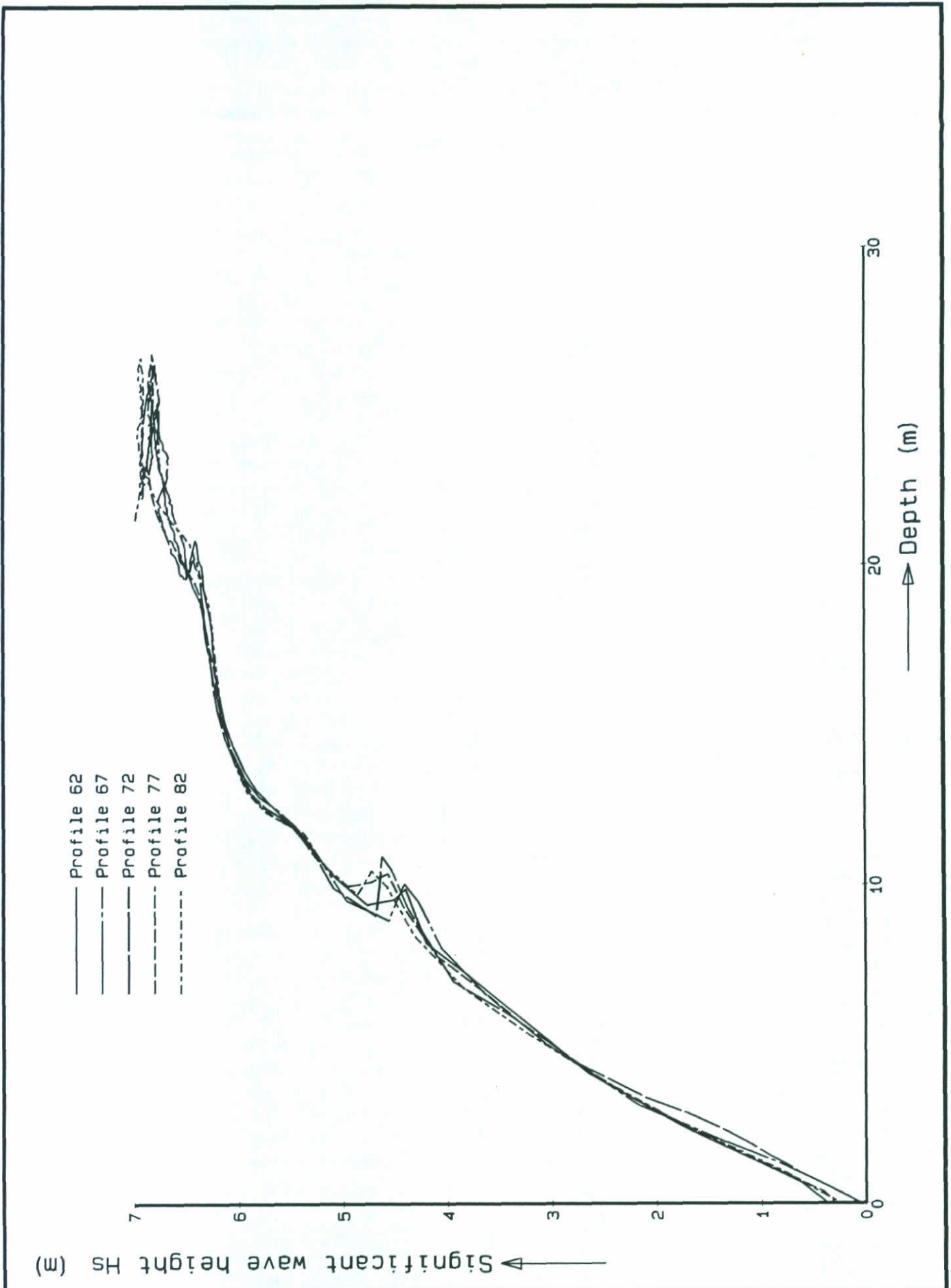
BOTTOM VARIABILITY
BATHYMETRY OF PROFILES

HYDRA-HISWA

DELFT HYDRAULICS

H1355

Fig 4.36a



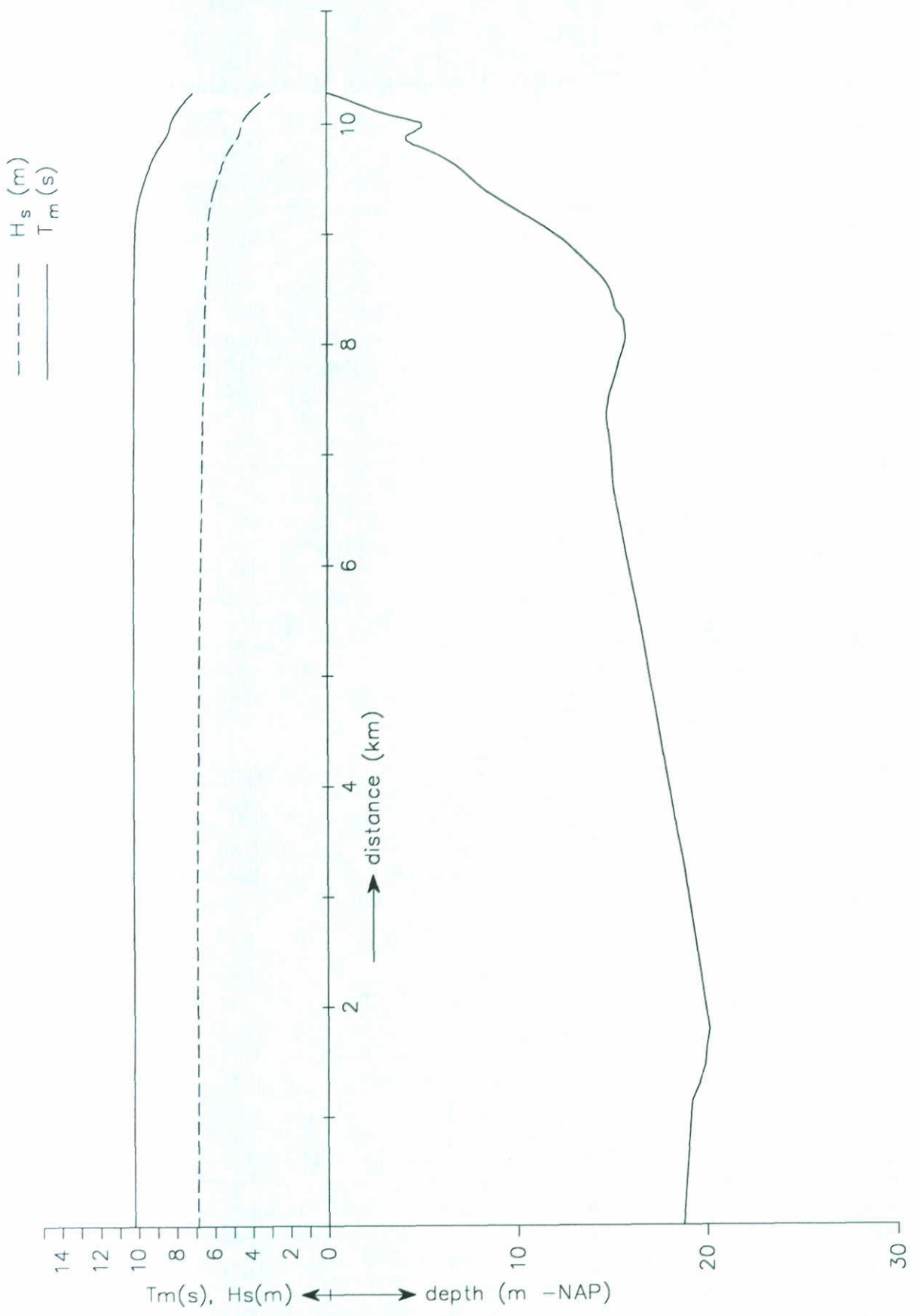
BOTTOM VARIABILITY
 RELATION DEPTH - SIGNIFICANT WAVE HEIGHT

HYDRA-HISWA

DELFT HYDRAULICS

H1355

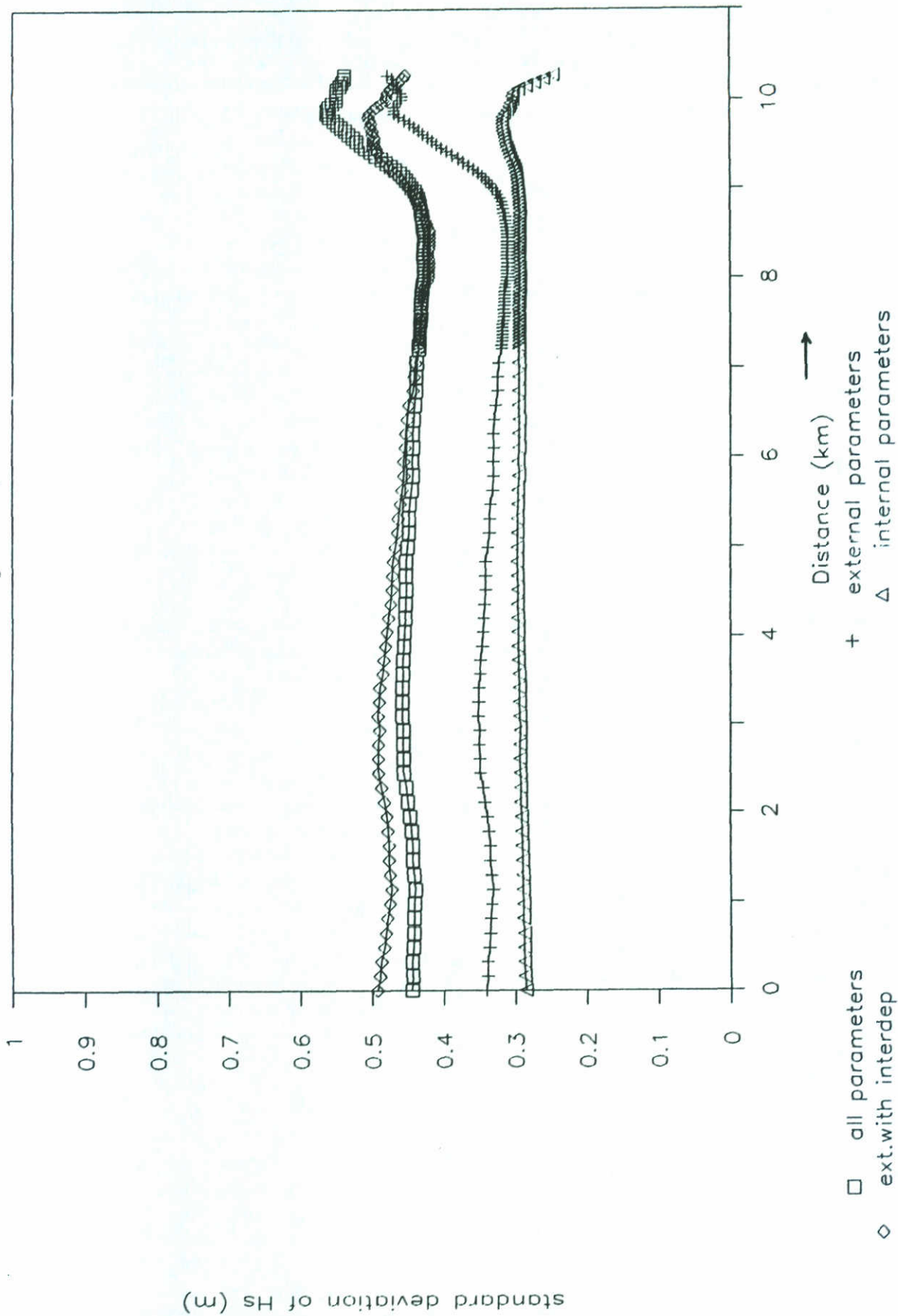
Fig 4.36b



SIGNIFICANT WAVE HEIGHT AND MEAN WAVE PERIOD EGMOND PROFILE

Influence of input parameters on Hs

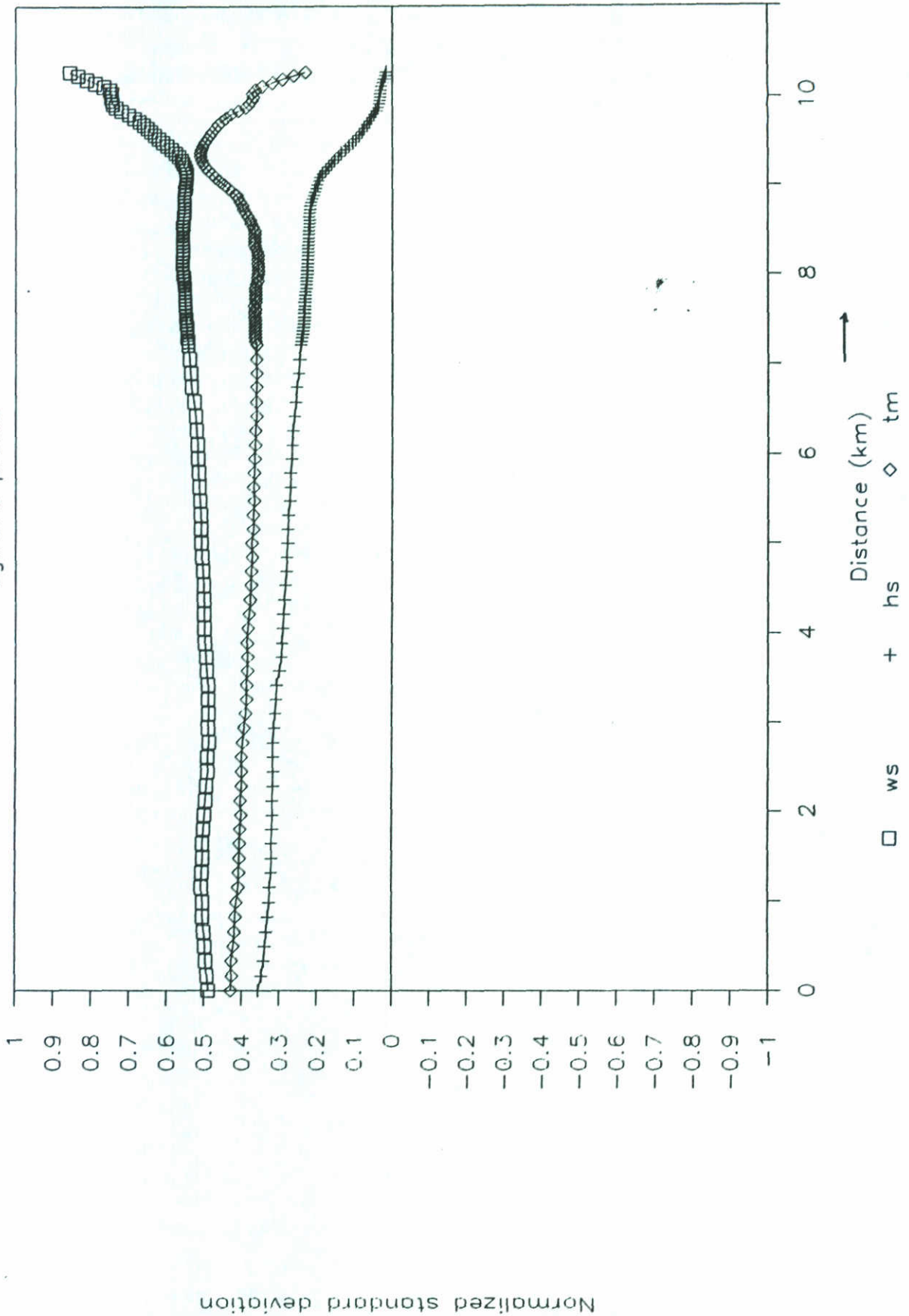
Egmond profile



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE,
TOTAL UNCERTAINTY

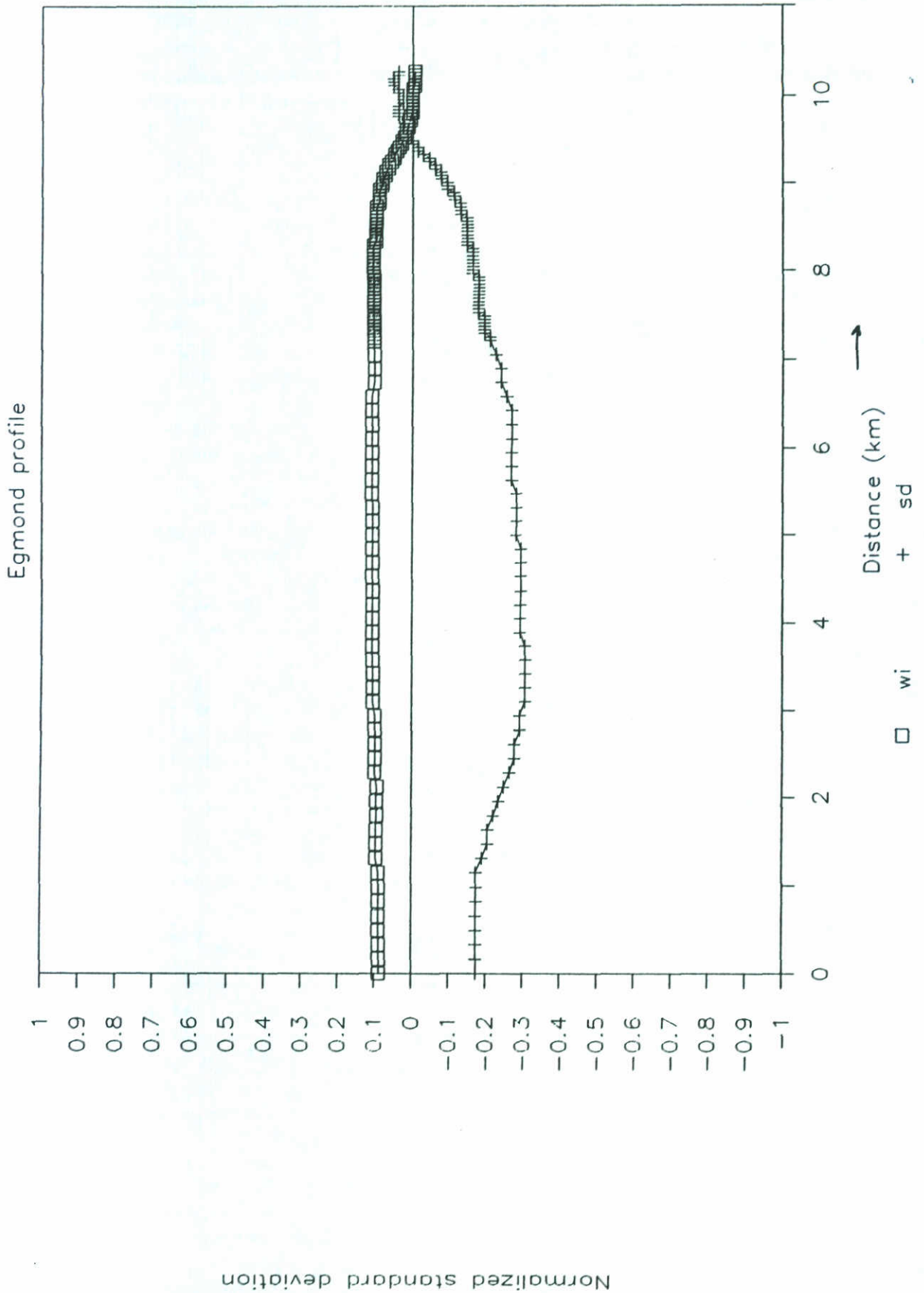
Influence of input parameters on Hs

Egmond profile



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WS, HS AND TM

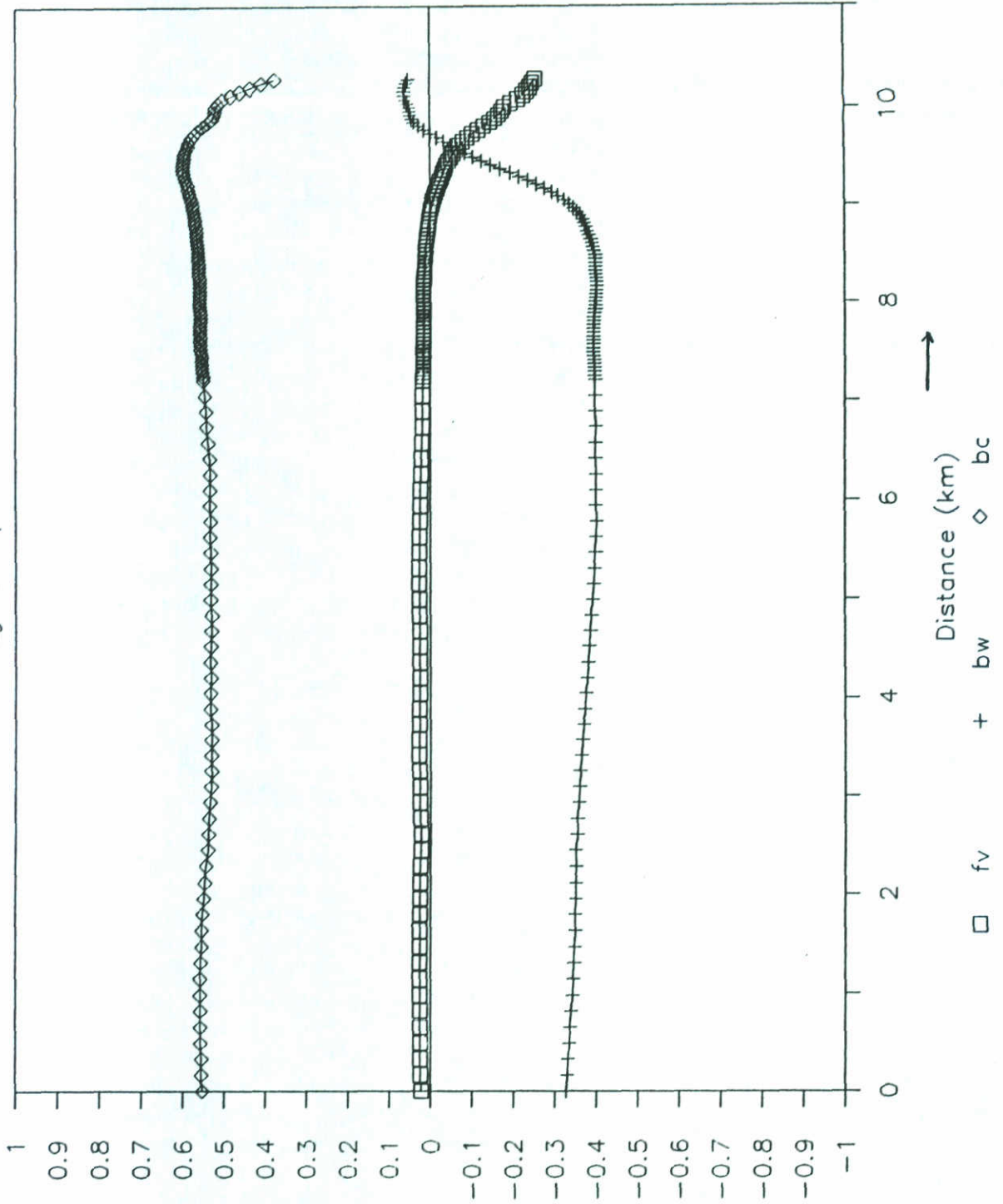
Influence of input parameters on Hs



SIGNIFICANT WAVE HEIGHT EGMOND PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WI AND SD

influence of input parameters on Hs

Egmond profile

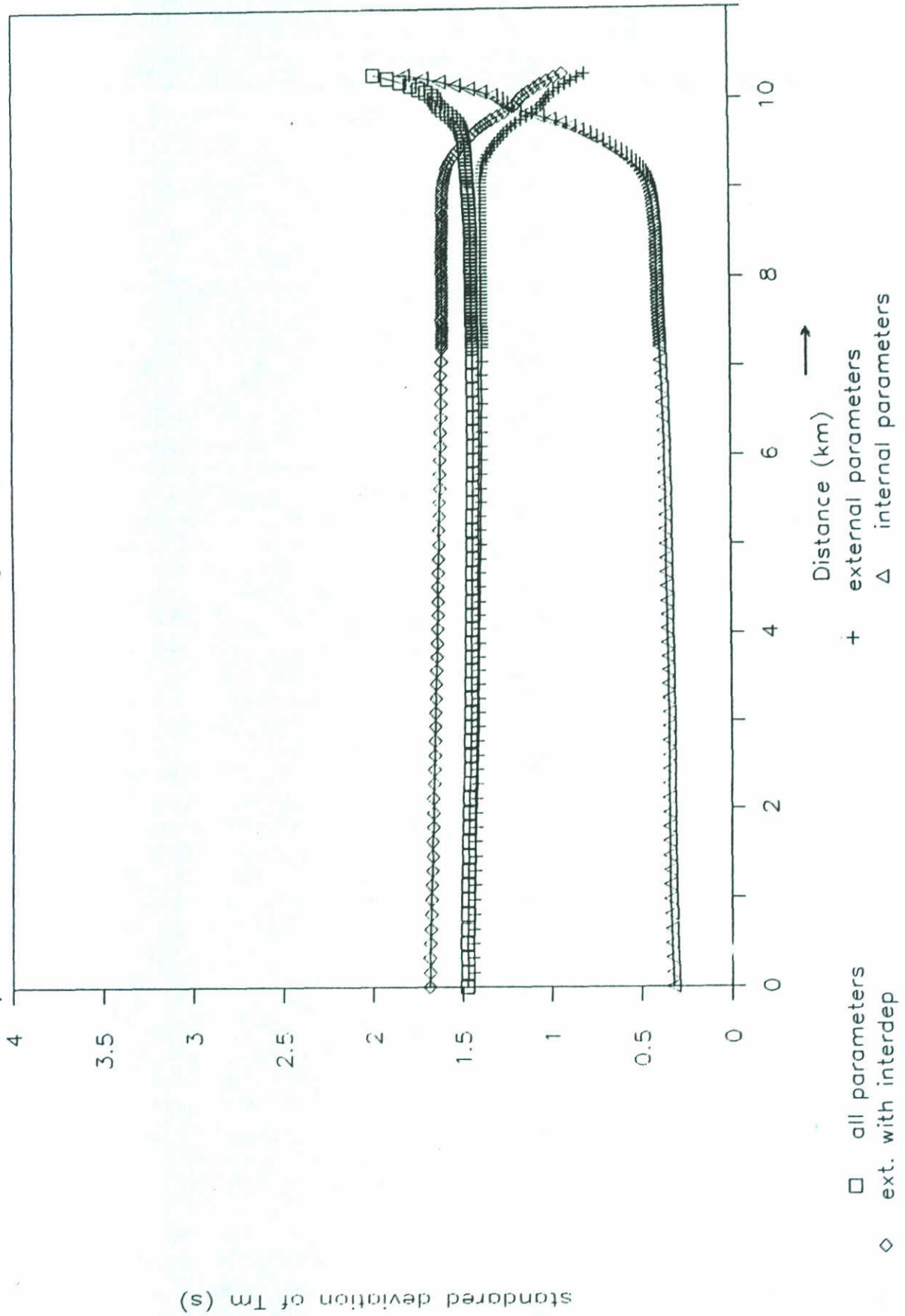


Normalized standard deviation

SIGNIFICANT WAVE HEIGHT EGMOND PROFILE,
NORMALIZED UNCERTAINTY DUE TO
PARAMETERS FV, BW AND BC

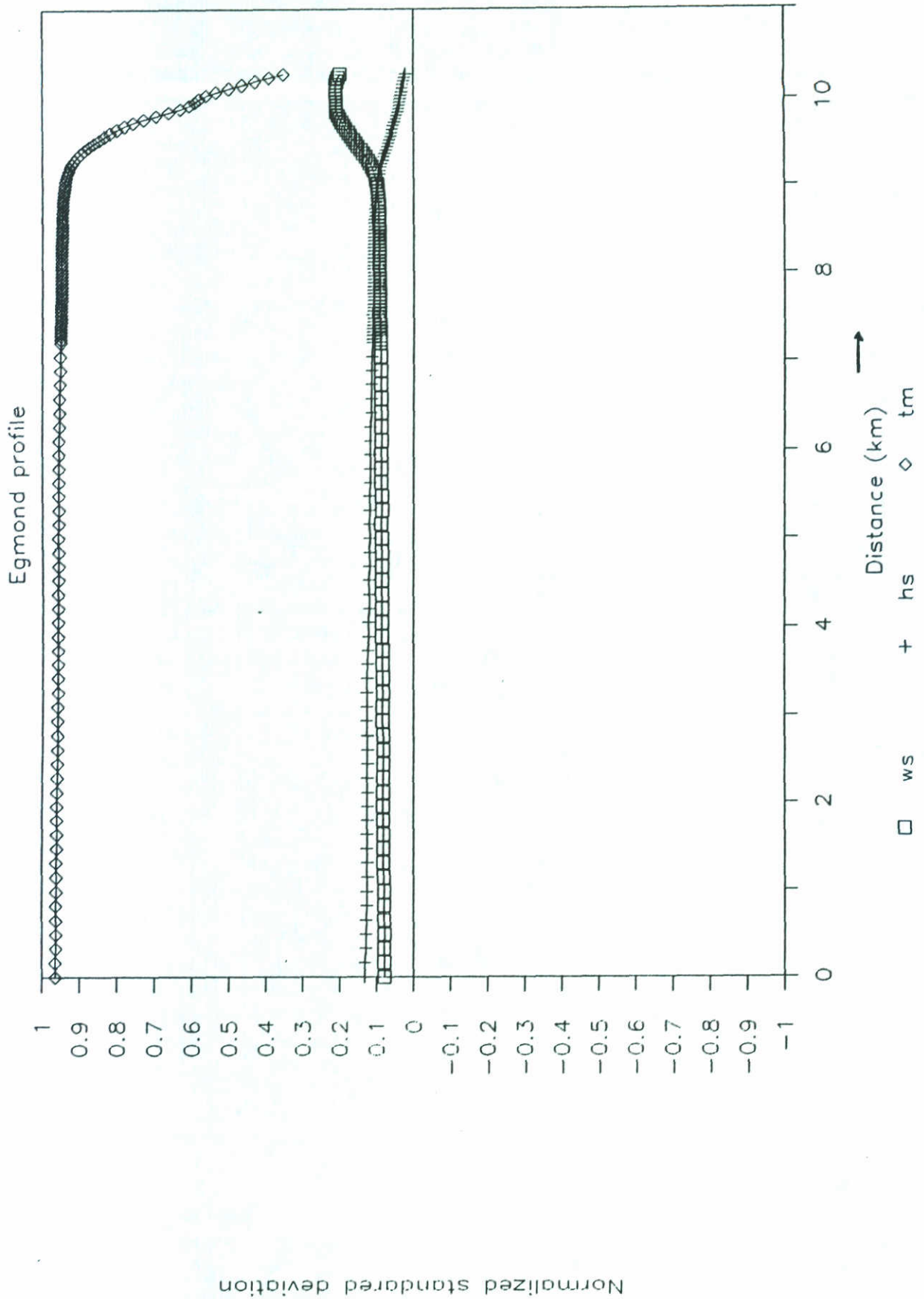
Influence of input parameters on Tm

Egmond profile



MEAN WAVE PERIOD EGMOND PROFILE,
TOTAL UNCERTAINTY

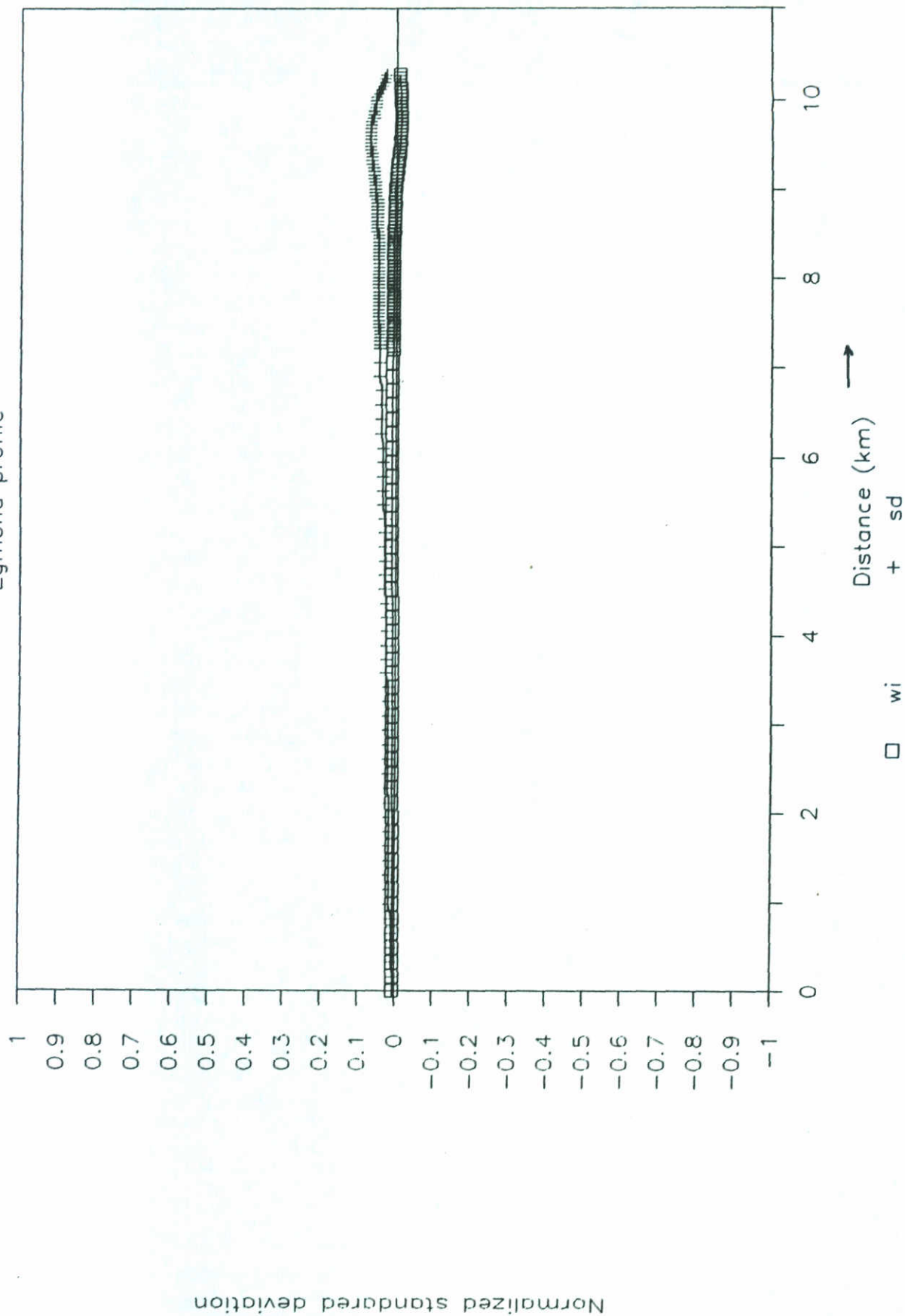
Influence of input parameters on T_m



MEAN WAVE PERIOD EGMOND PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WS, HS AND TM

Influence of input parameters on T_m

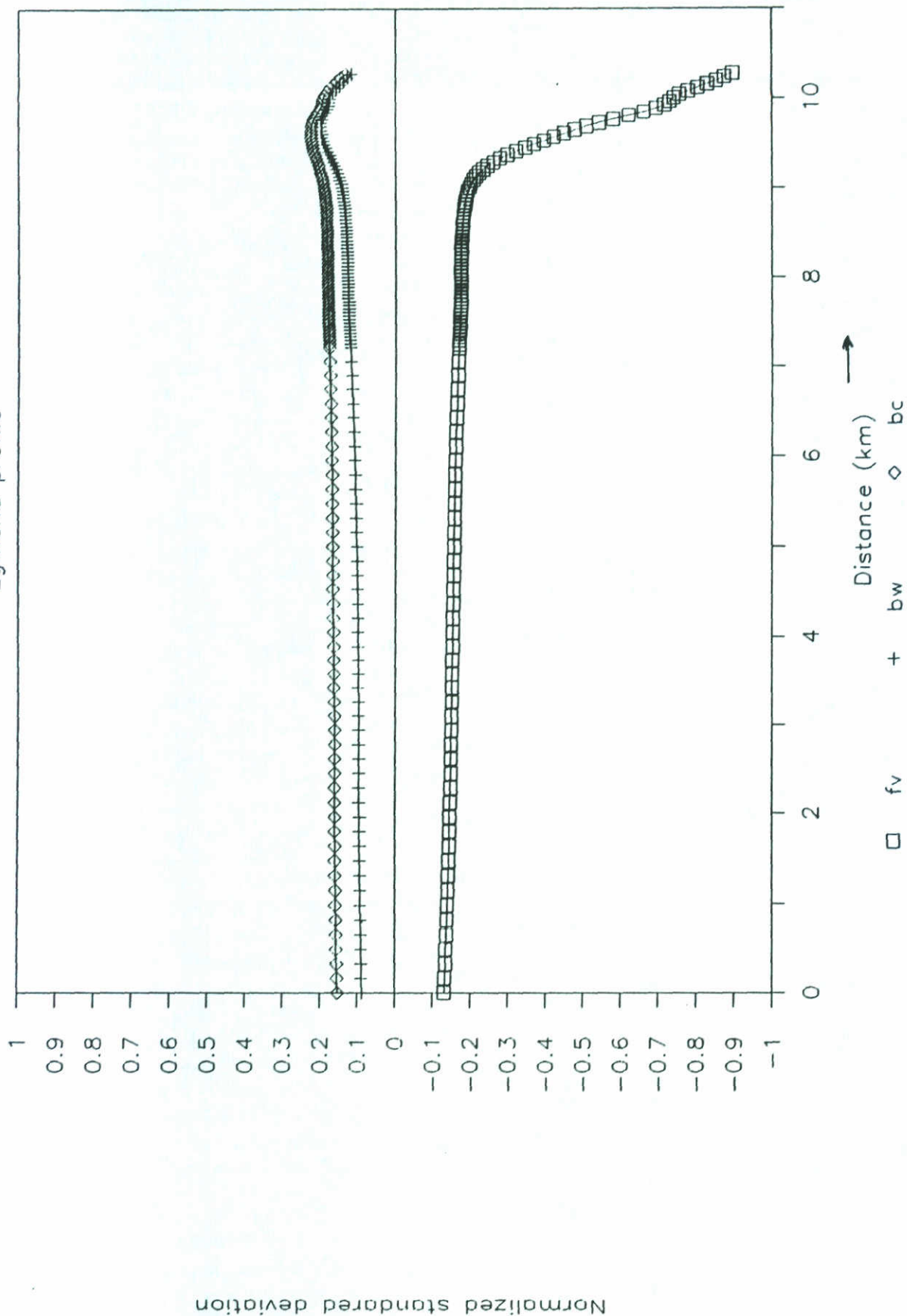
Egmond profile



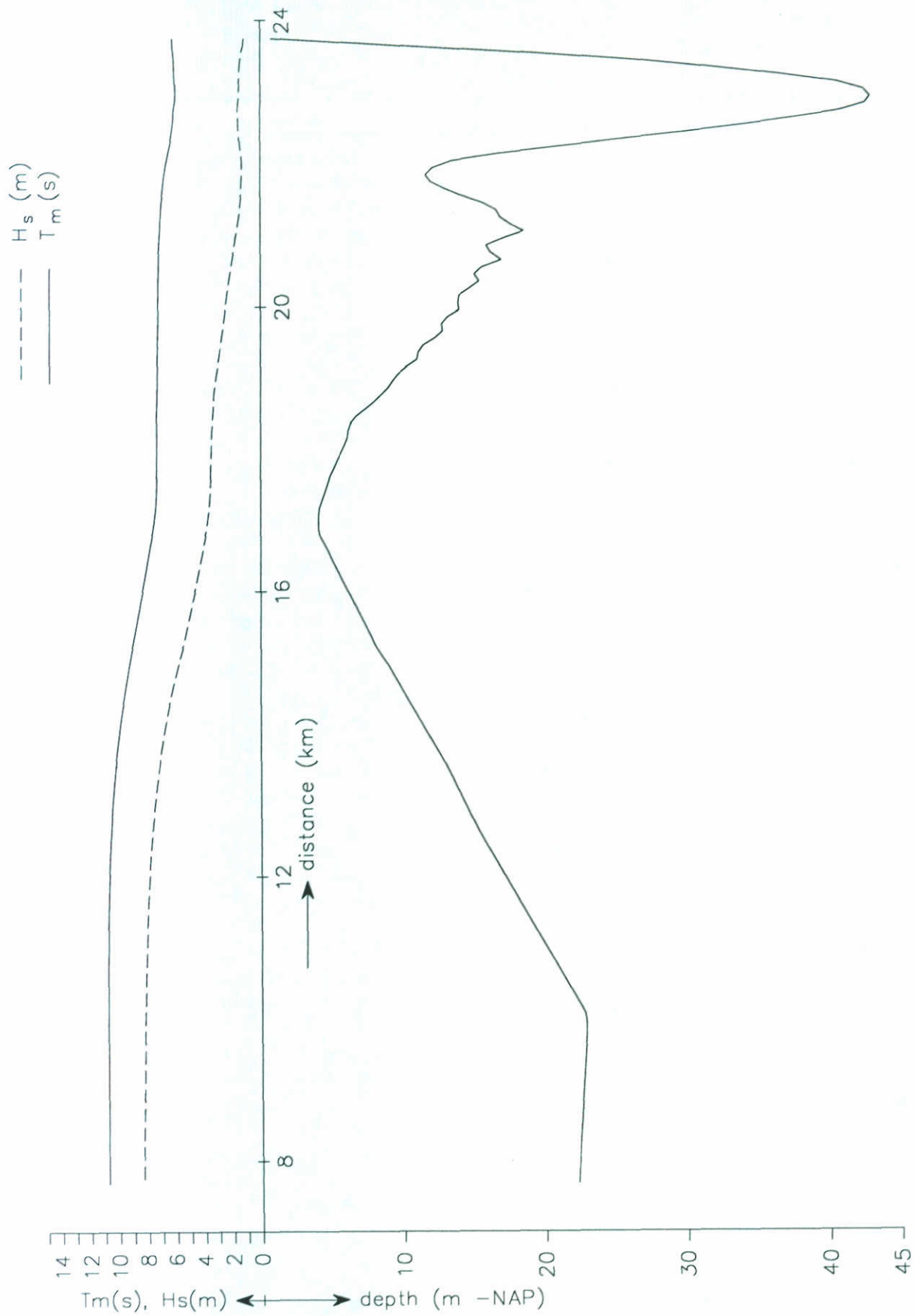
MEAN WAVE PERIOD EGMOND PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS w_i AND s_d

Influence of input parameters on T_m

Egmond profile



MEAN WAVE PERIOD EGMOND PROFILE,
NORMALIZED UNCERTAINTY DUE TO
PARAMETERS FV, BW AND BC



SIGNIFICANT WAVE HEIGHT AND MEAN WAVE PERIOD MOLENGAT PROFILE

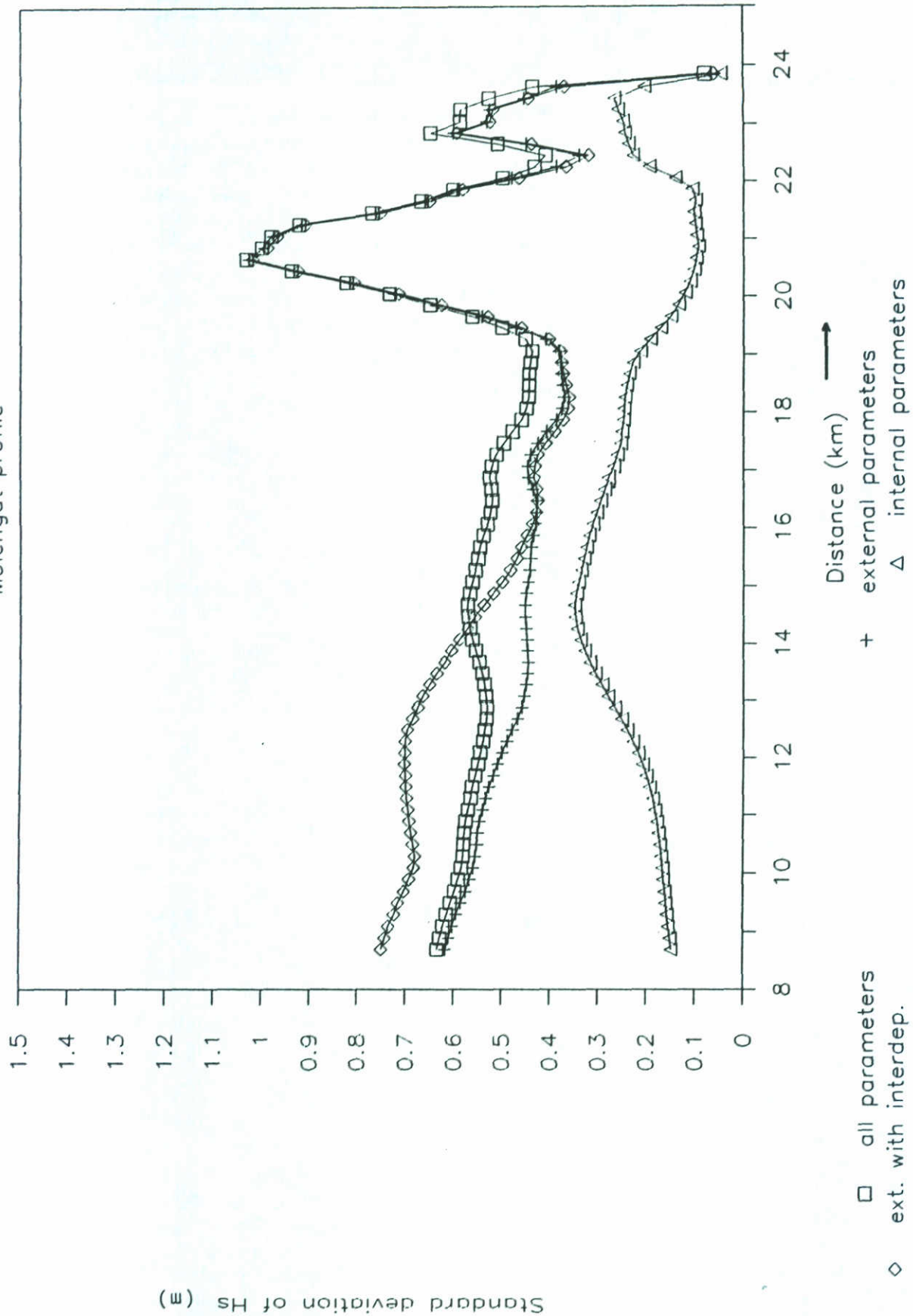
DELFT HYDRAULICS/TUD

H 1355

FIG. 4.38a

Influence of input parameters on Hs

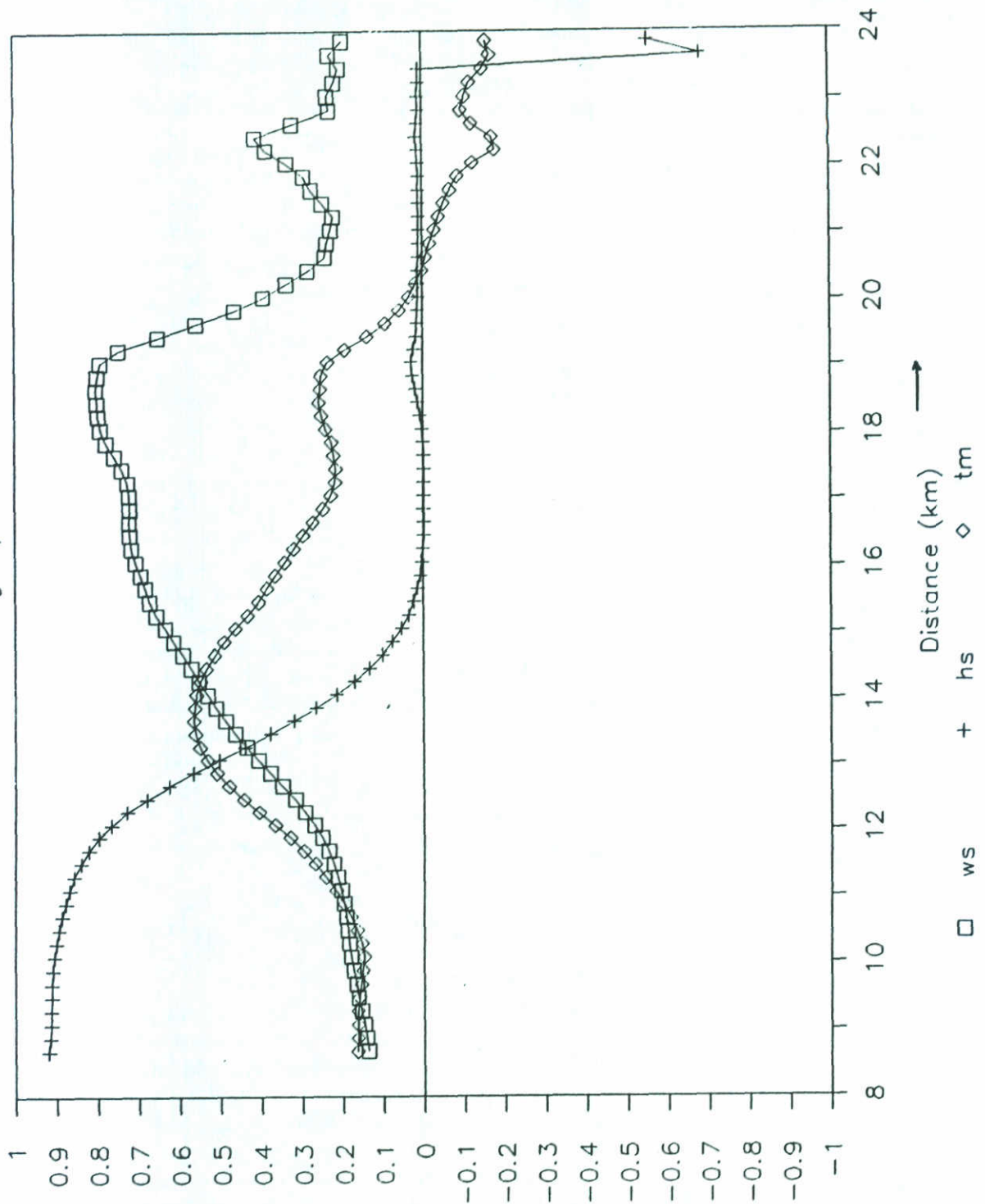
Molengat profile



SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE,
TOTAL UNCERTAINTY

Influence of input parameters on H's

Molengat profile

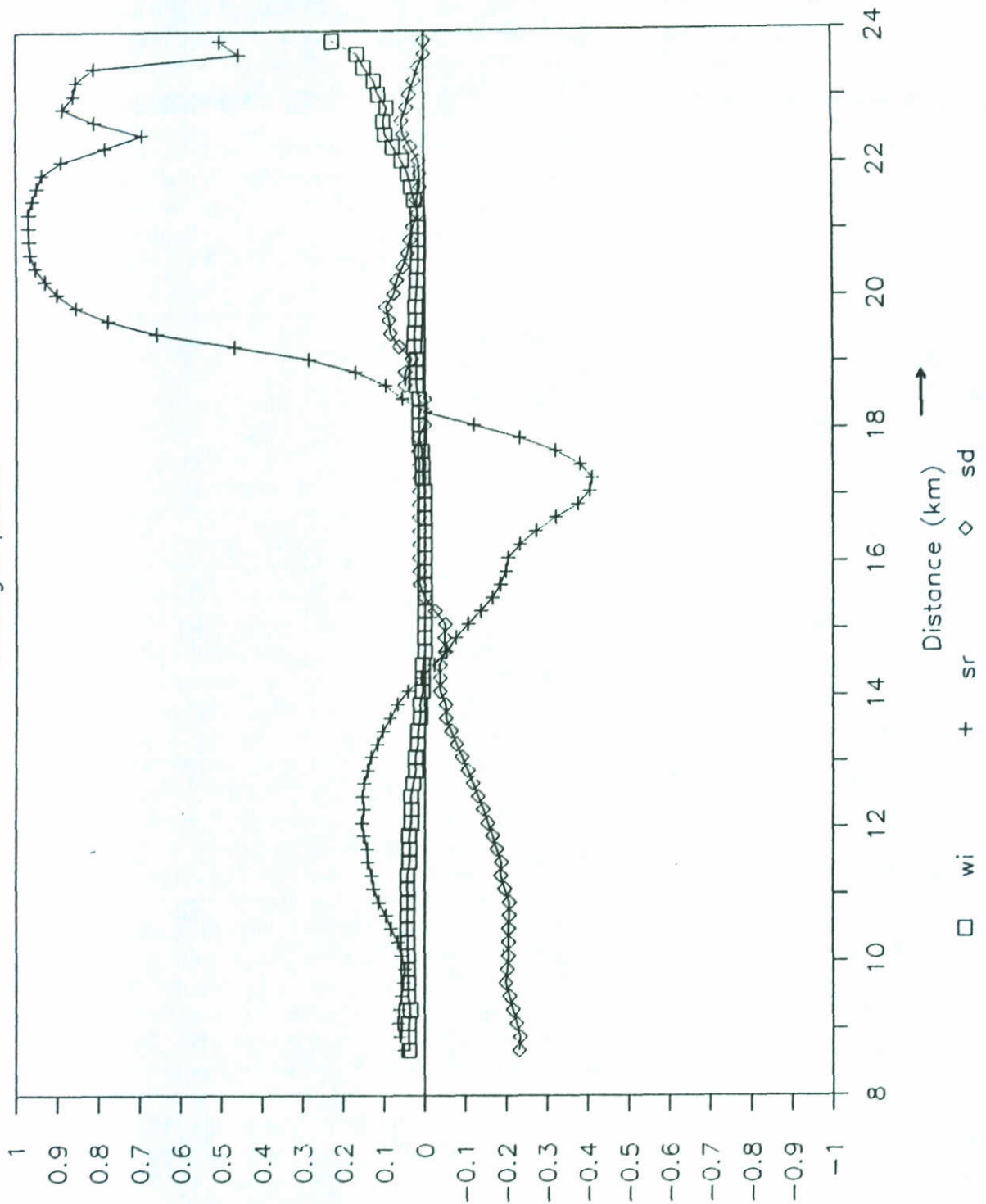


Normalized standard deviation

SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE,
NORMALIZED UNCERTAINTY DUE TO
PARAMETERS WS, HS AND TM

Influence of input parameters on Hs

Molengat profile

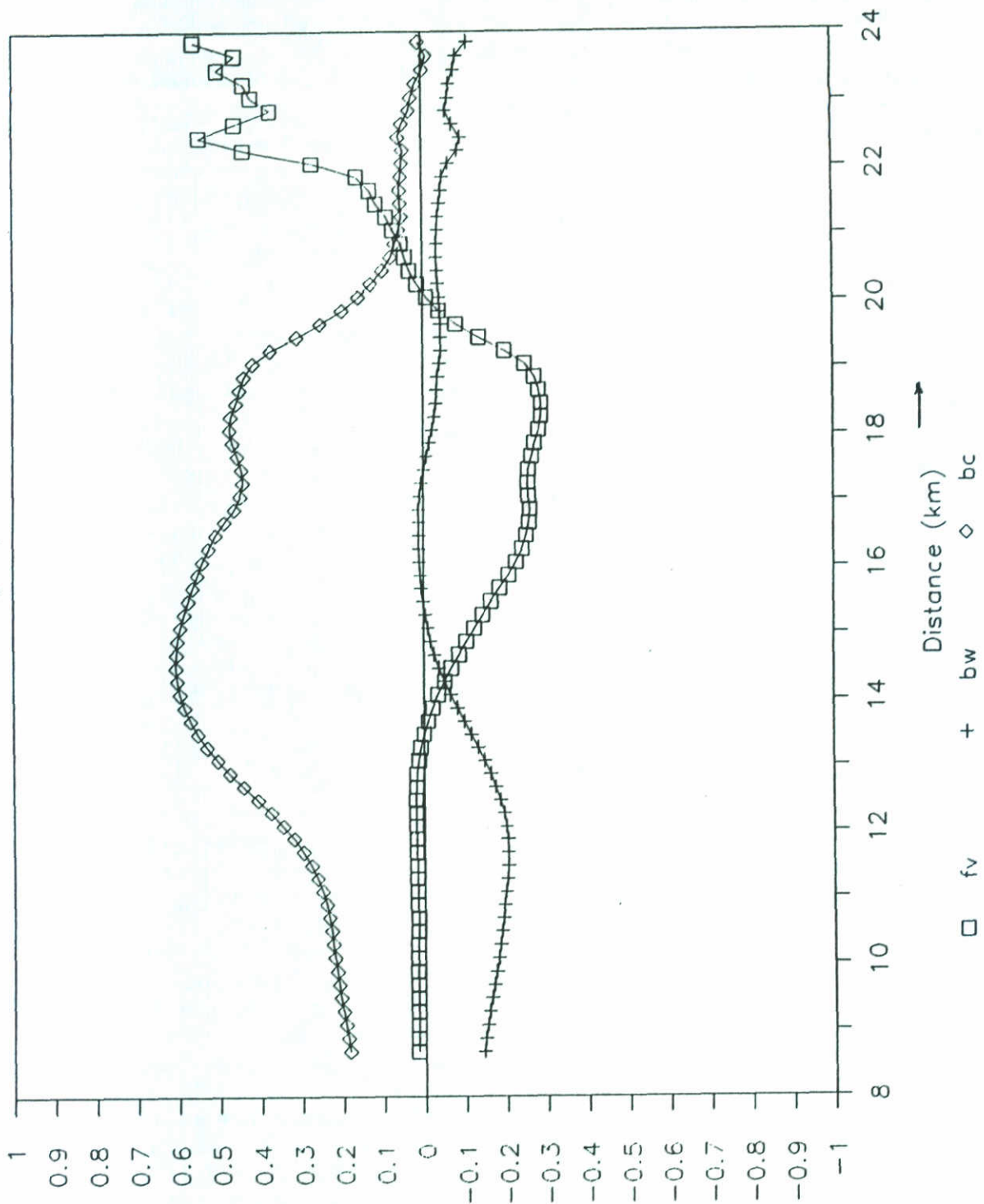


Normalized standard deviation

SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WI, SR AND SD

Influence of input parameters on Hs

Molengat profile

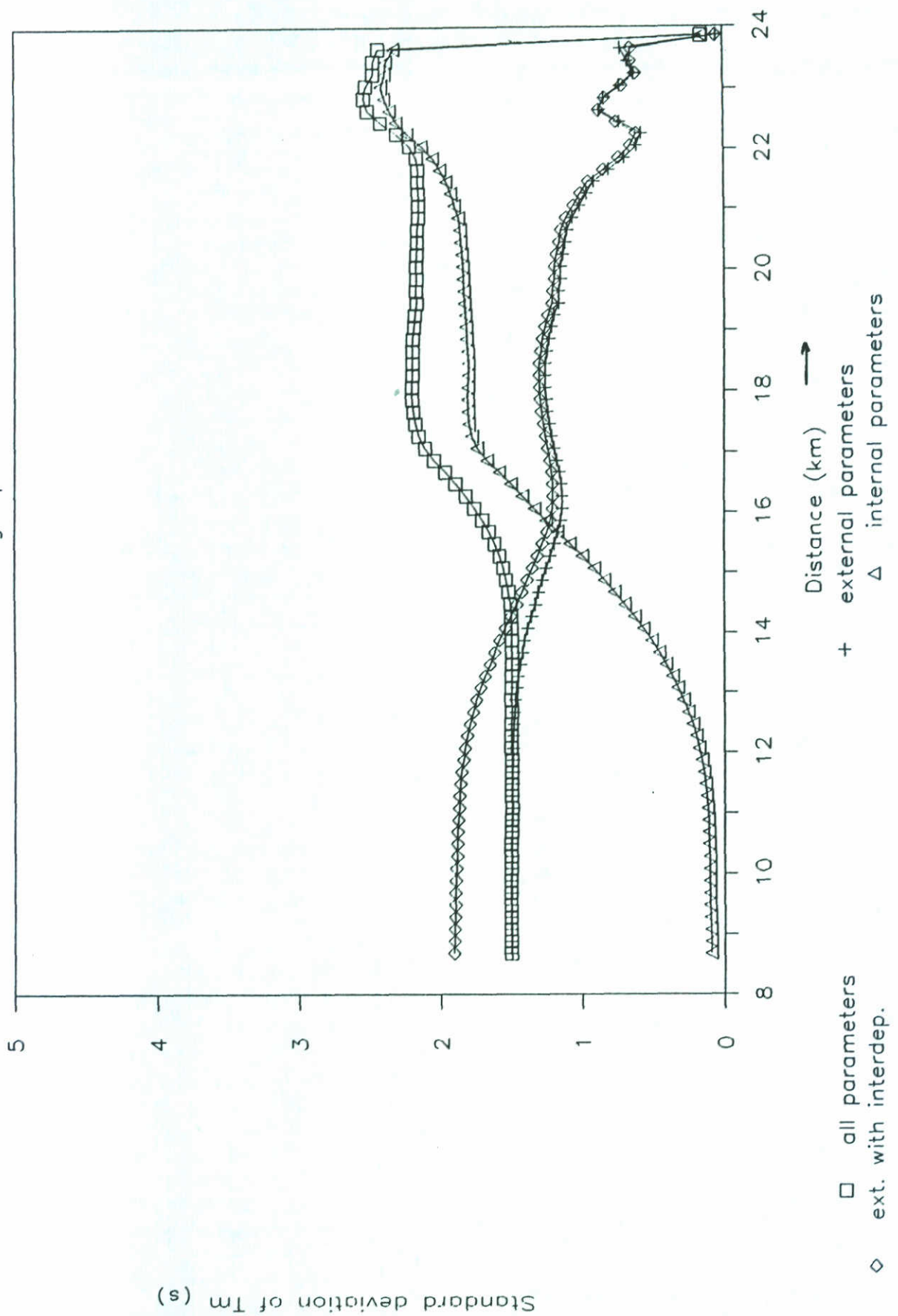


Normalized standard deviation

SIGNIFICANT WAVE HEIGHT MOLENGAT PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS FV, BW AND BC

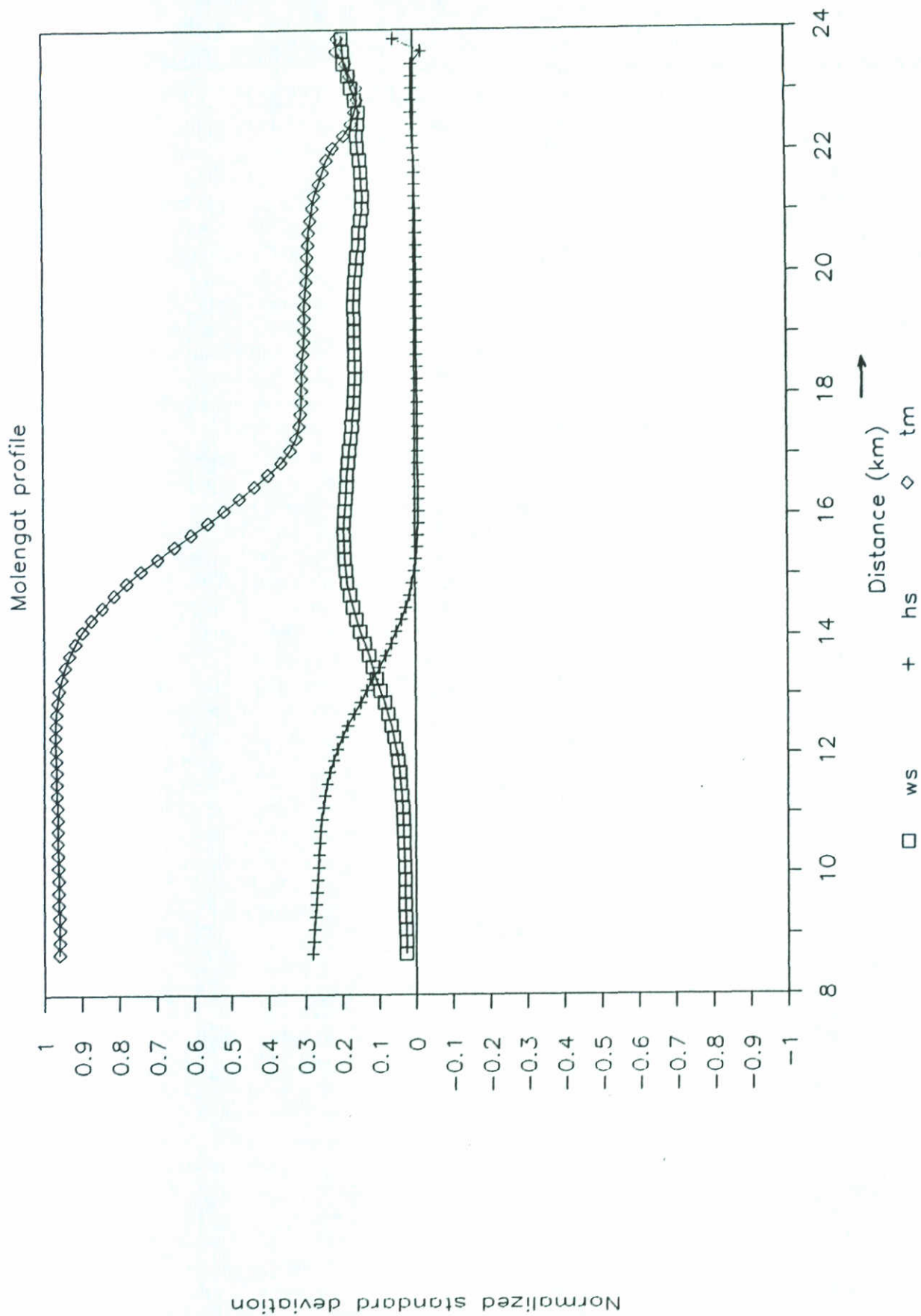
Influence of input parameters on T_p

Molengat profile



MEAN WAVE PERIOD MOLENGAT PROFILE,
TOTAL UNCERTAINTY

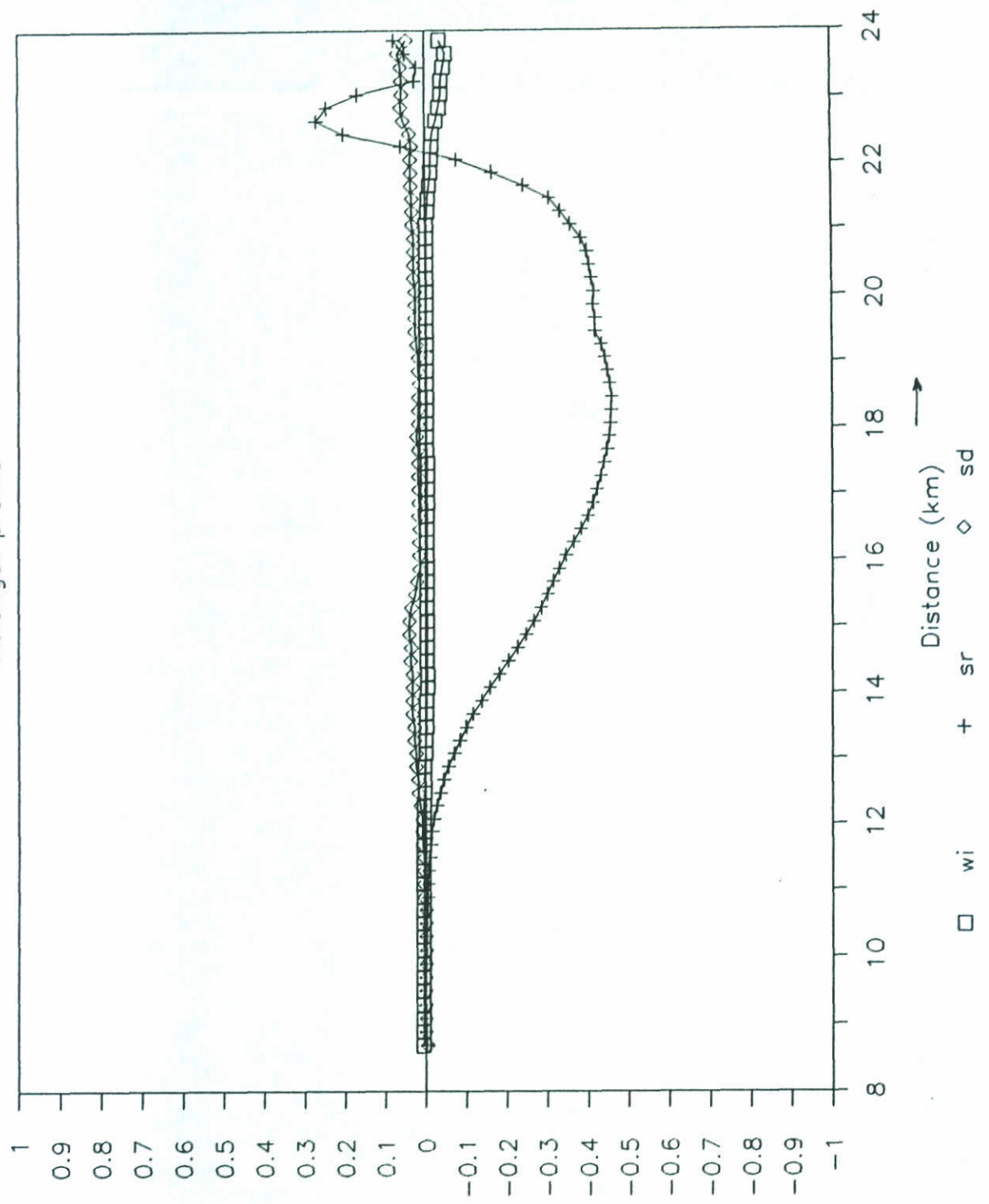
Influence of input parameters on T_p



MEAN WAVE PERIOD MOLENGAT PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WS, HS AND TM

Influence of input parameters on Tp

Molengat profile



Normalized standard deviation

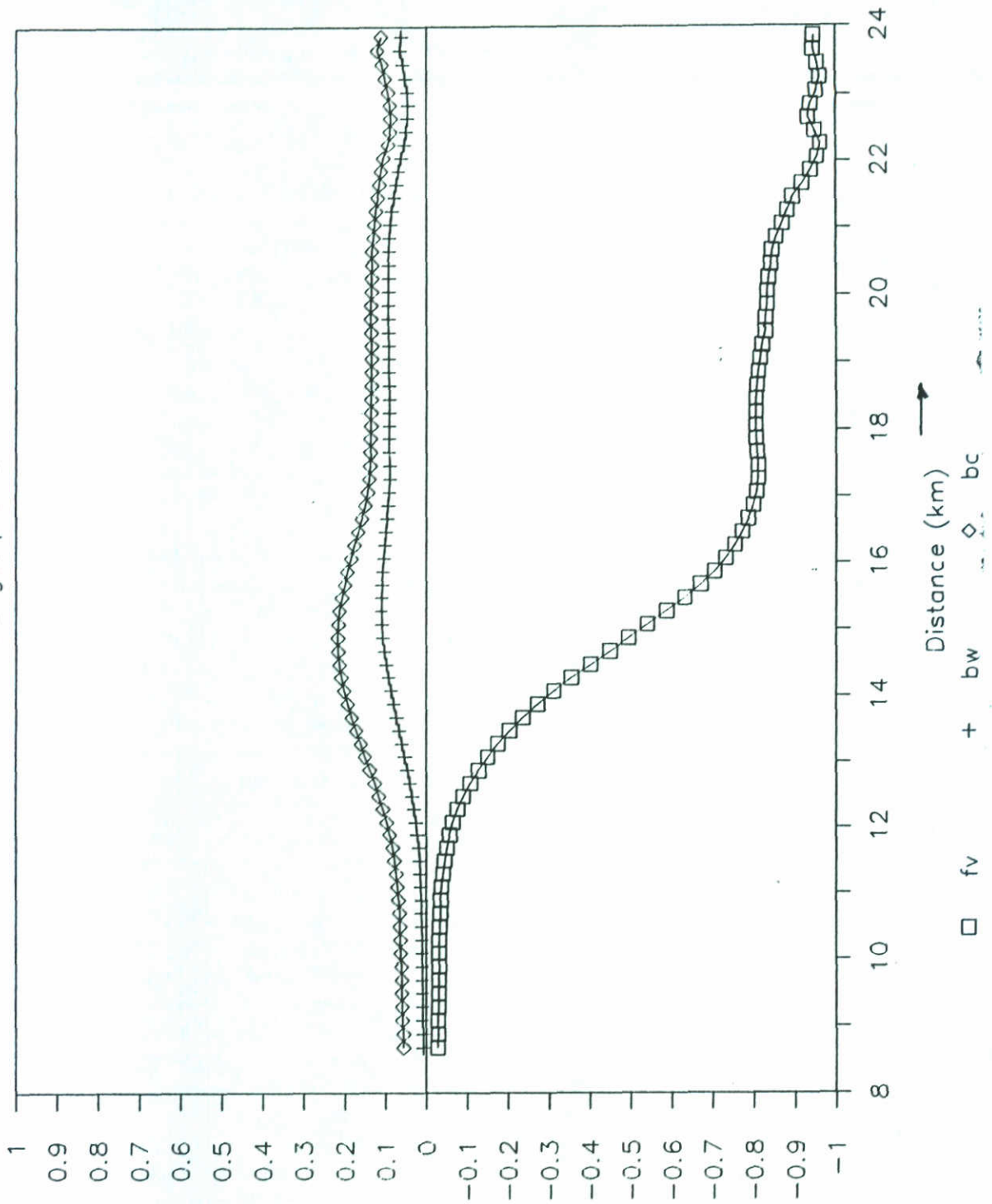
Distance (km)

□ wi + sr ◇ sd

MEAN WAVE PERIOD MOLENGAT PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WI, SR AND SD

Influence of input parameters on T_p

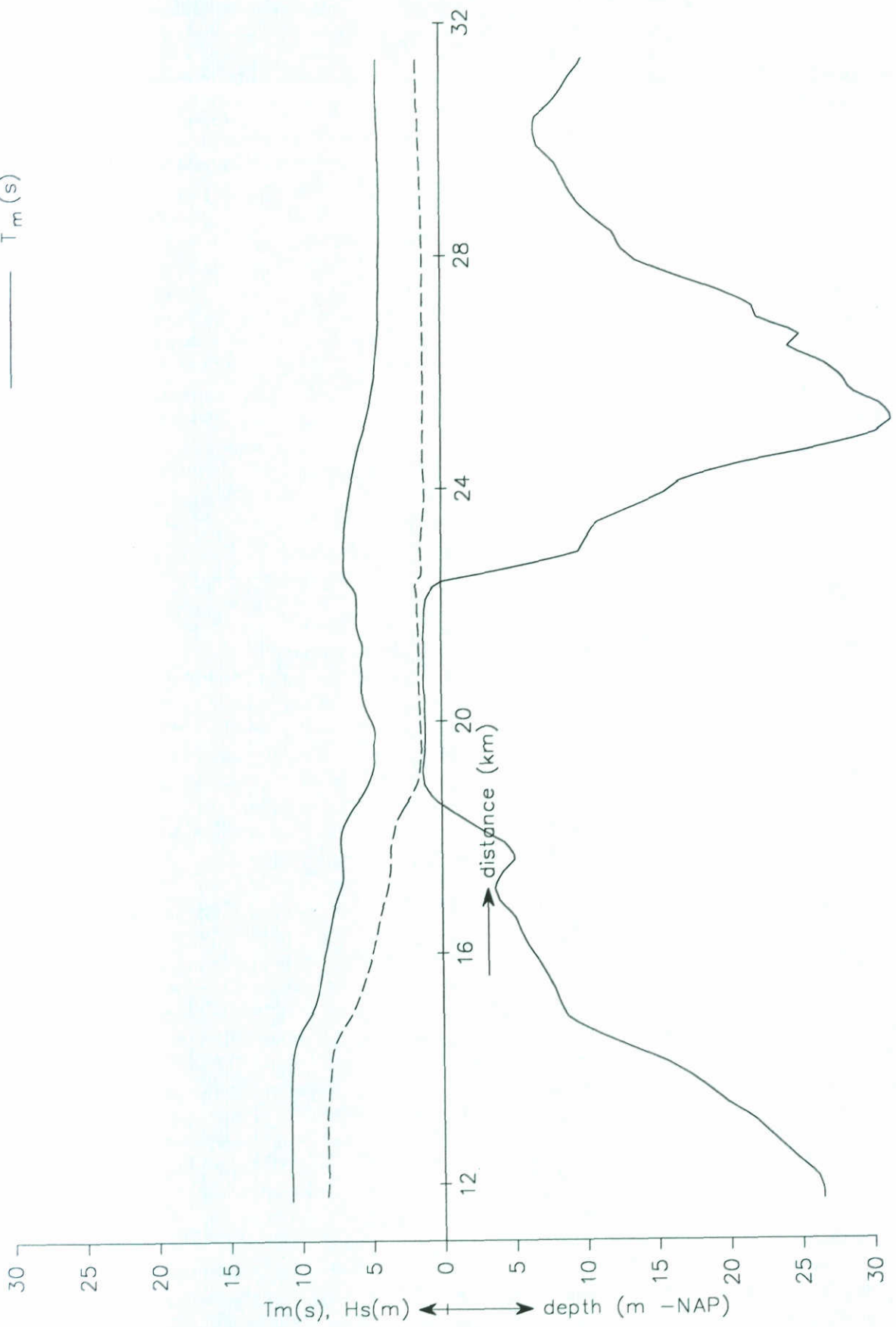
Molengat profile



Normalized standard deviation

MEAN WAVE PERIOD MOLENGAT PROFILE,
NORMALIZED UNCERTAINTY DUE TO
PARAMETERS FV, BW AND BC

- - - H_s (m)
 — T_m (s)



SIGNIFICANT WAVE HEIGHT AND MEAN WAVE PERIOD MARS DIEP PROFILE

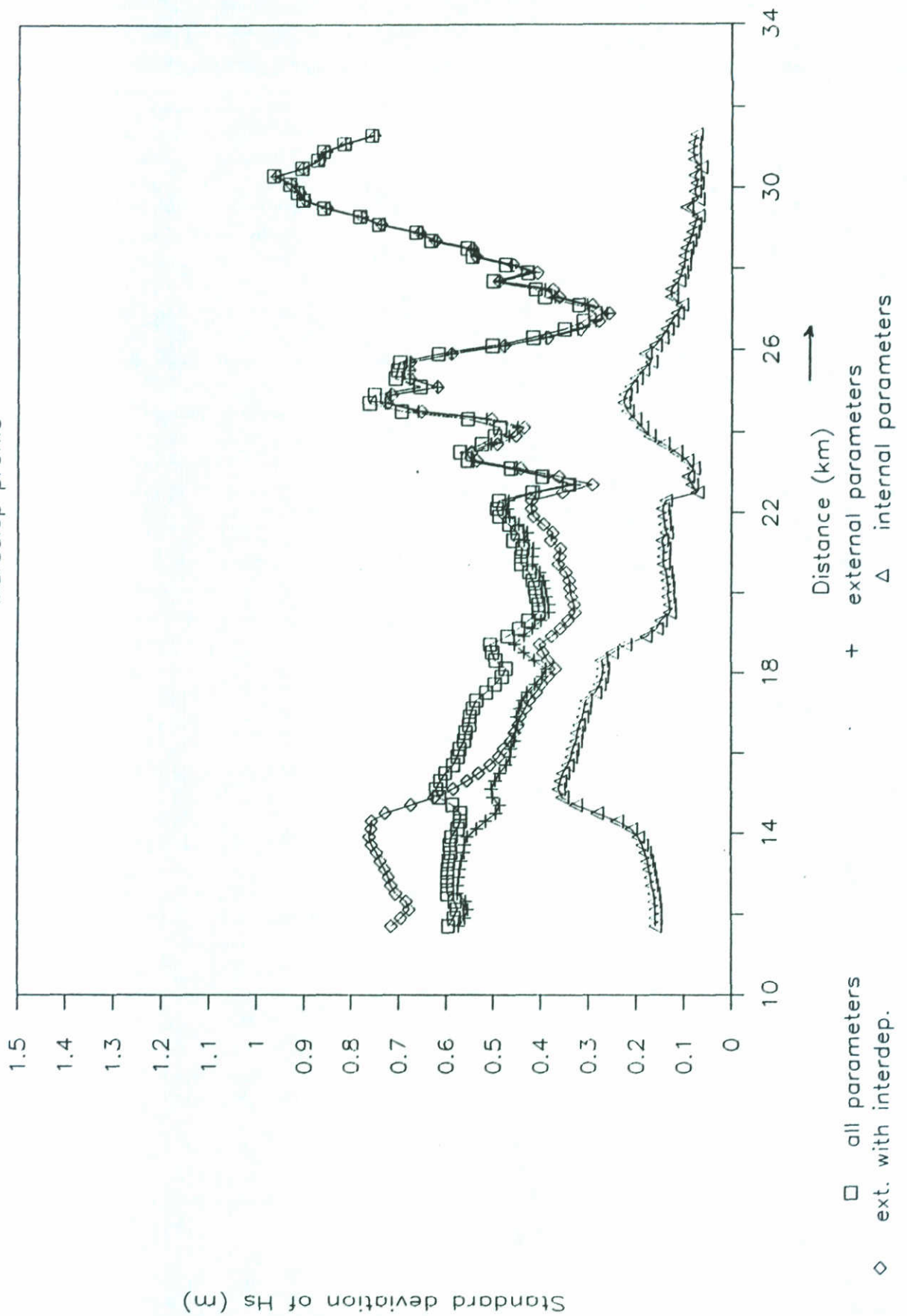
DELFT HYDRAULICS/TUD

H 1355

FIG. 4.39a

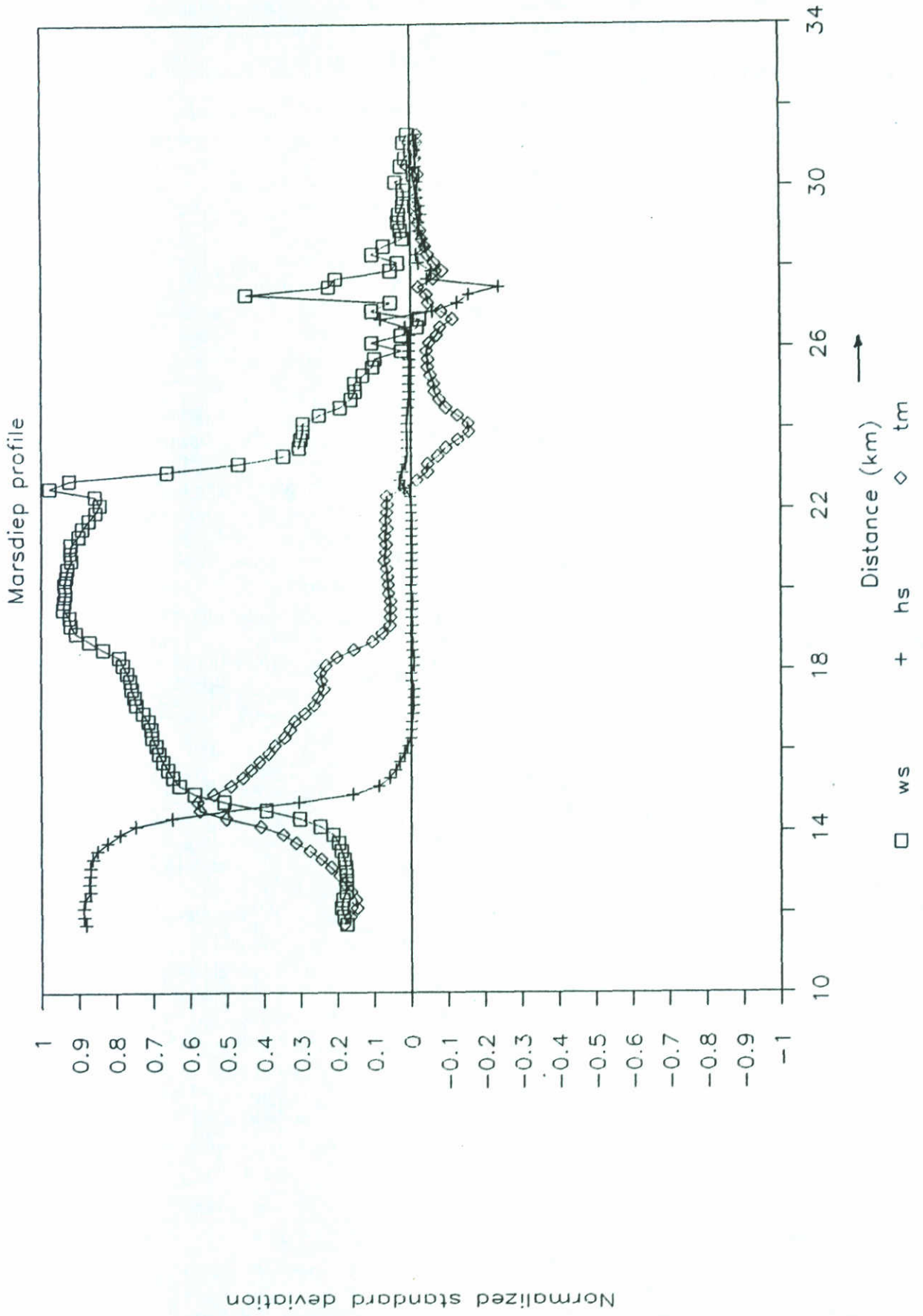
Influence of input parameters on Hs

Marsdiep profile



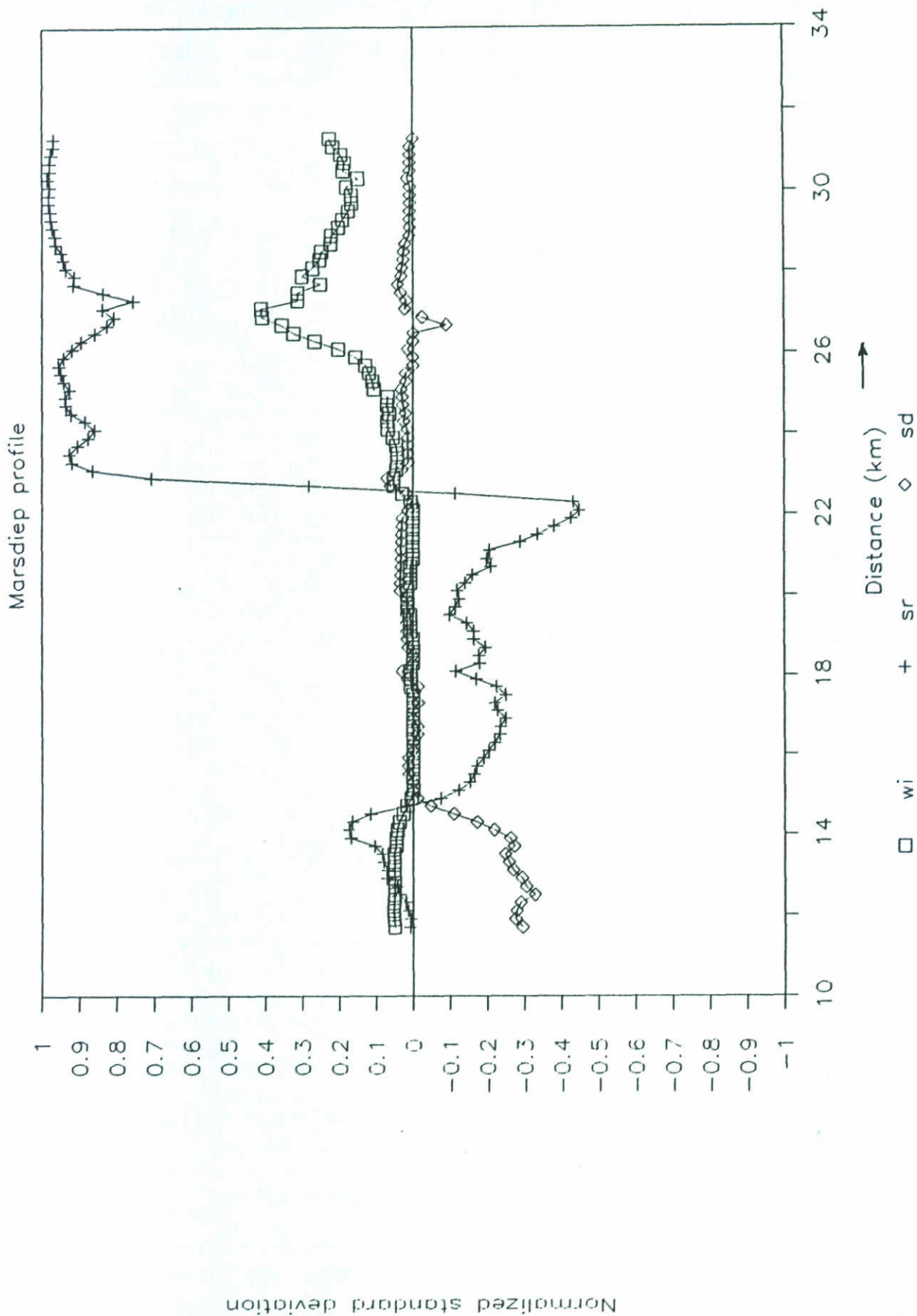
SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE,
TOTAL UNCERTAINTY

Influence of input parameters on Hs



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WS, HS AND TM

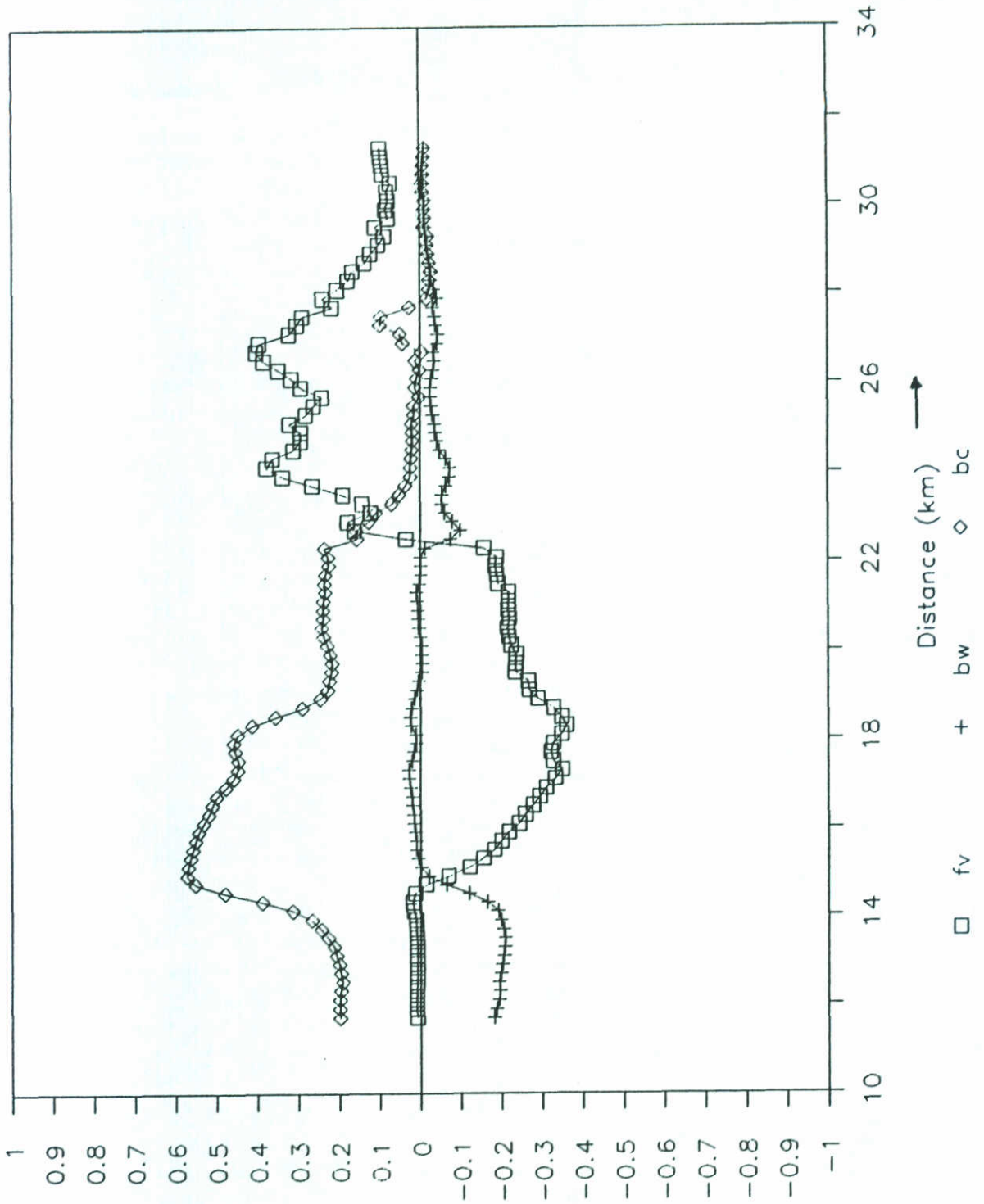
Influence of input parameters on Hs



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WI, SR AND SD

Influence of input parameters on Hs

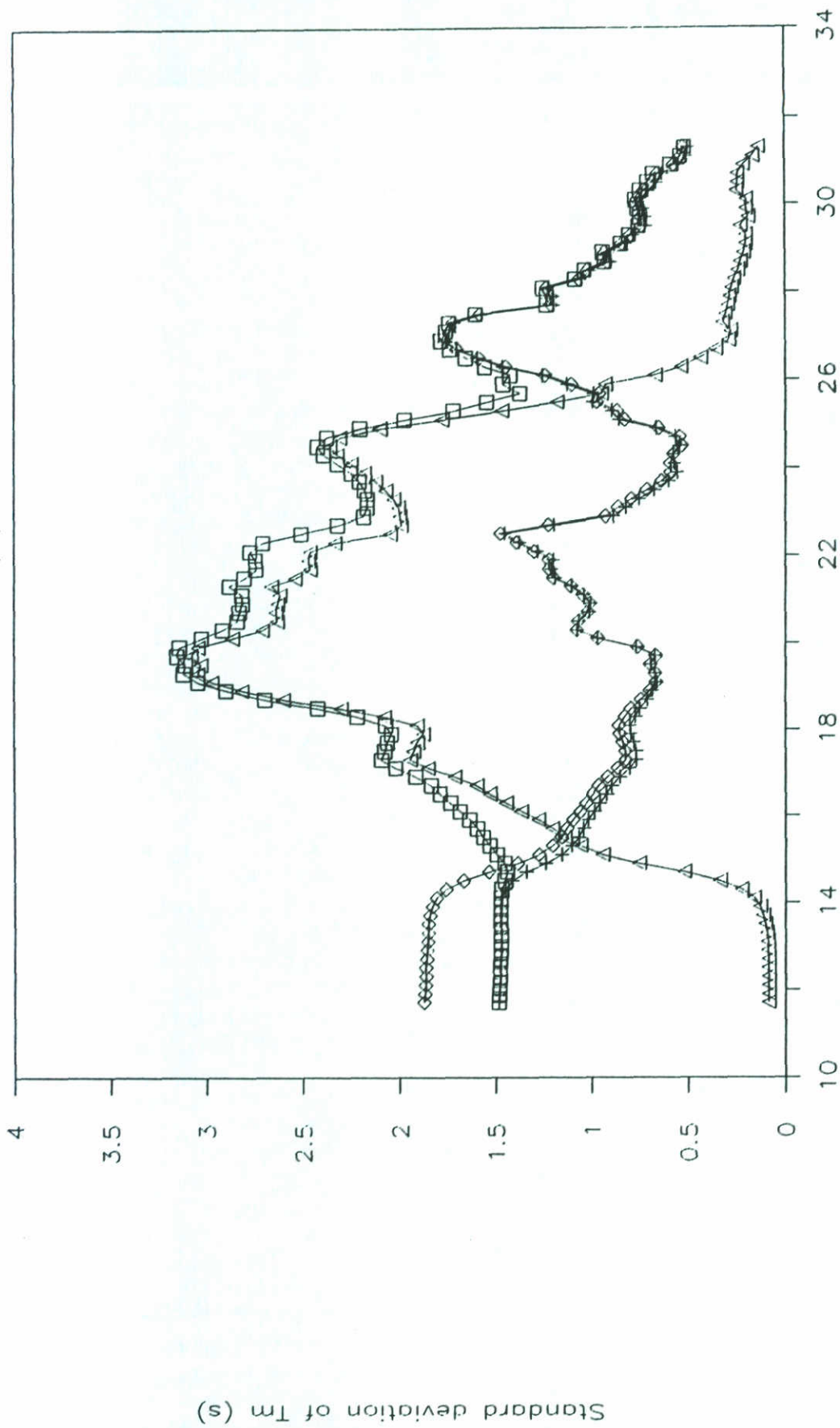
Marsdiep profile



SIGNIFICANT WAVE HEIGHT MARSDIEP PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS FV, BW AND BC

Influence of input parameters on T_m

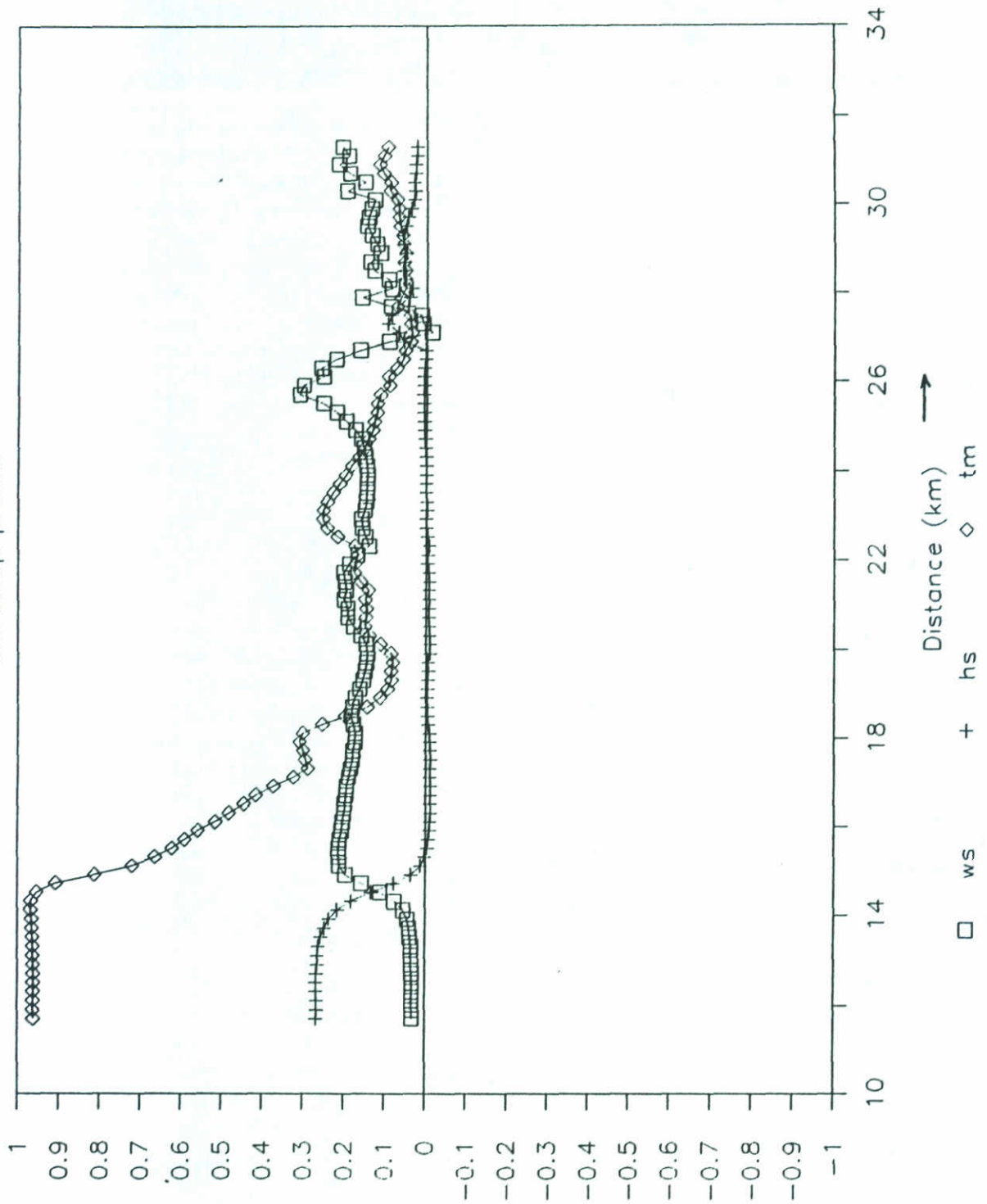
Marsdiep profile



MEAN WAVE PERIOD MARSDIEP PROFILE,
TOTAL UNCERTAINTY

Influence of input parameters on T_m

Marsdiep profile

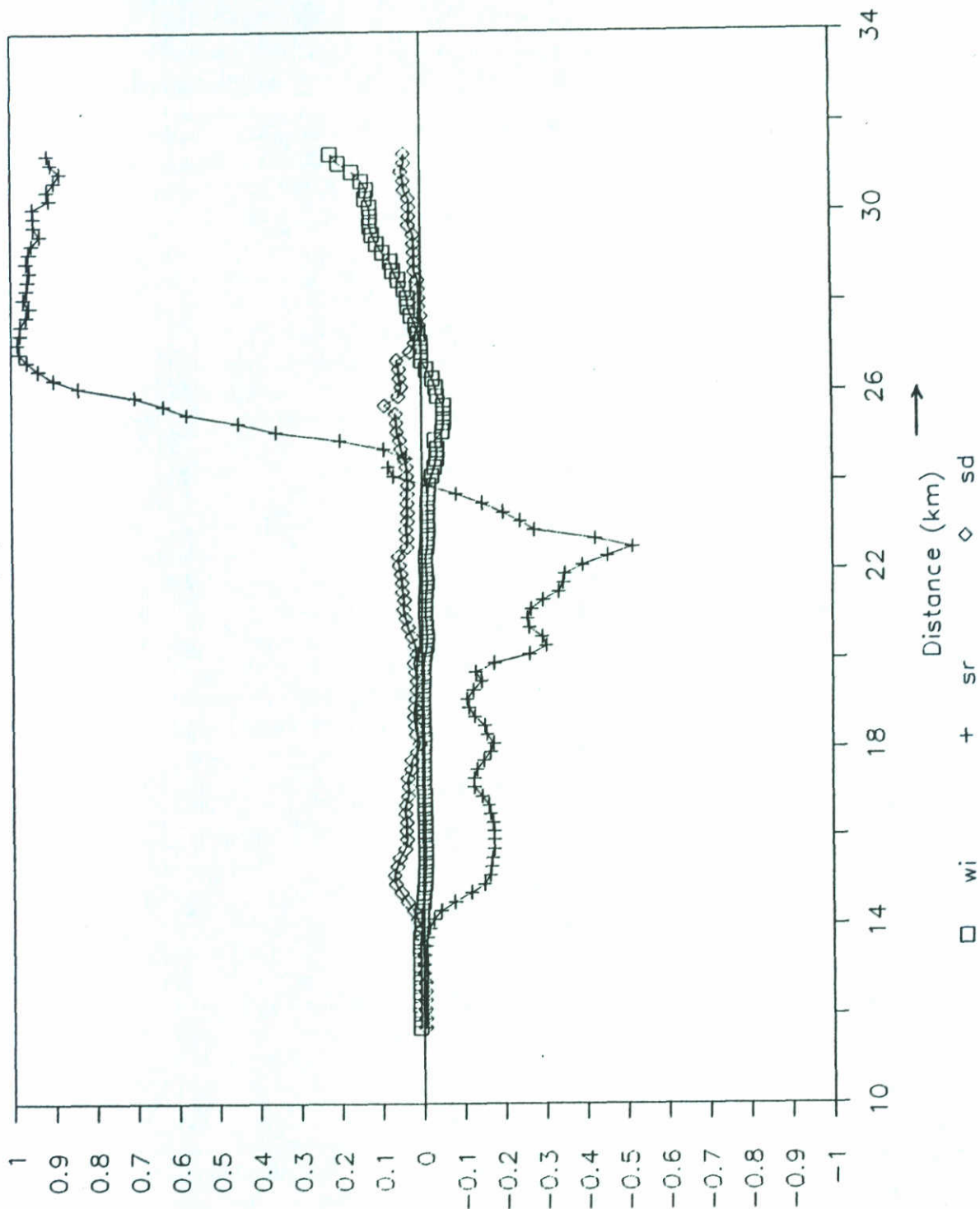


Normalized standard deviation

MEAN WAVE PERIOD MARSDIEP PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS WS, HS AND TM

Influence of input parameters on T_m

Marsdiep profile

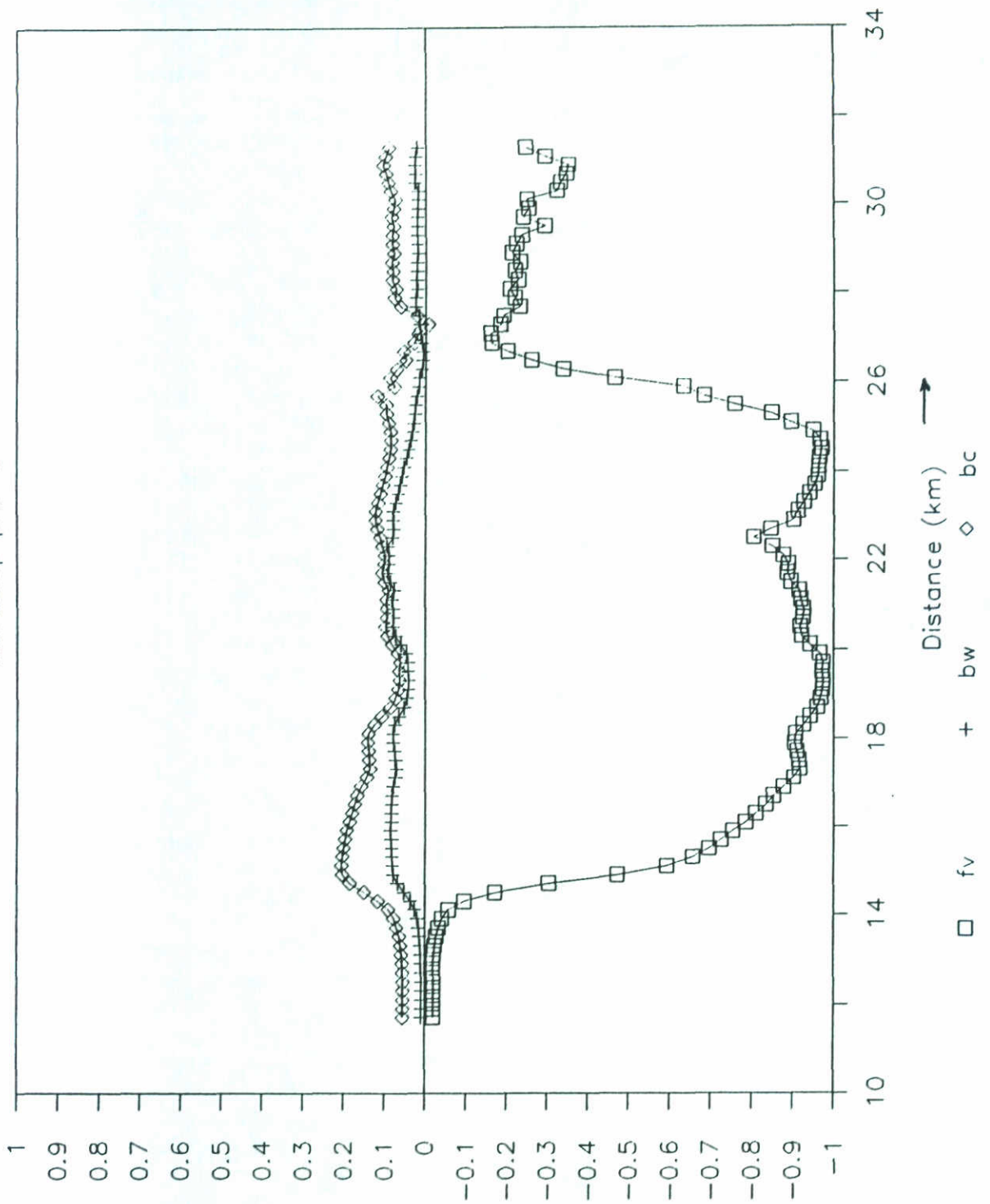


Normalized standard deviation

MEAN WAVE PERIOD MARSDIEP PROFILE,
 NORMALIZED UNCERTAINTY DUE TO
 PARAMETERS w_i , s_r AND s_d

Influence of input parameters on T_m

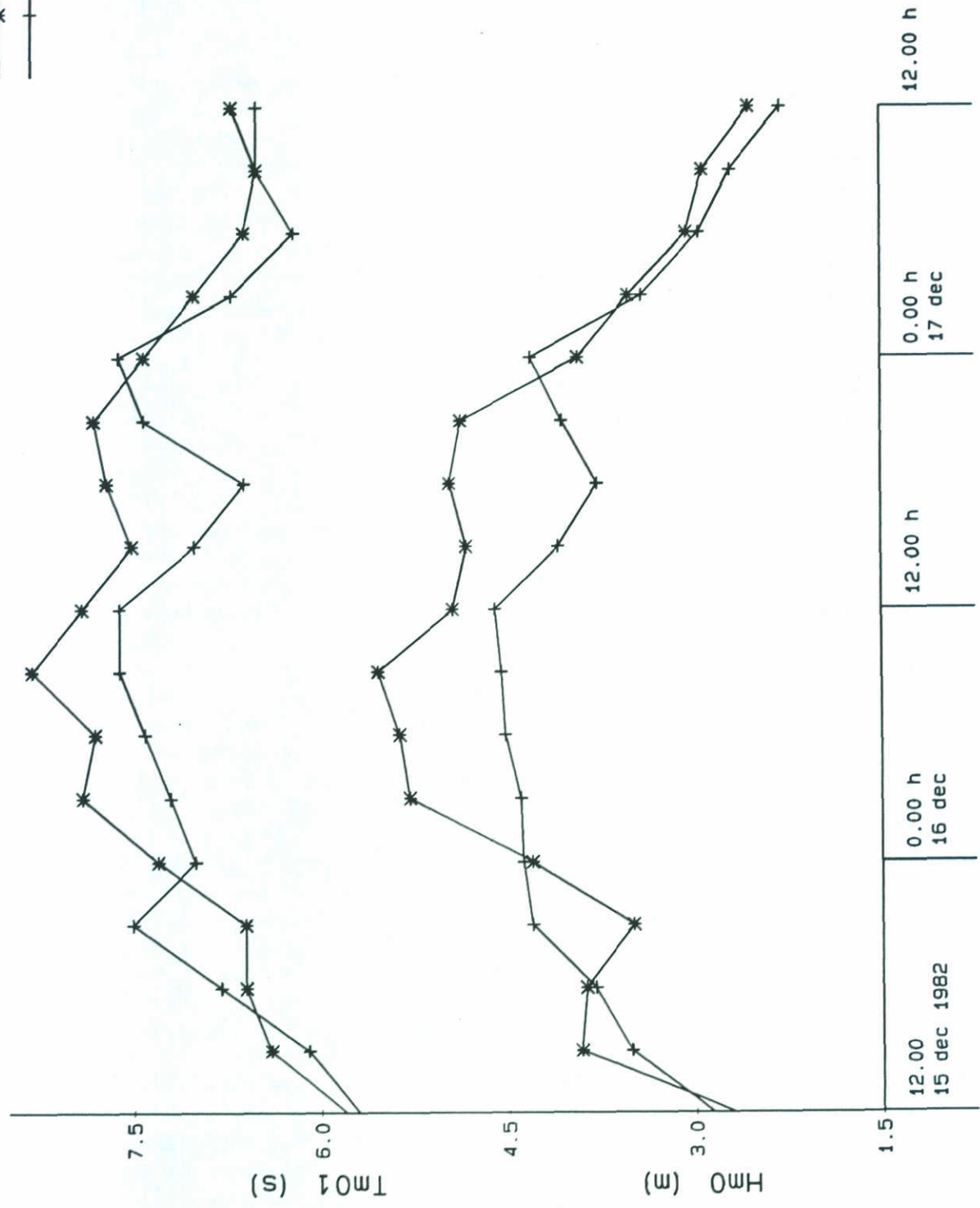
Marsdiep profile



Normalized standard deviation

MEAN WAVE PERIOD MARSDIEP PROFILE,
NORMALIZED UNCERTAINTY DUE TO
PARAMETERS FV, BW AND BC

* — Eierlandse gat
 + — IJmuiden



MEASURED WAVE HEIGHT H_{m0} (DOWN) AND
 WAVE PERIOD T_{m01} (UP)
 STORM DECEMBER 1982, OFFSHORE STATIONS

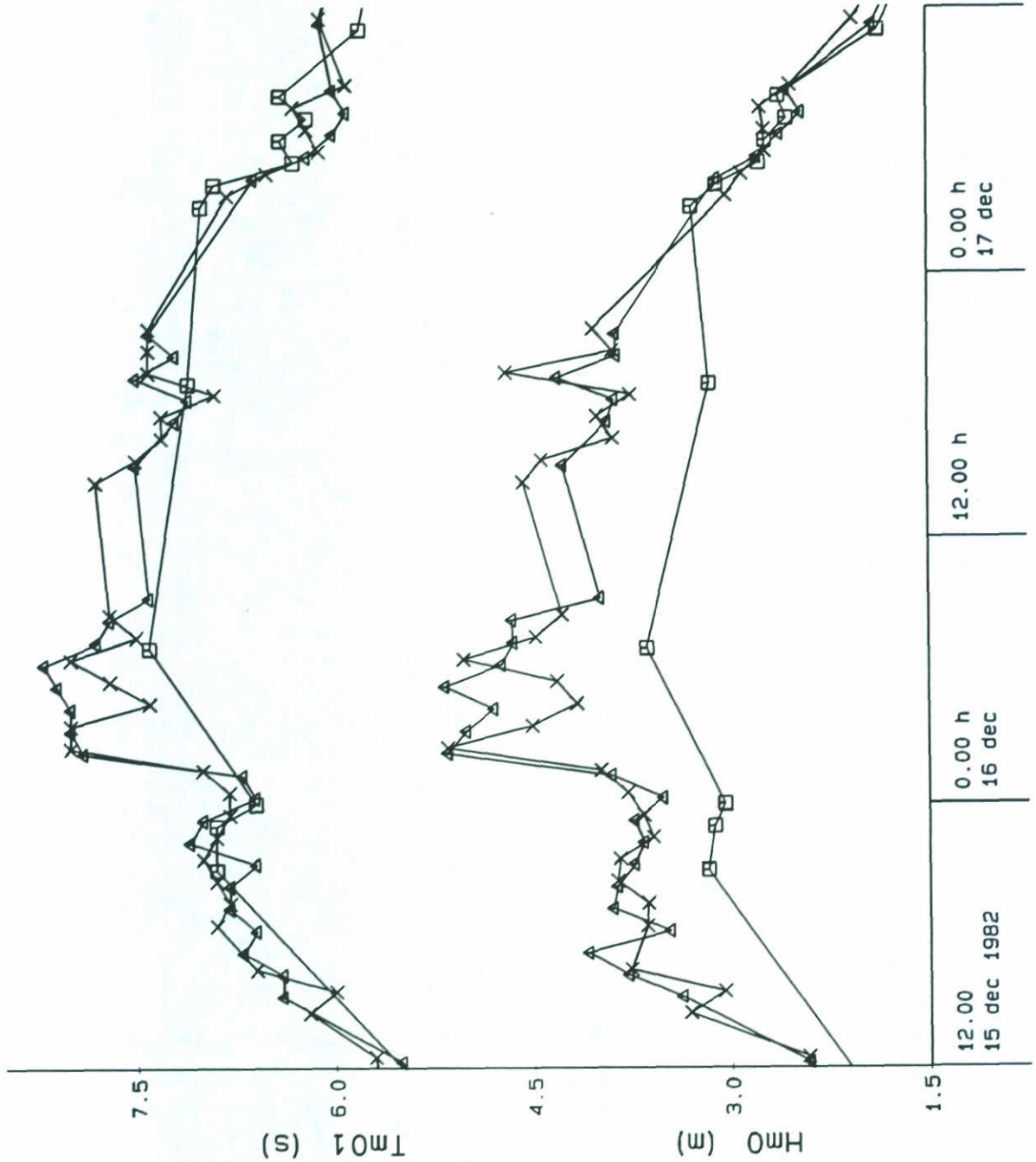
HYDRA-HISWA

DELFT HYDRAULICS

H1355

FIG 5.1a

X — Egmond-8
 ▲ — Egmond-7
 □ — Egmond-6



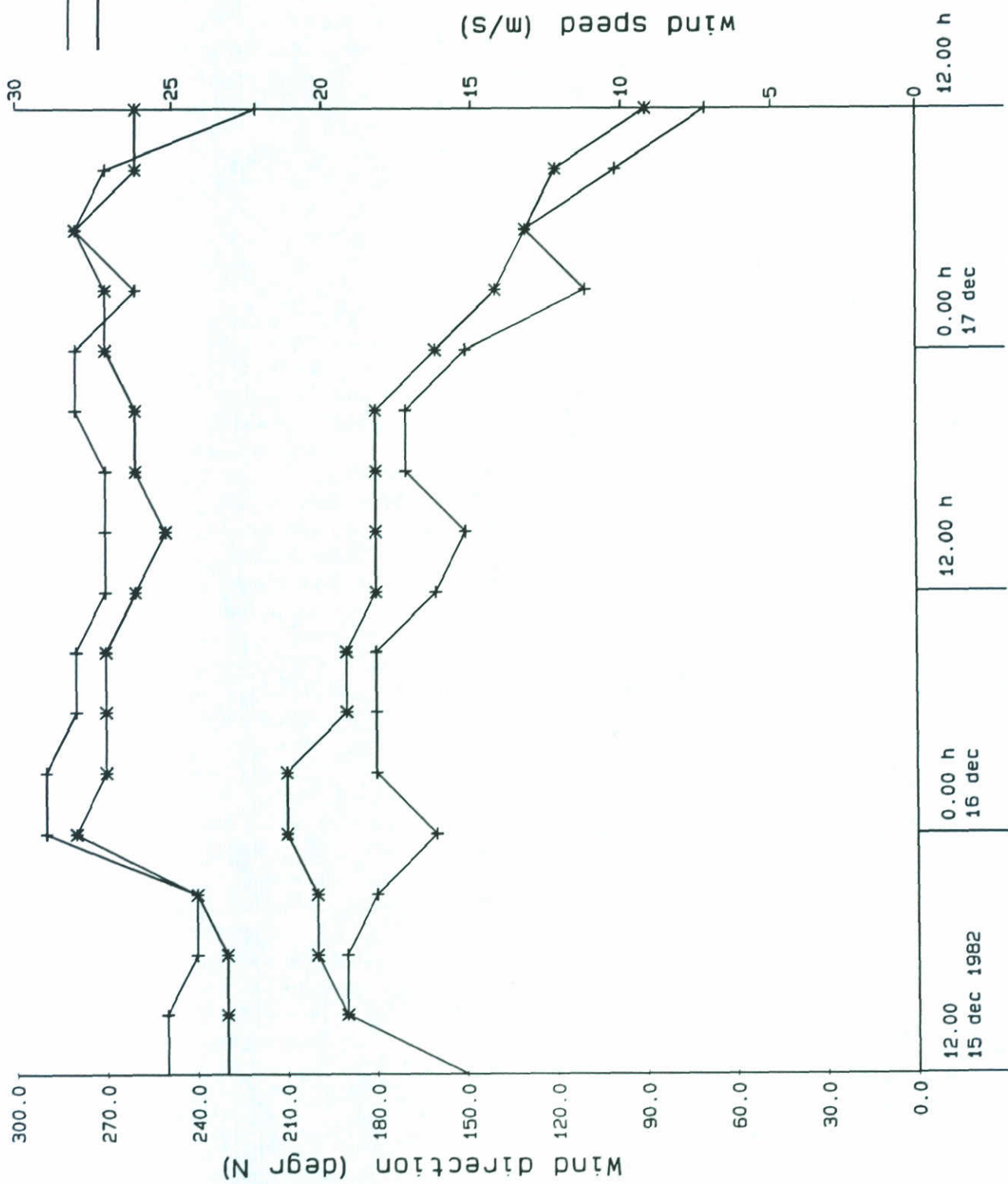
MEASURED WAVE HEIGHT H_{m0} (DOWN) AND
 WAVE PERIOD T_{m01} (UP)
 STORM DECEMBER 1982, EGMOND STATIONS

HYDRA-HISWA

DELFT HYDRAULICS

H1355

FIG 5.1b



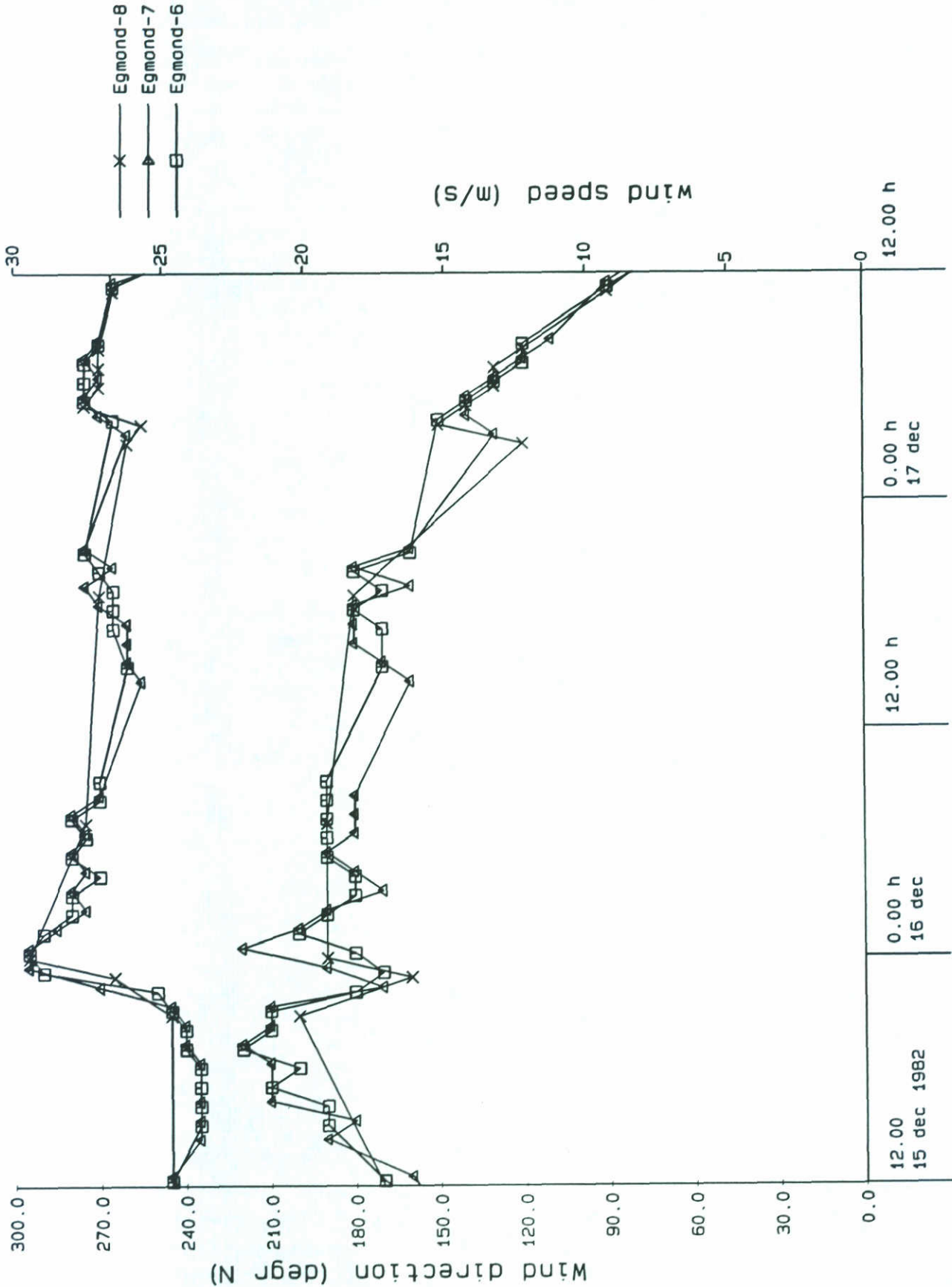
MEASURED WIND SPEED (DOWN) AND DIRECTION (UP) STORM DECEMBER 1982, OFFSHORE STATIONS

HYDRA-HISWA

DELFT HYDRAULICS

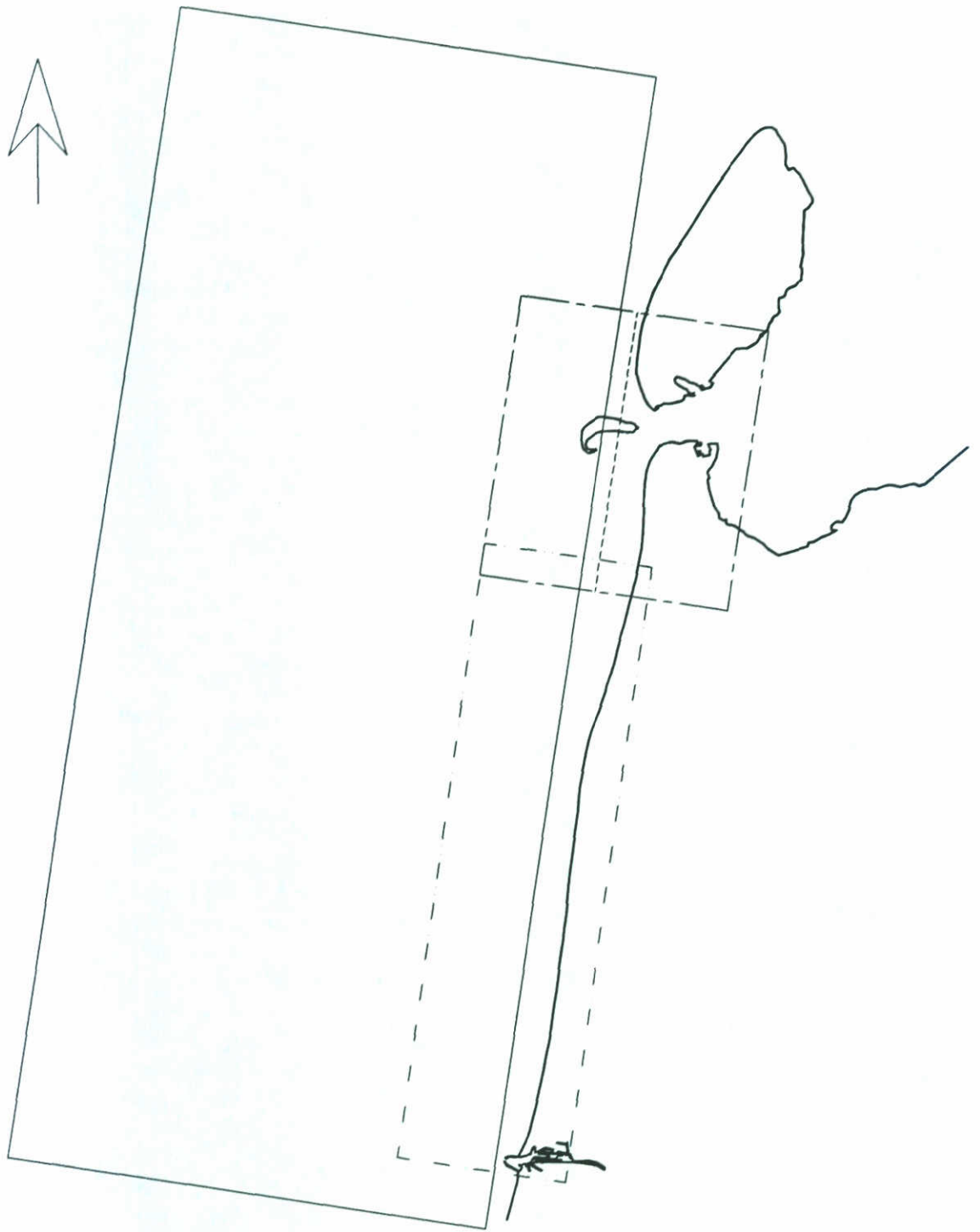
H1355

FIG 5.2a



MEASURED WIND SPEED (DOWN) AND DIRECTION (UP) STORM DECEMBER 1982, EGMOND STATIONS

HYDRA-HISWA



- BUITEN model
- - - - BINNEN model
- · - · ZEEGAT model
- · · · small ZEEGAT model

LOCATIONS OF COMPUTATIONAL GRIDS
VALIDATION COMPUTATIONS

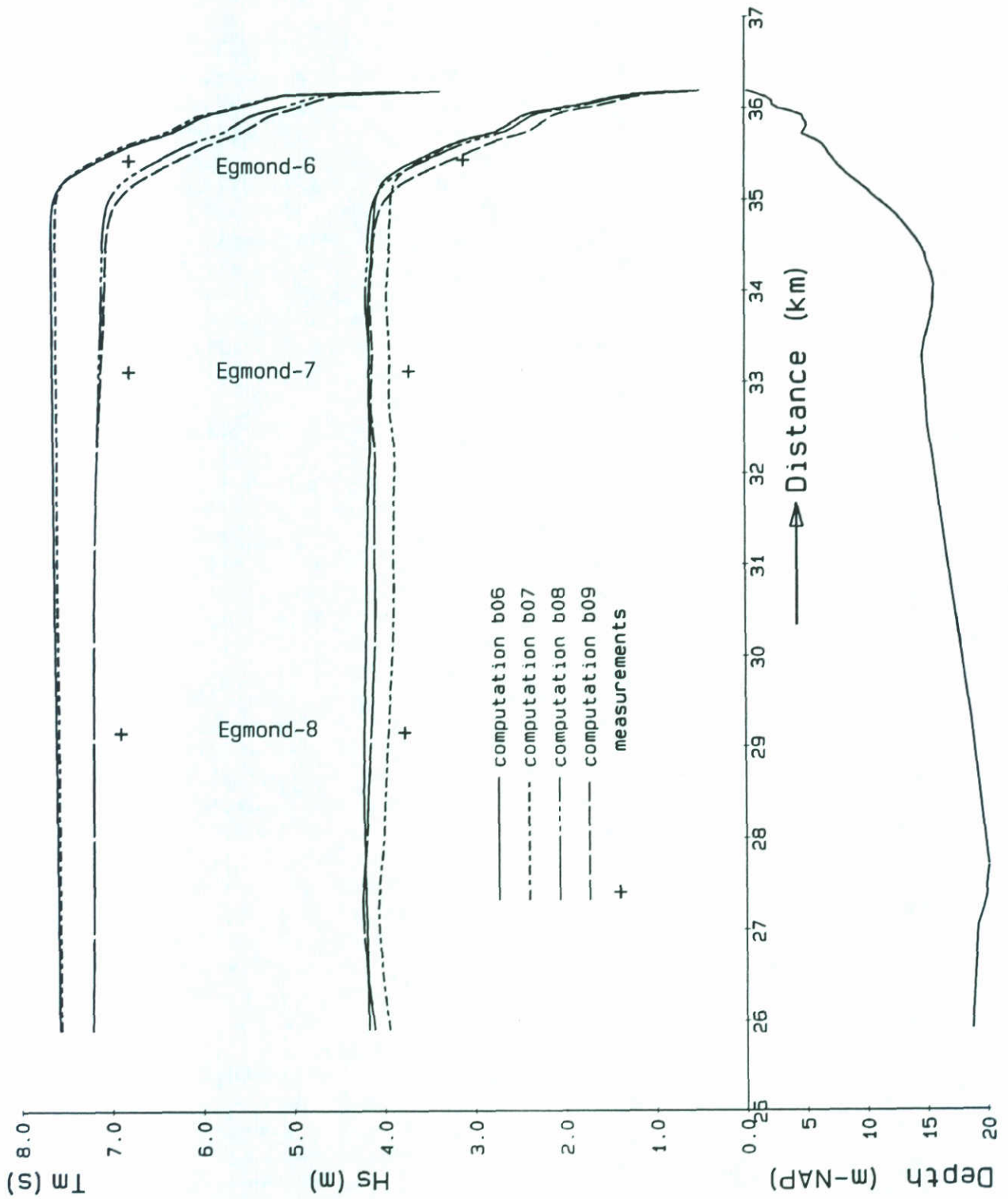
HYDRA

SCALE 1:500000

DELFT HYDRAULICS

H 1355

FIG. 5.3



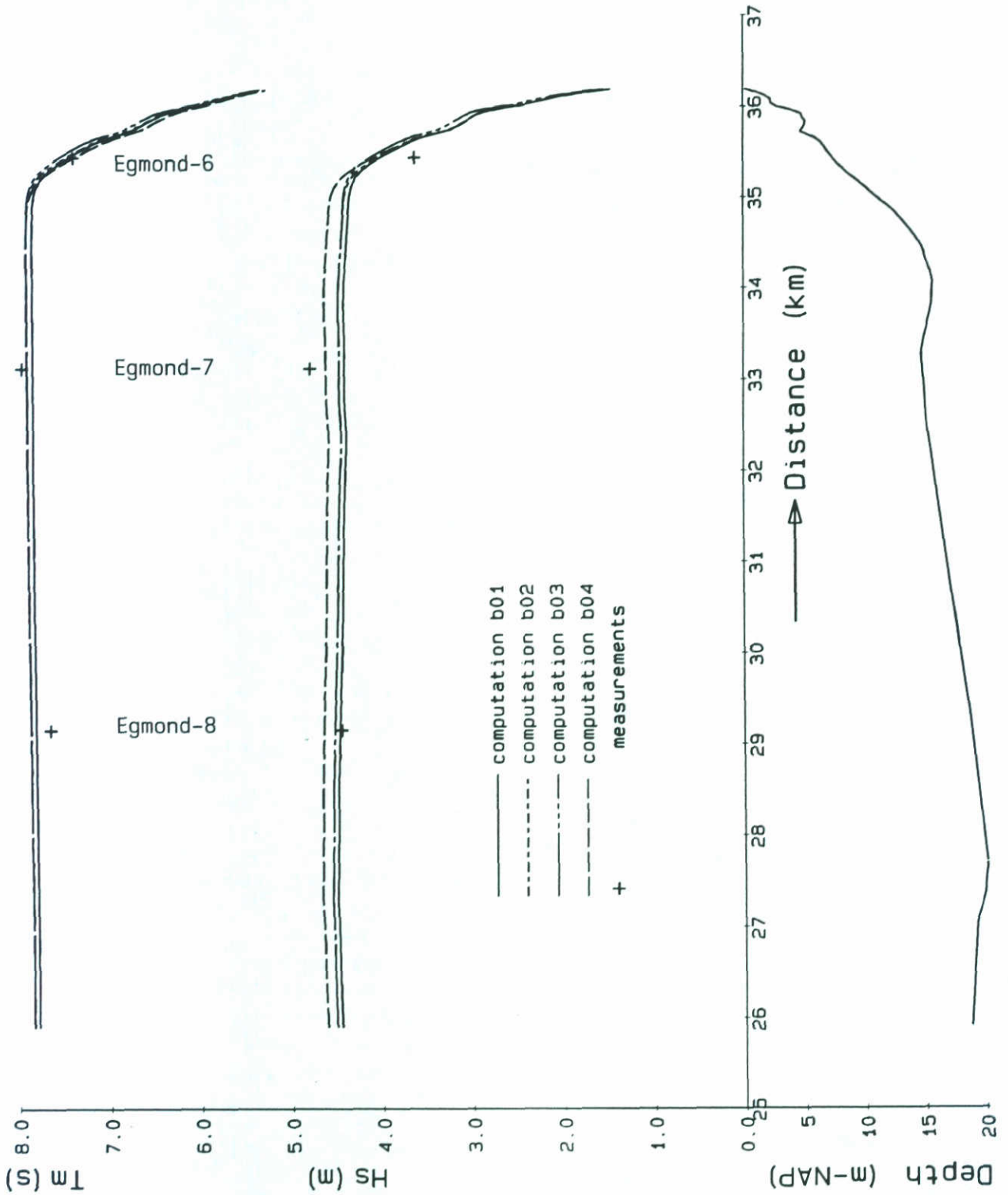
SIGNIFICANT WAVE HEIGHT H_s AND
 MEAN WAVE PERIOD T_m
 16 DECEMBER 1982, 0.00 h

HYDRA-HISWA

DELFT HYDRAULICS

H1355

FIG. 5.4



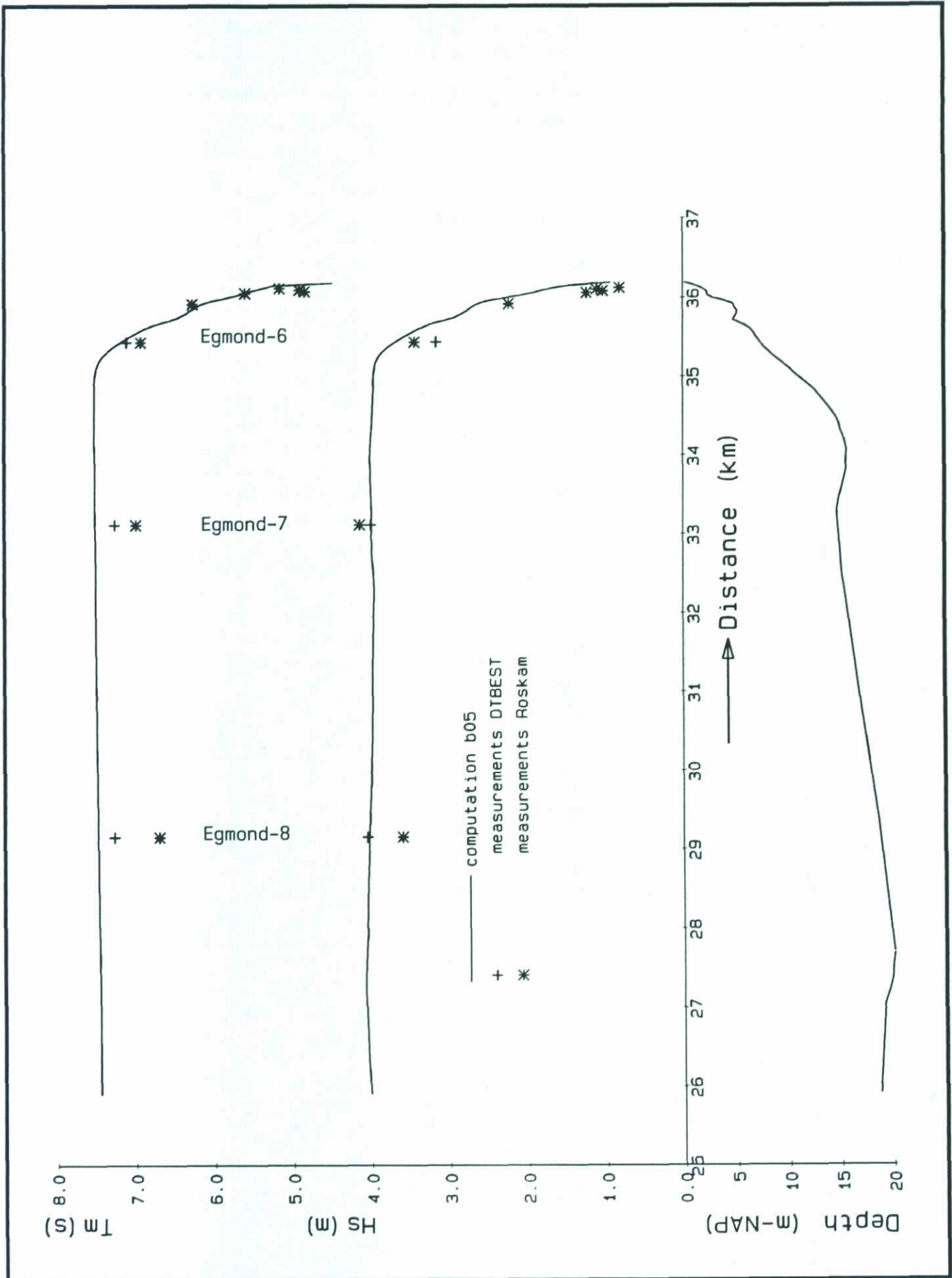
SIGNIFICANT WAVE HEIGHT H_s AND
 MEAN WAVE PERIOD T_m
 16 DECEMBER 1982, 6.00 h

HYDRA-HISWA

DELFT HYDRAULICS

H1355

FIG. 5.5



SIGNIFICANT WAVE HEIGHT H_s AND
 MEAN WAVE PERIOD T_m
 16 DECEMBER 1982, 18.00 h

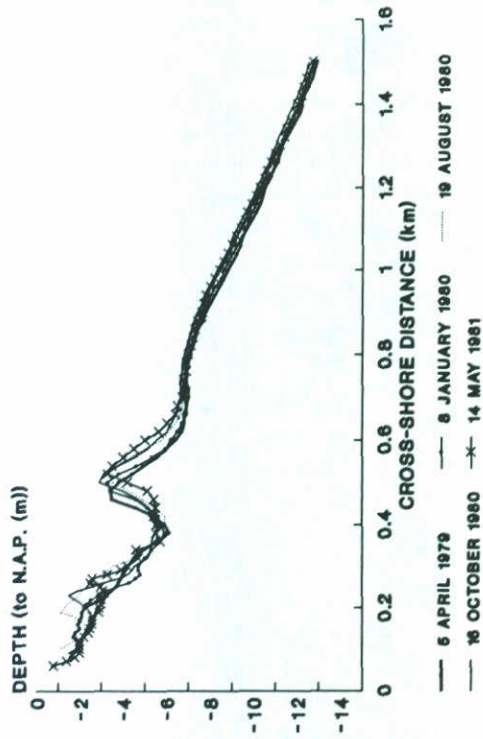
HYDRA-HISWA

DELFT HYDRAULICS

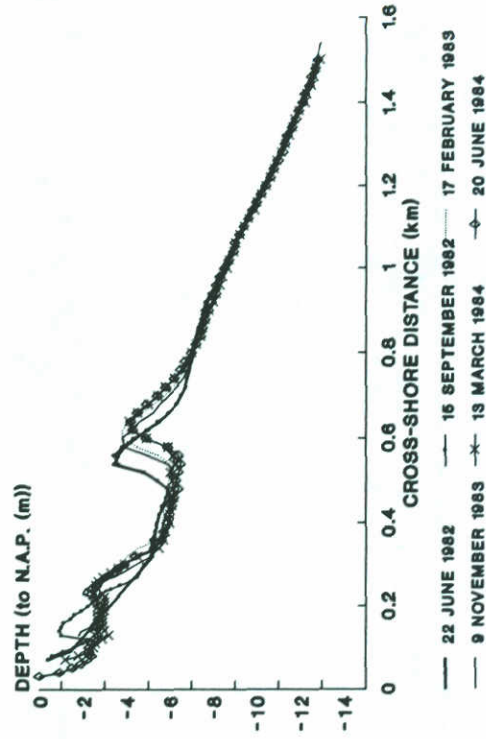
H1355

FIG. 5.6

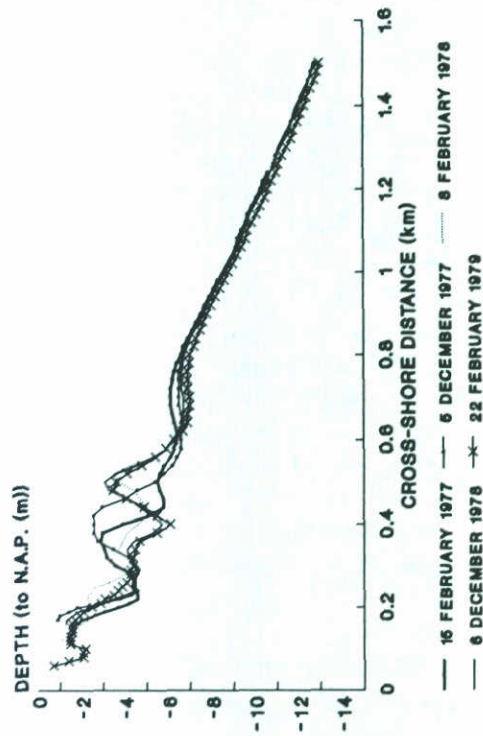
PROFILE 40.000



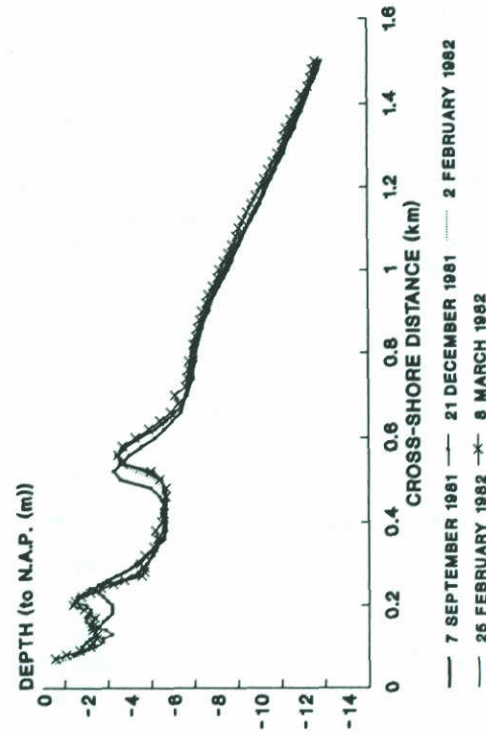
PROFILE 40.000



PROFILE 40.000



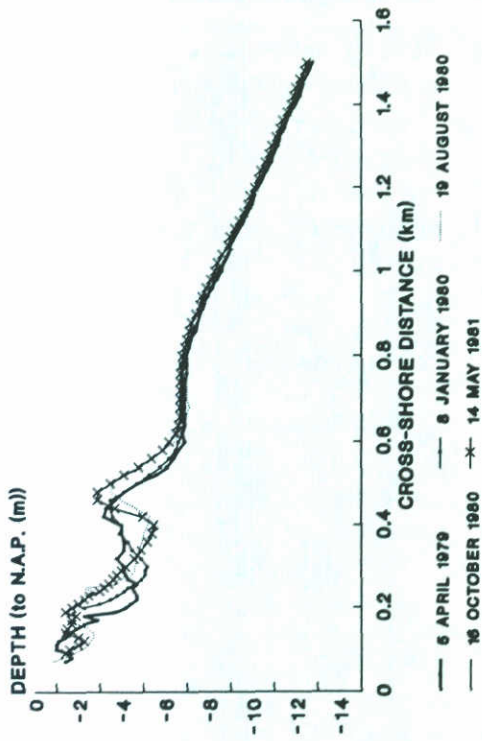
PROFILE 40.000



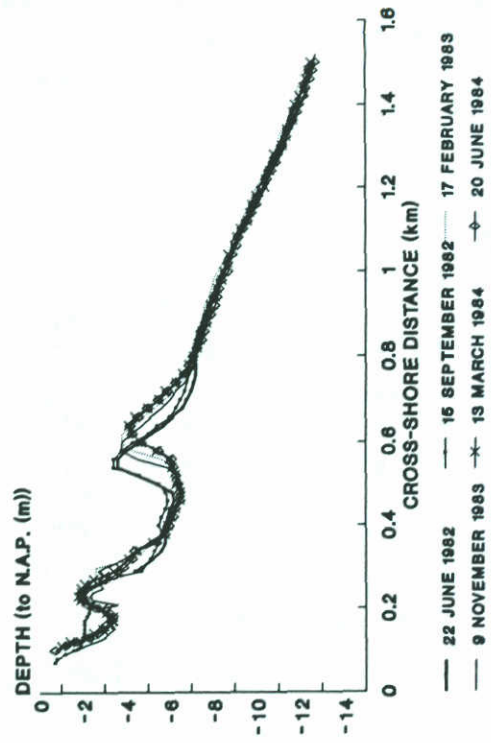
VARIATION BATHYMETRY EGMOND PROFILE
 PROFILE 40.000, 1977-1984

HYDRA

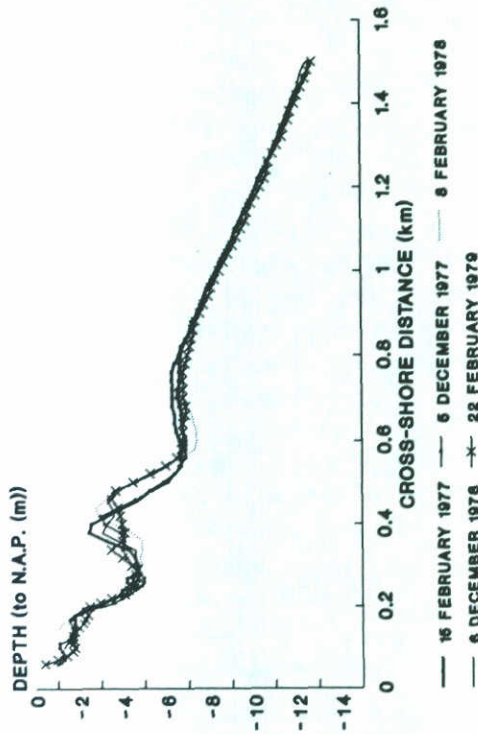
PROFILE 40.500



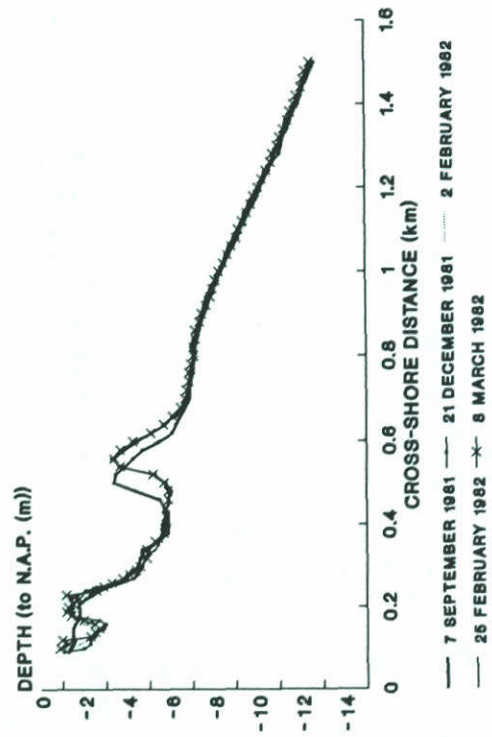
PROFILE 40.500



PROFILE 40.500



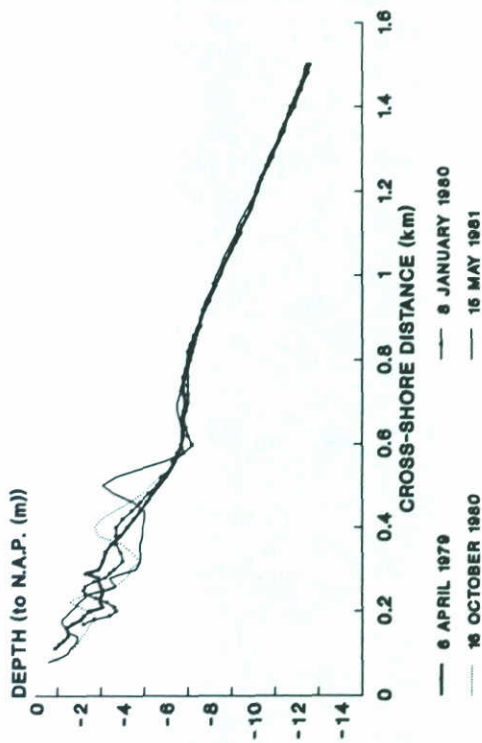
PROFILE 40.500



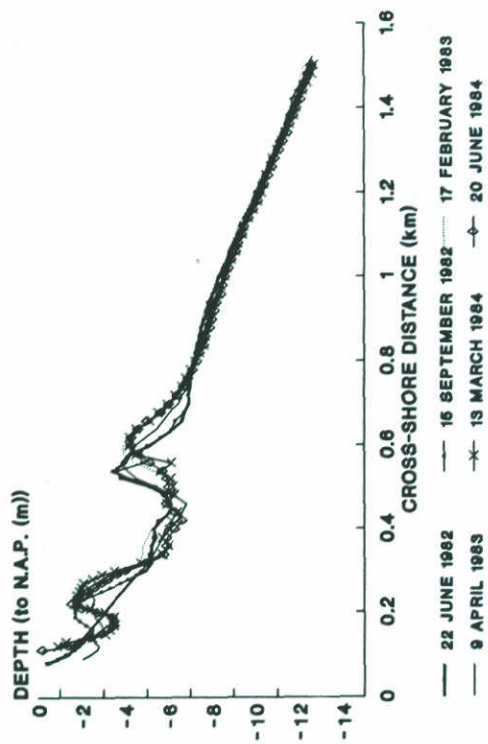
VARIATION BATHYMETRY EGMOND PROFILE
PROFILE 40.500, 1977-1984

HYDRA

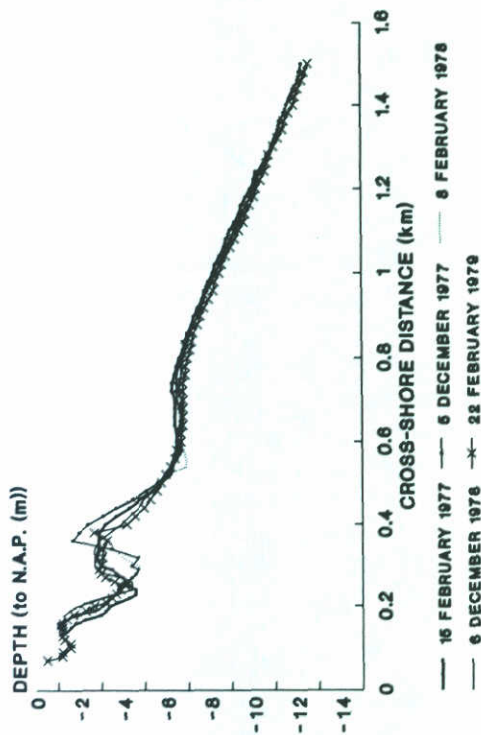
PROFILE 41.000



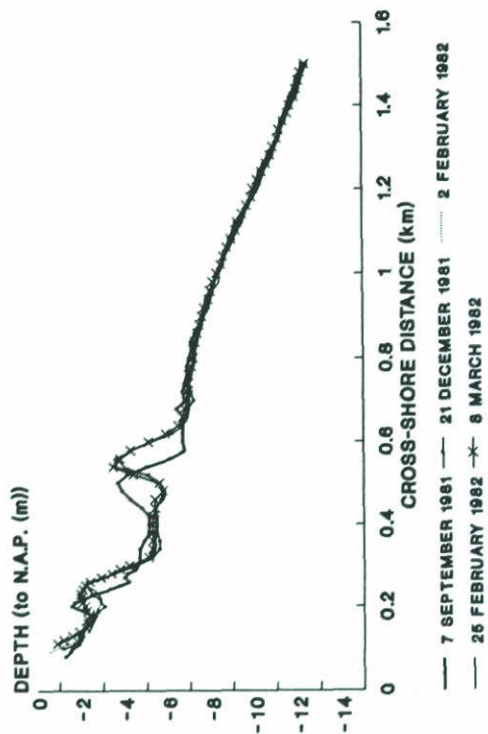
PROFILE 41.000



PROFILE 41.000



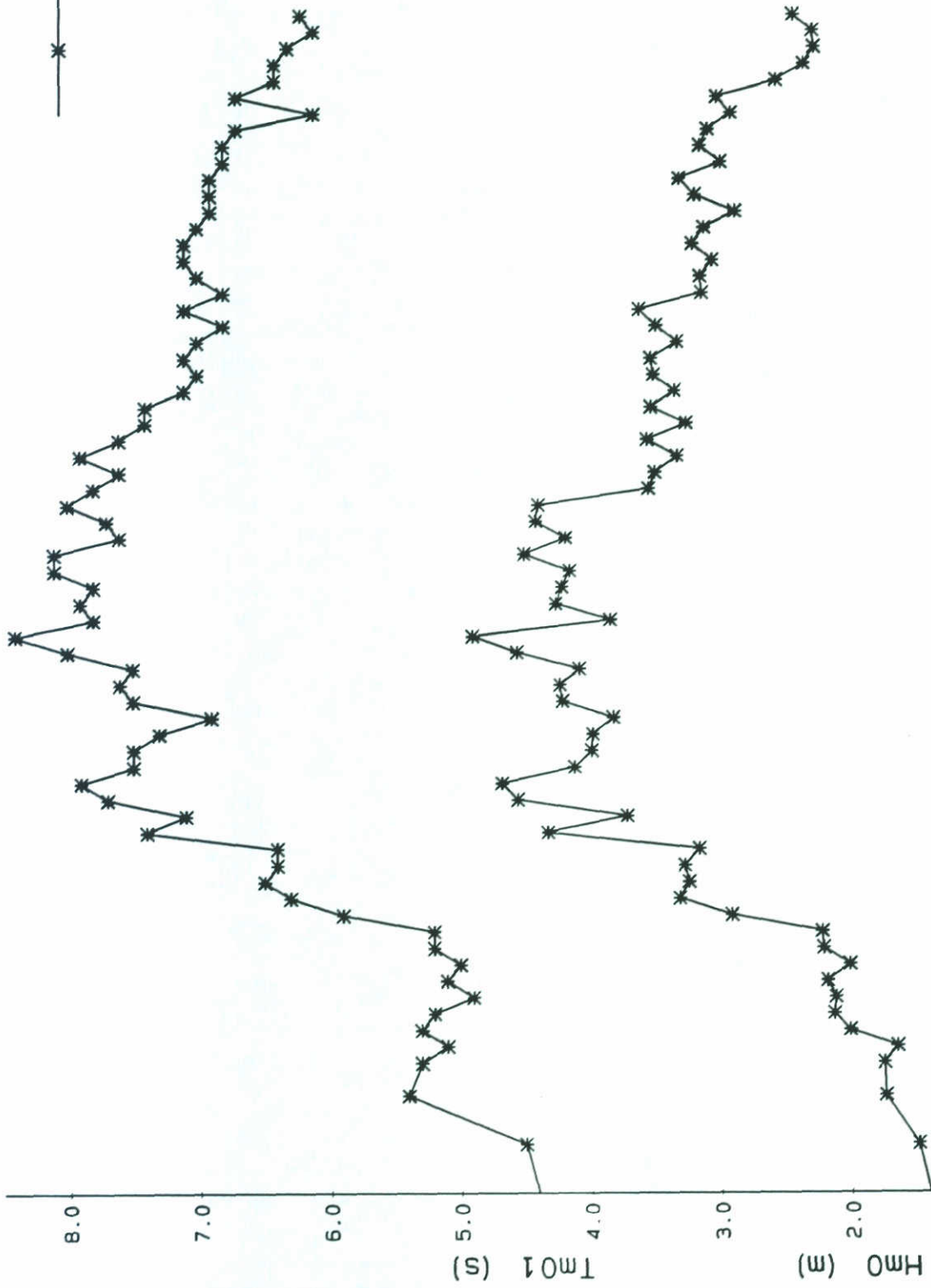
PROFILE 41.000



VARIATION BATHYMETRY EGMOND PROFILE
PROFILE 41.000, 1977-1984

HYDRA

Schulpenget



12.00 h
26 nov

0.00 h
25 nov

0.00 h
24 nov

0.00
23 nov 1981

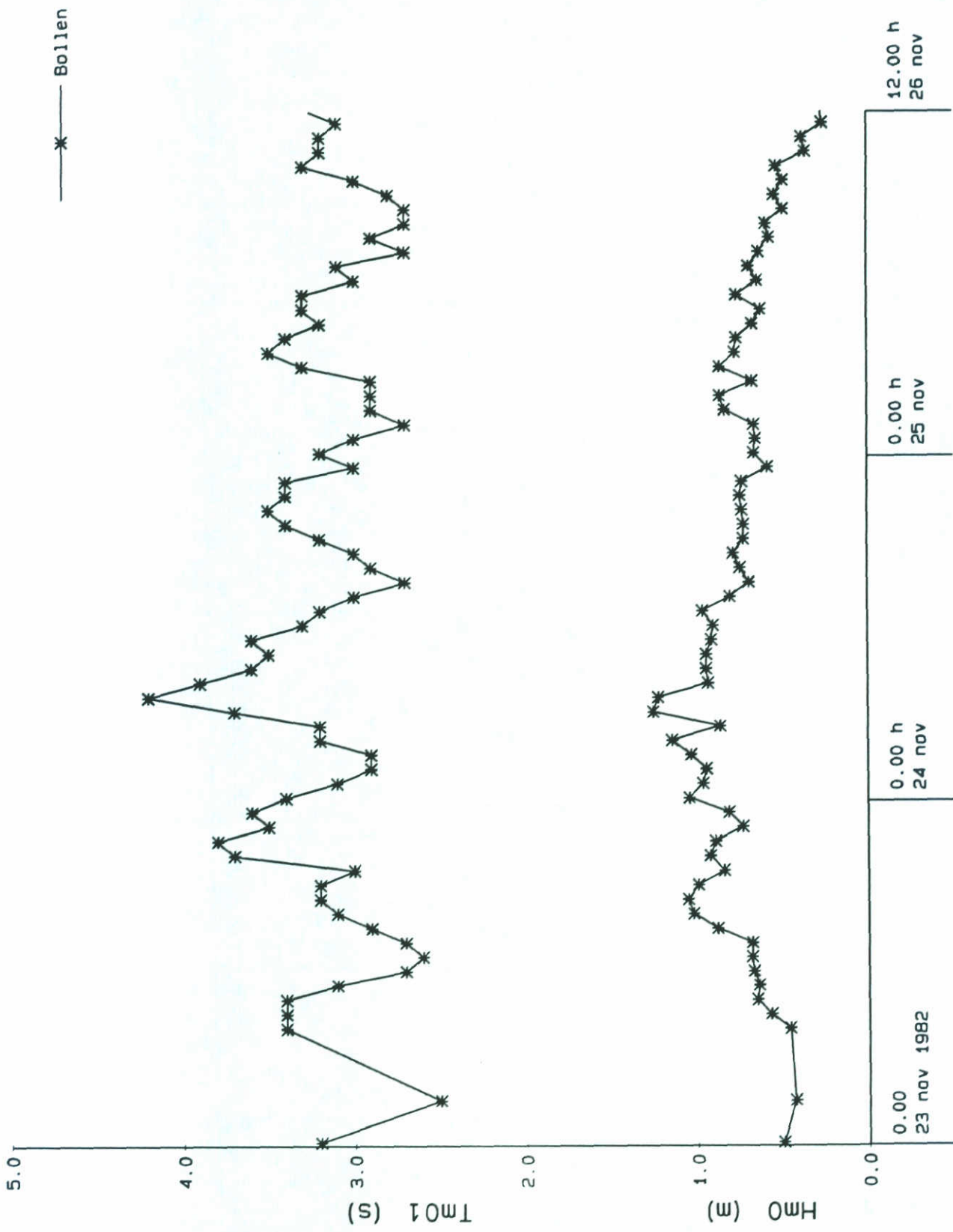
MEASURED WAVE HEIGHT H_{m0} (DOWN) AND
WAVE PERIOD T_{m01} (UP)
STORM NOVEMBER 1981, SCHULPENGET

HYDRA-HISWA

DELFT HYDRAULICS

H1355

FIG 5.8a



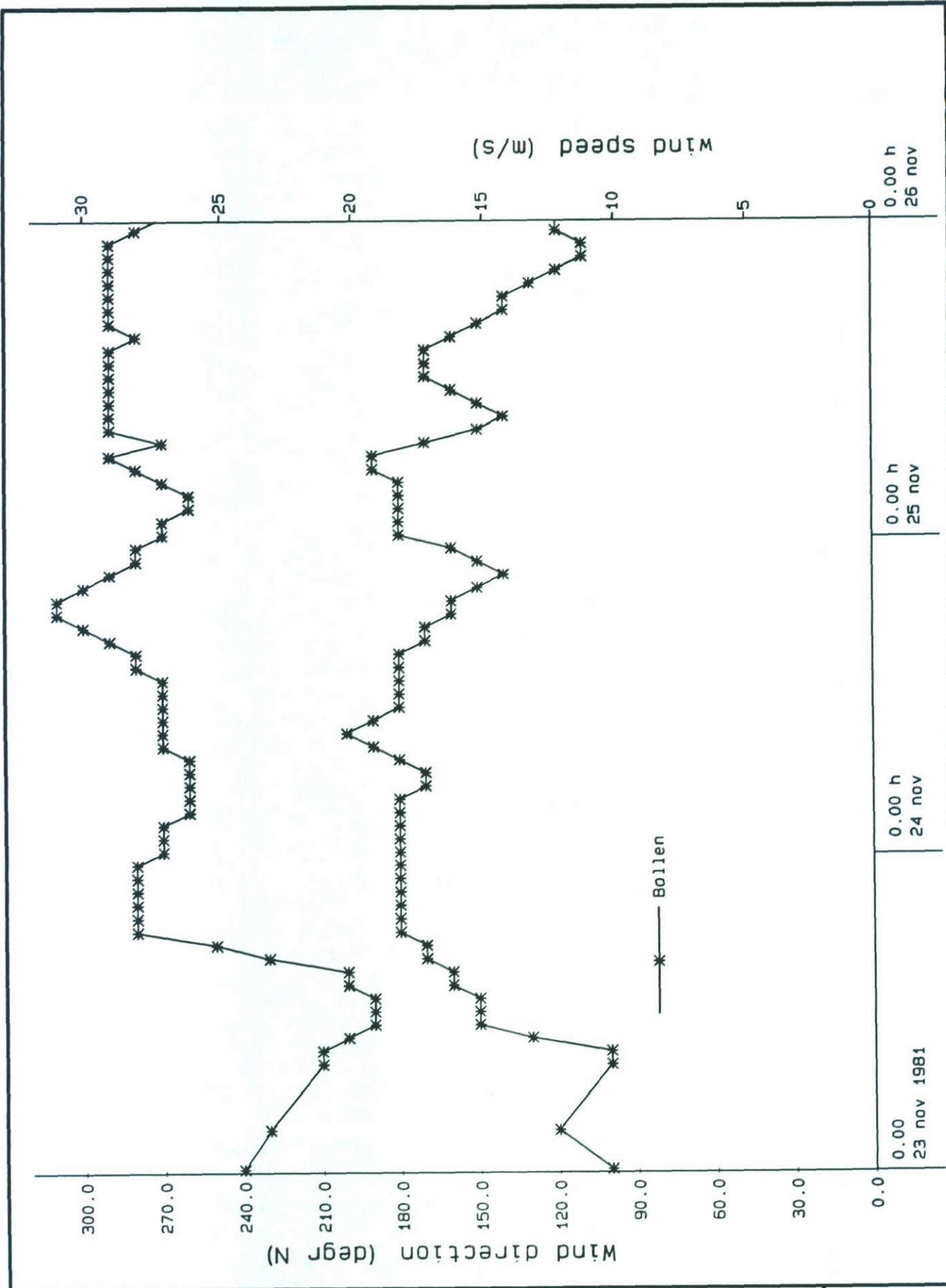
MEASURED WAVE HEIGHT H_{m0} (DOWN) AND
 WAVE PERIOD T_{m01} (UP)
 STORM NOVEMBER 1981, BOLLEN

HYDRA-HISWA

DELFT HYDRAULICS

H1355

FIG 5.8b



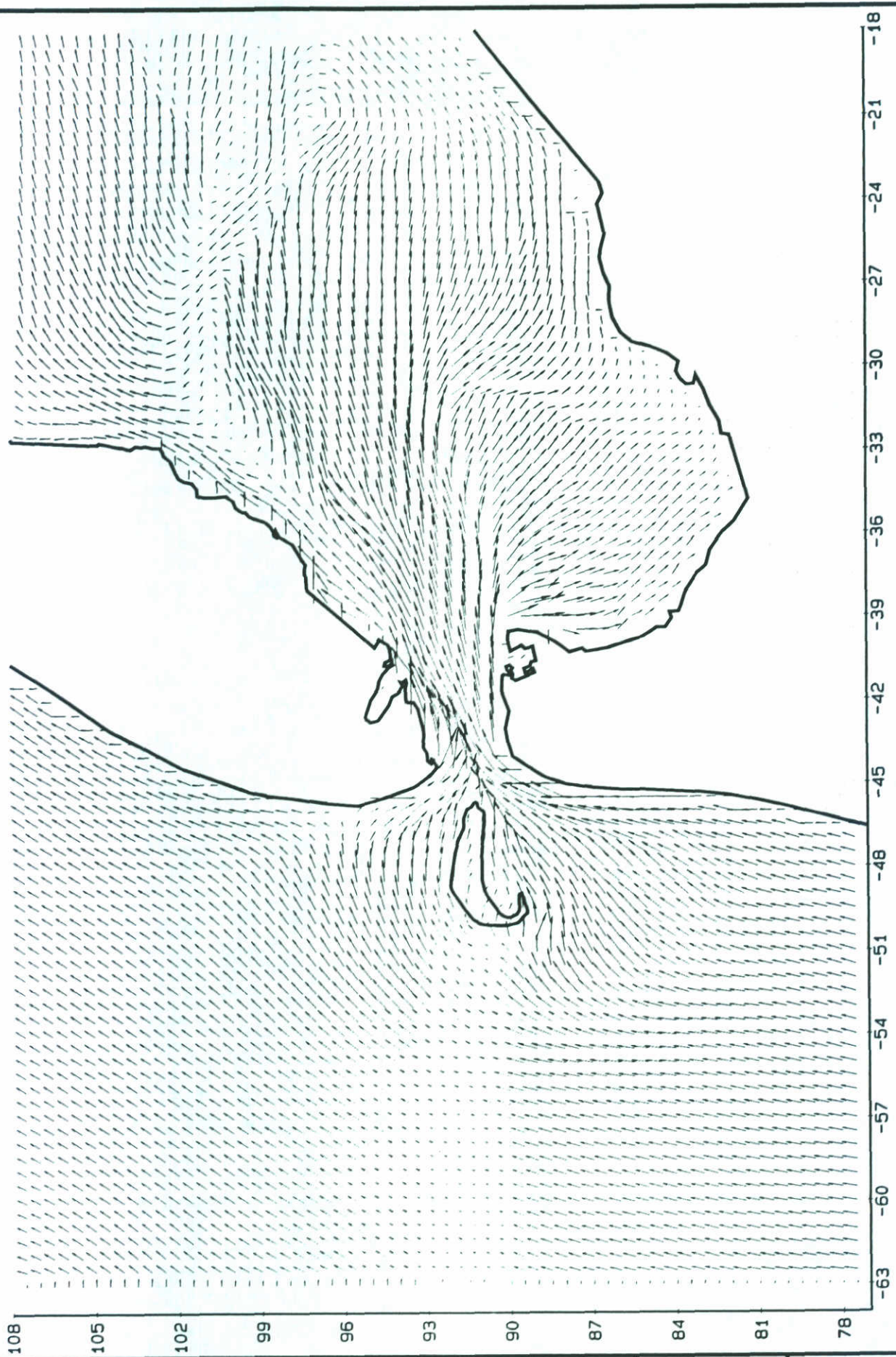
MEASURED WIND SPEED (DOWN) AND
 DIRECTION (UP) STORM NOVEMBER 1981,
 BOLLEN

HYDRA-HISWA

DELFT HYDRAULICS

H1355

FIG 5.9b



CURRENT FIELD STORM 24 NOVEMBER 1981

HYDRA

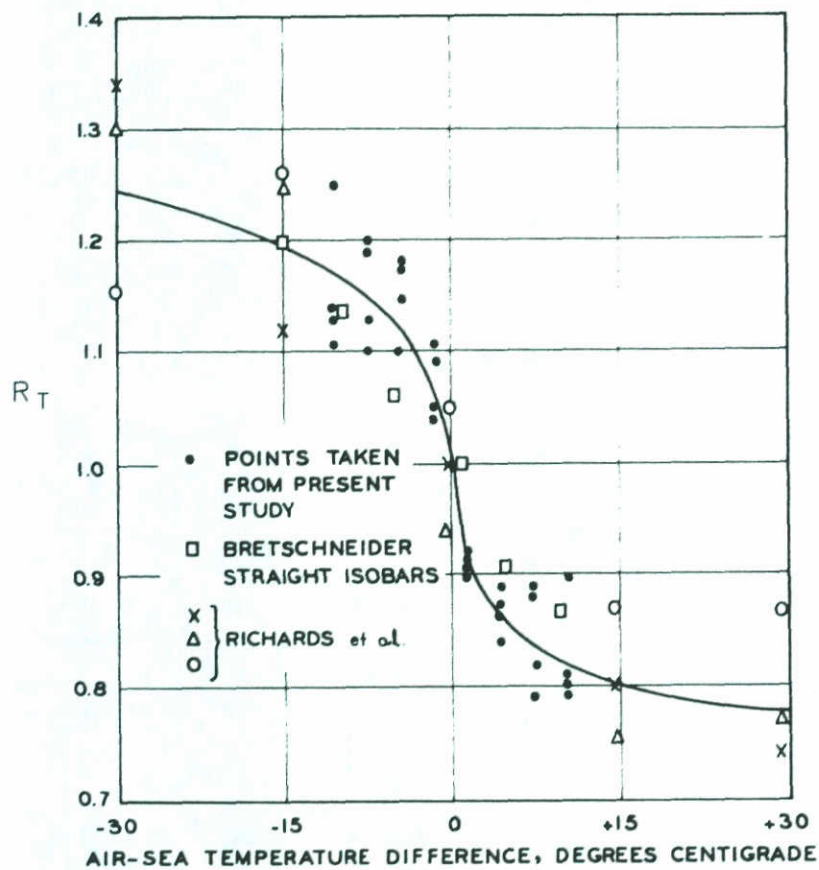
T=14.00 h

Scale 1 : 200000

DELFT HYDRAULICS

H1355

Fig 5.10



after Resio and Vincent (1977)

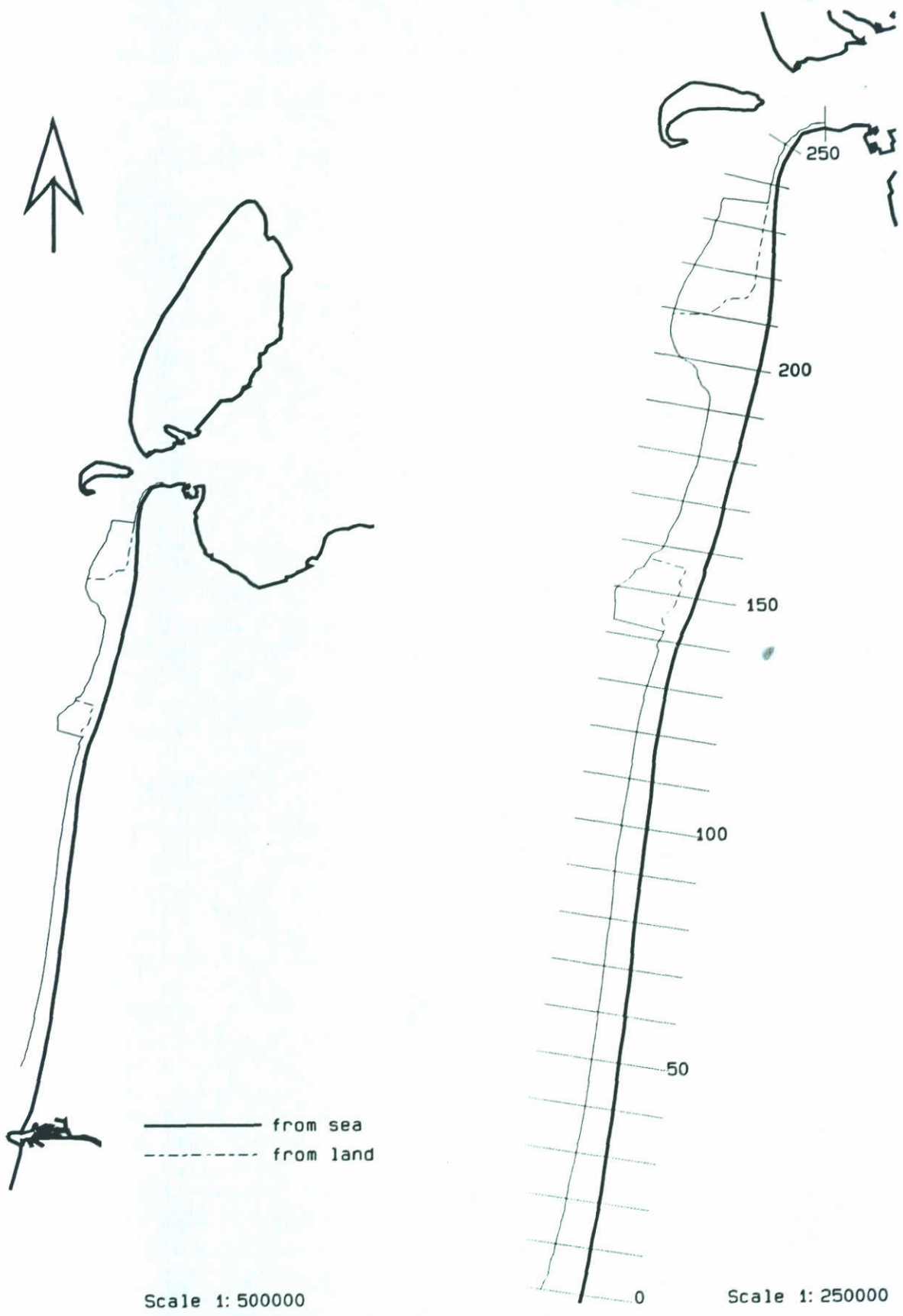
AMPLIFICATION FACTOR FOR EFFECT OF
AIR-WATER TEMPERATURE DIFFERENCE

HYDRA

DELFT HYDRAULICS

H 1355

FIG. 5.11



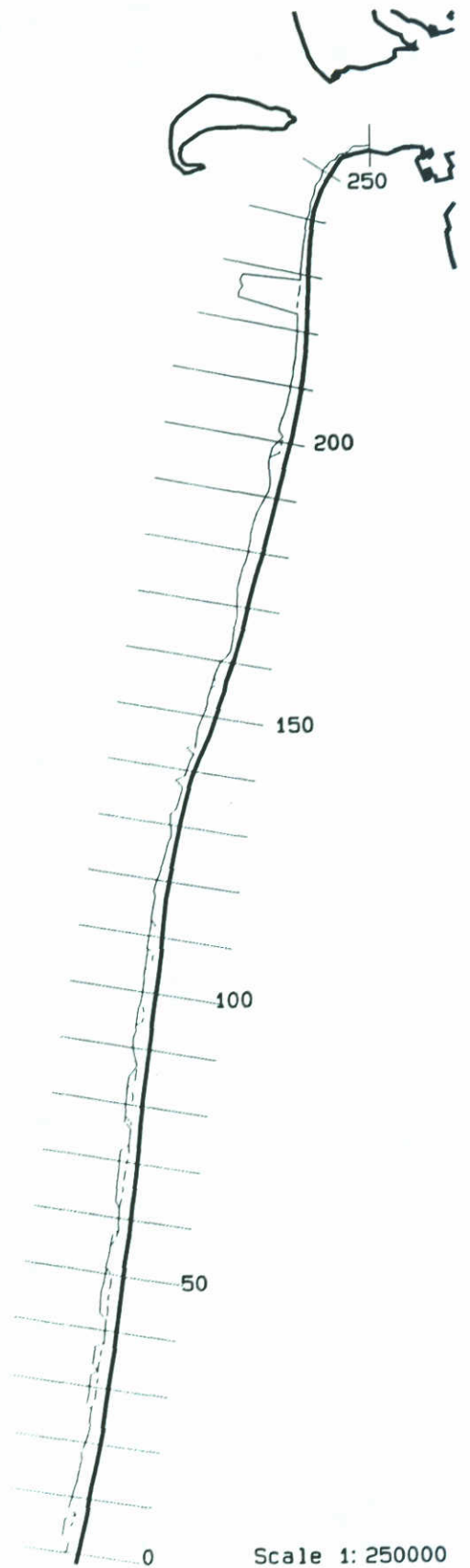
Position of NAP-10 m contour HISWA output
Coast of NORTH - HOLLAND

HYDRA	
Scale as shown	
H1355	Fig 6.1

DELFT HYDRAULICS



Scale 1: 500000



Scale 1: 250000

Position of NAP-5 m contour HISWA output
Coast of NORTH - HOLLAND

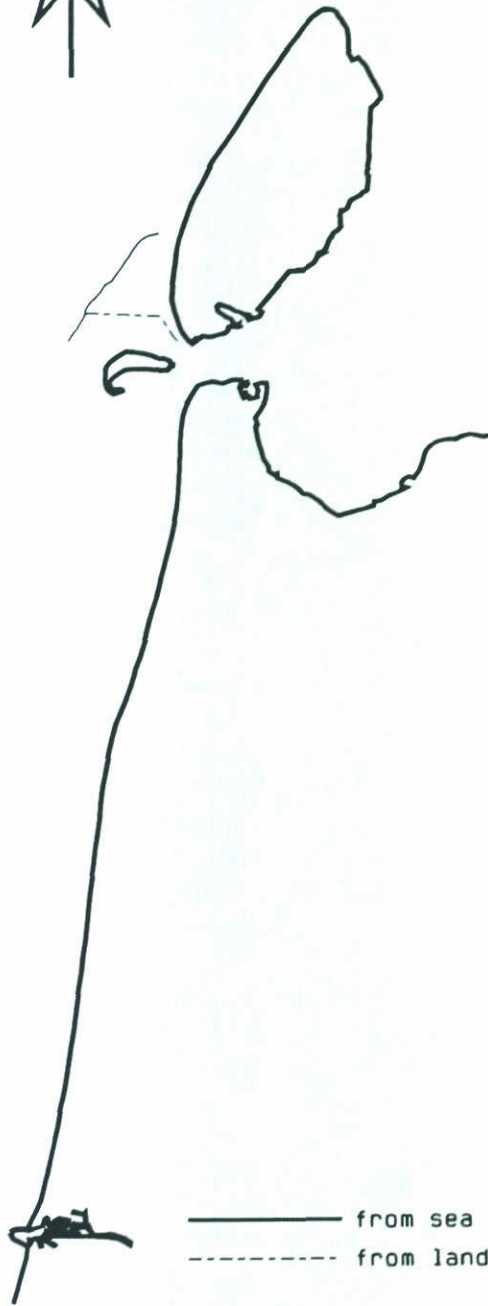
HYDRA

Scale as shown

DELFT HYDRAULICS

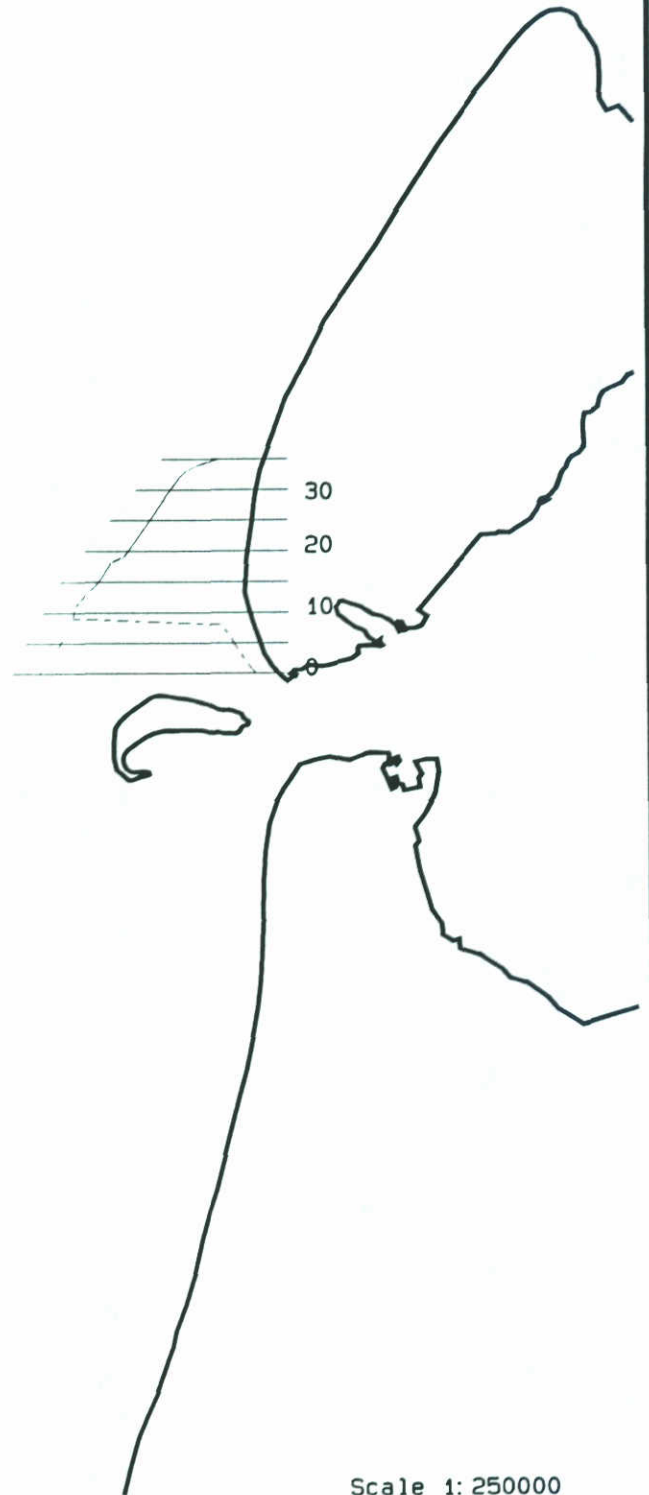
H1355

Fig 6.2



— from sea
- - - from land

Scale 1: 500000



Scale 1: 250000

Position of NAP-10 m contour HISWA output
Coast of TEXEL

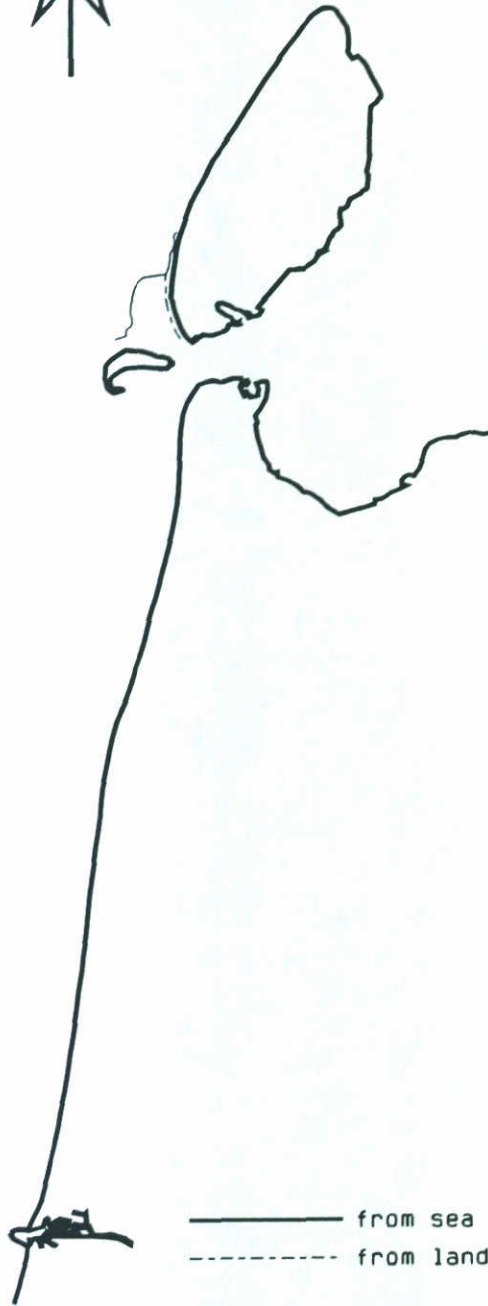
HYDRA

Scale as shown

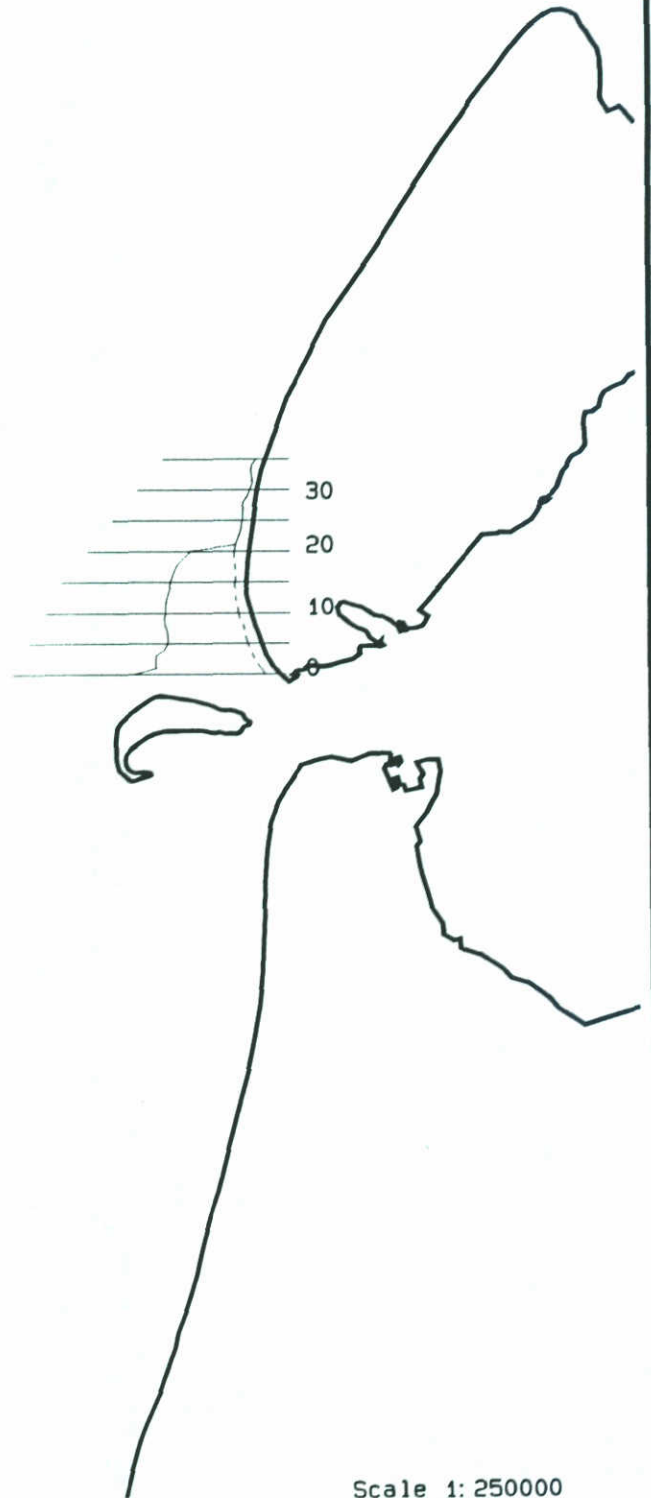
DELFT HYDRAULICS

H1355

Fig 6.3



Scale 1: 500000



Scale 1: 250000

Position of NAP-5 m contour HISWA output
Coast of TEXEL

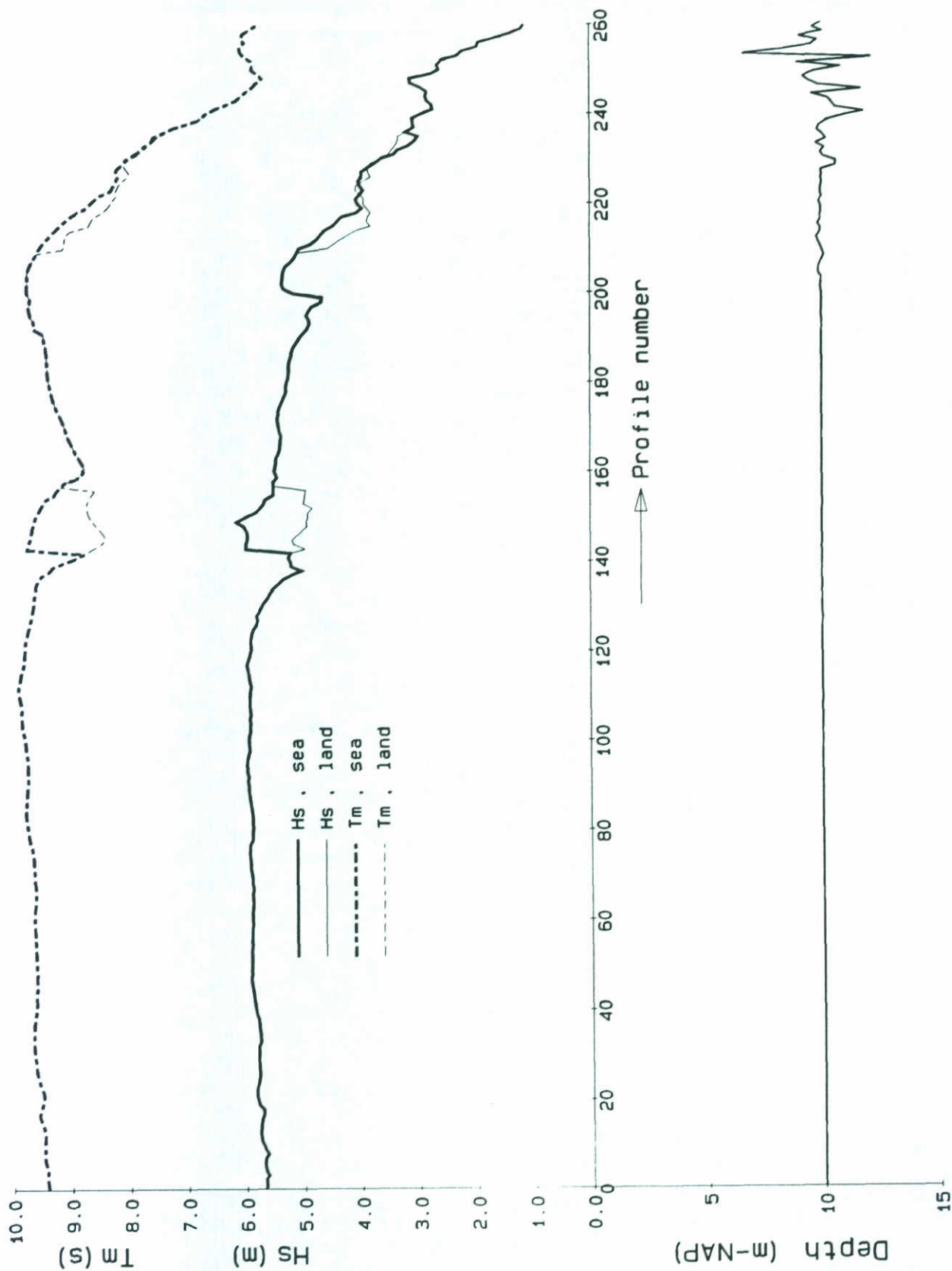
HYDRA

Scale as shown

DELFT HYDRAULICS

H1355

Fig 6.4



SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-10 M CONTOUR COAST OF NORTH-HOLLAND

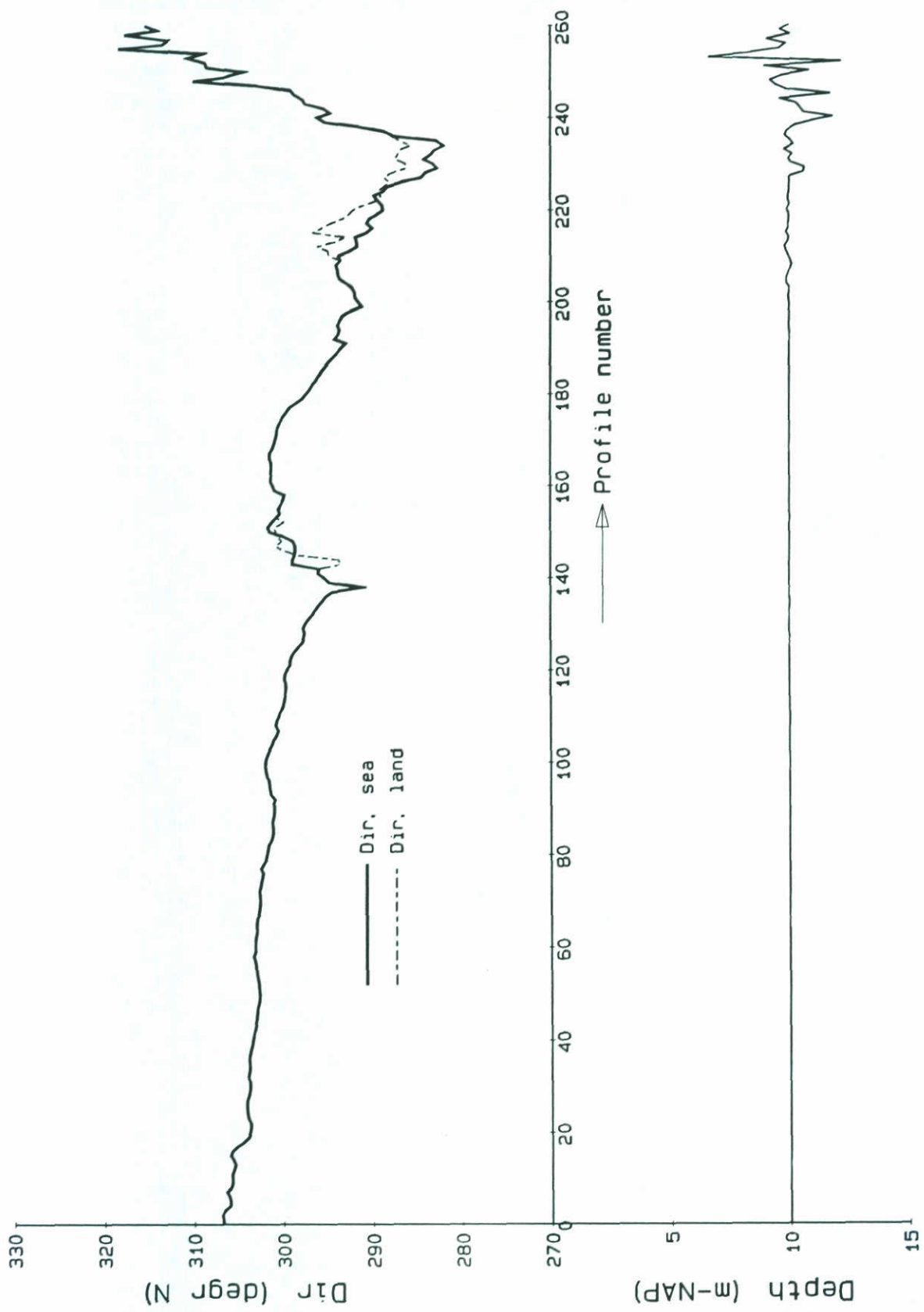
HYDRA-HISWA

Z01

DELFT HYDRAULICS

H1355

FIG 6.5a



MAIN WAVE DIRECTION AT NAP-10 M CONTOUR
 COAST OF NORTH-HOLLAND

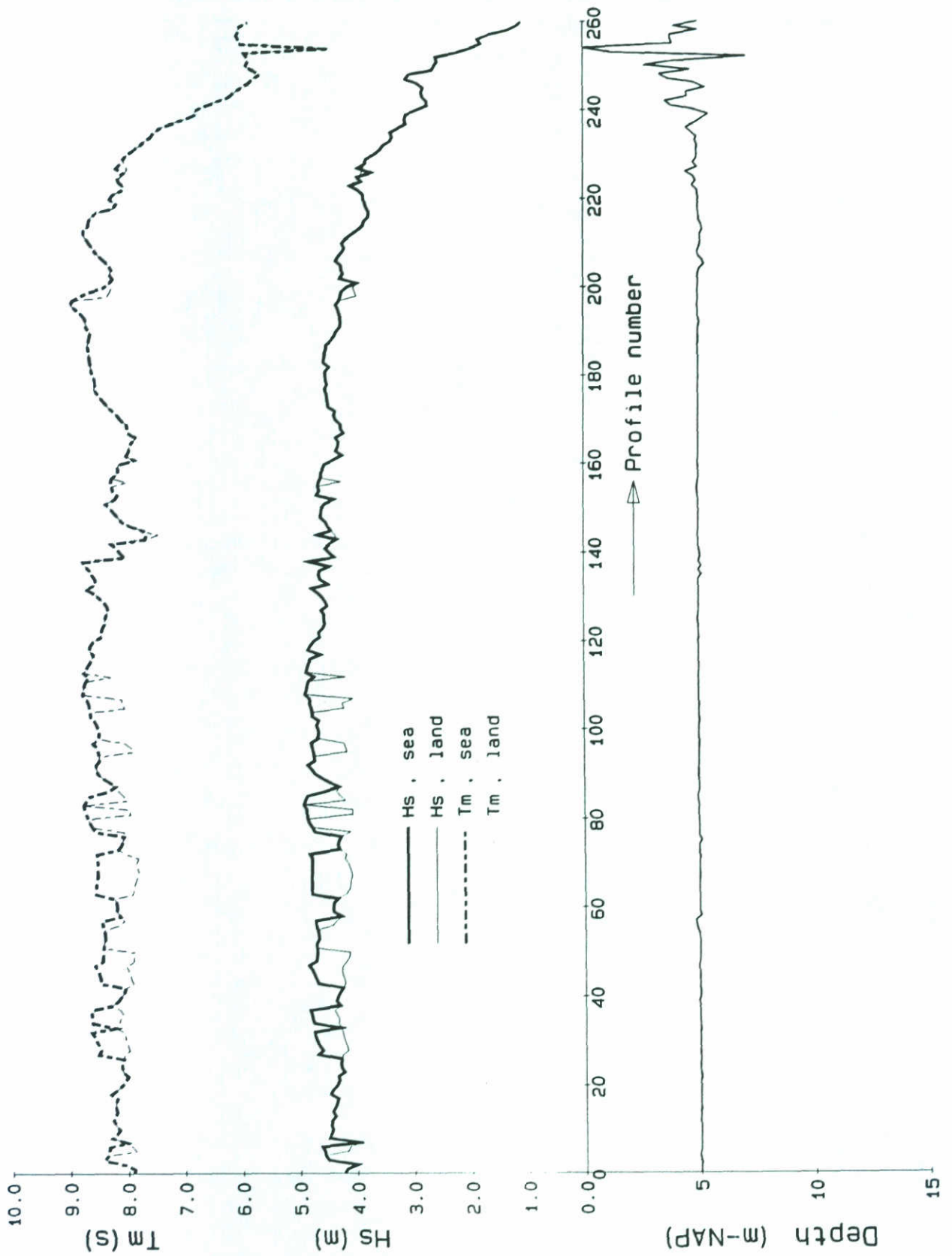
HYDRA-HISWA

Z01

DELFT HYDRAULICS

H1355

FIG 6.5b



SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-5 M CONTOUR COAST OF NORTH-HOLLAND

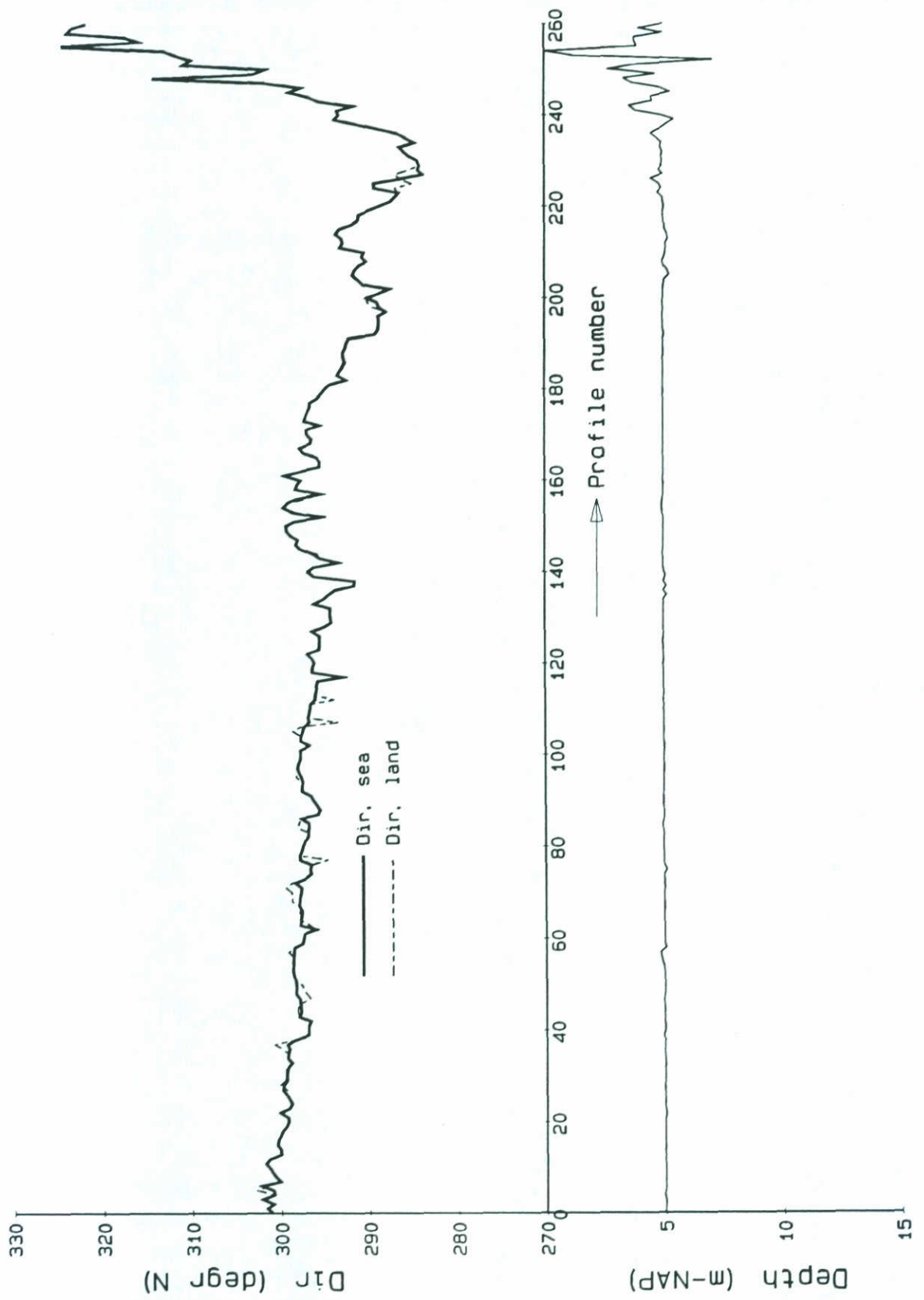
HYDRA-HISWA

Z01

DELFT HYDRAULICS

H1355

FIG 6.6a



MAIN WAVE DIRECTION AT NAP-5 M CONTOUR
COAST OF NORTH-HOLLAND

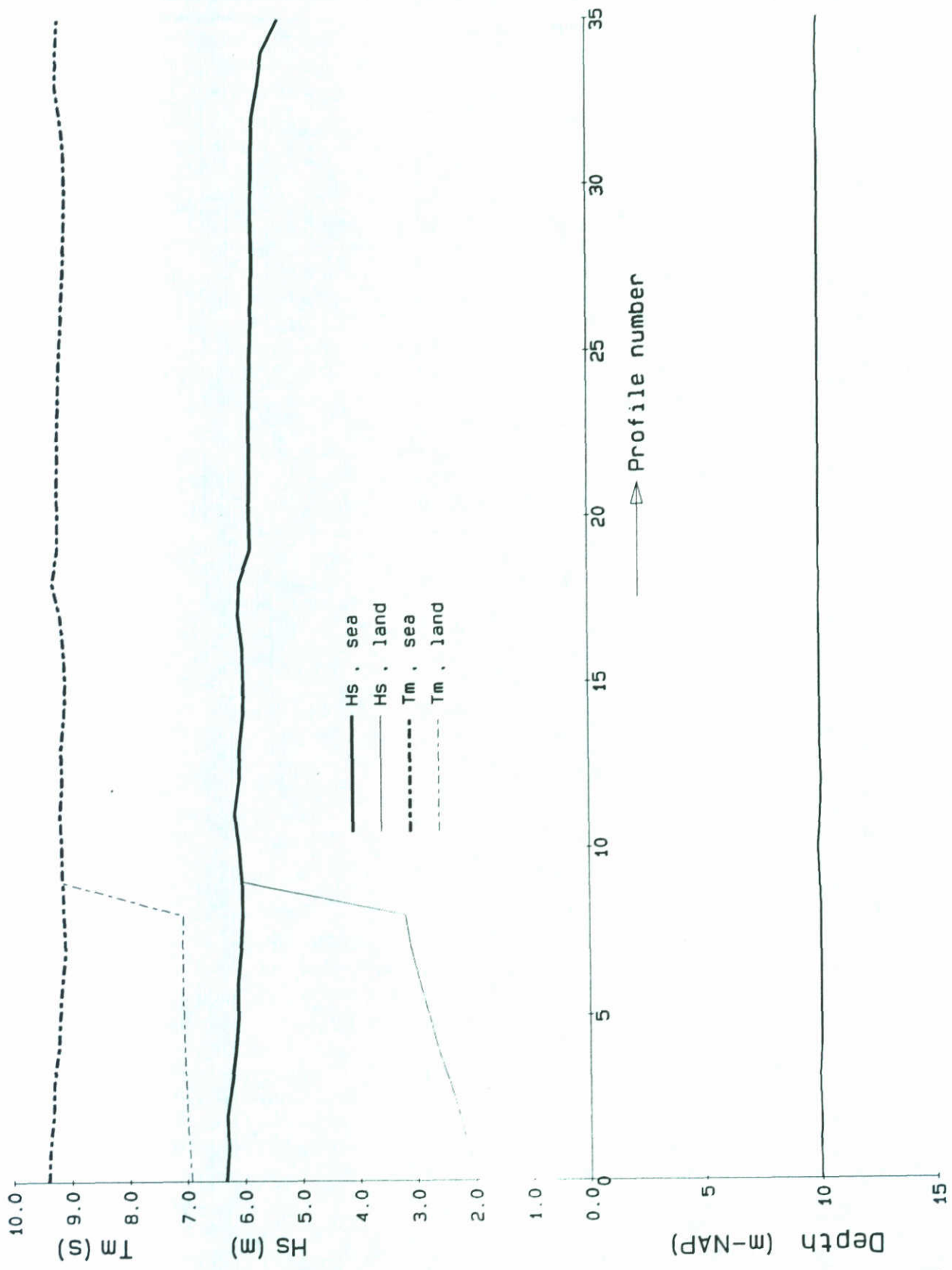
HYDRA-HISWA

Z01

DELFT HYDRAULICS

H1355

FIG 6.6b



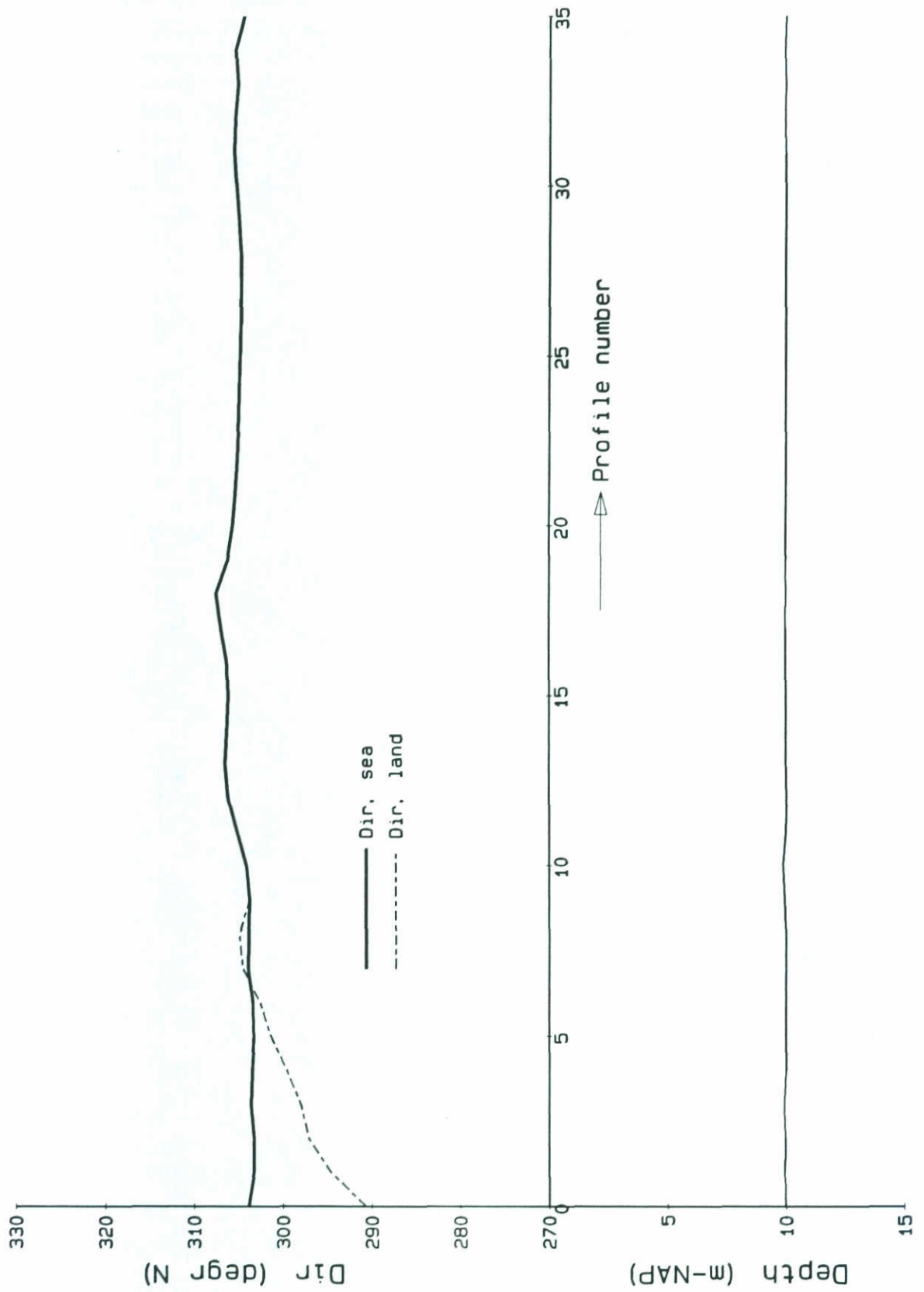
SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-10 M CONTOUR COAST OF TEXEL

HYDRA-HISWA Z01

DELFT HYDRAULICS

H1355

FIG 6.7a



MAIN WAVE DIRECTION AT NAP-10 M CONTOUR
COAST OF TEXEL

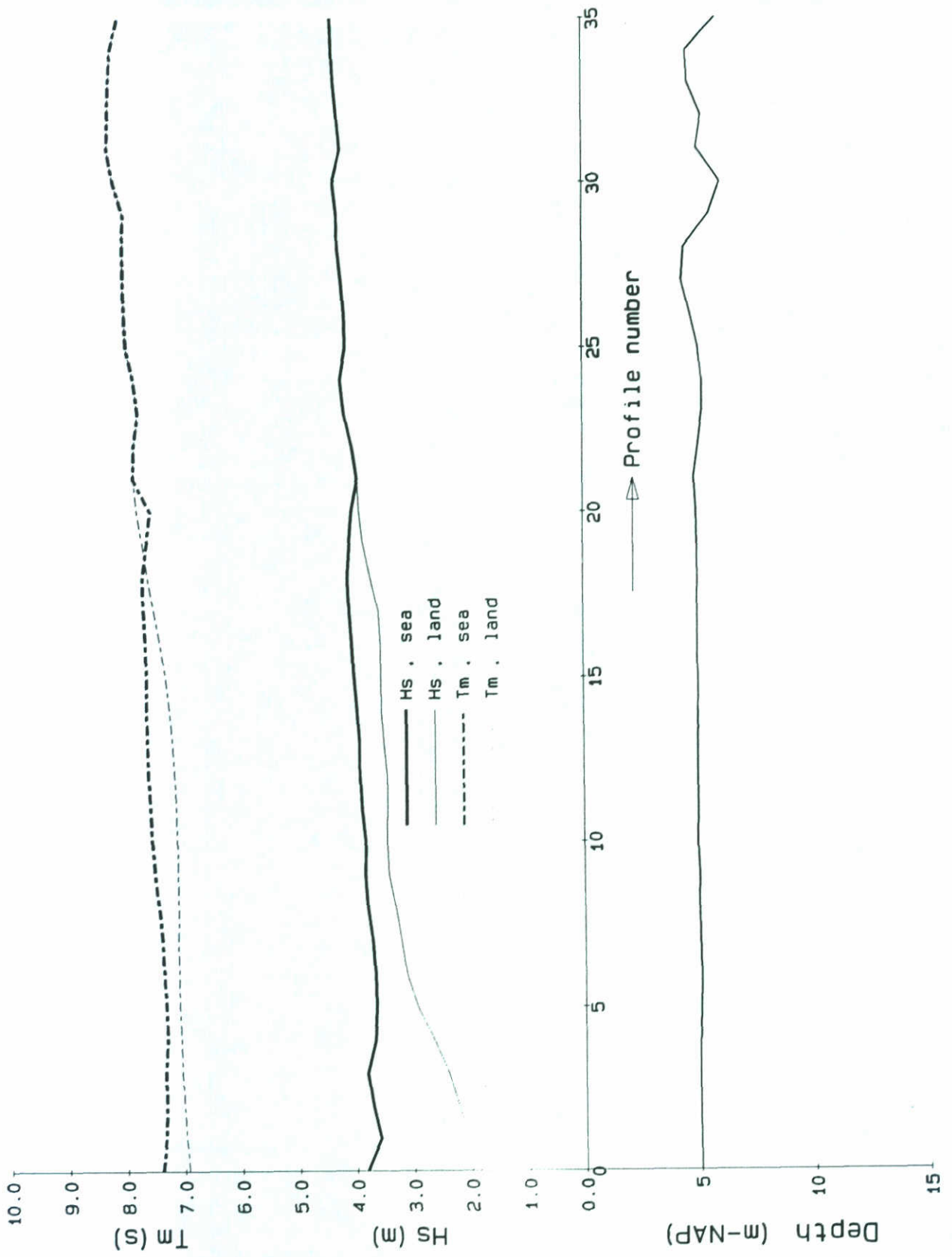
HYDRA-HISWA

Z01

DELFT HYDRAULICS

H1355

FIG 6.7b



SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-5 M CONTOUR COAST OF TEXEL

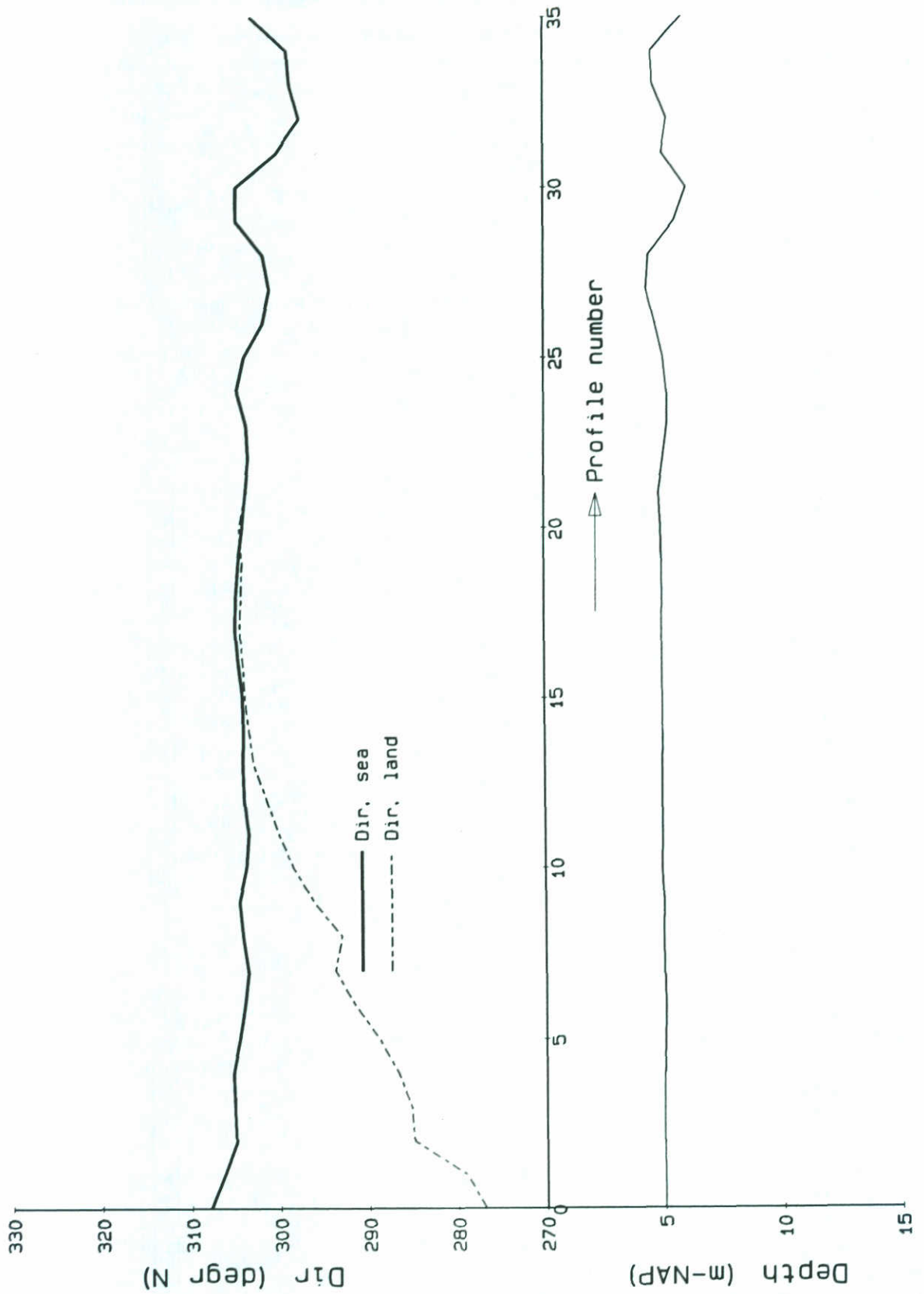
HYDRA-HISWA

Z01

DELFT HYDRAULICS

H1355

FIG 6.8a



MAIN WAVE DIRECTION AT NAP-5 M CONTOUR
 COAST OF TEXEL

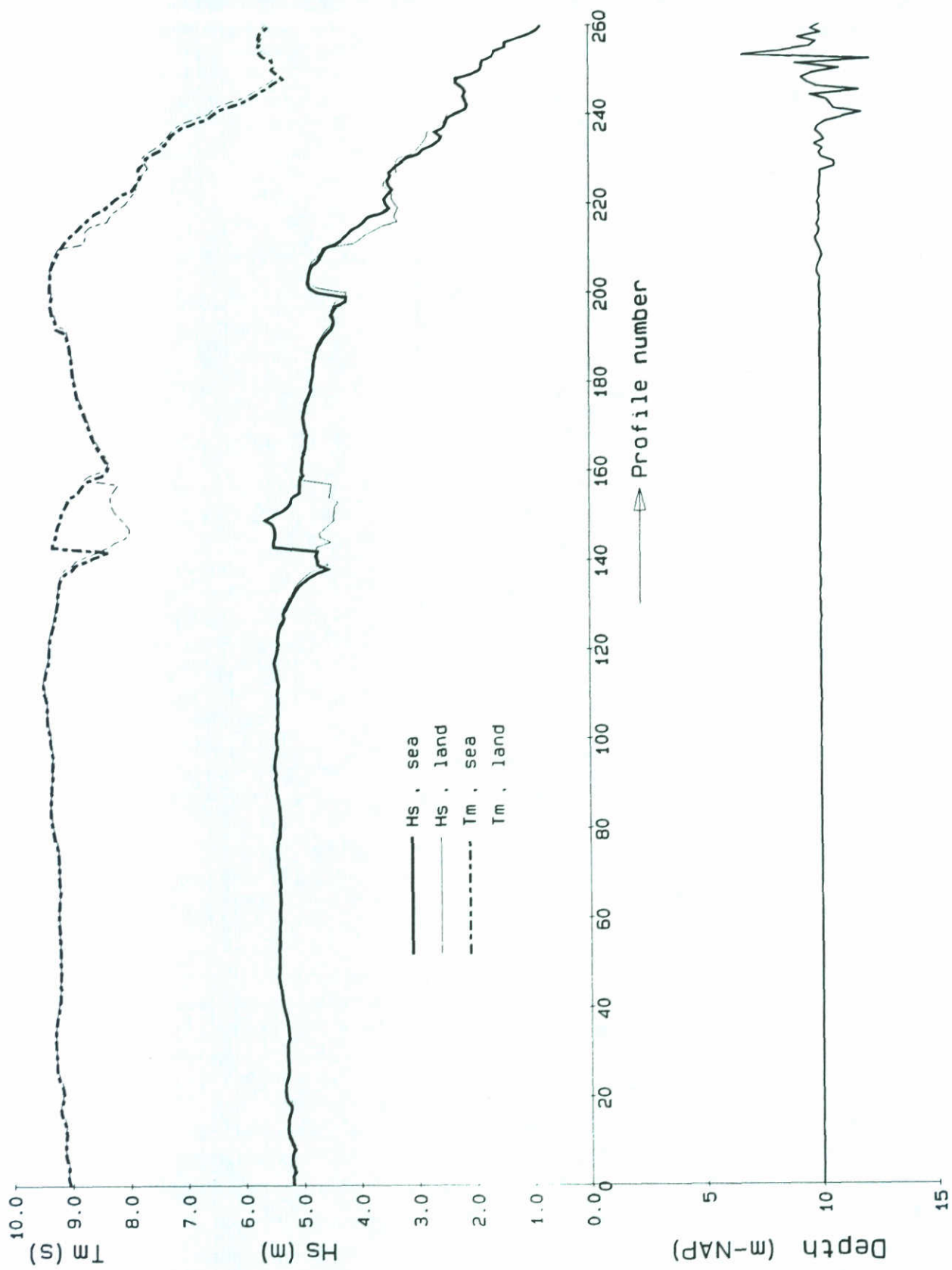
HYDRA-HISWA

Z01

DELFT HYDRAULICS

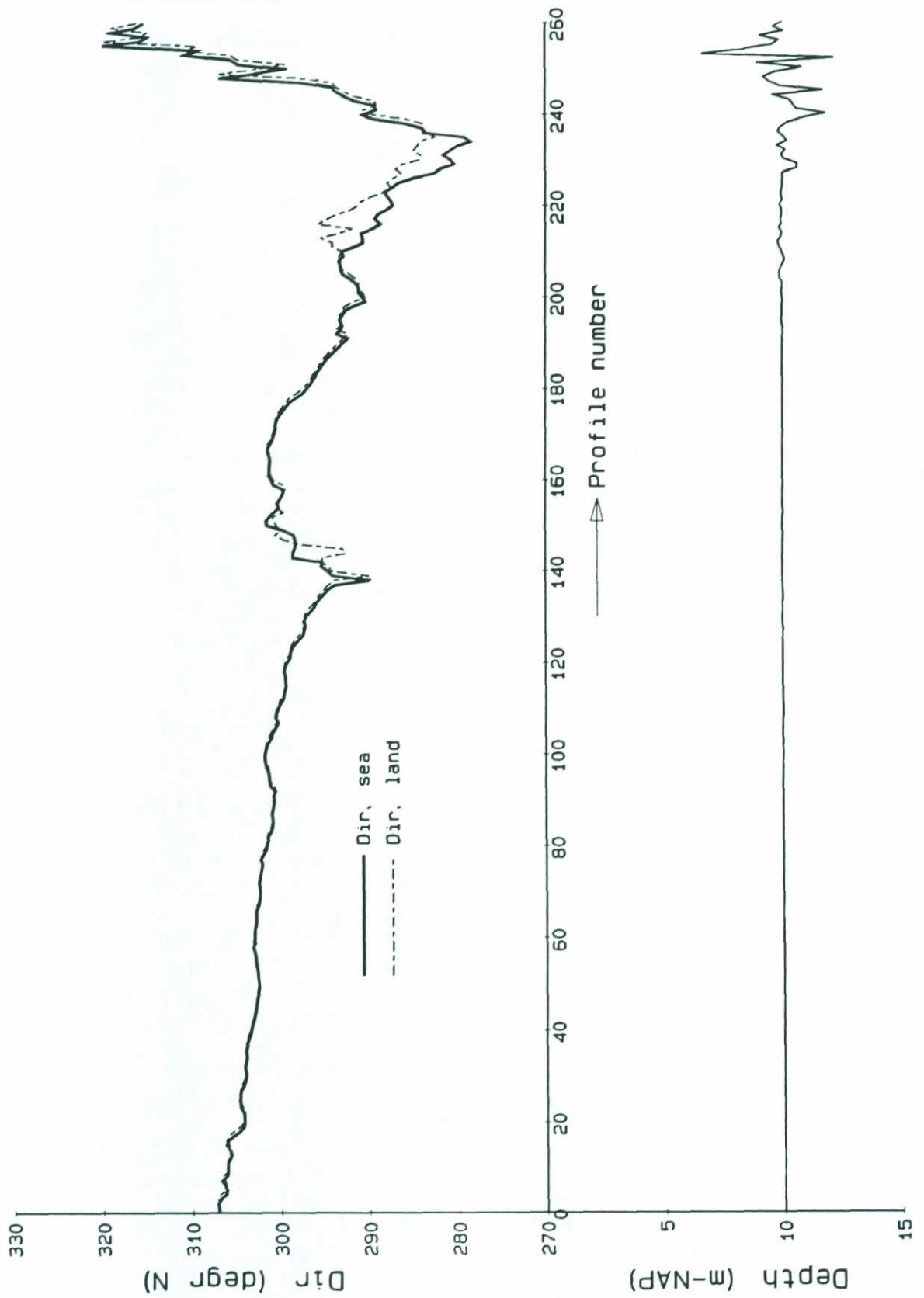
H1355

FIG 6.8b



SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-10 M CONTOUR COAST OF NORTH-HOLLAND

HYDRA-HISWA	Z02
H1355	FIG 6.9a



MAIN WAVE DIRECTION AT NAP-10 M CONTOUR
 COAST OF NORTH-HOLLAND

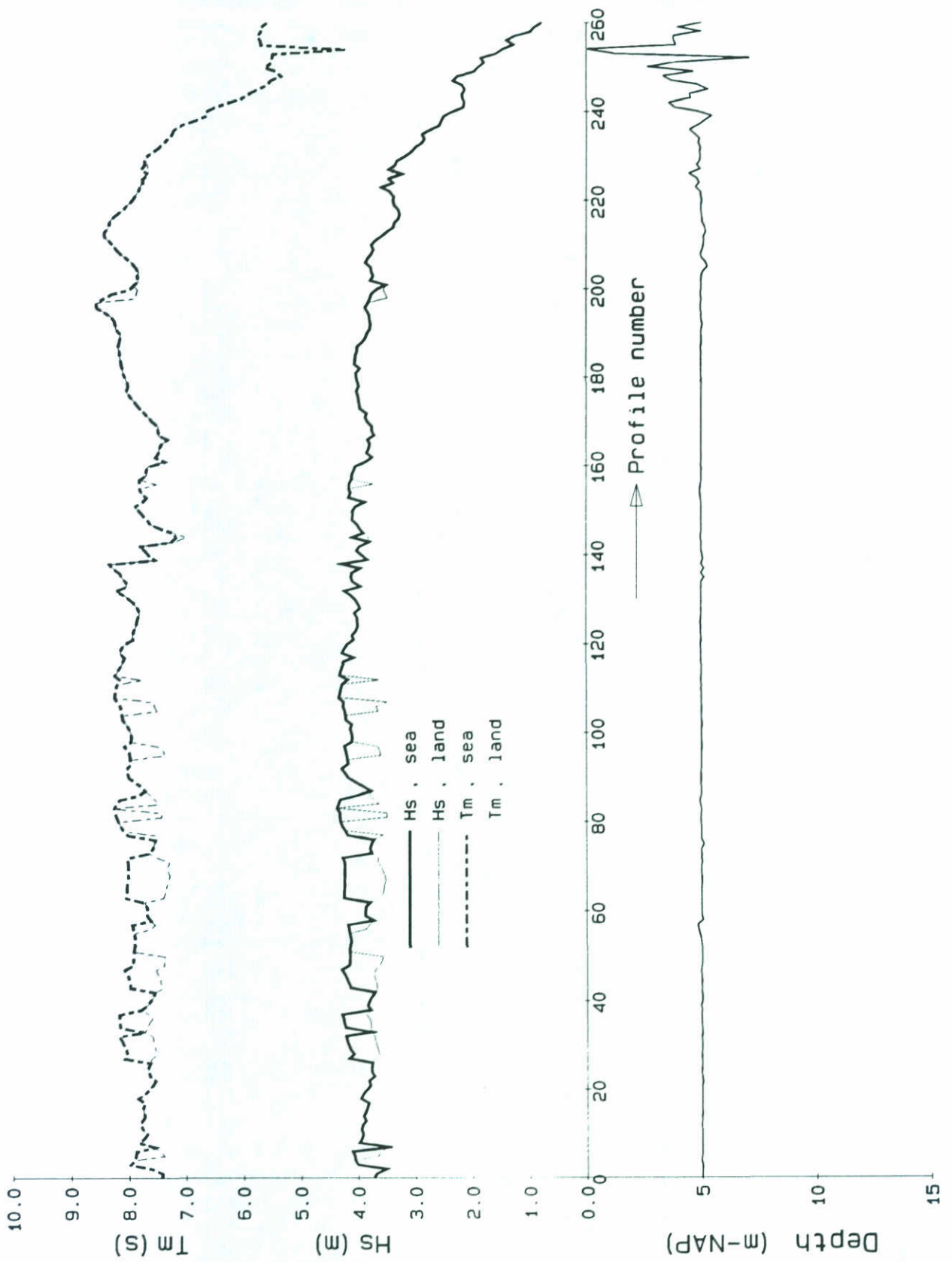
HYDRA-HISWA

Z02

DELFT HYDRAULICS

H1355

FIG 6.9b



SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-5 M CONTOUR COAST OF NORTH-HOLLAND

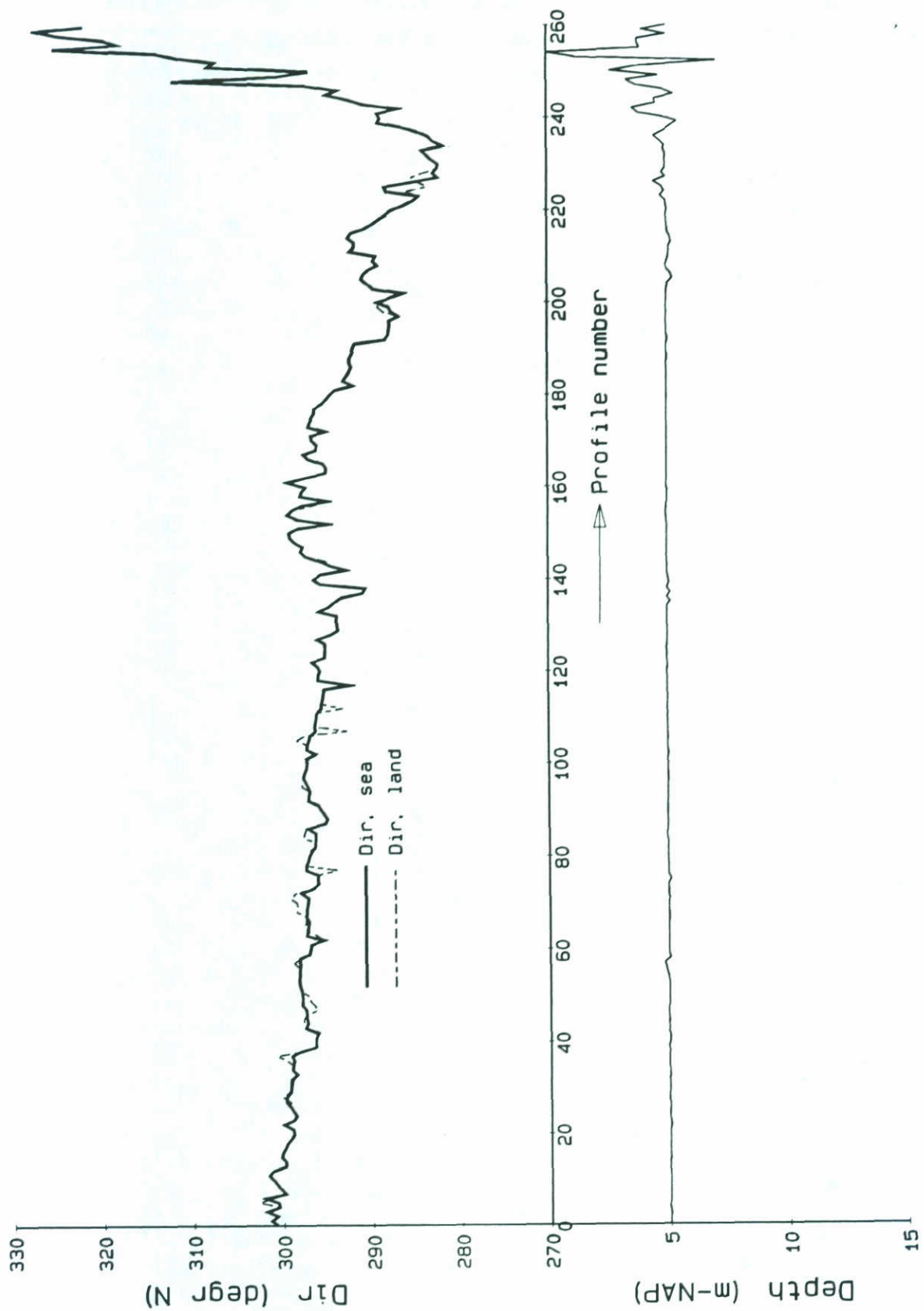
HYDRA-HISWA

Z02

DELFT HYDRAULICS

H1355

FIG 6.10a



MAIN WAVE DIRECTION AT NAP-5 M CONTOUR
 COAST OF NORTH-HOLLAND

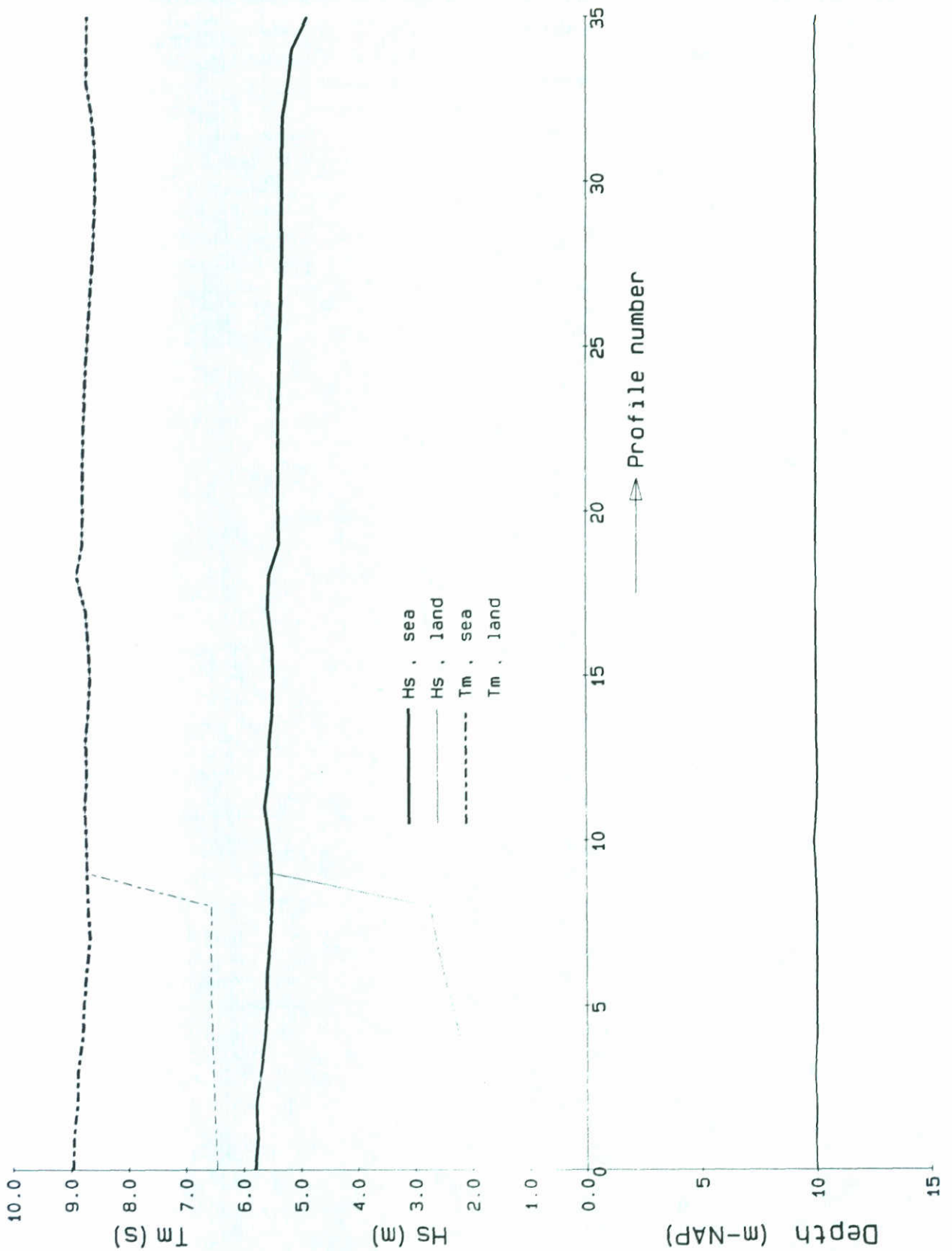
HYDRA-HISWA

Z02

DELFT HYDRAULICS

H1355

FIG 6.10b



SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-10 M CONTOUR COAST OF TEXEL

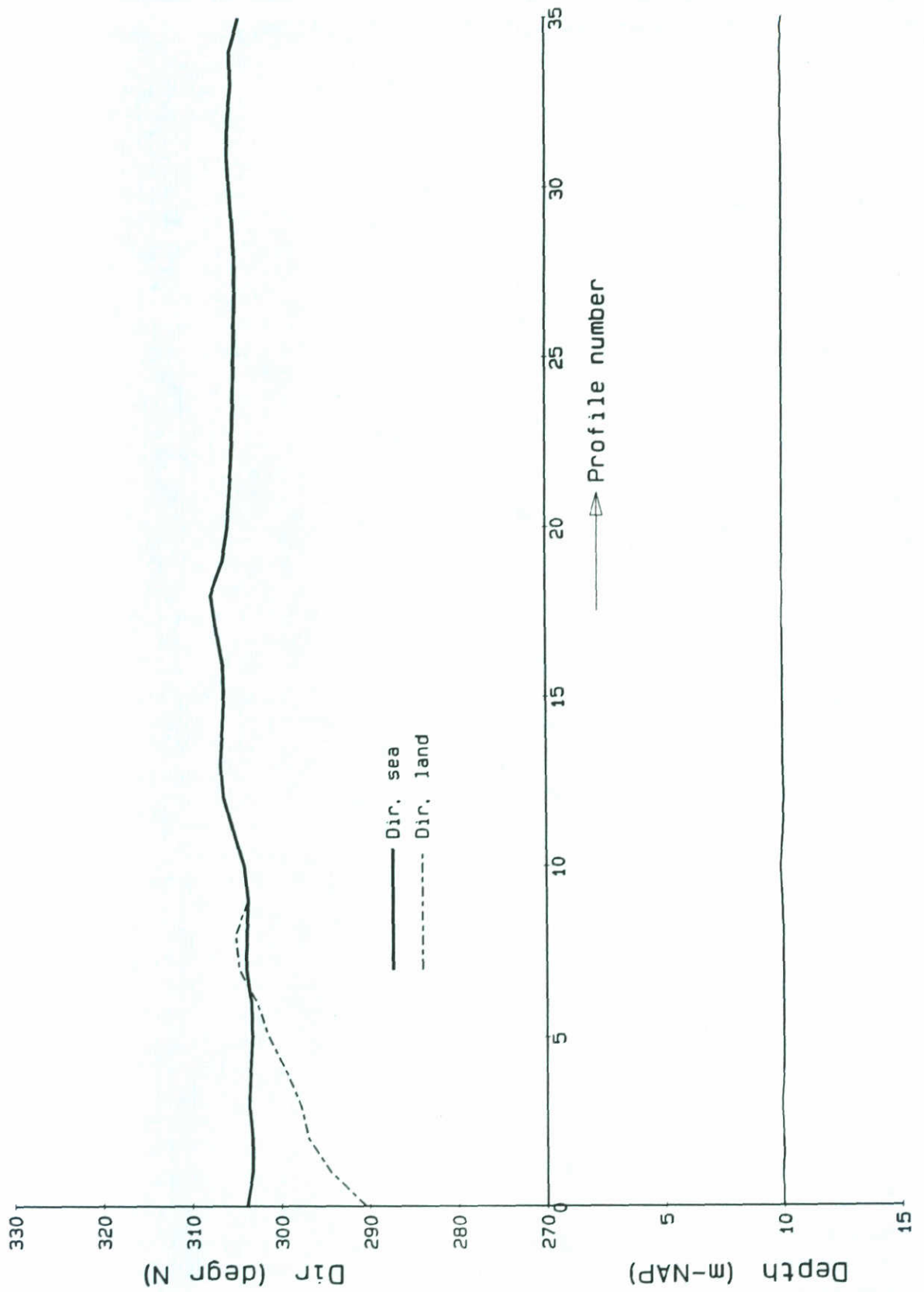
HYDRA-HISWA

Z02

DELFT HYDRAULICS

H1355

FIG 6.11a



MAIN WAVE DIRECTION AT NAP-10 M CONTOUR
COAST OF TEXEL

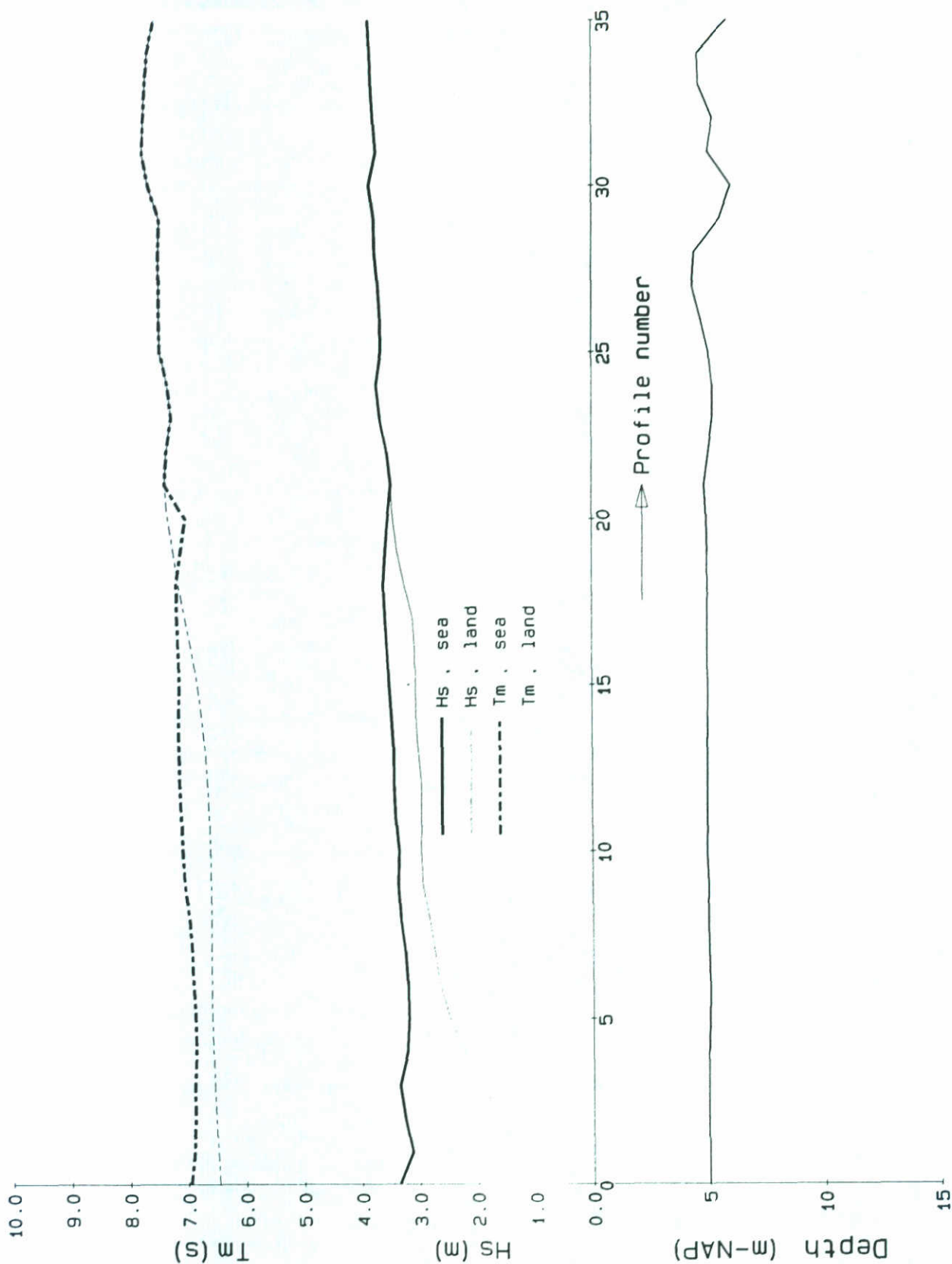
HYDRA-HISWA

Z02

DELFT HYDRAULICS

H1355

FIG 6.11b



SIGNIFICANT WAVE HEIGHT H_s AND MEAN WAVE PERIOD T_m AT NAP-5 M CONTOUR COAST OF TEXEL

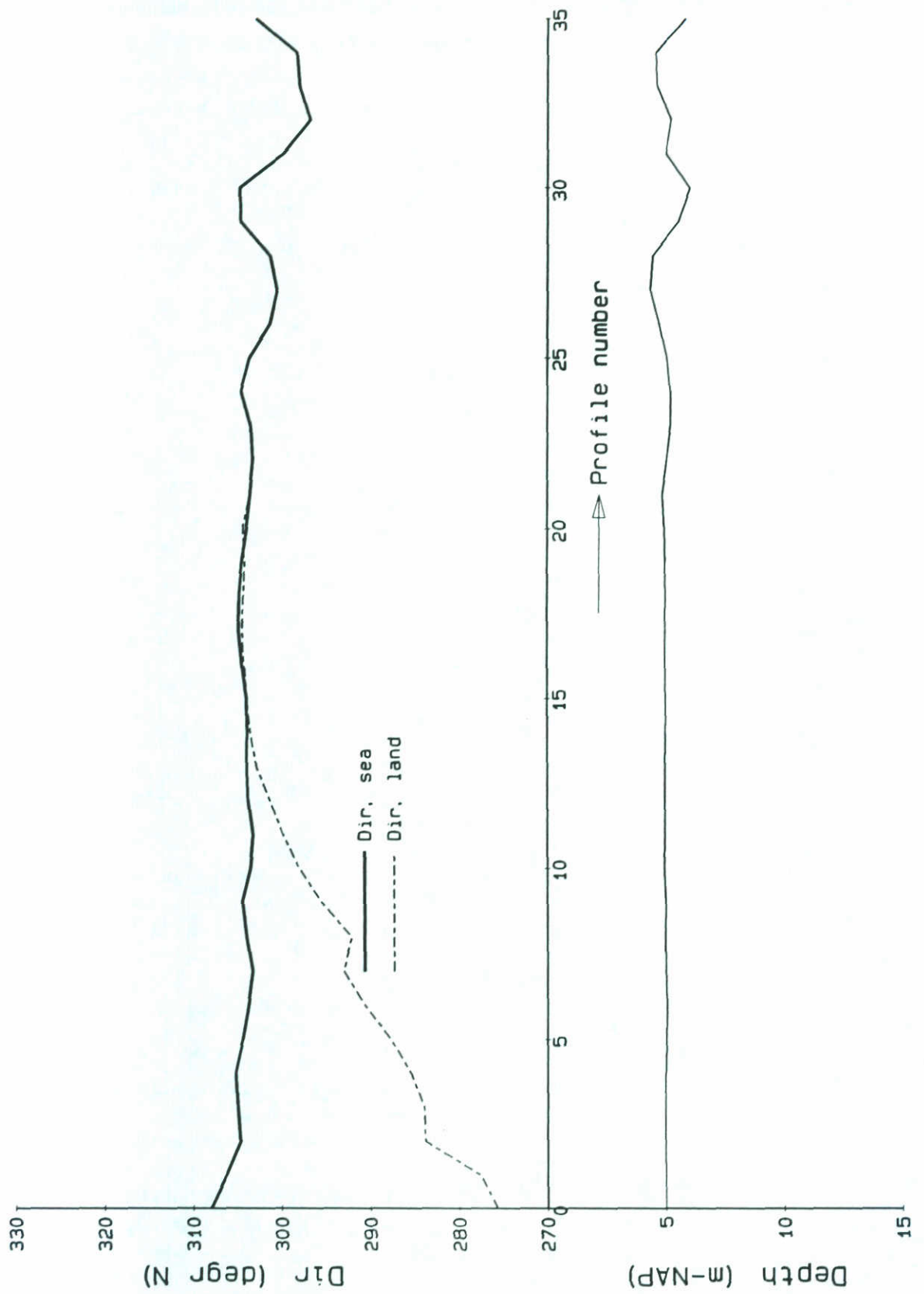
HYDRA-HISWA

Z02

DELFT HYDRAULICS

H1355

FIG 6.12a



MAIN WAVE DIRECTION AT NAP-5 M CONTOUR
COAST OF TEXEL

HYDRA-HISWA

Z02

DELFT HYDRAULICS

H1355

FIG 6.12b



delft hydraulics

main office
Rotterdamseweg 185
p.o. box 177
2600 MH Delft
The Netherlands
telephone (31) 15 - 56 93 53
telefax (31) 15 - 61 96 74
telex 38176 hydel-nl

location 'De Voorst'
Voorsterweg 28, Marknesse
p.o. box 152
8300 AD Emmeloord
The Netherlands
telephone (31) 5274 - 29 22
telefax (31) 5274 - 35 73
telex 42290 hylvo-nl

