INTERNATIONAL ATOMIC ENERGY AGENCY
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SMR/74 - 5

AUTUMN COURSE
ON
PHYSICS OF FLOW IN THE OCEANS, ATMOSPHERE AND DESERTS

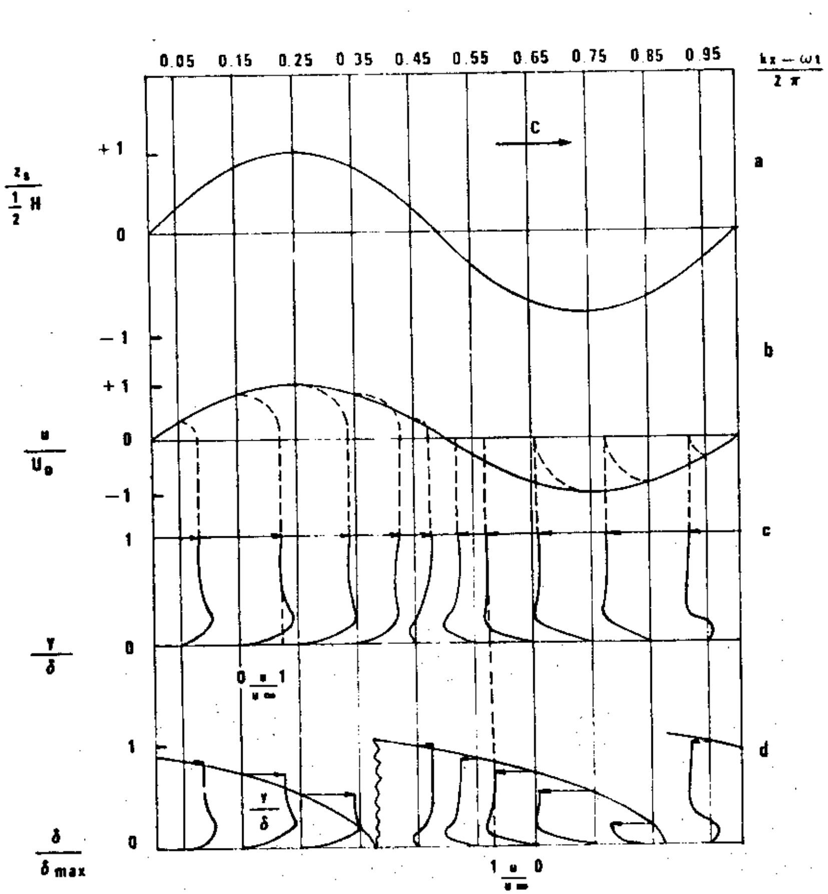
30 September - 28 November 1980

ACTION OF WAVES ON SEDIMENTS
(DIAGRAMS)

L.-R. LAFOND

Section Océanographie
Laboratoire de Sédimentologie
Université de Paris-Sud
Batiment 479
91405 Orsay
France

(Accompanying notes, in French, are available in Room 229, for French-speaking participants).



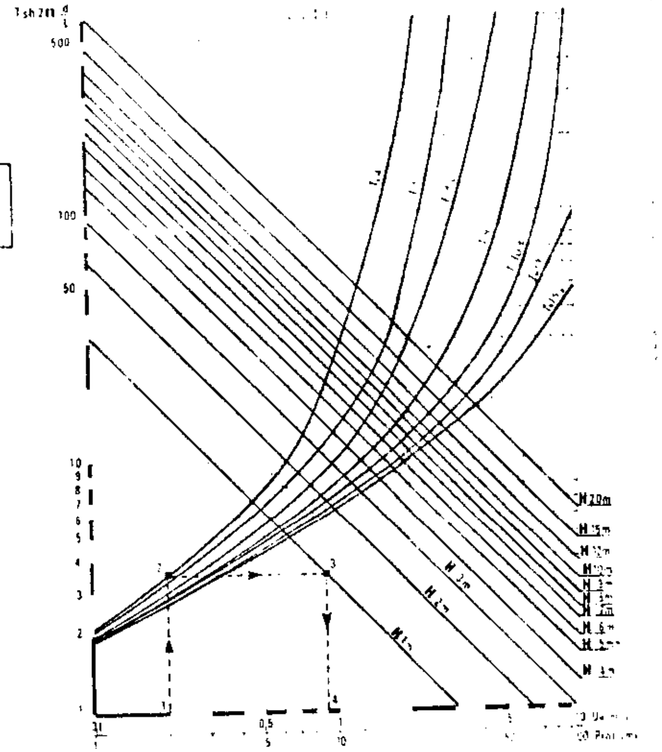
PROFIL DES VITESSES A L'INTERIEUR DE LA COUCHE LIMITE

(d'après EAGLESON, 1959)

1

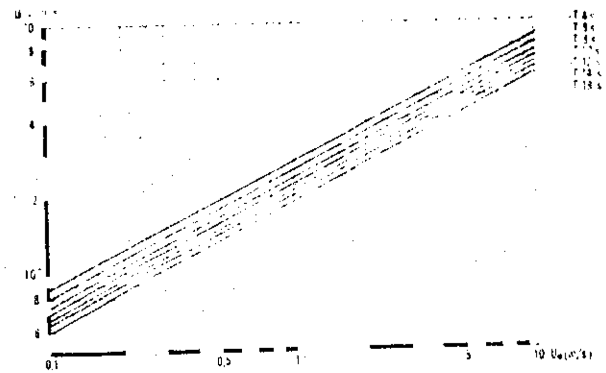
DETERMINATION DE LA VITESSE ORBITALE MAXIMALE SUR LE FOND U_0

$$U_0 = \frac{\pi H}{T\ sh\ 2\pi \frac{d}{L}}$$



VALEUR DE u_* EN FONCTION DE U_0 ET DE T

$$u_*^4 = \frac{8\,\nu\,U_0}{\pi T}$$



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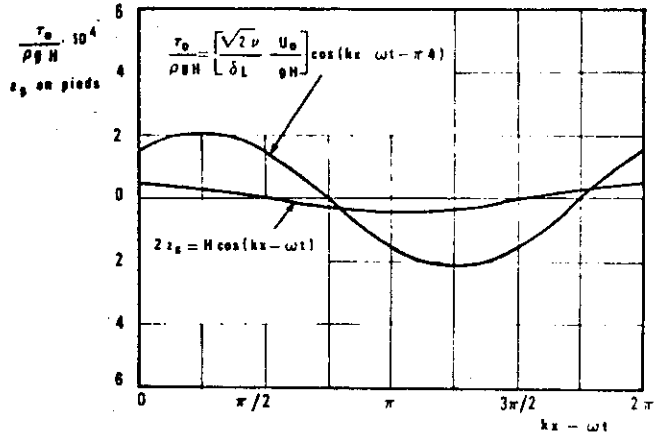
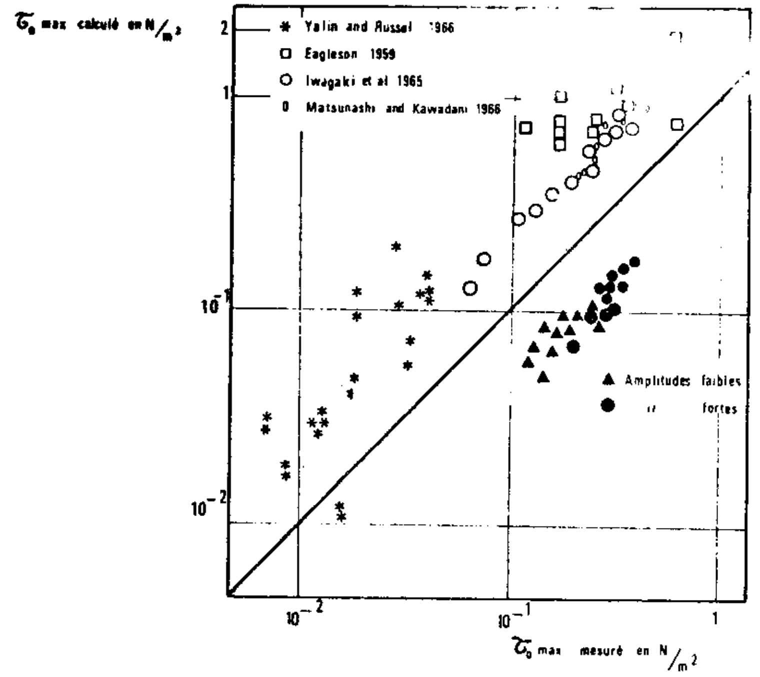


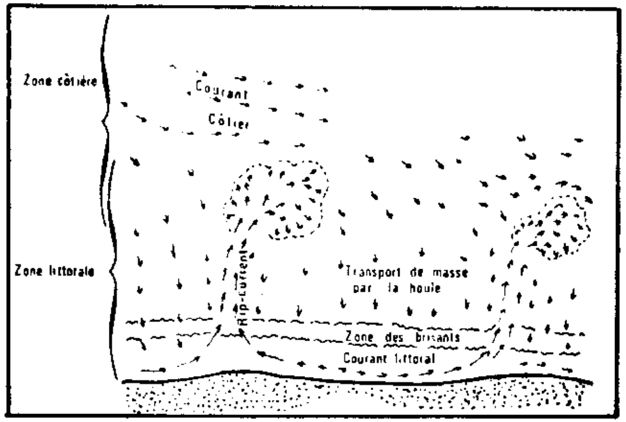
a - VARIATION AU COURS D'UNE PERIODE



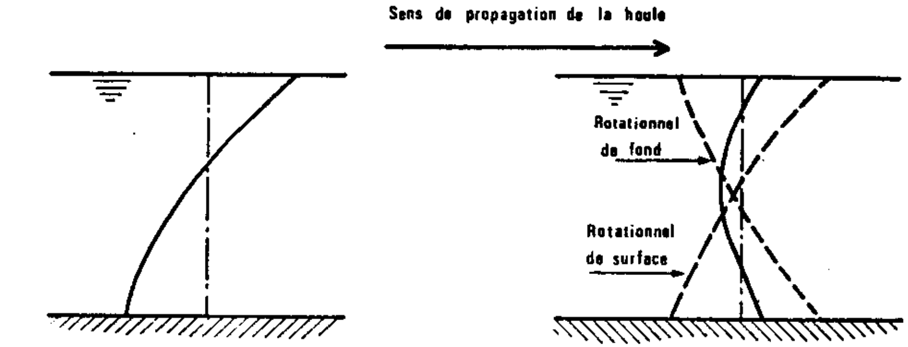
b - COMPARAISON ENTRE LES MESURES ET LA THEORIE

CONTRAINTE TANGENTIELLE SUR LE FOND

3



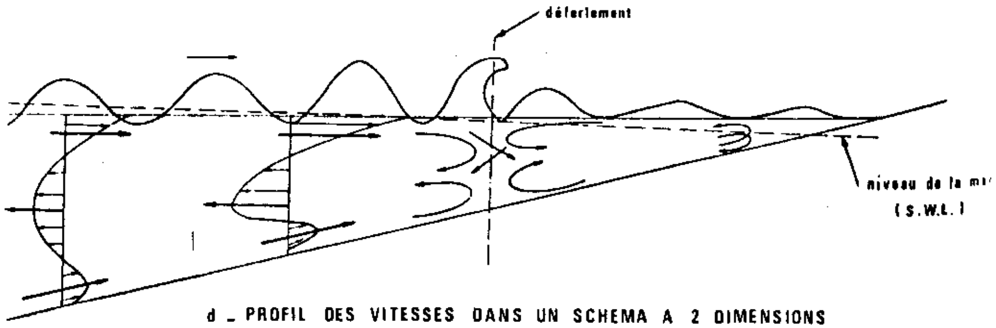
a - SCHEMA GENERAL DES COURANTS PRES DE LA COTE (d'après SHEPARD et INMAN, 1950)



b - d'après la théorie de STOKES

c - d'après LHERMITTE

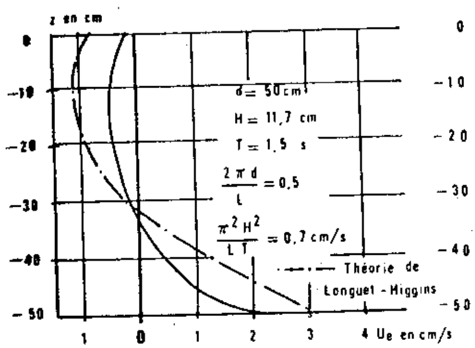
PROFIL DES VITESSES DU COURANT D'ENTRAINEMENT



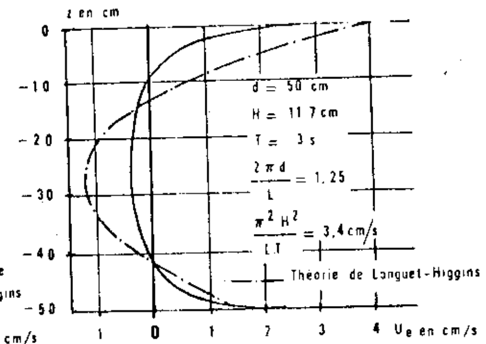
d - PROFIL DES VITESSES DANS UN SCHEMA A 2 DIMENSIONS

COURANTS ENGENDRES PAR LA HOULE

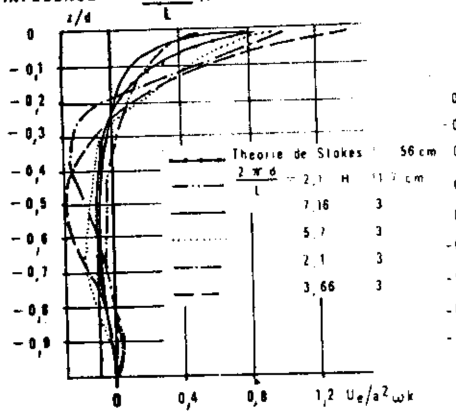
4



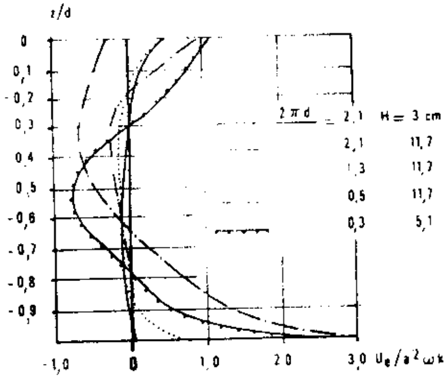
INFLUENCE DE $\frac{2\pi d}{L}$ (profondeur relative grande)



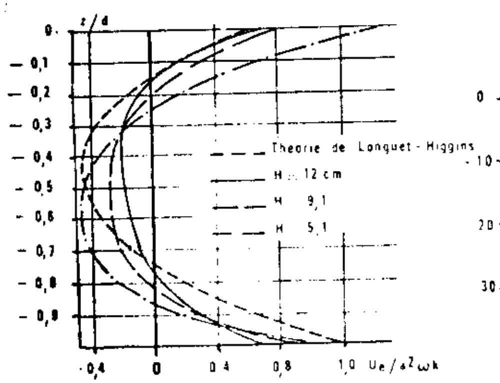
INFLUENCE DE $\frac{2\pi d}{L}$ (profondeur relative faible)

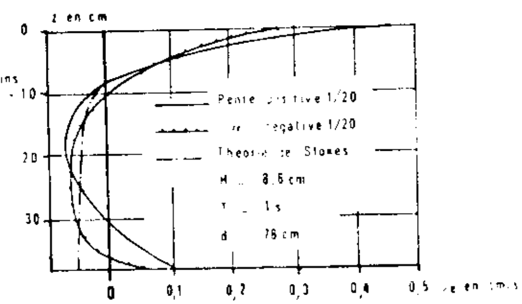


INFLUENCE DE L'AMPLITUDE DE LA HOULE



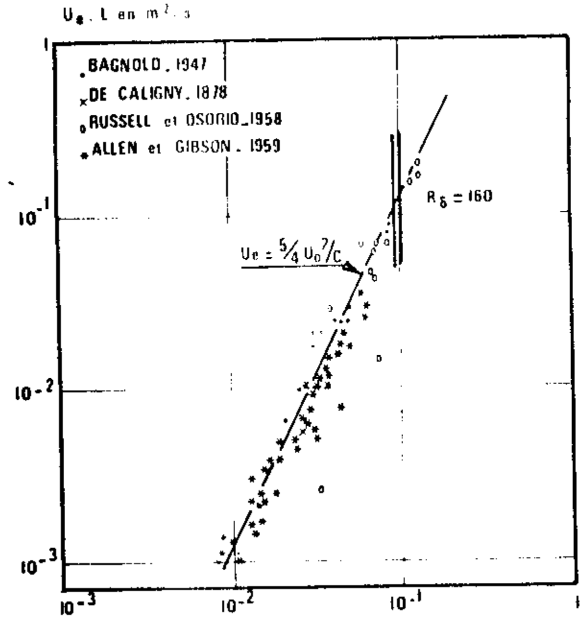
INFLUENCE DE LA PENTE DU FOND



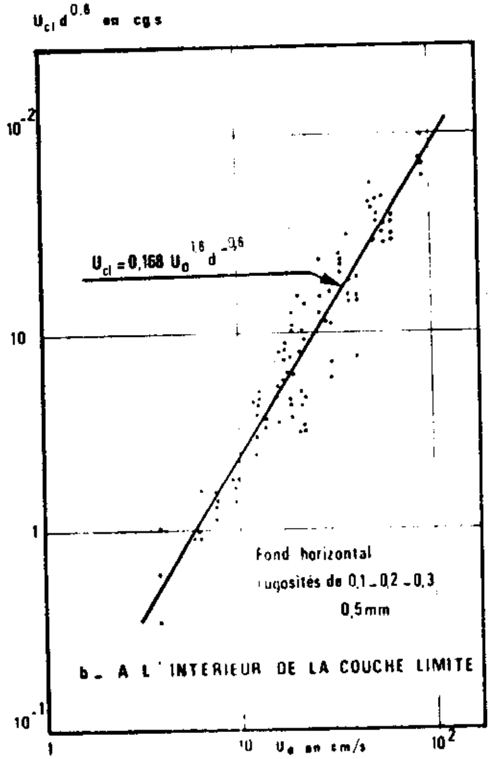


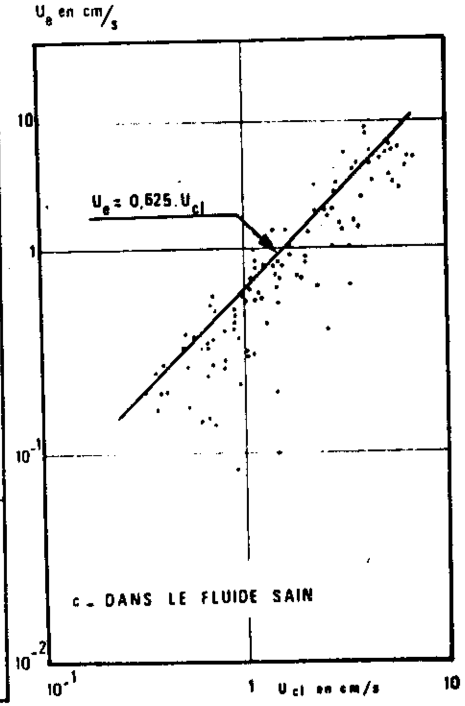
PROFIL DES VITESSES DU COURANT D'ENTRAINEMENT – COMPARAISON AVEC LES THEORIES DE STOKES ET LONGUET-HIGGINS (d'après RUSSELL et OSORIO, 1958)

5



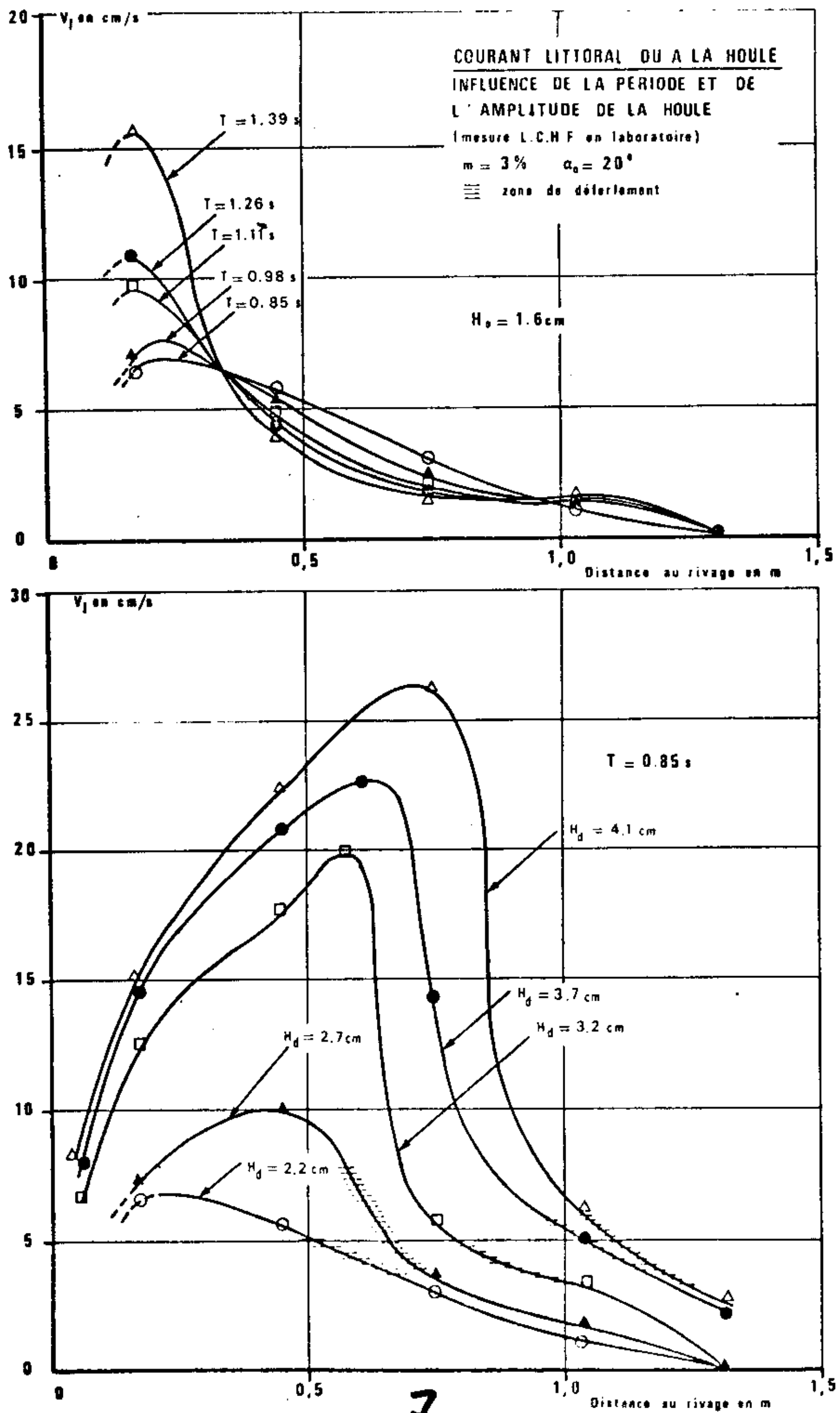
a – VITESSE D'ENTRAINEMENT Ue SUR LE FOND – COMPARAISON ENTRE LA THEORIE DE LONGUET-HIGGINS ET L'EXPERIENCE (d'après BREBNER ET COLLINS, 1961)



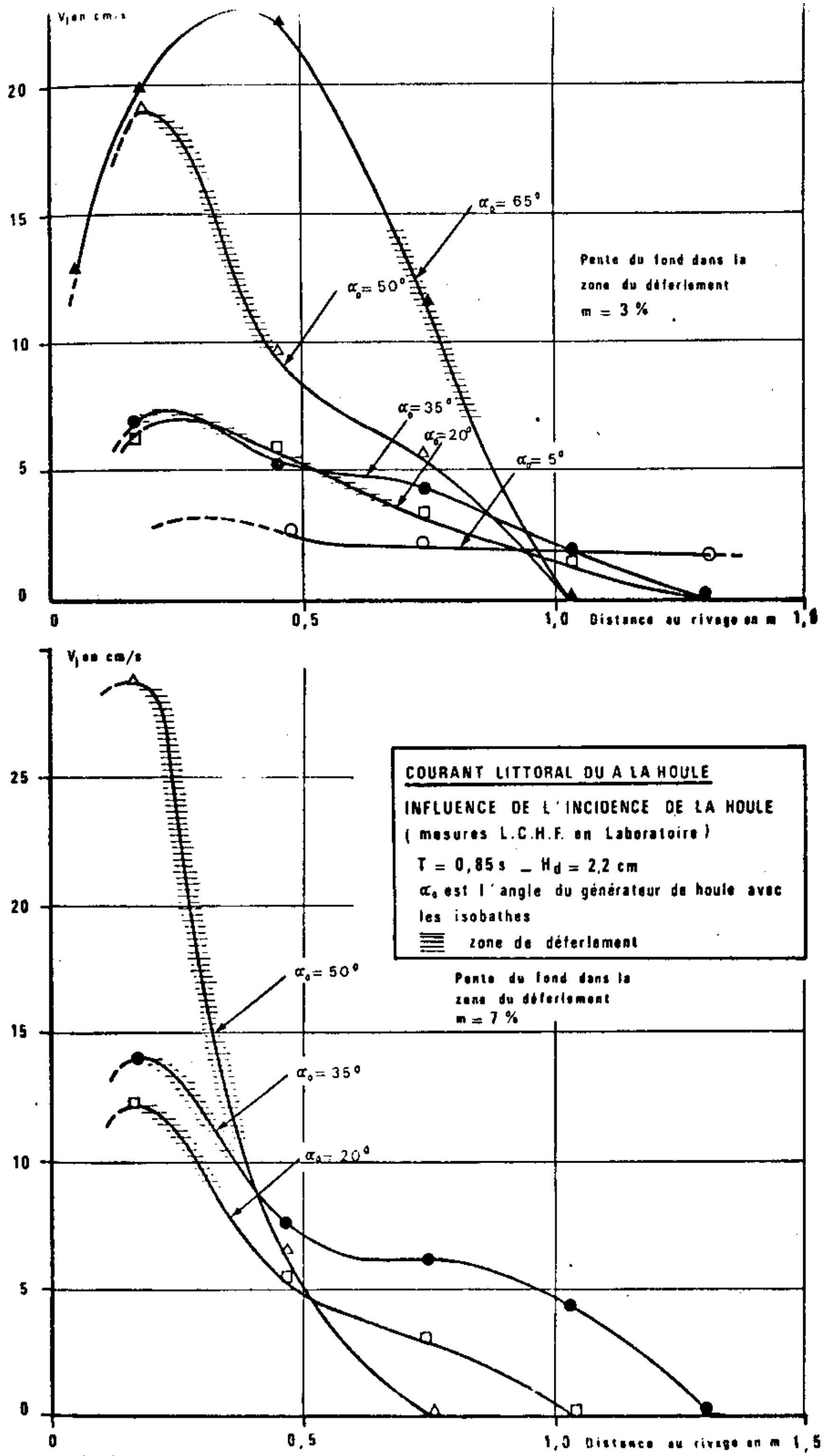


COURANT D'ENTRAINEMENT D'APRES LHERMITTE (1958)

6


COURANT LITTORAL DU A LA HOULE
INFLUENCE DE LA PERIODE ET DE L'AMPLITUDE DE LA HOULE
(mesure L.C.H.F en laboratoire)
m = 3% α₀ = 20°
zone de déferlement
H_0 = 1.6 cm
T = 1.39 s
T = 1.26 s
T = 1.11 s
T = 0.98 s
T = 0.85 s
V_l en cm/s
Distance au rivage en m
T = 0.85 s
H_d = 4.1 cm
H_d = 3.7 cm
H_d = 3.2 cm
H_d = 2.7 cm
H_d = 2.2 cm

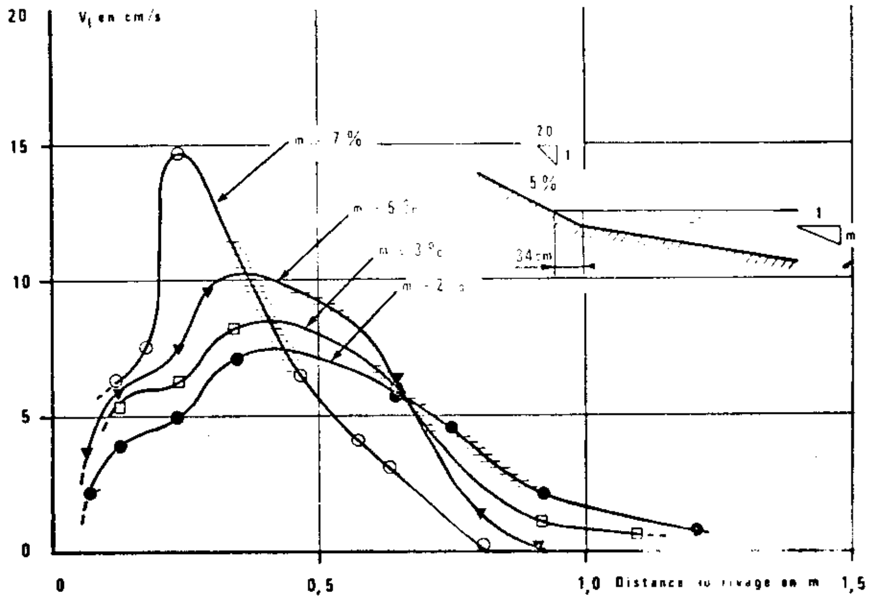
7

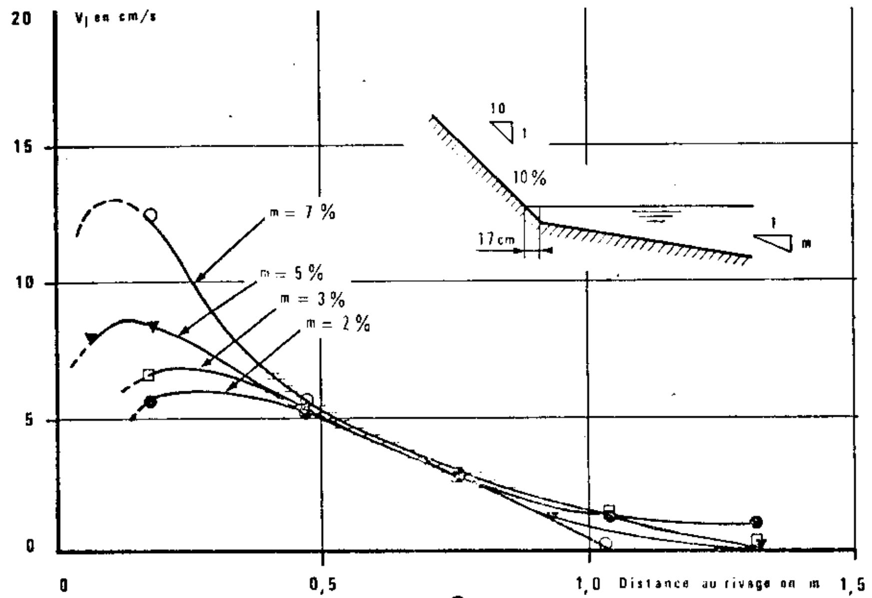

V_l en cm/s
α₀ = 65°
α₀ = 50°
α₀ = 35°
α₀ = 20°
α₀ = 5°
Pente du fond dans la zone du déferlement
m = 3 %
Distance au rivage en m
COURANT LITTORAL DU A LA HOULE
INFLUENCE DE L'INCIDENCE DE LA HOULE
(mesures L.C.H.F. en Laboratoire)
T = 0,85 s _ H_d = 2,2 cm
α₀ est l'angle du générateur de houle avec les isobathes
zone de déferlement
Pente du fond dans la zone du déferlement
m = 7 %
α₀ = 50°
α₀ = 35°
α₀ = 20°

8

COURANT LITTORAL DU A LA HOULE

INFLUENCE DE LA PENTE DU FOND
(mesures LCHF en Laboratoire)
T 0,85 s H_o 1,6 m α_o = 20°
zone de deferlement





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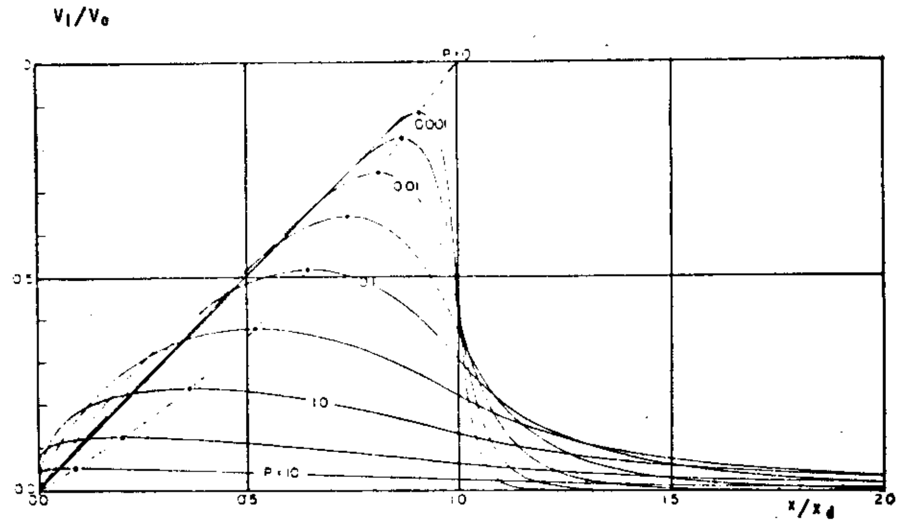
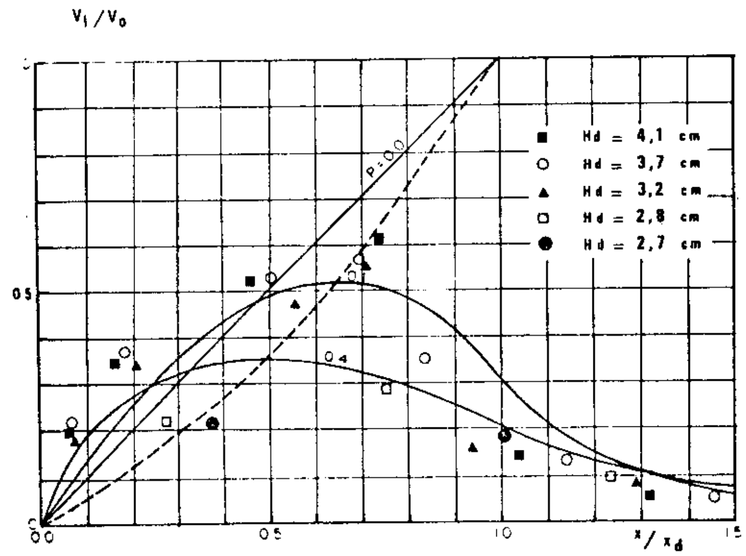


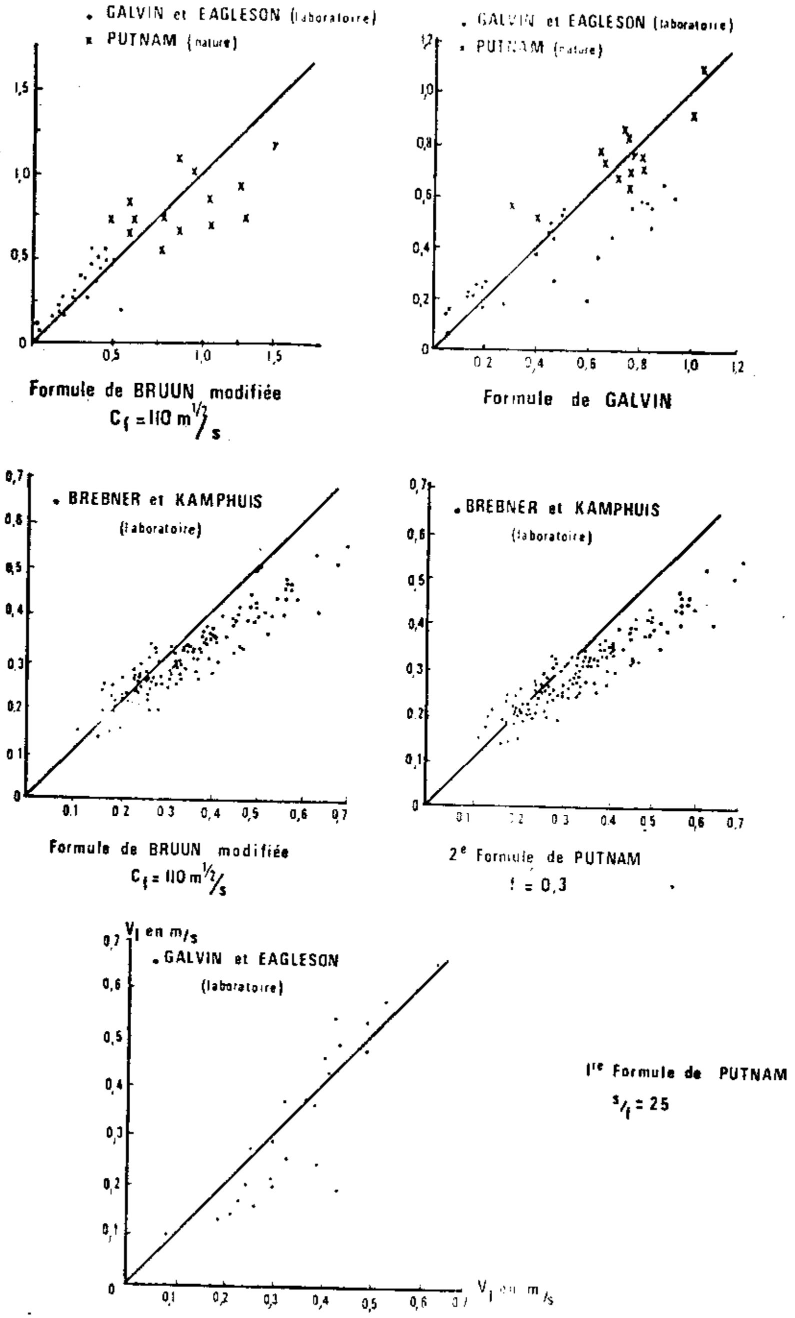
a _ THEORIE DE LONGUET-HIGGINS



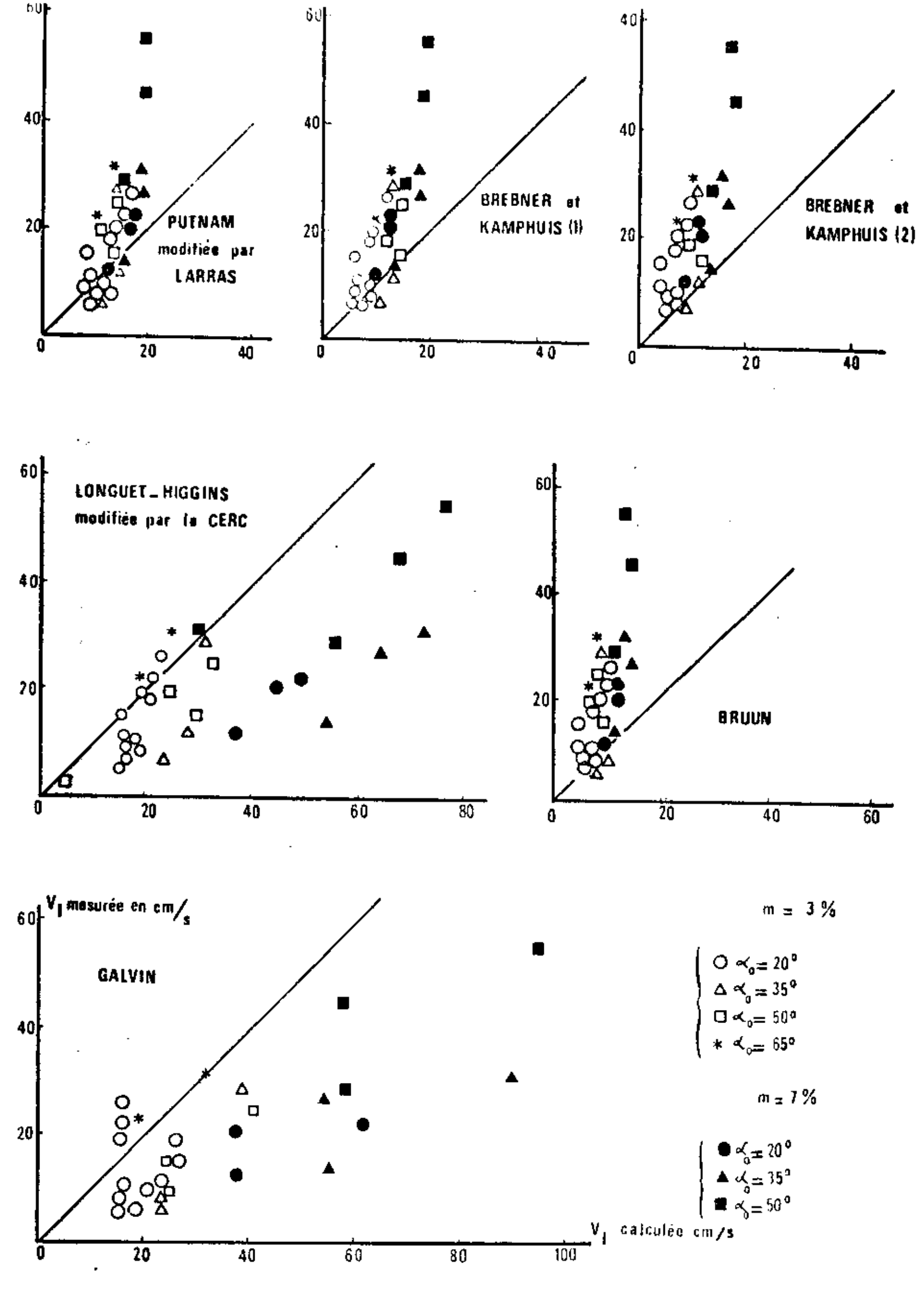
b _ COMPARAISON AVEC LES EXPERIENCES DU LCHF

COURANT LITTORAL DU A LA HOULE . PROFIL DES VITESSES

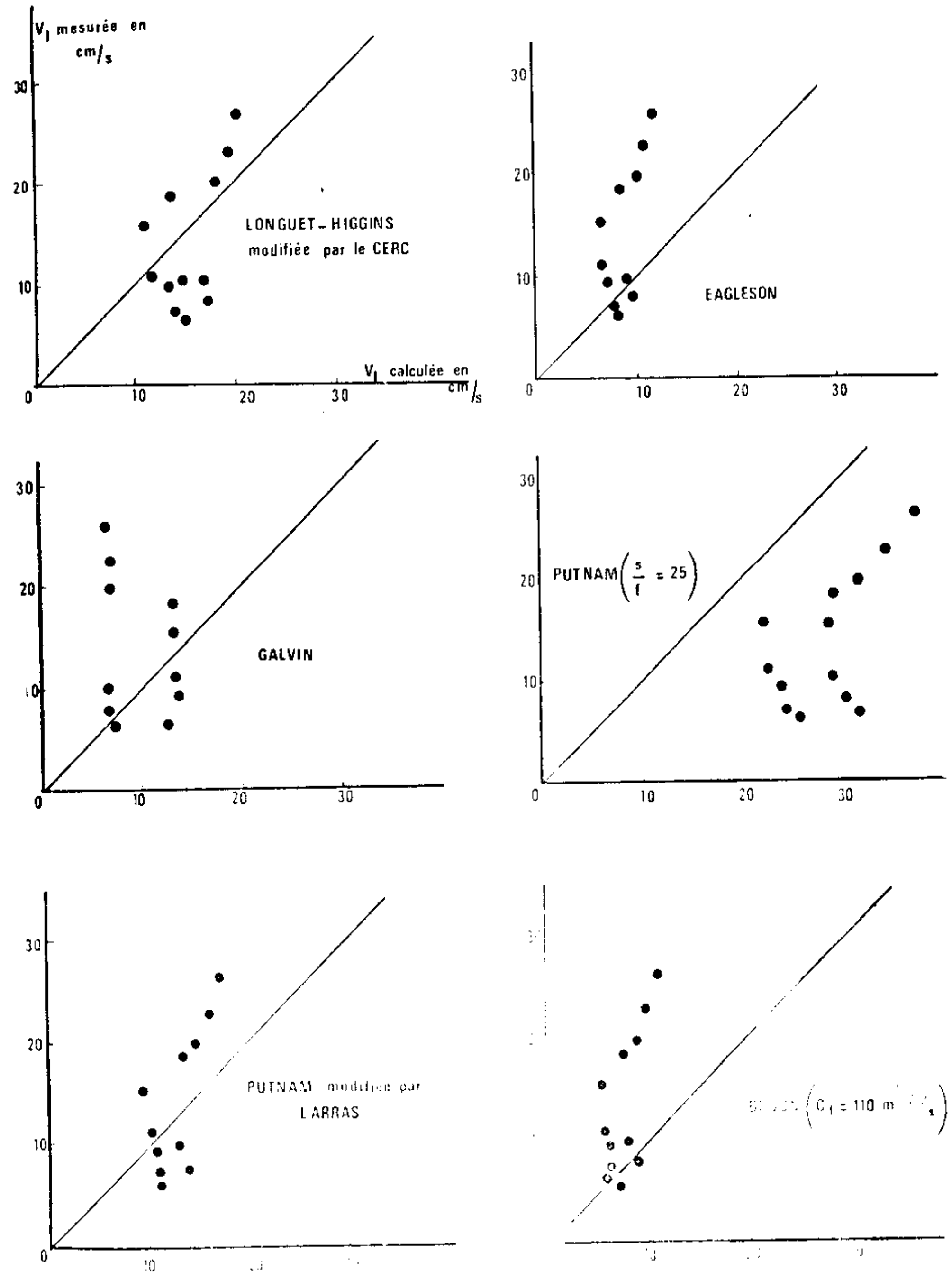
10



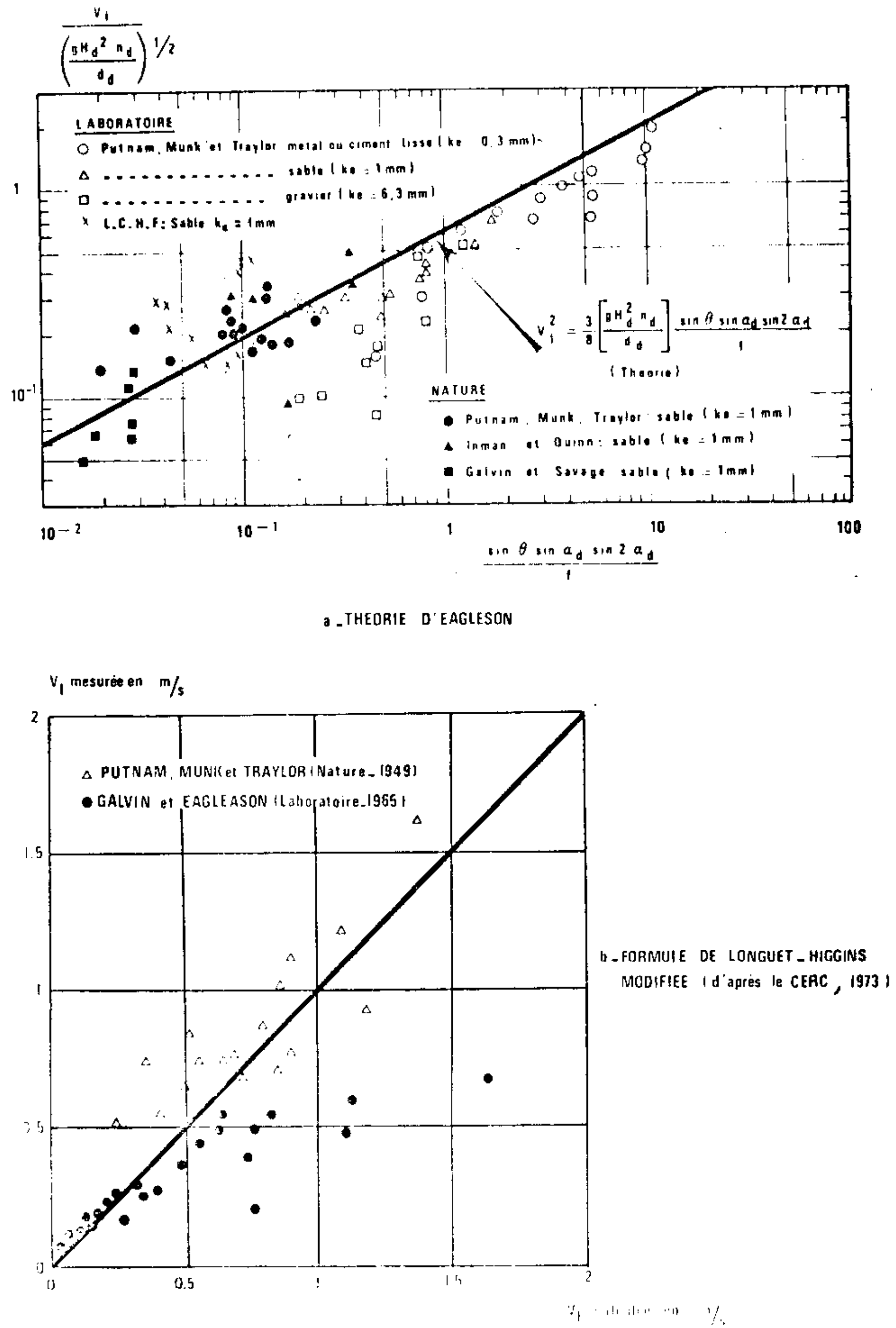
COURANT DU LITTORAL DU A LA HOULE _ EXEMPLES DE CORRELATION ENTRE THEORIES ET OBSERVATIONS (d'après GALVIN _ 1967)



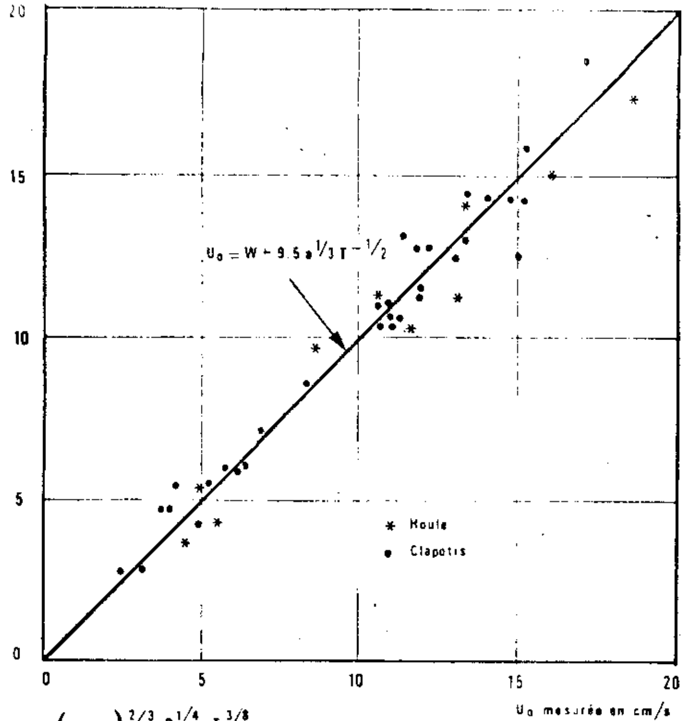
COURANT LITTORAL DU A LA HOULE _ ESSAIS DE CORRELATION ENTRE LES THEORIES ET LES OBSERVATIONS DU L C H F EN EN LABORATOIRE



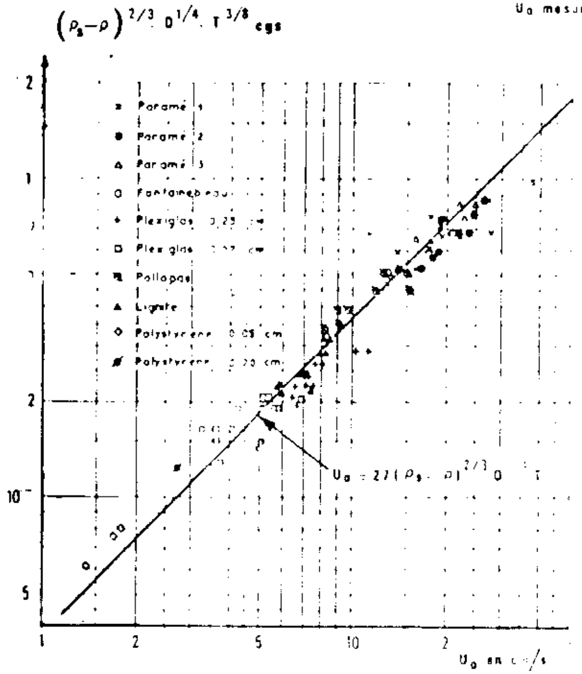
13 COURANT LITTORAL DU [illegible] HOULE _ ESSAIS DE C[illegible]PARATION ENTRE LES THEORIES ET LE[illegible] [illegible]RVATIONS DU L C H F EN LABORATOIRE



14 COURANT LITTORAL DU A LA HOULE



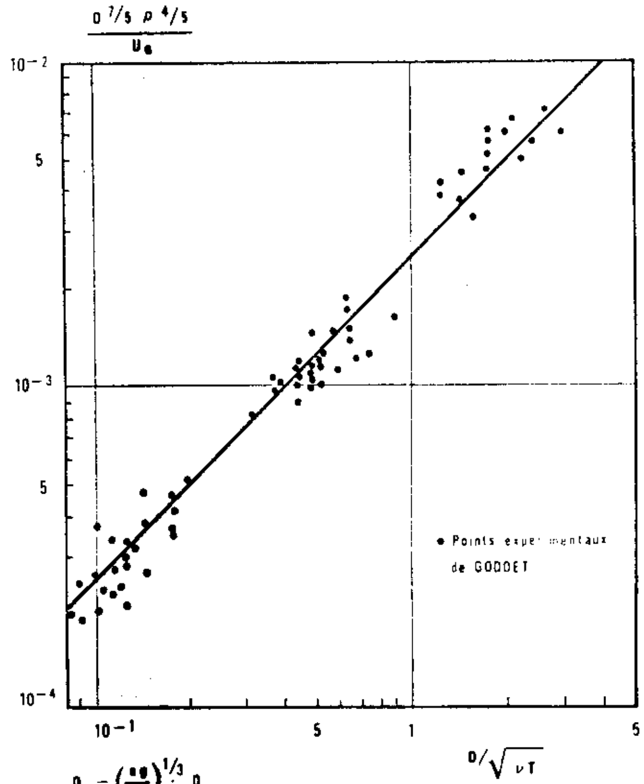
a_ FORMULE DE LARRAS



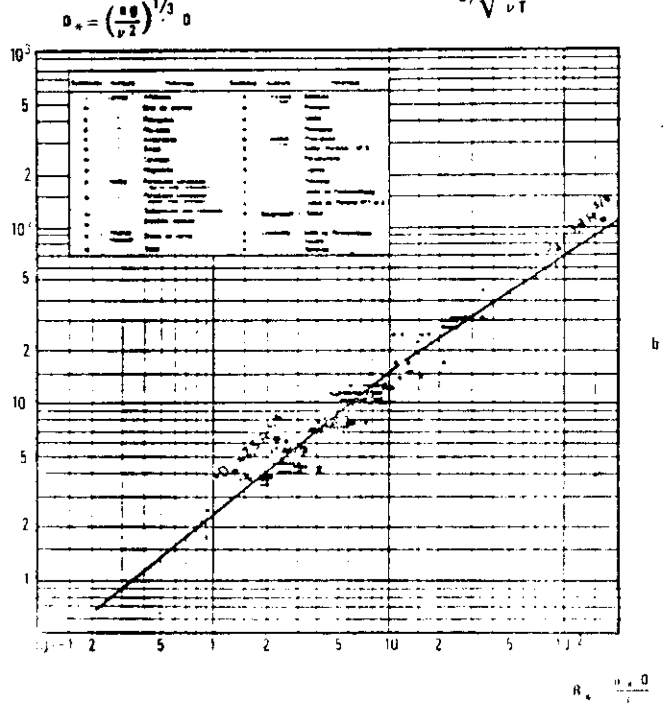
b _ FORMULE DE GODDET

DEBUT D'ENTRAINEMENT DES SEDIMENTS SOUS L'ACTION DE LA HOULE

15



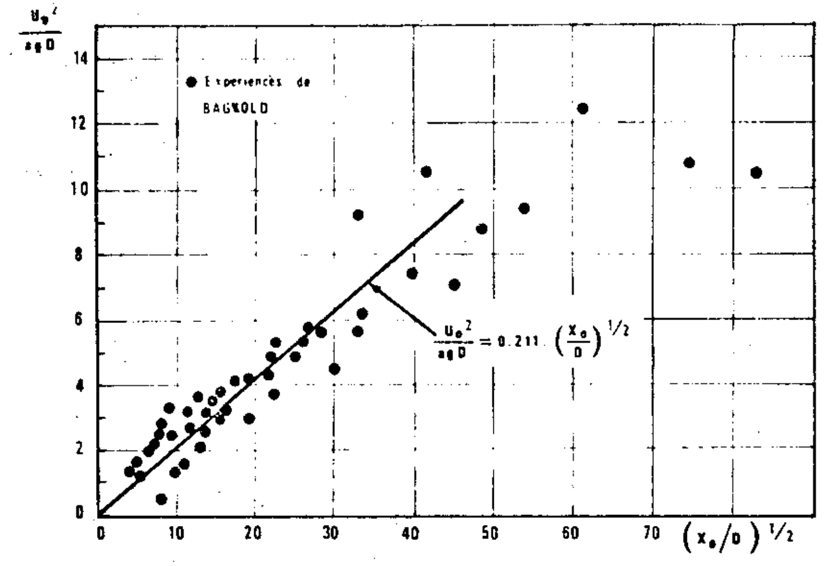
a _ FORMULE DE MOGUILNY
(L C H F)



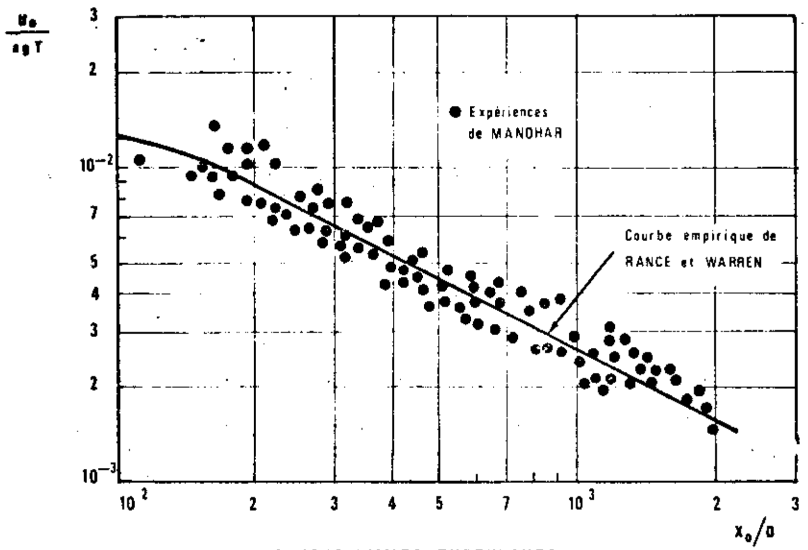
b _ FORMULE DE BONNEFILLE ET
PERNECKER

DEBUT D'ENTRAINEMENT DES SEDIMENTS SOUS L'ACTION DE LA HOULE

16



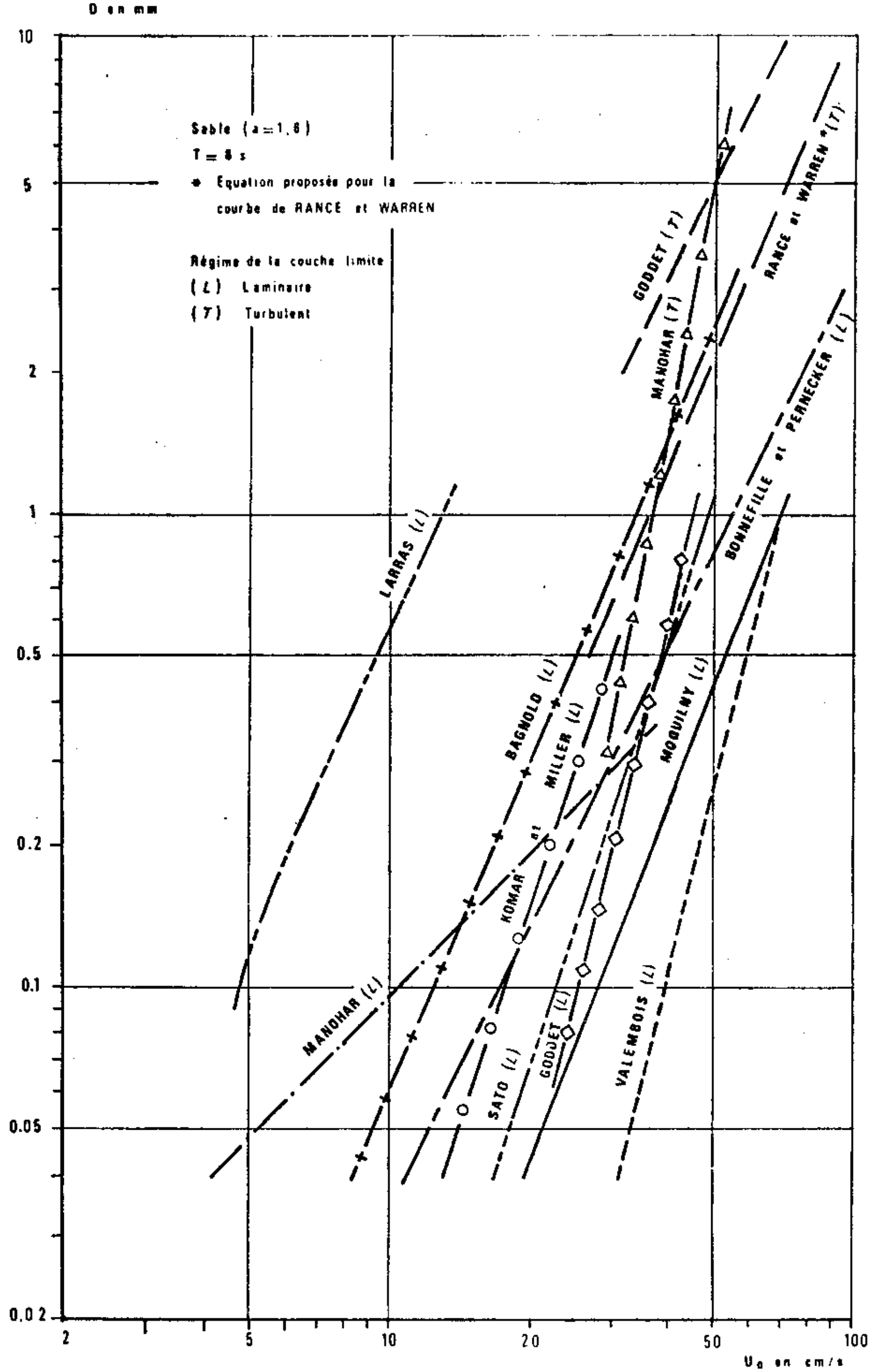
a_COUCHE LIMITE LAMINAIRE



b_COUCHE LIMITE TURBULENTE

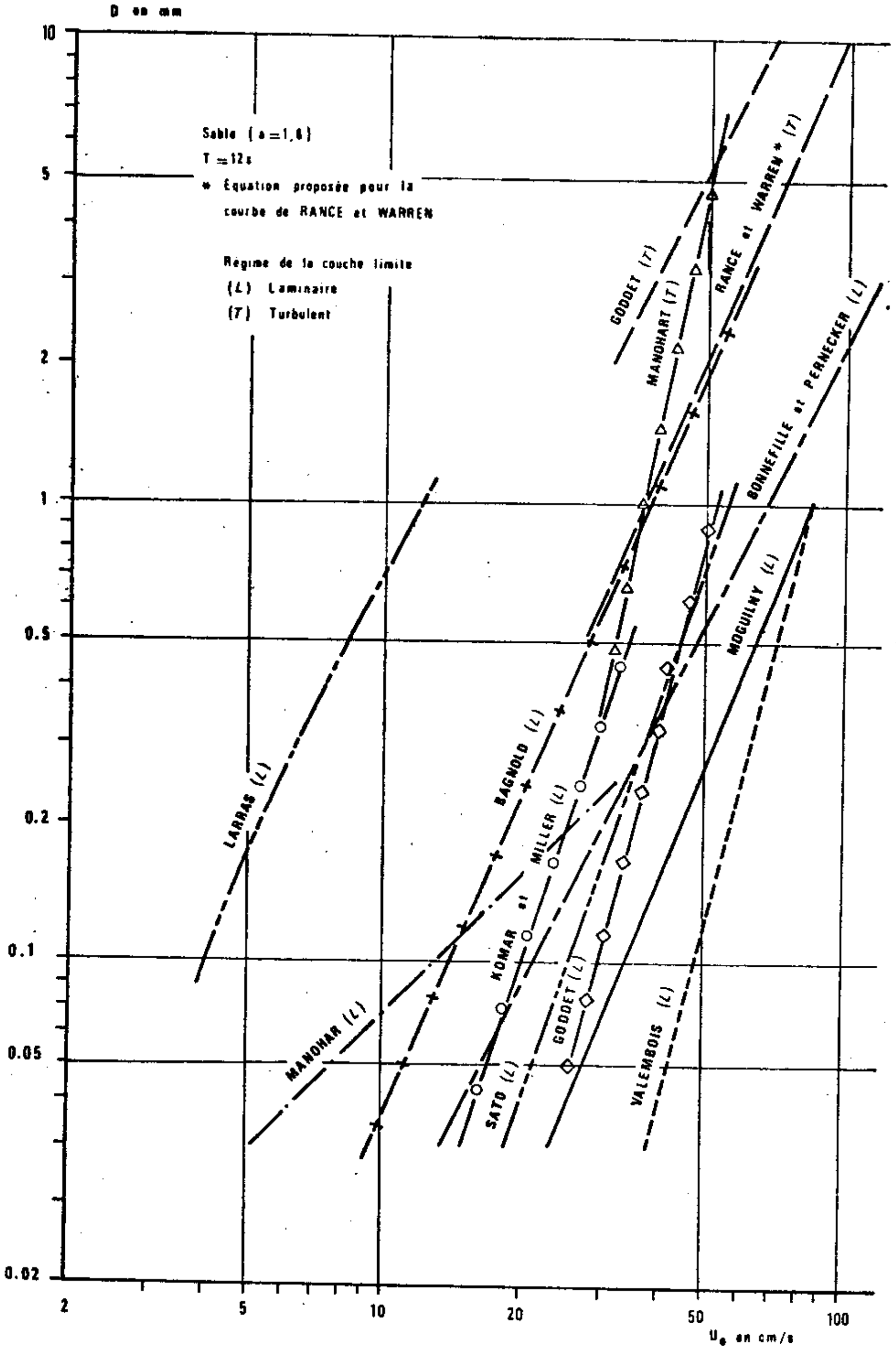
DEBUT D'ENTRAINEMENT DES MATERIAUX SOUS L'ACTION DE LA HOULE (d'après KOMAR et MILLER, 1973)

17



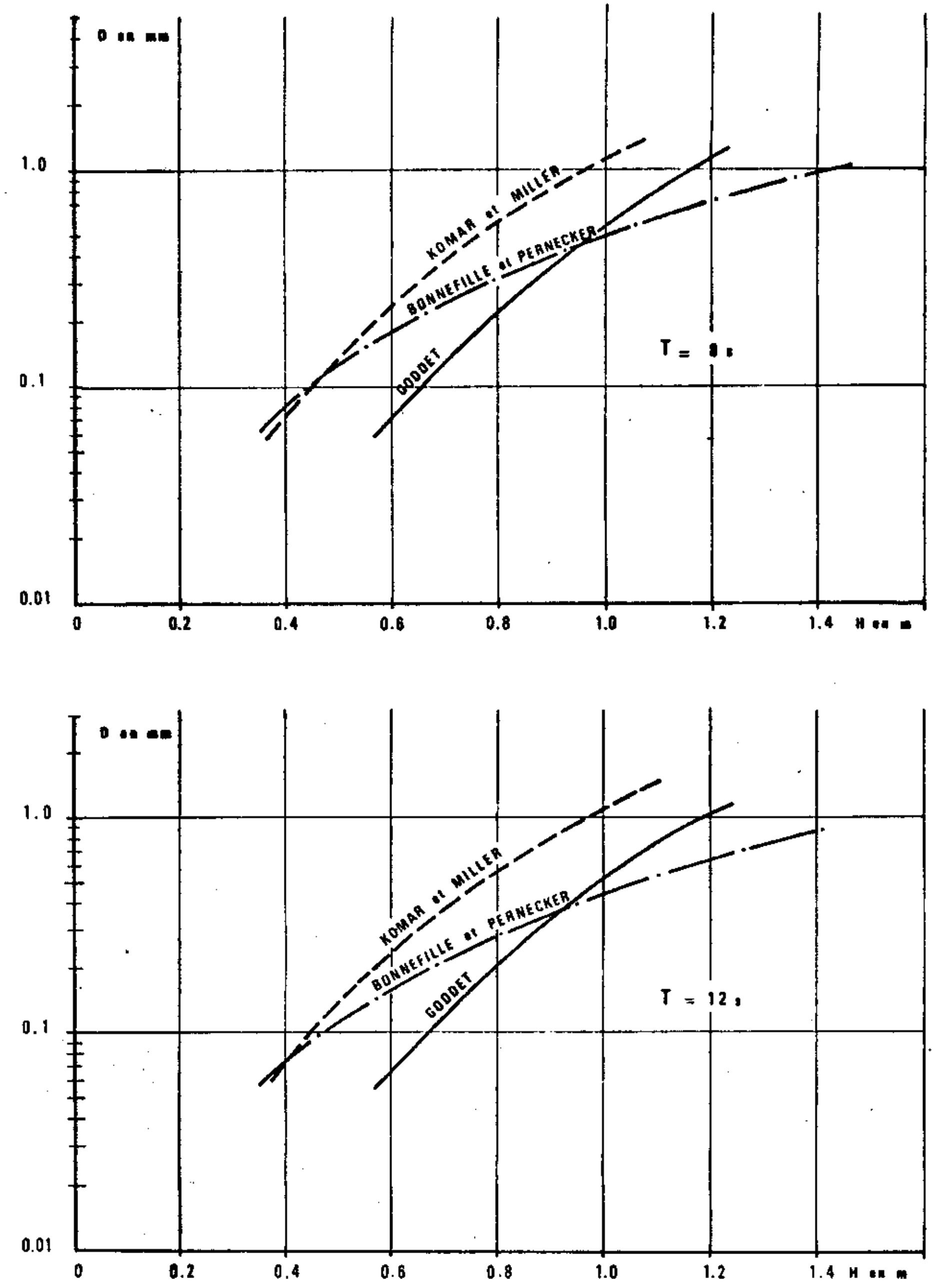
DEBUT D'ENTRAINEMENT DES SEDIMENTS NON COHESIFS SOUS L'ACTION ~~DE LA HOULE~~ _ COMPARAISON DES DIFFERENTES EQUATIONS

18



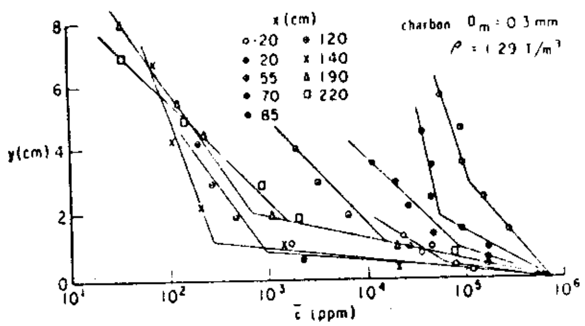
DEBUT D'ENTRAINEMENT DES SEDIMENTS NON COHESIFS SOUS L'ACTION DE LA HOULE . COMPARAISON DES DIFFERENTES EQUATIONS

19

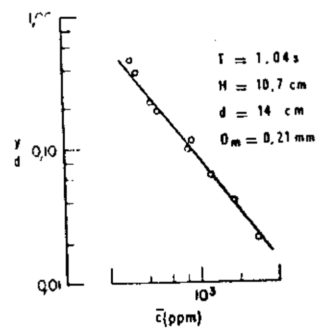


DEBUT D'ENTRAINEMENT DES SEDIMENTS NON-COHESIFS SOUS L'ACTION DE LA HOULE POUR LA PROFONDEUR d = 10 m

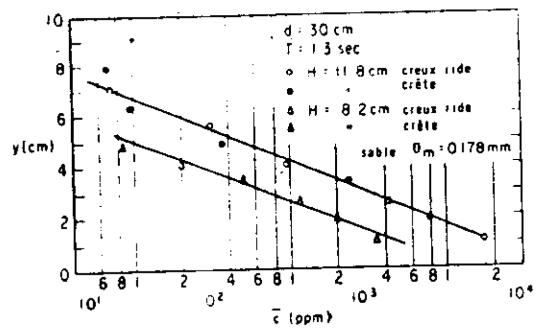
20



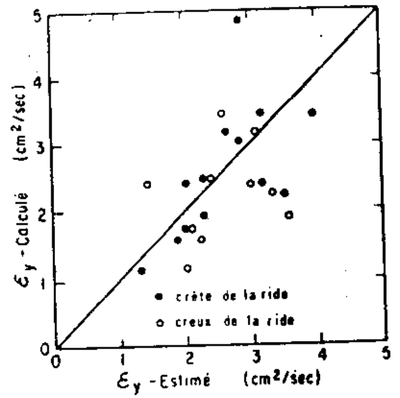
a – d'après SHINOHARA, 1958



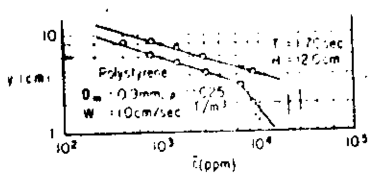
d – d'après BHATTACHARYA et KENNEDY, 1971



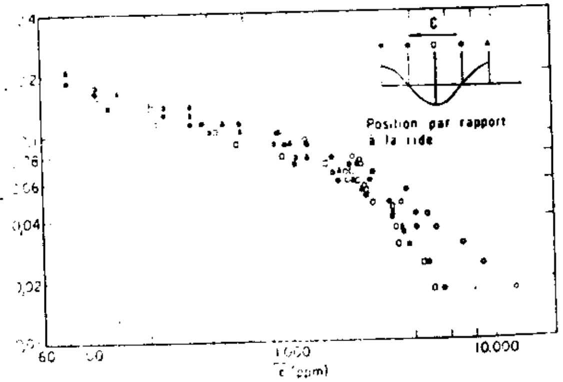
b – d'après HOM-MA, HORIKAWA, KAJIMA, 1965



e – d'après HORIKAWA et WATANABE 1968



c – d'après KISHI, 1964



f – d'après KENNEDY et LOCHER, 1971

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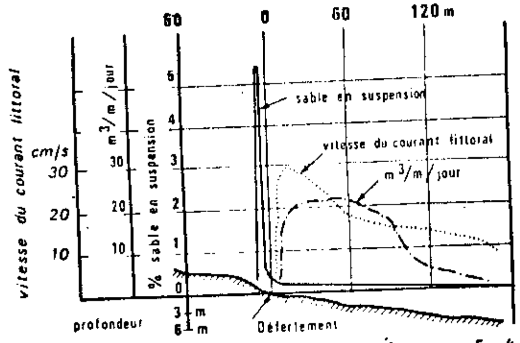
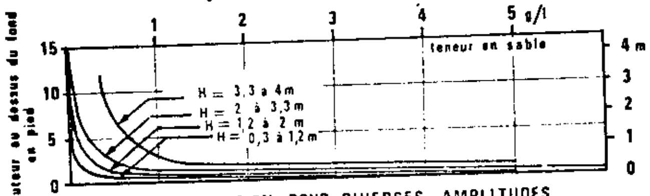
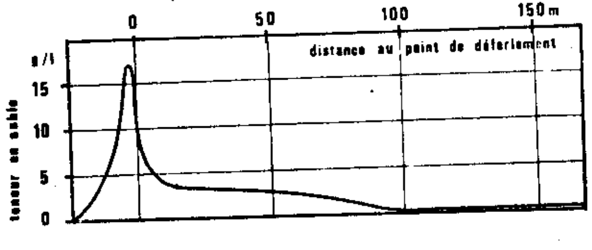
DISTRIBUTION DE LA CONCENTRATION DES SEDIMENTS EN SUSPENSION



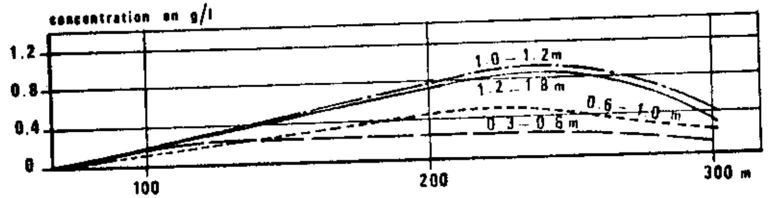


SABLE EN SUSPENSION POUR DIVERSES AMPLITUDES
(environ 180 m du rivage)

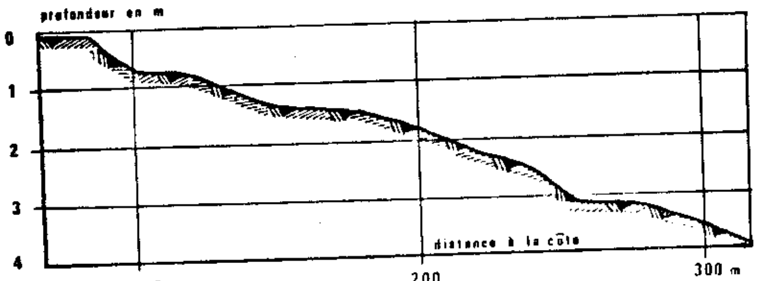


d'après BEACH EROSION BOARD 1933

SABLE EN SUSPENSION A DIVERSES DISTANCES DE LA ZONE DE DEFERLEMENT



d'après WATTS 1953

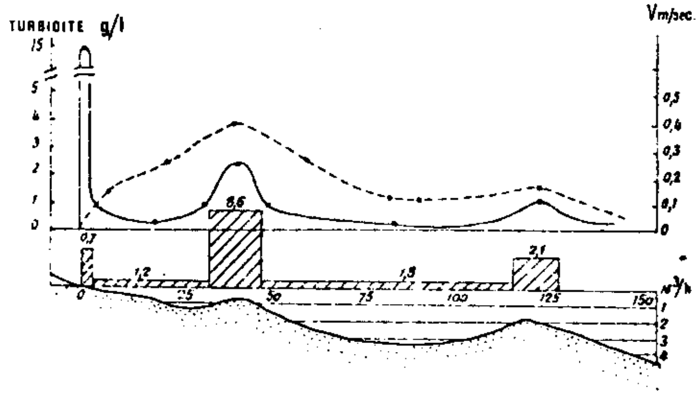


CONCENTRATION MOYENNE ENTRE LA SURFACE ET 15 cm AU DESSUS DU FOND

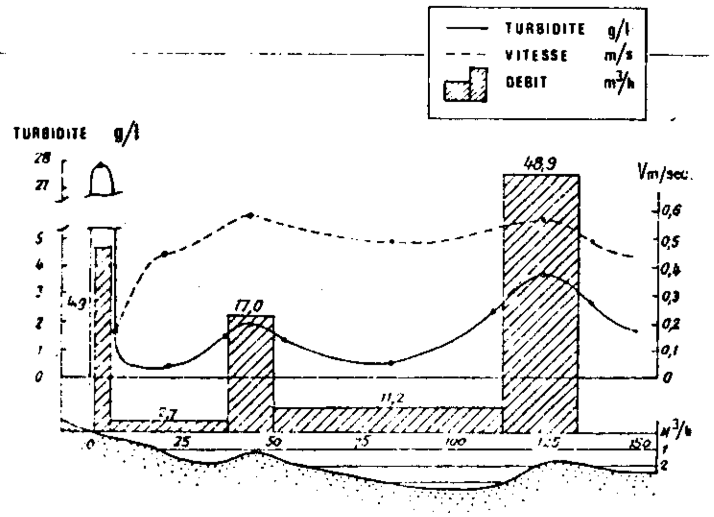
DISTRIBUTION DES CONCENTRATIONS LE LONG DE LA PLAGE EN FONCTION DE L'AMPLITUDE

22

DEBIT SOLIDE LE LONG D'UN PROFIL



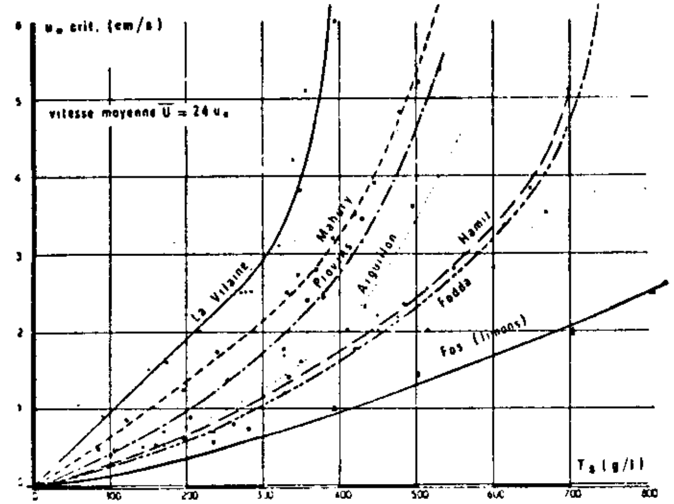
Vitesse du courant en surface et debit solide par houle de 0,5 à 1 m



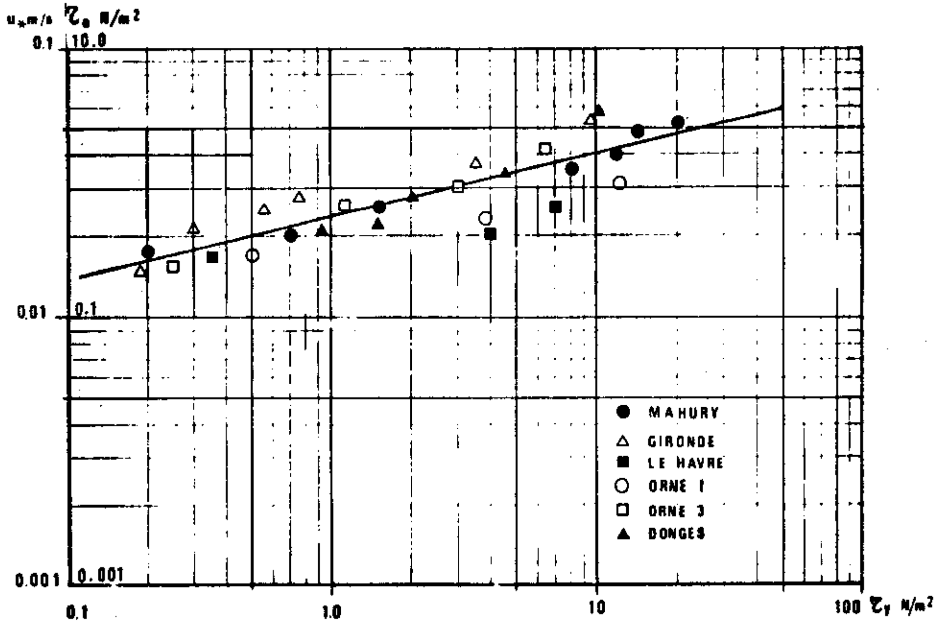
Vitesse du courant en surface et débit solide par houle de 2 à 3 m

d'après ZENKOVITCH

a_VITESSES CRITIQUES D'EROSION DE DIFFERENTES VASES EN FONCTION DE LA CONCENTRATION

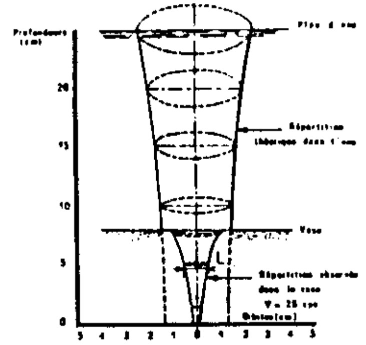


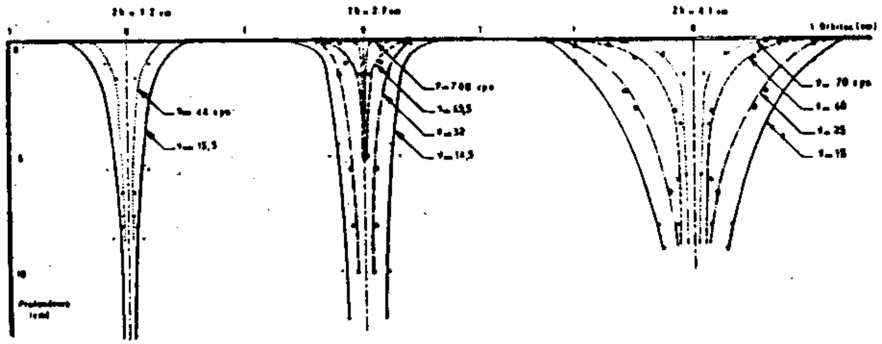
b_VARIATION DE LA FORCE CRITIQUE D'EROSION τ_e EN FONCTION DE LA RIGIDITE INITIALE

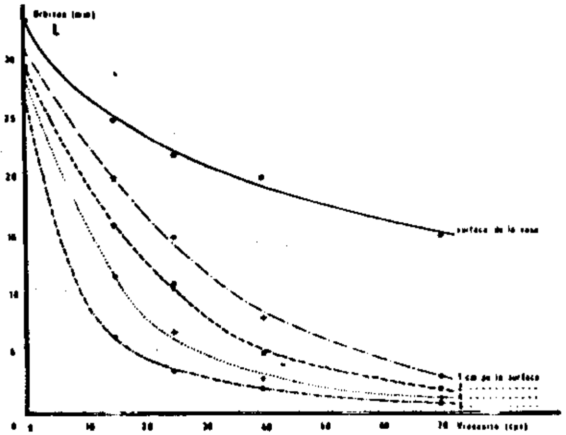


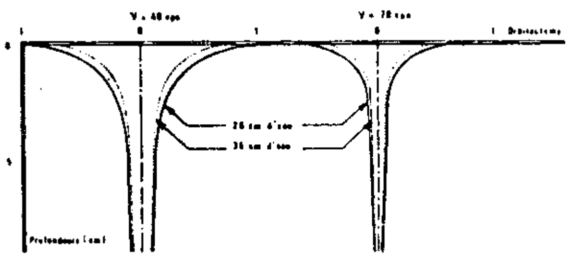
DEBUT D'ENTRAINEMENT DES MATERIAUX COHESIFS SOUS L'ACTION D'UN COURANT (d'après LCHF)

MOUVEMENT DES VASES SOUS LA HOULE



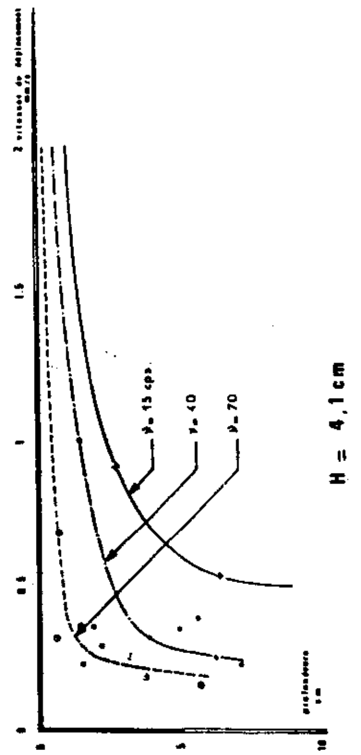


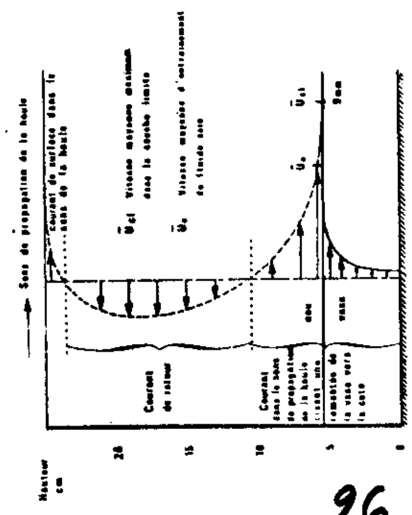


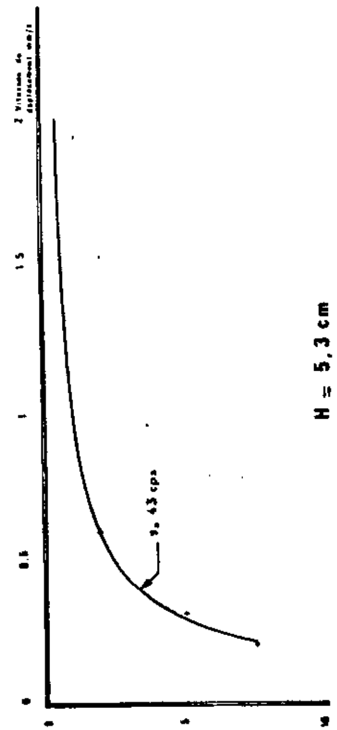


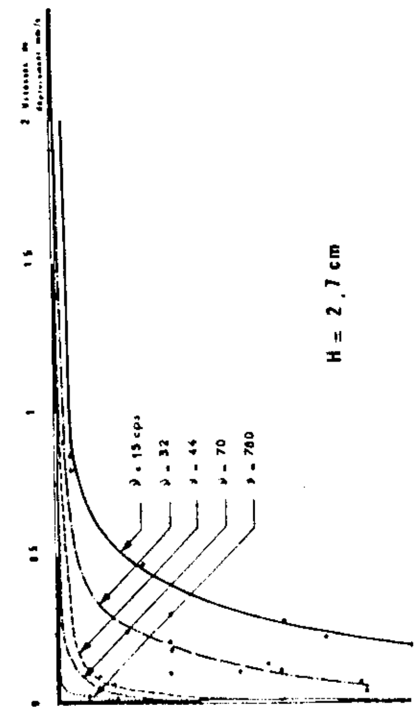
REPARTITION DU MOUVEMENT ORBITAIRE DANS LA VASE EN FONCTION DE SA VISCOSITE

DEPLACEMENT DE LA CREME DE VASE SOUS L'ACTION DE LA HOULE

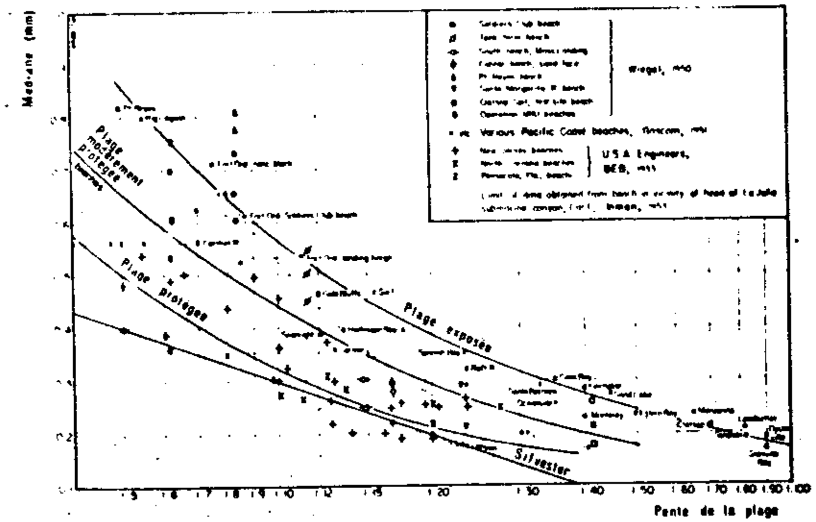






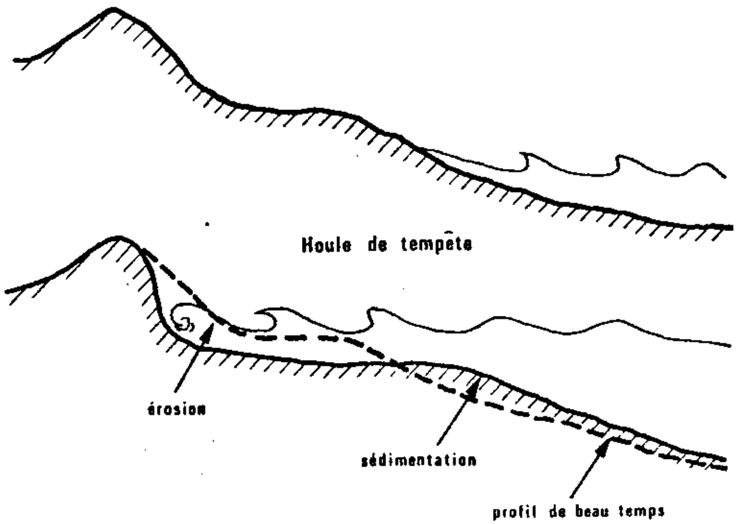


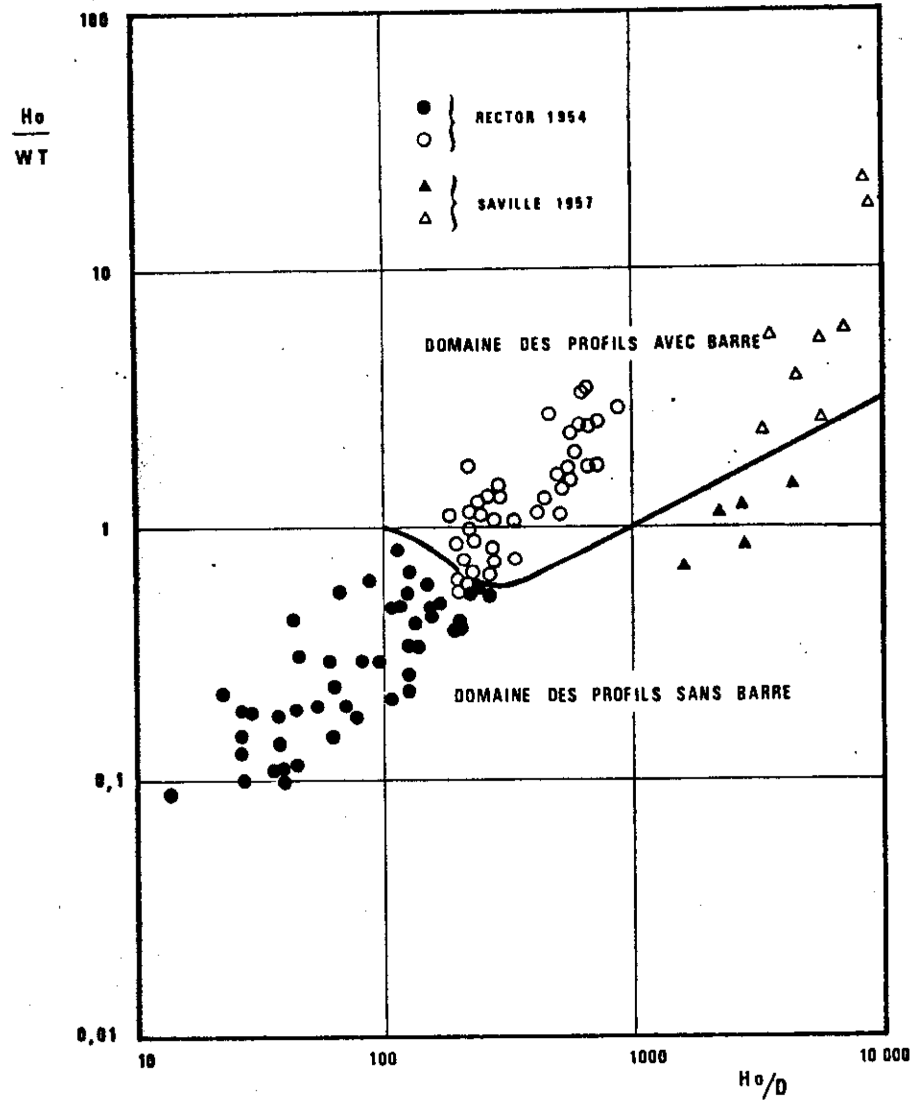
a _ PENTE DE LA PLAGE EN FONCTION DE LA MEDIANE ET DE L'EXPOSITON (d'après WIEGEL)



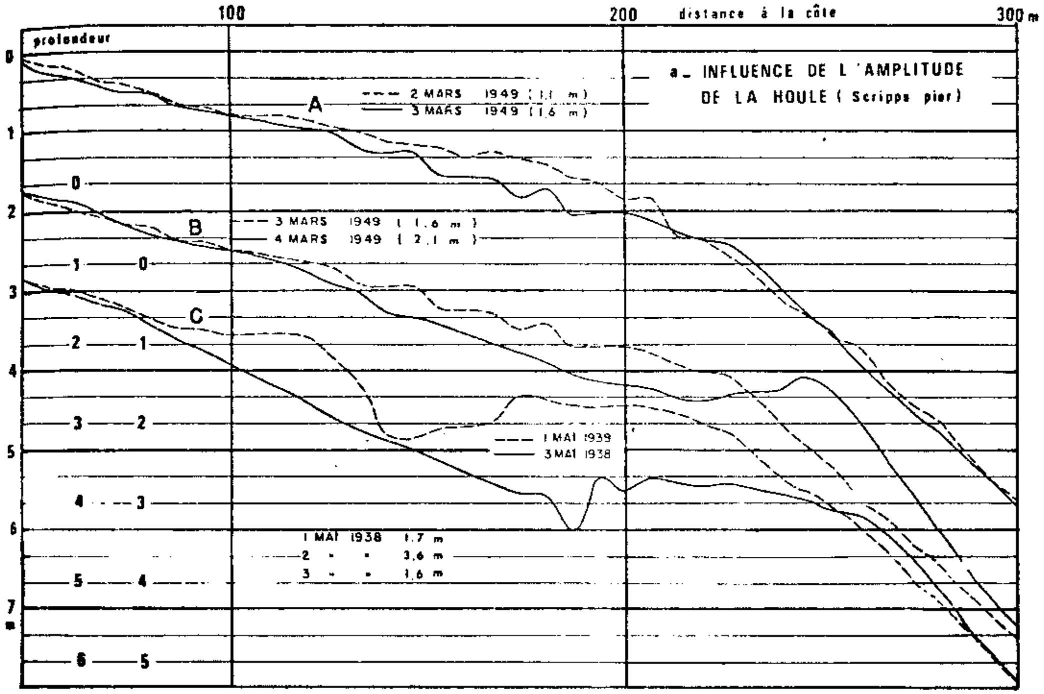
b _ TYPES DE PROFIL

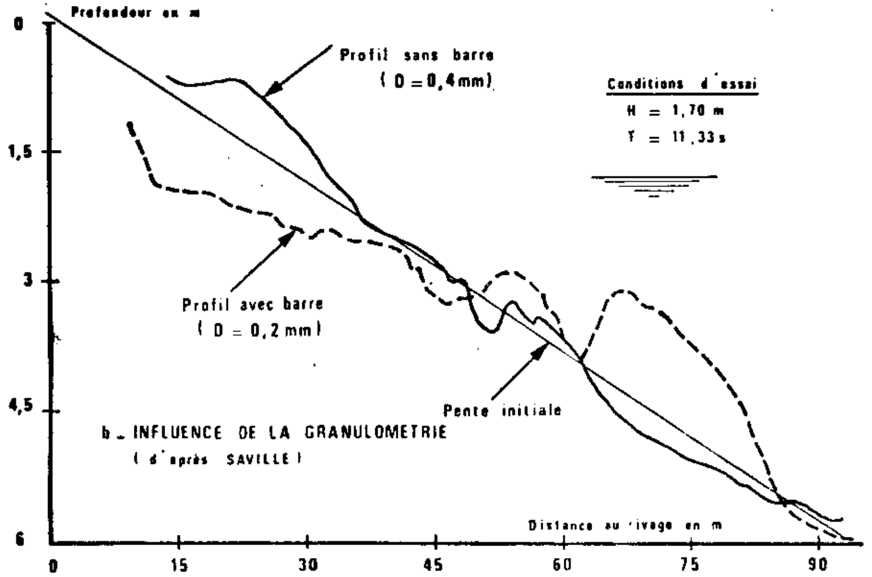
Houle de beau temps





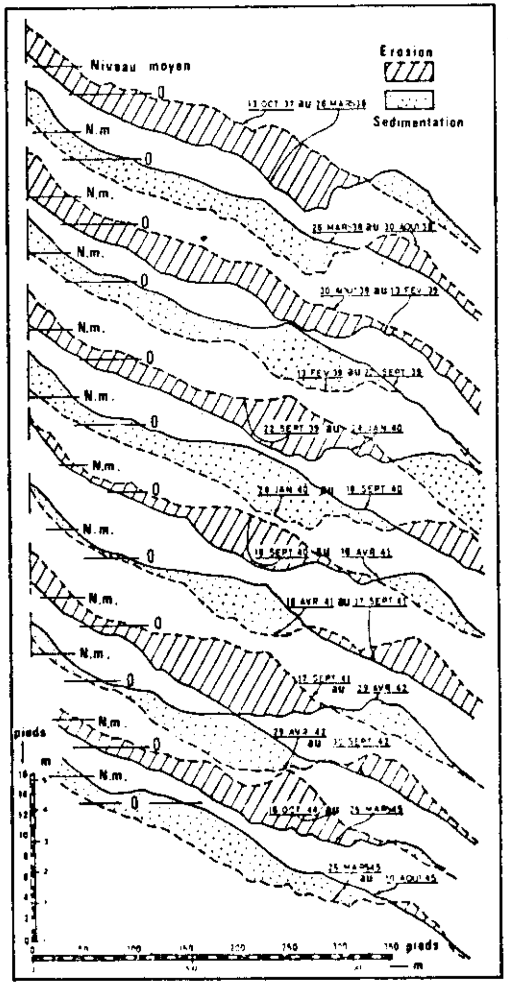
DOMAINES D'EXISTENCE DES PROFILS AVEC ET SANS BARRE
(d'après KOHLER et GALVIN)
1973





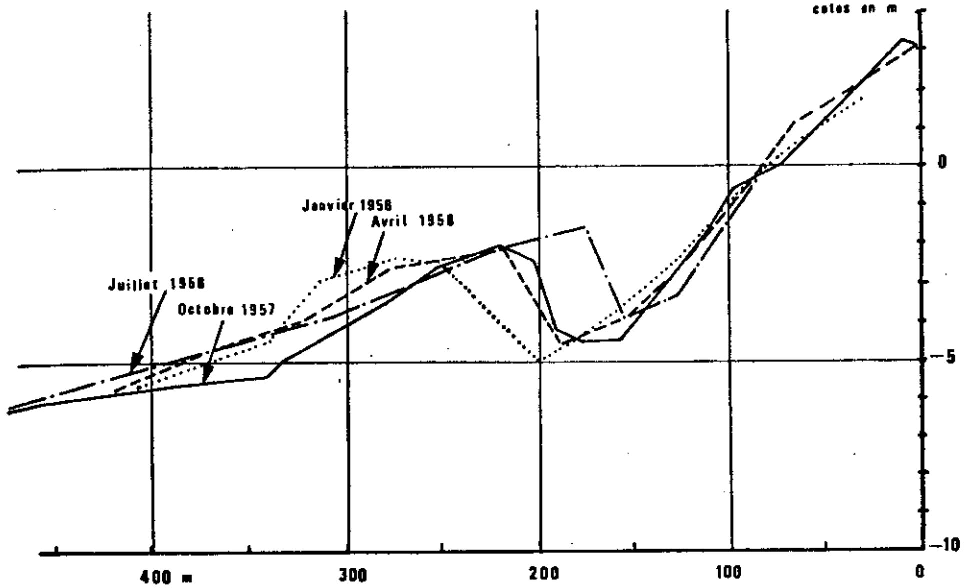
TYPES DE PROFILS DE PLAGE EN FONCTION DES CARACTERISTIQUES DE LA HOULE

EVOLUTION SAISONNIERE DE PROFILS (SCRIPPS PIER)

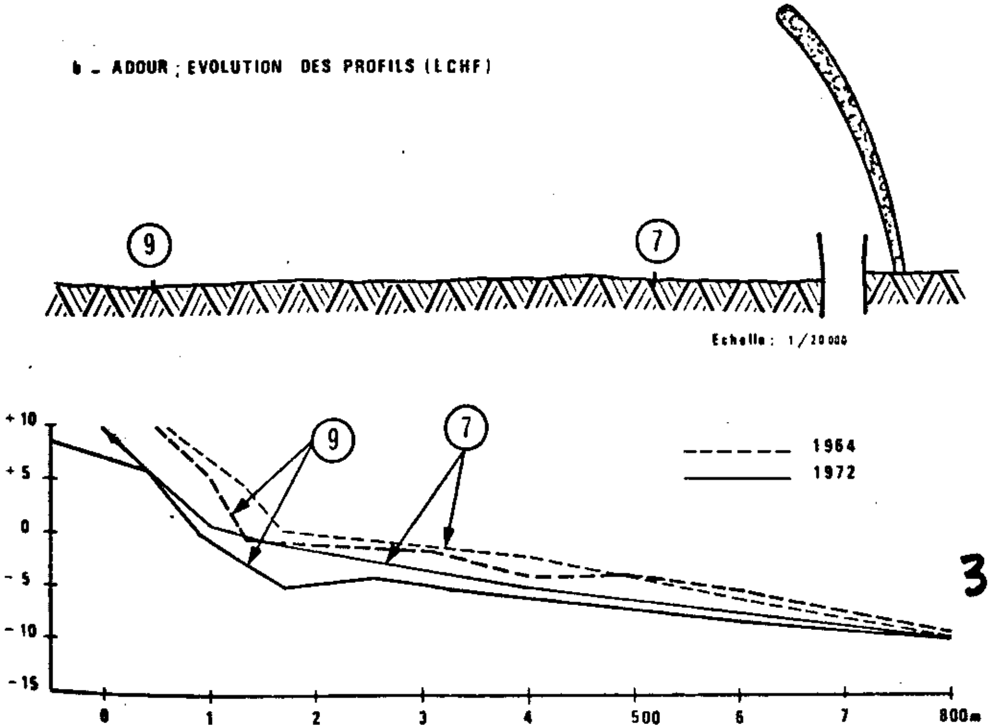


d'après SHEPARD

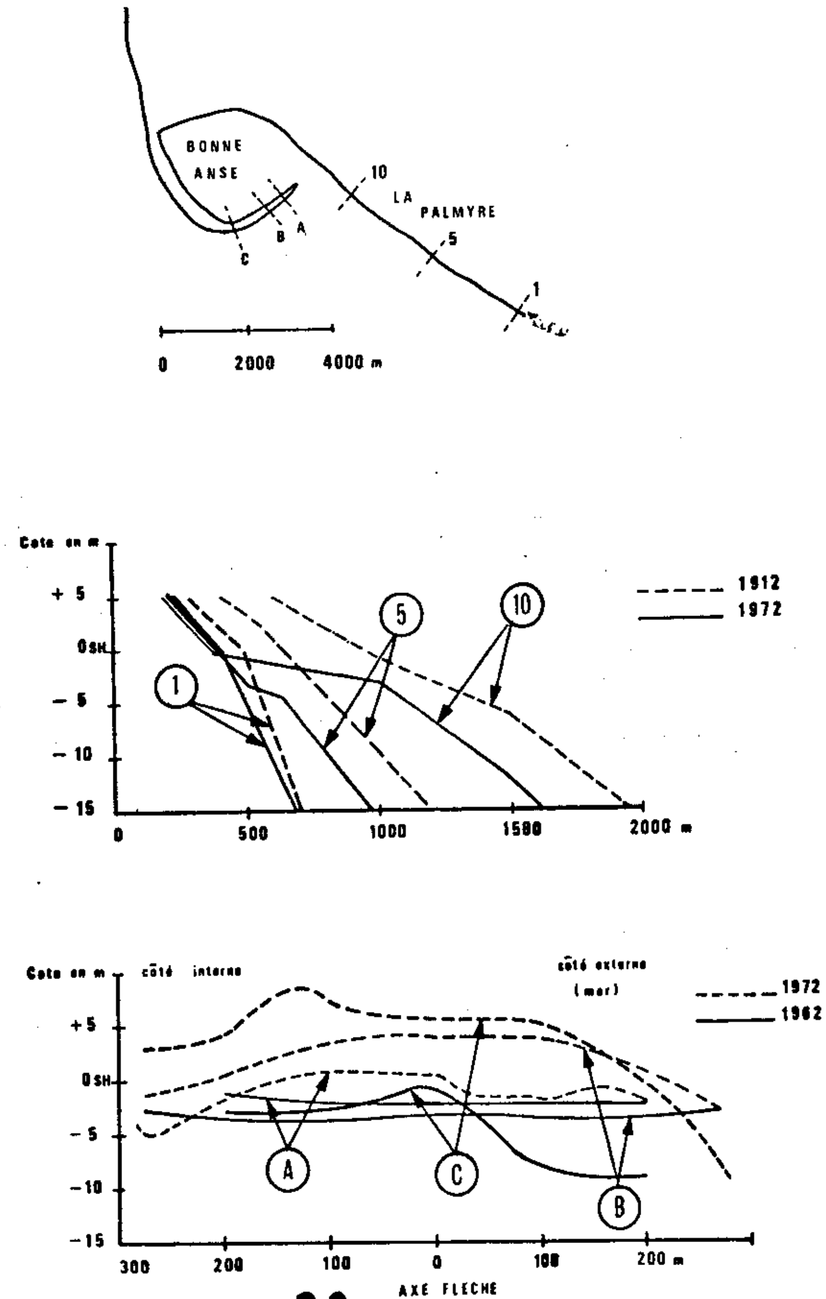
a - EVOLUTION SAISONNIERE DES PROFILS ; MEDITERRANEE ORIENTALE (LCHF)



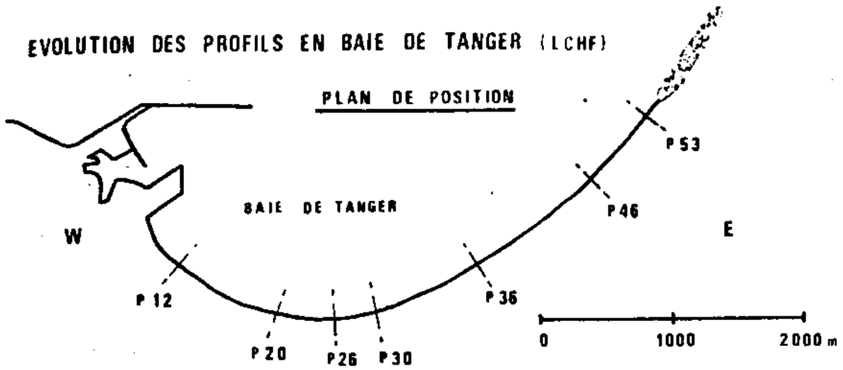
b - ADOUR ; EVOLUTION DES PROFILS (LCHF)



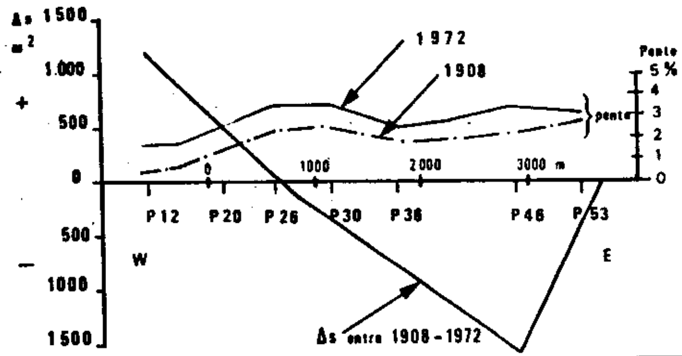
EVOLUTION DES PROFILS DE LA FLECHE DE LA COUBRE
ET DE LA COTE DE LA PALMYRE (LCHF)

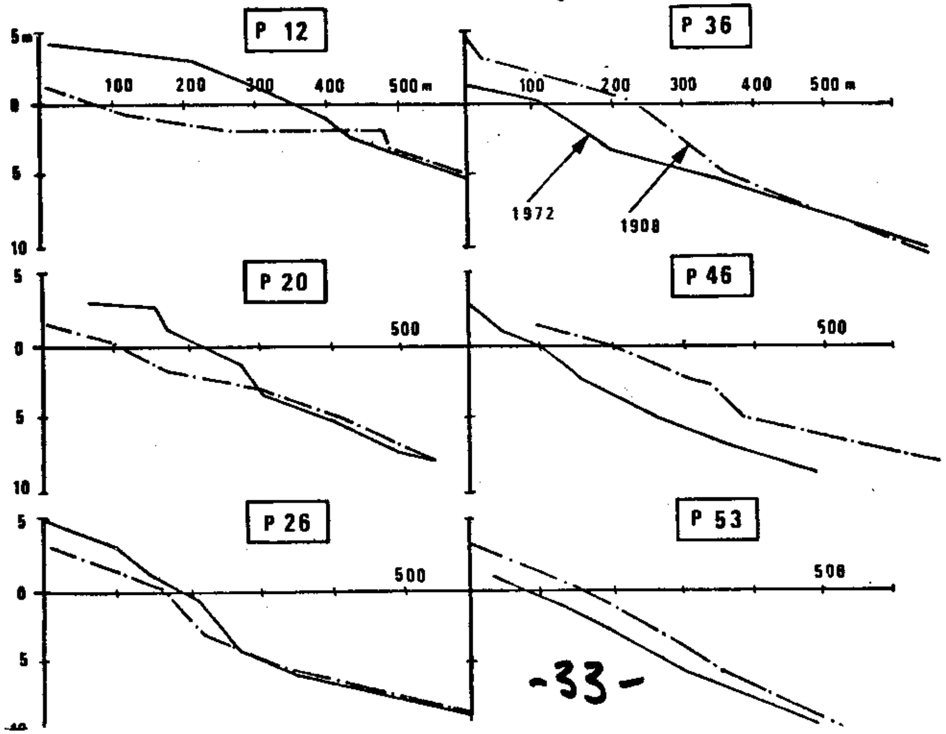


EVOLUTION DES PROFILS EN BAIE DE TANGER (LCHF)

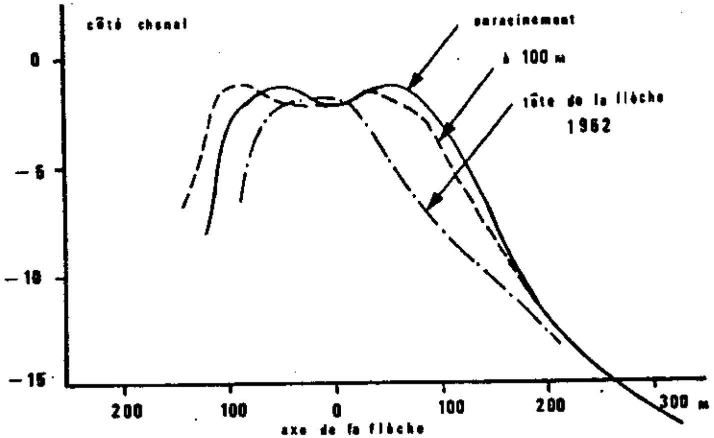


EVOLUTION DES SECTIONS ET DES PROFILS DE 1900 A 1972

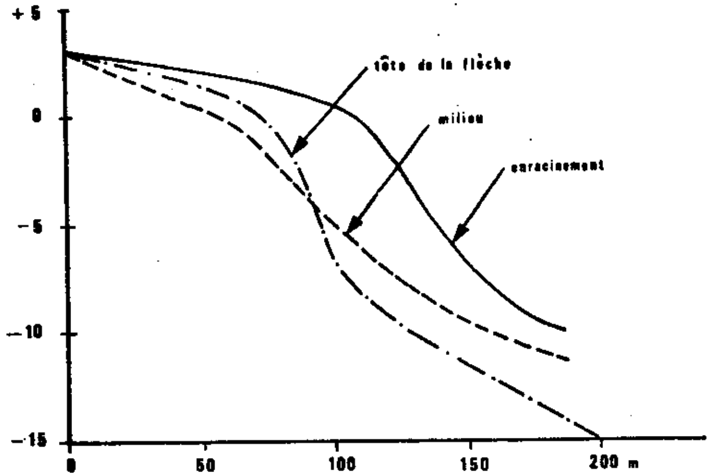




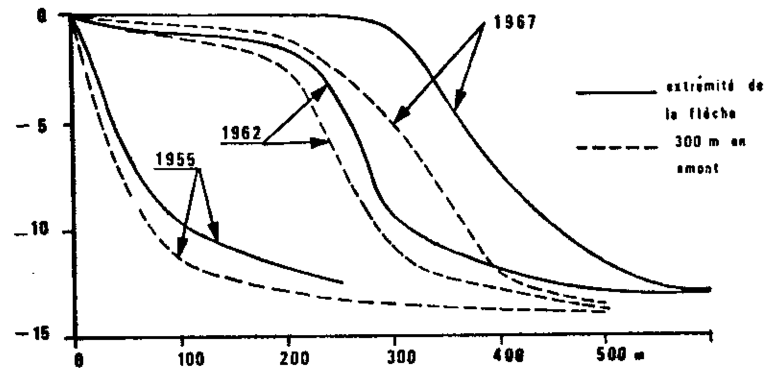
AGADIR (LCHF)

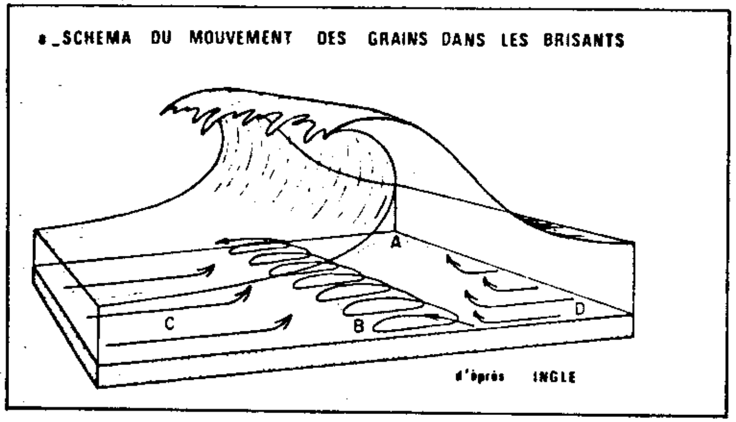


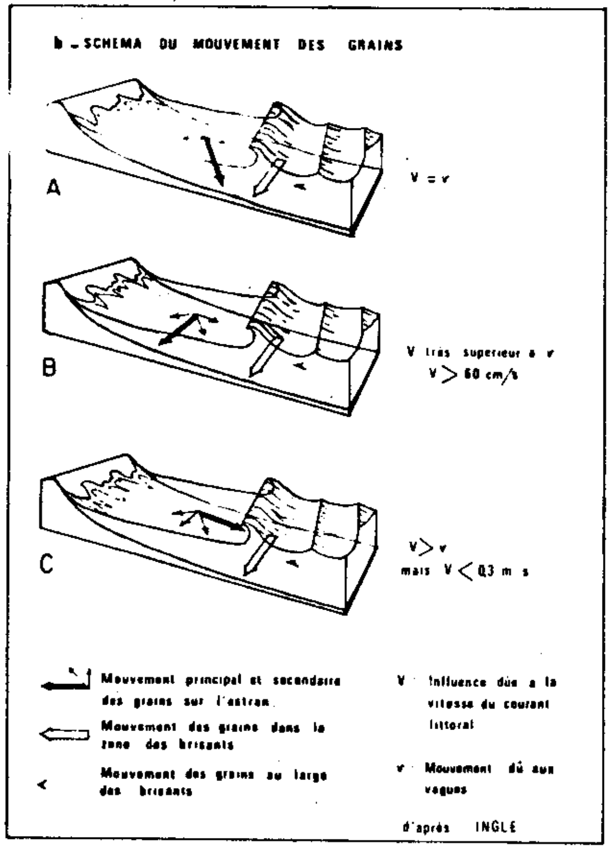
CAP FERRET: FLECHE DU MINBEAU



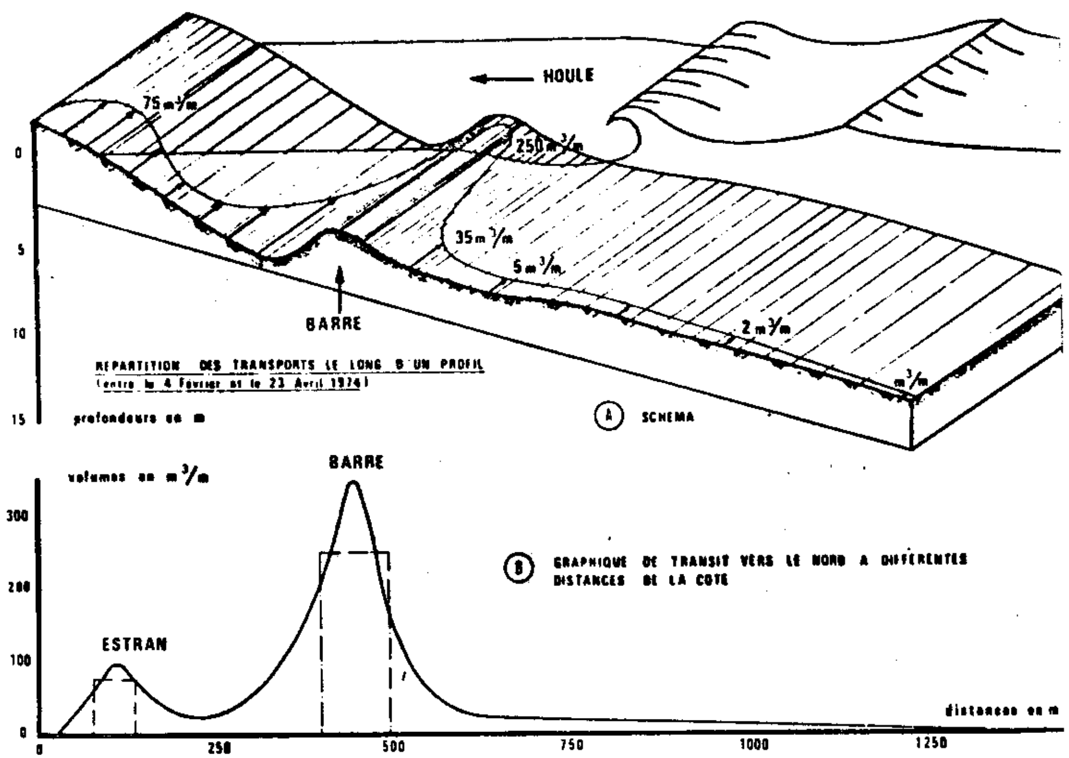
FOS: FLECHE DE LA GRACIEUSE



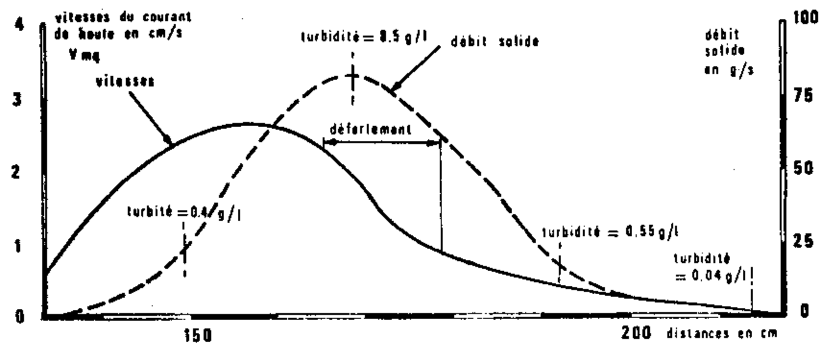




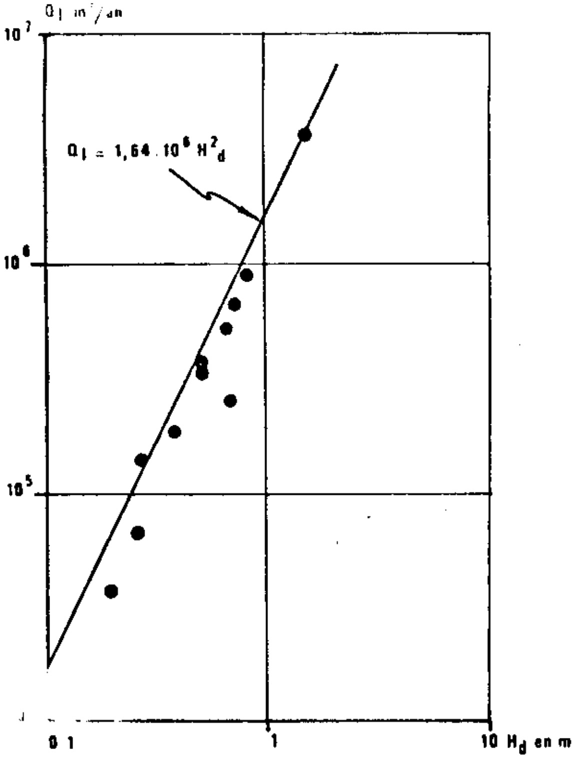
a_ EN MEDITERRANEE ORIENTALE (L C H F)



b_ EN MODELE REDUIT (document L.C.H.F)

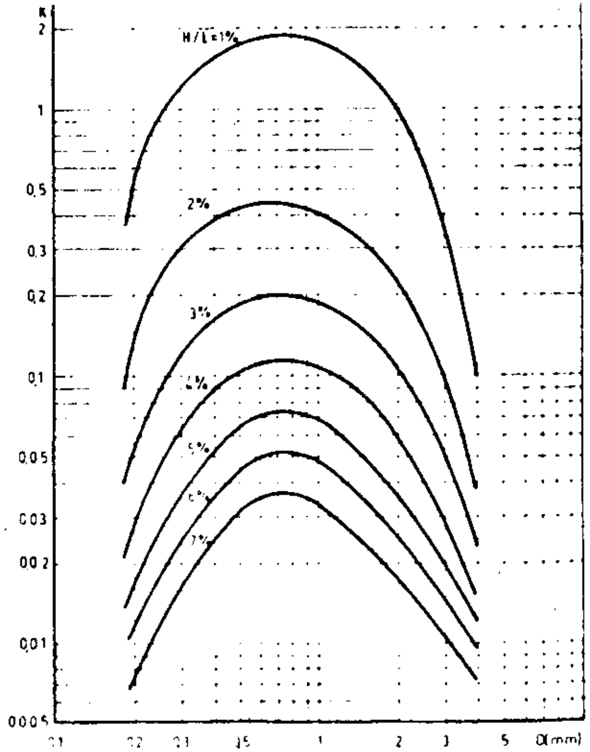


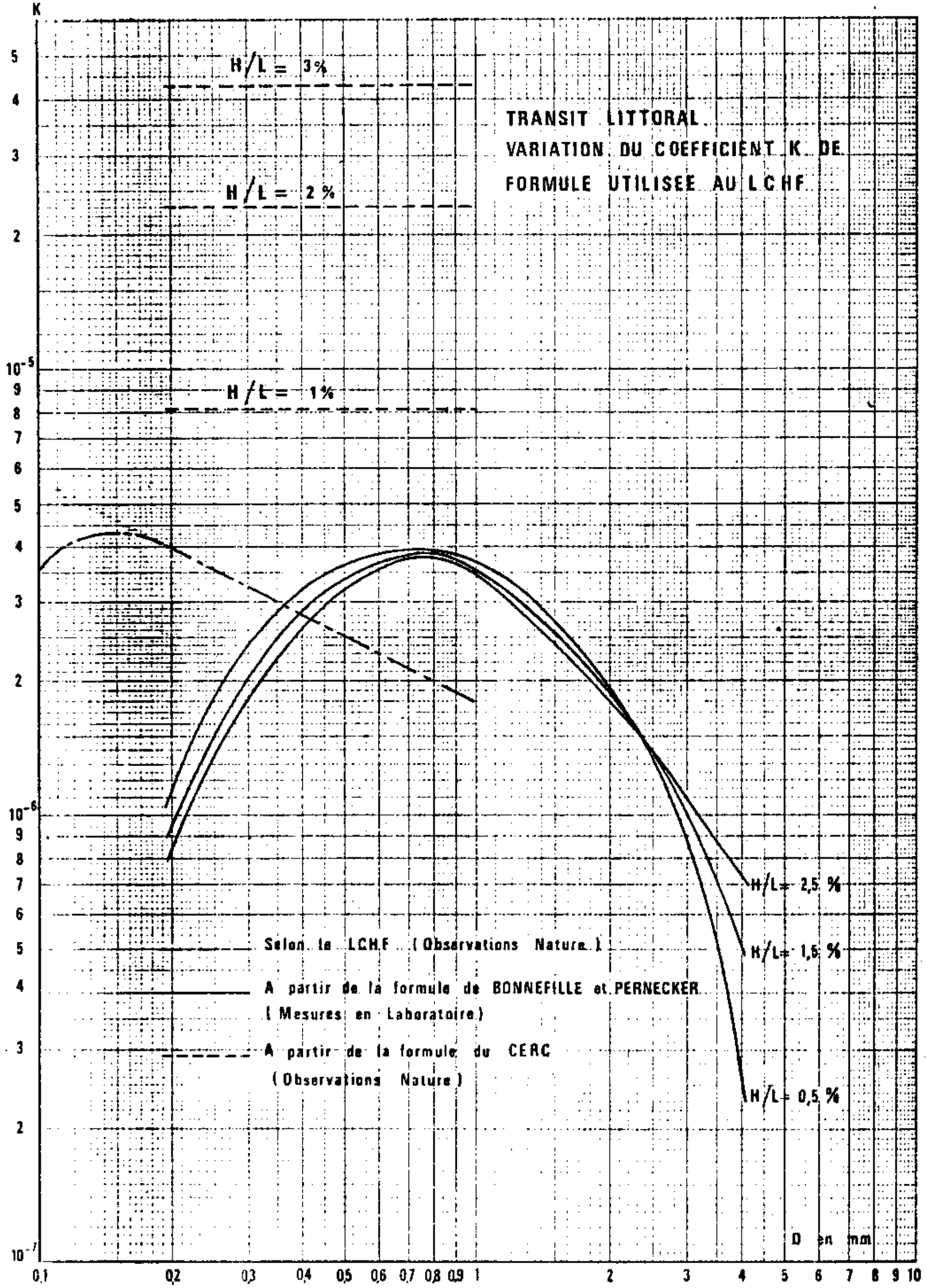
REPARTITION DU TRANSIT LITTORAL LE LONG D'UN PROFIL

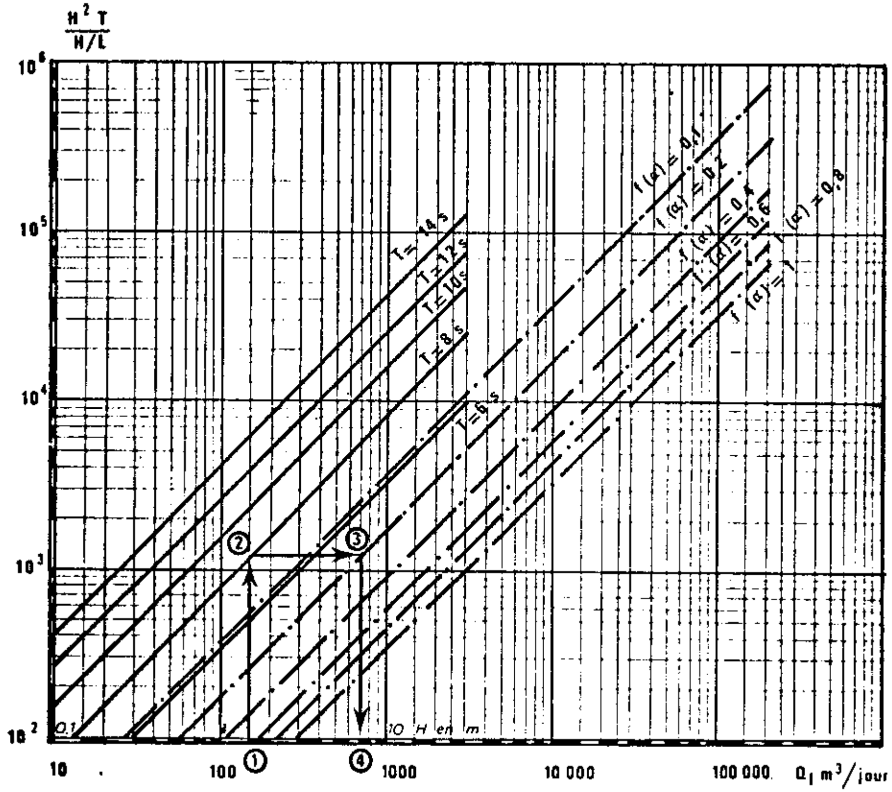


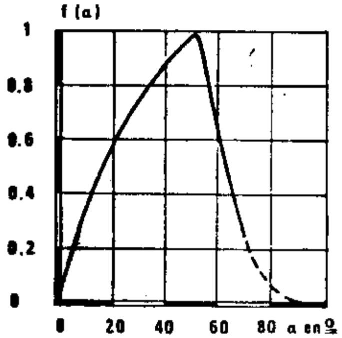
a – TRANSIT LITTORAL EN FONCTION
DE L'AMPLITUDE DE LA HOULE
(d'après GALVIN, 1972)

b – VARIATION DU COEFFICIENT K
DE LA FORMULE DE LARRAS
ET BONNEFILLE





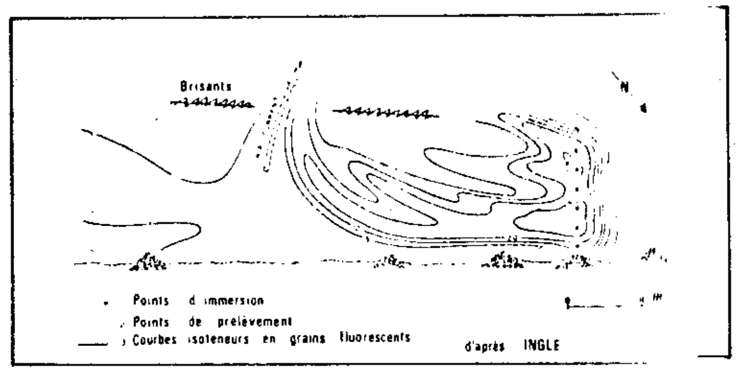




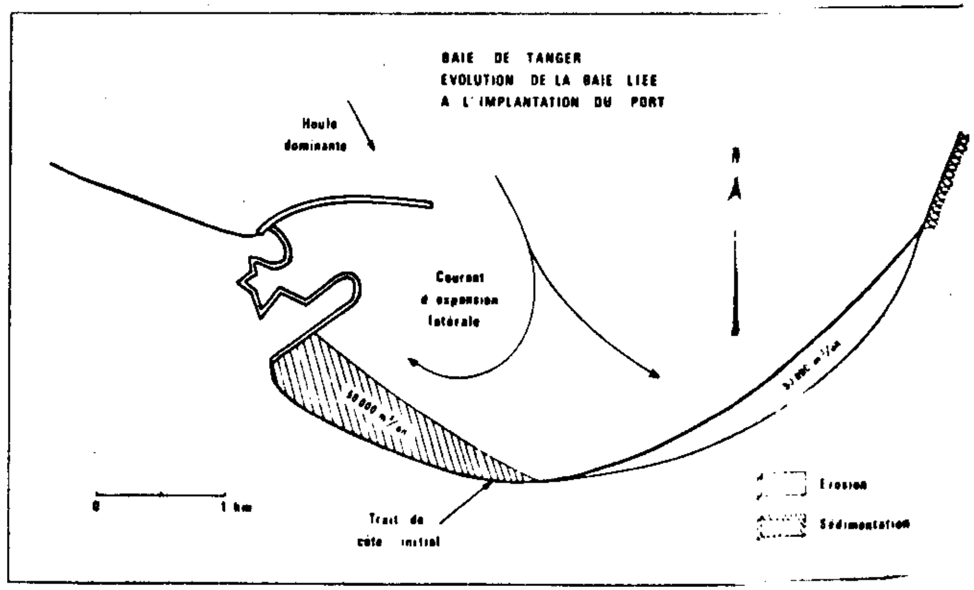
α en degrés	0	10	20	30	40	50	60	70	80	90
f (α)	0	0.30	0.57	0.70	0.83	0.98	0.70	0.28	?	0

TRANSIT LITTORAL EN FONCTION DES CARACTERISTIQUES DE LA HOULE

(d'après la formule en usage au LCHF)

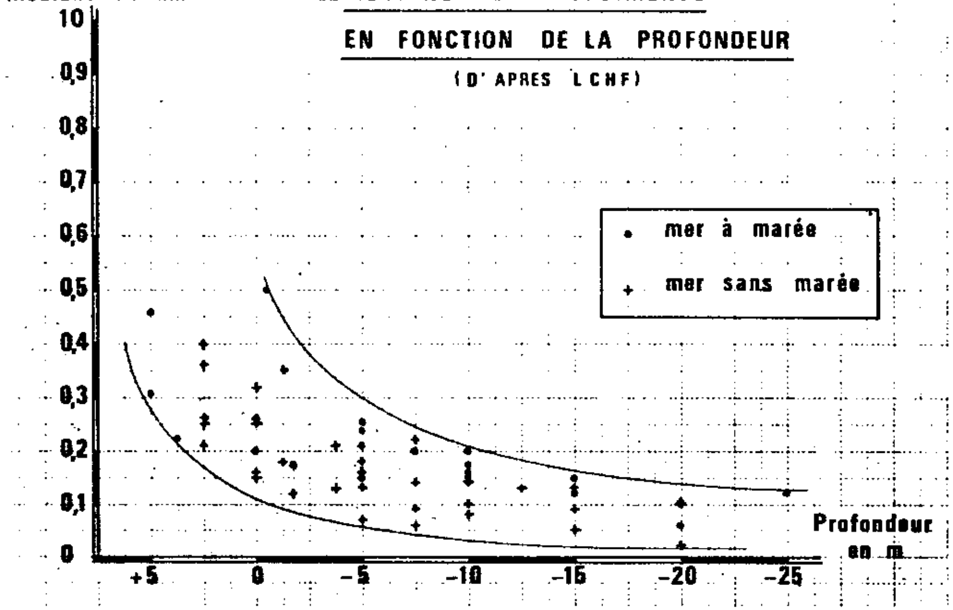


a _ TRANSPORT PAR RIP - CURRENT

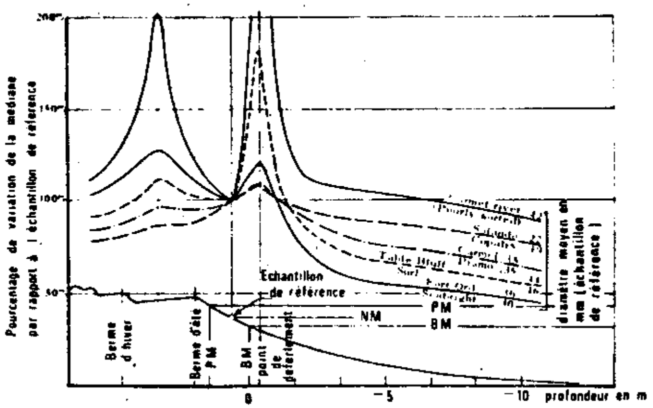


b _ TRANSPORT PAR COURANT D'EXPANSION LATERALE (LCHF) a_MEDIANE DES SEDIMENTS EN FONCTION DE LA PROFONDEUR

(D' APRES LCHF)

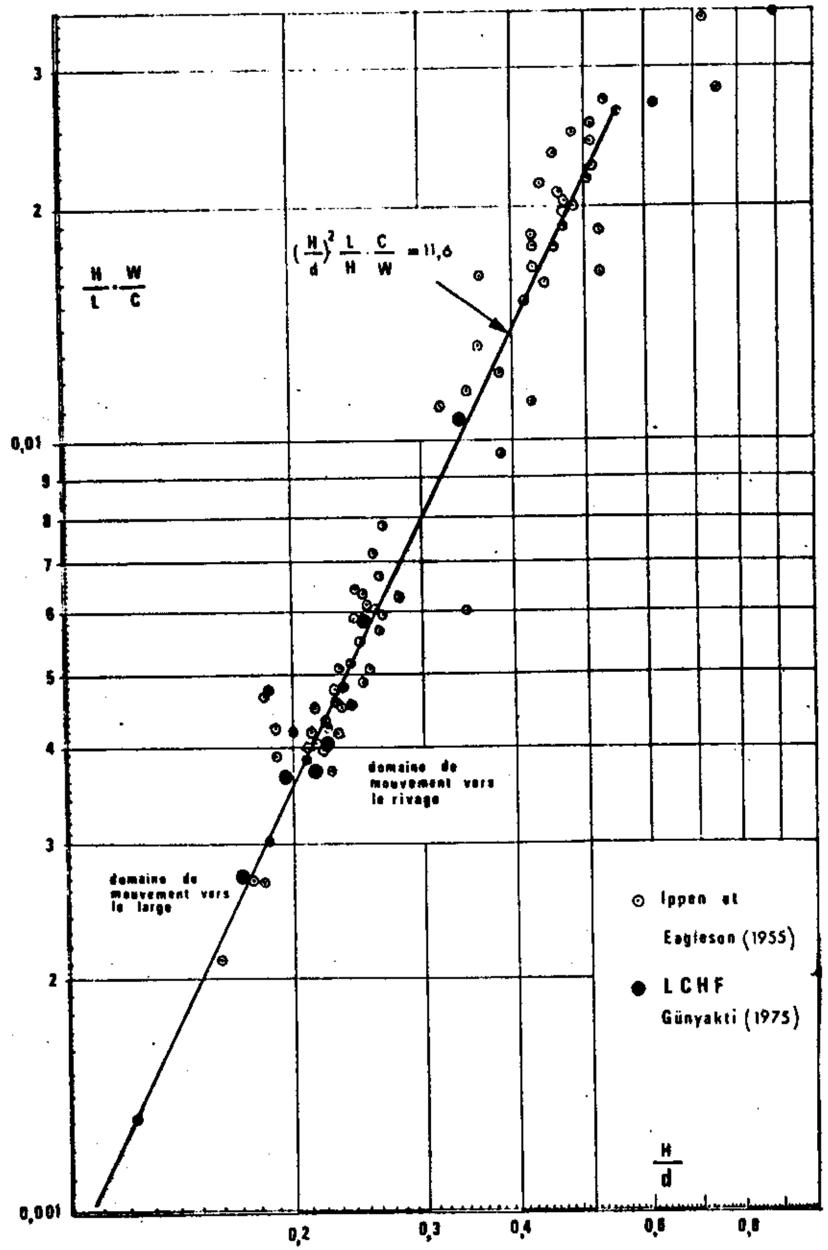


b_DISTRIBUTION TYPIQUE DES SEDIMENTS SUR UN PROFIL (d'après BASCOM)



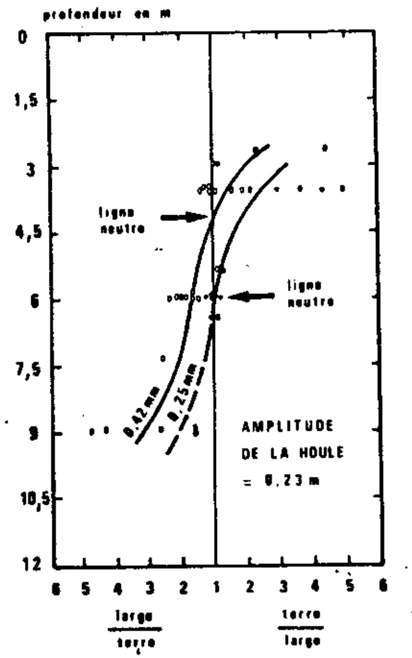
TRIAGE GRANULOMETRIQUE DANS LE PROFIL

41

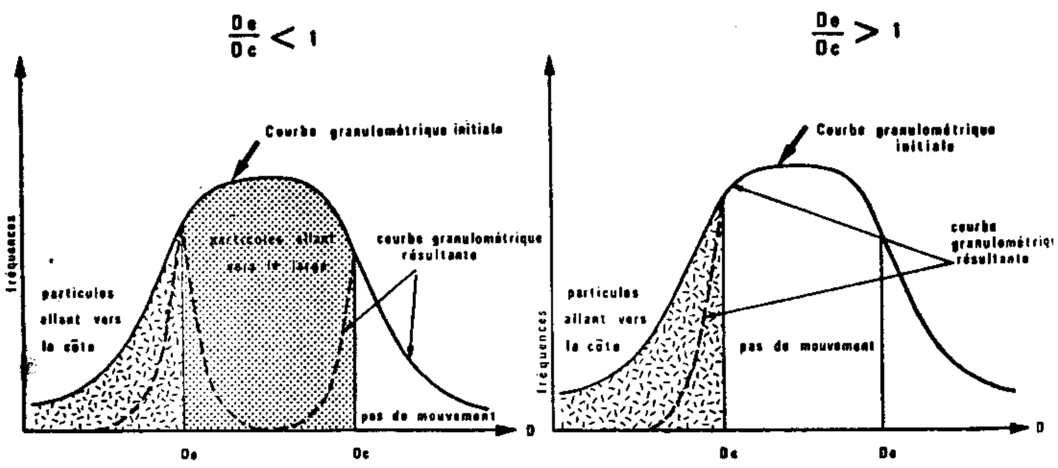


LIGNE NEUTRE D'APRES A.T. IPPEN ET P.S EAGLESON (1955)

42



a _ RAPPORT DES INTENSITES DE TRANSPORT
(d'après VERNON, 1966)



b _ INFLUENCE DU TRIAGE SUR LA COURBE GRANULOMETRIQUE
(d'après EAGLESON 1961)