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# **DEBRIS FLOWS: Disasters, Risk, Forecast, Protection**

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Pyatigorsk, Russia, 22-29 September 2008



Edited by  
S.S. Chernomorets

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## Гидрометеорологические условия периодов массового селеобразования на о. Сахалин

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## Hydrometeorological conditions of the periods of mass debris-flow occurrence on Sakhalin Island

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JZkkfZljbZ\_lky ēbygb fZdkbfZevguo agZq\_gbc ūZfbo bdbo hkZdh gZ ijhp\_kk nhjfbjhZgby ijjbhh fZkhh]h k\_e]h]ZahZgby gZhkljh KZoZebg

We examine the influence of the maximum values of liquid precipitation on the process of the formation of periods of mass debris-flows occurrence on Sakhalin Island.

### 1 Введение

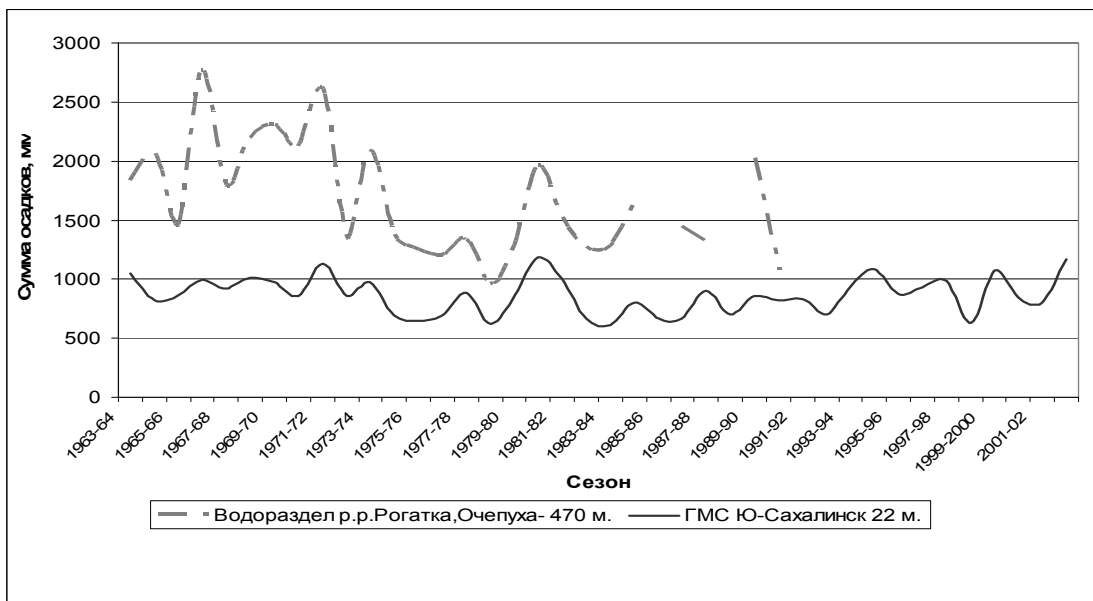
g[и] erf[и] nZdlhjh]f, hij[и]eyxsb]f bgl]gkbghklv jZablby k\_e]uo ijhp\_k- kh[и] gbadh]hjv[и] h KZoZebgZ\_yey\_lky dhebq\_klh b bgl]gkbghklv hkZdh ūZZx[и] - sb[и] gZ\_l]jjblhjbb . <hijhkm ēbygby bdbo hkZdh gZnhjfbjhZgb[и] k\_e]c[и] gbadh- ]hjv[и] KZoZebgZ\_ue ihkys\_g jy[и] jZ[h]l (imZjbgZ b]j[и] , 1987; l]j[и] , 1989; DZaZdh]b mdhZ, 1988, 1990). HgZdh[и] , fū ijb]bZ\_fky a]eyZ , hjZ\_ggh]h [и] jZ[h]Zo (DZ aZdh]b Fbg\_jbg, 2000; DZaZdh[и] b]gkbhjhkdbc[и] , 2007), l]j[и] ]bjhf\_l]h jheh]bq\_kdb[и] nZdlhju k\_e]h]ZahZgby jZkkfZljbZlky dZdihqbg\_ggu[и] , Z]eZ\_gklmxsmx[и] jhev[и] b]jZxl[и] nZdlhju l]heh]bq\_kdb[и]

### 2 Рассмотрение проблемы

l]hknjgu[и] [и]hkZdb, ūZZxsb[и] gZ\_l]jjblhjbb hkljhZ , yeylky j\_amevlZlhf Zdlbgc pbdehgbq\_kdhc yl]evghklb. ēhhu[и] kmffu hkZdh[и] [и] gbsZo hebg b gZ fhjkdhf ih\_l]jv[и] [и] xguo jZchgZo dhe\_l]exlky [и] ij\_eZo 800-1100 ff( [и] ]hZo kj\_gb[и] agZq\_gbykmff ūZfbo hkZdh[и] [и] aZbkbfhklb hl ūklghc ahgu khklZeyxl 1500-2000 ff b [и] hl]evgu[и] ]hu fh]ml ij\_ūZlv 3000 ff). Wlh ohjhrh bgh gZ kjZgb\_l]evghf l]Znbd fgh]he\_l]g]h ohZ hkZdh[и] , ijb\_l]ggh]h gZjbk. 1.

< l]ieuc[и] ijjb[и] ūZZ\_l] 65-80% ]hhc ghjfu . Kmffu hkZdh[и] ih Zgguf ]bjhf\_l]hjheh]bq\_kdbc klZgpbc (≠FK) [и] ih\_l]gpZevgh k\_e]hiZkguc ijjb[и] (bxgv-hdly]jv[и]) [и] kj\_g]f khklZeyxl 300-600 ff, [и] fZdkbfmf[и] hklb]Zy 1100 ff . GZh hl]l- l]lv ke\_l]mxs[и] , qlh ihZeyxZy qZklvgZ]exZ\_l]evghc k\_l]b ]hk]bjhf\_l]Z jZkiheh- \_g Zhev ih\_l]jbc, eb]h [и] gbsZo j\_qguo hebg hkljhZ . < l]Z]ebp[и] l ijbhblky ijhp\_l]gh[и] khhlghr]gb[и] jZki\_l]e]gby ≠FK b ]bjheh]bq\_kdb[и] ihklh[и] (≠[и] ih ūkh - l]Zf gZ\_l]jjblhjbb hkljhZ (≠gkbhjhkdbc b DZaZdh, 2007).

< mkehbyo dh]Z , ¼ l]jjblhjbb aZgyh ]hjZfb , kZ[khexlgufb hl]l]dZfb 350-1600 f. bkihevahZgb[и] lhevdh Zgguo h[и] hkZdZo, ihemq\_gguo gZ≠FK , ijbhh[и] d]g[и] hm q\_lm iZjZf\_l]j[и] ]bjhf\_l]hjheh]bq\_kdb[и] ye]gbc , Zgguo b[и] gZ]ex]gbc g[и] fh]ml bkihevahZlvky ey khklZe]gby k\_e]h]h ijh]ghaZ.



К[е]т[е] ил[л]д[л] : dZIZkljhnu , jbkd, ijh]gha, aZsbIZ. К[е]т[е] ил[л]д[л] : dZIZkljhnu , jbkd, ijh]gha, aZsbIZ. К[е]т[е] ил[л]д[л] : dZIZkljhnu , jbkd, ijh]gha, aZsbIZ.

Л[л]д[л]д[л] 1. И[л]п[л]г[л]г[л] к[л]л[л]г[л]р[л]г[л] jZkiheh[л]gby [FK б[л] ил[л] [л]к[л]л[л] gZ[л]jbb[л]hb[л] KZoZ[л]ebgZ.

>bZiZahg[л] [л]k[л] f[л].	% h[л]h[л]s[л]h[л] dhebq[л]kIZ [FK б[л]
0-50	77,7
50-100	9,6
100-200	11,7
>200	1

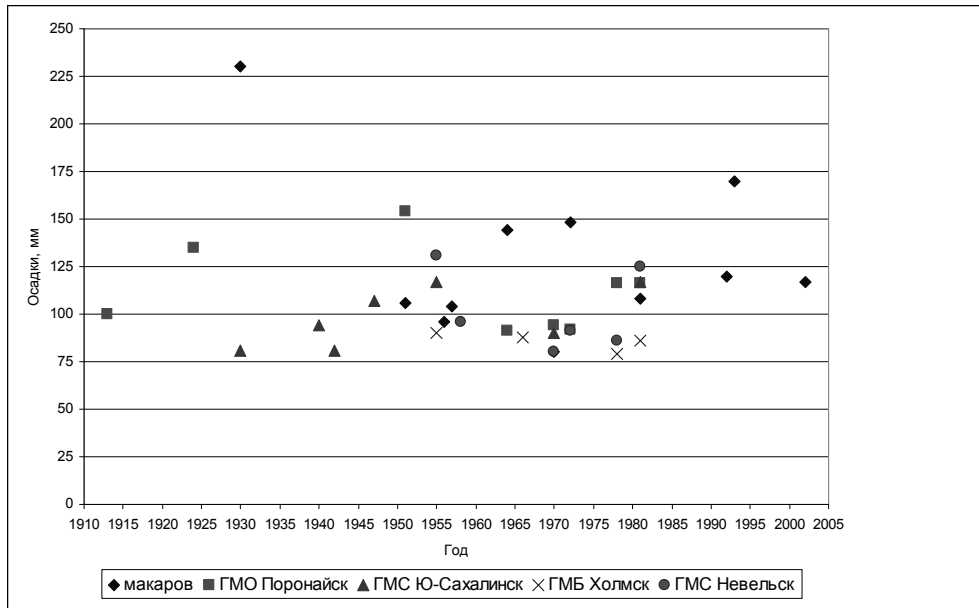
GZijbf[л] , lZdZykblmZpbykehbeZkv [л]jZchg[л] j FZdZjhZ [л]ijbh[л] fZkkhh]h k[е]h[jZahZgby [л]gZqZe[л]k[л]gly[jy 1992 j, ihkdhevdm [FK jZkiheh[л]gZ gZ fhjkdhc [л]jZk[л] (Z[khexlgZy [л]khlZ 38 f), [л]ahg[л]jZajmadb k[е]t[е] hleh[л]gbc , ZhhjZa[л]e[л] k[е]t[е] [Zkk[л]cgh[л] gZohylky [л]hl[л]ldZ[л] 300-500 f, lh hkZdb, [л]Zrb[л] [л]jZchg[л] klZgpbb agZqbl[л]evgh hlebqZebkv hl hkZdh[л] [л]Zrb[л] [л]jbbhhjZa[л]evghc qZklb [Zk[л]cgh[л]

< dhgp[л] e[л]lZb gZqZe[л]hk[л]gb gZ[л]exZxlky [л]ohu jem[hdb[л] pbdehgh[л] b lZcnm-gh[л] ijbgkysbo ebg[л] h[л] AZkmldb hahfgh [л]Z[л]gb[л] 1-2 f[л]kyqguo ghjfi hkZdh[л]. lZd[л] [л] >heb[л]gd [л]k[л]gly[jy 1947 j aZkmldb [л]Zeh[л] 222 ff hkZdh[л], ij[л] f[л]-kyqghc ghjfi 120 ff. FZdkbfZevgu[л] kmlhqu[л] dhebq[л]kIZ hkZdh[л] hl[л]hy ij[л] [л] -gu gZj[л]kmgd[л]2.

DZdbgh[л] ba ij[л] [л]ggh]h jbkmgdZ, kmlhqu[л] fZdkbfmfu hkZdh[л] fh]m[л] ij[л] [л] rZlv 200 ff. K[е]h[jZamxsZy kmffZ hkZdh[л] gZ hkljh[л] KZoZebgij[л]urZ[л] 50 ff ij[л] bgl[л]gkbgk[л]b hkZdh[л] 30-50 ff /kmlb (DZaZdh[л]b Fbg[л]jbg , 2000). HgZdh[л] , [л] kemqZij[л]f[л]k[л]m[л]xs[л]h meZg[л]gby ihjh[л] [л]k[е]h[л] fZkkb[л] , k[е]t[е] ijhp[л]kku jZa- bZxlky ij[л] [л]Z[л]gbb 10-20 ff hkZdh[л] [л]q[л]gb[л] kmlhd

KhiZ[л] [л]gb[л] kmlhqu[л] fZdkbfm[л]hkZdh[л] (ij[л] [л]gu fZdkbfZevgu[л] kmlhqu[л] hkZdb hl[л]hy ij[л]urZ[л]xs[л]b 70 ff ) ih g[л]kdhevdbf klZgpbyf, hghj[л]f[л]ggh mdZau Z[л] [л]ijbh[л] fZkkhh]h k[е]h[nh]fbjhZgby gZ [hevr[л]c qZklb [л]jbbhhjbb h KZoZebg JZkfh]jbf gZb[he[л] [л]hdZaZl[л]evgu[л] kemqZbZkhh]h nh]fbjhZgby k[е]h[л]c

>Zggu[л] [л]ijbh[л] dZdijZbeh , hl[л]qZxlky kh]ljhc ihehgu bxey h k[л]j[л]b -gu hdly[jy b kyaZgu k ijhoh[л] [л]gb[л] jem[hdb[л] pbdehgh[л] khijhhZ[л]sboky [л]Z[л]gb[л] h[л]bevguo hkZdh[л] ([he[л] 50 ff kmlb) ij[л] bo [hevr[л]c bgl[л]gkbgk[л]b . HgZdh[л] g[л]h[oh]bf h[yaZl[л]evgh[л] mkeh[л]b - gZdhie[л]gb[л] [л]k[е]h[л] hqZjZodjbbq[л]kdh]h h[л]f[л]Z ihl[л]gpbZevgh]h k[е]h]h fZkkbZ (IKE). Djbb[л]q[л]kZy lhesbgZ IKE khklZey[л] 0,5-1,0 f (DZaZdh[л]b Fbg[л]jbg, 2000).



Jbk2. Kmlhquu fZdkbfmfu hkZdh hl hy ih =FK k\_e\_hiZkguo jZchgZo aZi\_jbh 1913-2003 ]]

Pbdehg, ijhfbc gZojjblhjb KZoZebgdhch[eZklb 18-19.09.1970 hoZlbe [hevrnx ijblhjbx hkljhZ. Kmlhquu fZdkbfmfu hkZdh khklZbeb jZchgZo k\_e\_hjZahZgby: =FK FZdZjh - 80 ff, =FK G\_evk d - 80 ff, ]hjZo x]Z (kg\_lheZbggZy kIZgpby IjZe, Z[k ukhIZ 300 f) aZ 12 qZkhuiZeh 121 ff. <uiZgb lZdh]h dhebq\_klZ hkZdh ijb\_eh d fZkkhhfm k\_e\_hjZahZgby G\_evkdhf, Ohefkdhf, FZdZjhkdhf jZchgZo KZoZebgdhc h[eZklb.

Ke\_mxsbc jZkkfZljbZ\_fuc i\_jbh k\_glyjv-hdlyjv 1972 ]hZ, dh]Z ijhoh\_gb jyZ pbdehgh ijb\_eh d uiZgbx agZqbl\_evg]h dhebq\_klZ hkZdh, m\_eZg\_gbx ijblhjb b\_uaZeh fZkkhuc koh\_k\_e\_c ur\_gZaZgguo jZchgZo. Km lhquu fZdkbfmfu hkZdh khklZbeb: =FK FZdZjh - 148 ff, =FK G\_evk d - 91 ff, =FK Xgh- KZoZebgd - 68 ff ( aZ9 qZkh). < ]hjZo x]Z (kg\_lheZbggZy kIZgpby IjZe) aZ 12 qZkhuiZeh 121 ff.

?s\_hbg i\_jbh fZkkhh]h nhjfbjhZgby k\_e\_c hoZlbfbc [hevrnx qZklv hkljhZ - Z]mk 1978 ]hZ. Kmlhquu fZdkbfmfu dhe\_Zebkv h 76 ff ( ]bjhf ]hjeh - eh]bq\_kdh [xjh Ohefkd) h 116 ff ( ]bjhf ]hjeh]bq\_kdZy h[k\_j]lhjby ]hjh - gZckd), ]hjZo hkljhZ bg\_gkbgkiv hkZdh [ueZ s ur (kg\_lheZbggZy kIZgpby IjZe) - 40 ff aZ 3 qZkZljb ij\_hoh\_gbb lZcnmgh «Hbg » b «Nbeebk» 2-7 Z]m-klZ 1981 ] kmffZ hkZdh gZ=FK «Xgh -KZoZebgd (Z[k ukhIZ 22 f) khklZbeZ 220 ff. AZlh i\_jbh KmkmgZckdhfj] ih Zgguf kmffZjguo hkZdhf\_jh ]bg- IjZe Z[khexlguo hlf\_lhd h 400 h 600 f kmffu hkZdh khklZbeb [he 1200 ff.

<h k\_o ur\_i\_jqbk\_e\_gguo i\_jbhZo k\_e\_hjZahZgby, uiZrb hkZdb h[m-keZebZeb Zdlbgh hjZahZgb k\_e\_uo ihlhdh.

HgZdh g\_k]Z uiZgb agZqbl\_evg]h dhebq\_klZ hkZdh ijbhb d fZk- khfm kohm k\_e\_c lZd, k\_glyjv 1982 ]hZ, ijb ijhoh\_gbb pbdehgz kmlhagh\_dh- ebq\_klh hkZdh ih =FK FZdZjh khklZbeh 124 ff. JZkoh hu ih j\_FZdZjh kh- klZbe 850 f<sup>3</sup>/k Zgguc jZkoh ih kh\_c ebqbg, yey\_lky lhjuf aZkv i\_jbh gZ [ex\_gbc b mklmiZ\_lhev dh dZlZkljhn bq\_kdhfm jZkoh hu 1722 f<sup>3</sup>/k (Z]mk 1981 ]hZ). Gh fZkkhh]h k\_e\_nhjfbjhZgby jZchg hlf\_q\_gh g [ueh. Wlh h[mkehe\_gh ]f, qlh ]hbf jZg, ihke ijhoh\_gby lZcnmgZ «Nbeebk», khf\_rfb k\_e\_uo ihlh- db iheghklvx hqbkbeb k\_e\_uo hqZ]b h ihl\_gpbZevguo k\_e\_uo fZkkbh gZdhie\_gby. Dh\_klv hklmklhZeh h]yaZl\_evg]h mkehb kohZ k\_e\_c gbadh]hjv h KZoZebgZ - djblbq\_kdbc h]f fZl\_jbZeZ k\_e\_uo hqZ]Zo.



Jbk13. К[е] [у] илхдб [е] lhesbghc h 2,5 f ([Zkk\_cg] Jh]ZldZ). Nhlh Ljmr . . .

### 3 Заключение

1. Kmffu hkZdh [ P\_gljZevguo b Xguo jZchgZo KZoZebgZ ( hēbgZo b gZ fhjkdbo ih [jvyo ) [ ihl\_gpbZevgh k\_e\_hiZkguc i\_jbh (bxgv-hdly[jv) [ kj\_g\_f khklZeyx [ 300-600 ff), [ fZdkbfmf hklb]Zy 1100 ff) [ Jhguo qZklyo hkljhZ aZ ye\_gb [ fh [ uZklv ( aZbkbfhklb h\_ukhlu f\_klZ) [he [ 1200 ff) hkZdh [ .

2. [ JhZo hkljhZ bg\_gkbghklv hkZdh [ fh [ khklZeylv [he [ 40 ff /q ljb ijhoh\_gbb lZcnmgh [ jZagbpZ f\_m hkZdZfb, hlf\_qZ\_fufb aZ ye\_gb [ ijb [j [ -ghc, hēbgghc qZklyo hkljhZ b hkZdZfb [ JhZo fh [ khklZeylv 1000 ff) aZ ye [ -gb [ .

3. К[е] [h] jZamxsZy kmffZ hkZdh [ gZ hkljh [ KZoZebgi\_j\_rZ [ 50 ff ijb bg\_gkbghklb hkZdh [ 20-50 ff / kmldb .

4. >ey fZkhh]h k\_e\_nhjfjhZgby g\_h [ohbfh gZdhie\_gb [ k\_e [u] hqZ]Zo djblbq\_kdh]h h [f [ ihl\_gpbZevgh]h k\_e [h] fZkkbZ lhesbghc 0,5-1,0 f .

### Список литературы

mBgZ H.B., [j [ [N., KbhjhZ L.E. К[е] [у] ye\_gb h KZoZebg- [klgbd Fhkdhkd]h mglZ, k [j, 5, [h]jZnby, [ 3, 1987, k 76-81.

[gkbhjhkdb [ X . [., DZaZdh [G. [ . G\_hmq [ hkZdh [ gbadh]hjv h KZoZebgZdZd ijbqbgZ aZgb\_gby jZkq\_lguo iZjZf\_ljh khjm\_gbc ijb ijh\_dlbjhZgbb b kljhb\_evkl [ - [h- jkд, [ 1, 2007, k 58-60.

DZaZdh [G. [., [gkbhjhkdb [ X . [ . DZlZkljhnbq\_kdb [ k\_e [u] илхдб [gbadh]hjv h KZoZebgZ b bo hiZkghklv ey fZ]bkljZevguo ljm[hijh]h (gZ ijb [j [ «KZoZebg-2»). - ljh [e] fu ijh]ghabhZgby q\_auqZcguo kblmZpbc K[hjgbd fZ\_ljbZeh [ VII gZmqghijZdlbq\_kdhc dhgn [gpbb . FhkDZ: « [gklboby », 2007, k 34-35.

DZaZdh [G. [., mdhZ AB. JZchgbjhZgb [ h KZoZebgih kl [i] gb ijhye\_gb [ k\_e [h [ yl [ev] -ghklb - Ljmu [bjhf\_lp\_gljZ KZoZebgkd]hM=FK. J\_lbhgZevgu [ bkke\_hZgby . Xgh - KZoZebgkd, 1988, k 131-137.

DZaZdh [G. [., mdhZ AB. Mkehby nhjfjhZgby k\_e [u] iZhdh [ [fZuo hhlhdZo . - ljb - jhgu [ dZlZkljhnu b klbocgu [ klby [ >Zevg\_hklhghf [ j\_lbhg [ , [ 2, [eZbnklhd : [H :G KKKJ, 1990, k 394-400.

DZaZdh [G. [., Fbg\_jbg B. [ К[е] [у] ijhp\_kku gZ h KZoZebg- ljbdeZgZy [hwdheh]by, q\_auqZcguo kblmZpbbb\_a\_f\_evgu [ dZklj [ . [u] 4, Fh kdZ : lhel [dk , 2000, k 35-38.

[j [ [ [N. К[е] [у] ye\_gb [ gZ\_ljb]hjb KKKJ. FhkDZ : <BGBLB , 1989, 148 k