GLACIOLOGICAL LITERATURE

THIS is a selected list of glaciological literature on the scientific study of snow and ice and of their effects on the Earth; for the literature on polar expeditions, and also on the "applied" aspects of glaciology, such as snow ploughs, readers should consult the bibliographies in each issue of *Recent Polar Literature* (supplement to the *Polar Record*). For Russian material the system of transliteration used is that agreed by the U.S. Board on Geographic Names and the Permanent Committee on Geographical Names for British Official Use in 1947. Readers can greatly assist by sending reprints of their publications to the Society, or by informing Dr J. W. Glen of publications of glaciological interest. It should be noted that the Society does not necessarily hold copies of the items in this list, and also that the Society does not possess facilities for microfilming or photocopying.

CONFERENCES

KARLSSON, T., *ed. Sea ice. Proceedings of an international conference. Sponsored by the National Research Council of Iceland. Cosponsored by the Bauer Scientific Trust with financial support from UNESCO. Reykjavik, Iceland, May 10–13, 1971.* Reykjavík, National Research Council, 1972. 309 p. [Contains the following papers: K. Aagaard, "On the drift of the Greenland pack ice", p. 17–22; T. Einarsson, "Sea currents, ice drift, and ice composition in the East Greenland Current", p. 23–32; J. Blindheim and R. J. Ljøen, "On the hydrographic conditions in the West Spitsbergen Current in relation to ice distribution during the years 1956–1963", p. 33–41; S. A. Malmberg, "Annual and seasonal hydrographic variations in the East Icelandic Current between Iceland and Jan Mayen", p. 42–54; N. Untersteiner, "Scientific plan for the Arctic Ice Dynamics Joint Experiment (AIDJEX)", p. 57–58; A. A. Lebedev and N. A. Uralov, "Methods of ice forecasting in the North Atlantic and adjacent seas", p. 59–61; N.A. Volkov, "On the state of long-range ice forecasting techniques", p. 62–66; T. Tabata, "Radar network for drift ice observation in Hokkaido", p. 67–71; T. Tabata, "Observations of deformation and movement of ice field with the sea ice radar network", p. 72–79; J. A. Heap, "International co-operation in sea ice observing, recording and reporting", p. 80–83; Moira Dunbar, "Increasing severity of ice conditions in Baffin Bay and Davis Strait and its effect on the extreme limits of ice", p. 87–93; P. Bergthórsson, "Advection of climate by ocean currents", p. 94–100; D. B. Lawrence, "Geographic distribution of some climatic aberrations", p. 101–11; E. H. Muller, "Implications of an ice-free polar basin", p. 112–17; D. Smithers, "Plans for a trans-Arctic hovercraft expedition", p. 118–22; W. S. Dehn, "Alaskan sea ice", p. 125–29; S. A. Malmberg, H. G. Gade and H. E. Sweers, "Current velocities and volume transport in the East Greenland Current off Cape Nordenskjöld in August–September 1965", p. 130–39; C. T. Fezzel and R. C. Kollmeyer, "Major iceberg-producing glaciers of west Greenland", p. 140–45; O. H. Løken, C. S. L. Ommanney and G. Holdsworth, "Iceberg studies in the Glaciology Subdivision, Environment Canada", p. 146–51; K. Watanabe, "An average pattern of extending and retreating of an ice area in the Sea of Okhotsk", p. 152–54; J. D. Bradford, "A preliminary report of the observation of sea ice pressure and its effect on merchant vessels under icebreaker escort", p. 154–58; T. Vilmundarson, "Evaluation of historical sources on sea ice near Iceland", p. 159–69; Y. Suzuki and K. Fujino, "Water drag measurements of ice flow", p. 173 (abstract); T. Ishida, T. Tabata, Y. Suzuki, N. Ono and K. Fujino, "Preliminary tests of stress and strain measurement within ice sheet", p. 174–75; W. J. Campbell and L. A. Rasmussen, "A numerical model for sea ice dynamics incorporating three alternative ice constitutive laws", p. 176–87; T. Karlsson, "A viscoelastic-plastic material model for drifting sea ice", p. 188–95; E. Banke, "Wind stress over sea ice and over water in the Beaufort Sea", p. 196–97 (summary); W. W. Knapp, "Satellite observations of large polynyas in polar waters", p. 201–12; R. D. Ketchum, Jr., and W. I. Wittmann, "Recent remote sensing studies of the east Greenland pack ice", p. 213–26; E. Palosuo, "Determination of surface profile of sea ice by stereoscopic photography", p. 227–28; D. C. Archibald, "An aerial reconnaissance platform with remote sensors for the Canadian ice reconnaissance program", p. 229–36; A. D. Super, "On problems of a North American Arctic marine transportation system", p. 239–40; R. A. Lake and E. L. Lewis, "The microclimate beneath growing sea ice", p. 241–45; C. W. M. Swithinbank, "Arctic pack ice from below", p. 246–54; P. Wadhams, "Measurement of wave attenuation in pack ice by inverted echo sounding", p. 255–60; W. D. Hibler III, "Two dimensional statistical analysis of Arctic sea ice ridges", p. 261–75; A. Kovacs, "On pressured sea ice", p. 276–95.]

[UNION GÉODÉSIQUE ET GÉOPHYSIQUE INTERNATIONALE.] *Union Géodésique et Géophysique Internationale. Association Internationale d'Hydrologie Scientifique. Commission de Neiges et Glaces. Symposium on the Hydrology of Glaciers, Cambridge, 7–13 September 1969, organized by the Glaciological Society.* Gentbrugge, Association Internationale d'Hydrologie Scientifique, 1973. 262 p. (Publication No. 95 de l'Association Internationale d'Hydrologie Scientifique.) [For details of individual papers see elsewhere in this list.]

WHALLEY, E., *and others, ed. Physics and chemistry of ice: papers presented at the Symposium on the Physics and Chemistry of Ice, held in Ottawa, Canada, 14–18 August 1972. Edited by E. Whalley, S. J. Jones, L. W. Gold.* Ottawa, Royal Society of Canada, 1973. xiii, 403 p. [For details of individual papers see elsewhere in this list.]

GENERAL

CURRAN, R. J., *and others.* Mars: Mariner 9 spectroscopic evidence for H_2O ice clouds, by R. J. Curran, B. J. Conrath, R. A. Hand, V. G. Kunde, J. C. Pearl. *Science*, Vol. 182, No. 4110, 1973, p. 381–83. [Observed spectra consistent with transmission through clouds of ice particles of mean radius 2 μm.]

DANIELLS, R. The image of ice in literature. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 3–6.) [Review of how ice is used in literature, particularly Canadian literature. Text of after-dinner speech at symposium.]

GRIN, A. M., *and* IVANOVSKAYA, E. N. Review of mountain hydrology studies in the U.S.S.R. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 233. [Title only.]

KRASTANOV, L. K., *and others*. Can water drops and ice crystals be formed in the Venus atmosphere? By L. K. Krastanov, S. V. Todorova, L. G. Yuskesselieva. *Doklady Bolgarskoy Akademii Nauk*, Tom 26, No. 6, 1973, p. 759–60. [Discusses possibilities and concludes ice crystal formation is more probable.]

ØSTREM, G. A review of present work in the field of "engineering glaciology". *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 225. [Title only.]

OWEN, T. Ice in astronomy. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice . . . .* Ottawa, Royal Society of Canada, 1973, p. 117–26.) [Survey of experimental and theoretical ideas on presence of ice in interstellar space, on planets and satellites and in comets.]

TRONOV, M. V. Nekotoryye voprosy primeneniya printsipa aktualizma v glyatsiologii [Some problems of application of the actualism principle in glaciology]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 98–103. [Discusses use of principle. English summary, p. 103.]

YOHE, G. R. The catalyst. *Chemistry*, Vol. 46, No. 8, 1973, p. 8–11. [A science fiction story about a civilization which alters water so as to produce an ice denser than water and how this leads to destruction of life.]

GLACIOLOGICAL INSTRUMENTS AND METHODS

BILGRAM, J. H. Perfect highly doped ice crystals by the Czochralski method. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice . . . .* Ottawa, Royal Society of Canada, 1973, p. 246–50.) [Method of growing ice crystals with no brine inclusions or low-angle boundaries.]

CHANG, E. T., *and others. Construction and operation of an improved ice calorimeter*, [*by*] *E. T. Chang, N. A. Gokcen and C. D. Robison*. Los Angeles, Los Angeles Air Force Station. Air Force Systems Command. Space and Missile Systems Organization, 1972. vi, 35 p. [Describes in detail the construction, calibration and operation of an improved Bunsen-type calorimeter.]

GOODMAN, R. H., *and* TERROUX, A. C. D. Use of radio-echo sounder techniques in the study of glacial hydrology. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 149. [Abstract. Field tests with modified SCR-718 radar altimeter indicated feasibility for studying temperate valley glaciers.]

JATILA, E. Experimental study on the measurement of snowfall by radar. *Geophysics*, Vol. 12, No. 2, 1973, p. 141–50. [Shows that this is possible, especially if the radar measurements are calibrated by a reference gauge on the ground.]

KIMURA, T. Rezā bīmu ni yoru setsumen kenshutsu [Snow surface detection by laser beam]. *Seppyō*, Vol. 35, No. 3, 1973, p. 129–36. [Describes new detector for studying changes in snow depth and density during snowfall and results obtained with it. English summary, p. 135–36.]

KRANTS, B. G., *and* FREYDLIN, V. S. K organizatsii nablyudeniy na stokovoy ploshchadke [Organization of observations at the run-off plot]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 200–01. [Describes field tests with new instrument on Lednik Dzhankuat. English summary, p. 201.]

MACAULEY, H. A. A total-time approach for estimating depth to bedrock in glaciated mountain valleys. *Canadian Journal of Earth Sciences*, Vol. 10, No. 8, 1973, p. 1333–37. [Seismic method for estimating thickness of unconsolidated material in formerly glaciated valleys.]

MUROZUMI, M., *and* NAKAMURA, S. Kariumu no dōitai kishaku shitsuryō bunseki [Isotope dilution mass spectrometry of potassium]. *Bunseki Kagaku: Japan Analyst*, [Vol.] 22, [No.] 2, 1973, p. 145–51. [Description of method for determination at ppb level and results for Antarctic and Greenland samples. English summary, p. 151.]

ØSTREM, G. Satelittbilder—et nytt glasiologisk verktøy. *Vannet i Norden*, Nr. 2, 1973, p. 19–23. [Describes the use of satellite photographs in various spectral bands to give glaciological information.]

ROBERTSON, C. E. The reliability of an optical technique for measuring snowfall rates. *Journal of Applied Meteorology*, Vol. 12, No. 3, 1973, p. 553–55. [Device provides reliable measure only when the crystals are unrimed.]

SAUNDERS, C. P. R., *and* WAHB, N. M. A. The replication of ice crystals. *Journal of Applied Meteorology*, Vol. 12, No. 6, 1973, p. 1035–39. [Discusses ways of improving technique to avoid crystal growth and flocculation during replication.]

TEMNIKOV, S. N. O vozmozhnosti ispol'zovaniya sputnikovykh fotografiy pri kartirovanii snezhnogo i ledyanogo pokrova [On the possibility of using satellite photographs for mapping snow and ice cover]. *Okeanologiya*, Tom 13, Vyp. 3, 1973, p. 517–23. [Examples from Kazakhskaya S.S.R. and Aral'skoye More. English summary, p. 523.]

PHYSICS OF ICE

ACKLEY, S. F. Microhardness testing on ice single crystals. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice . . . .* Ottawa, Royal Society of Canada, 1973, p. 382–86.) [Measurement of Knoop hardness on various faces of ice single crystal and its variation with time.]

ALDRICH, H. S., *and others*. An LCAO-MO model for excess electrons in ice and water, [by] H. S. Aldrich and L. P. Gary and L. C. Cusachs. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice . . . .* Ottawa, Royal Society of Canada, 1973, p. 161–64.) [Theory of behaviour of an excess electron in a region of ice structure gives results in reasonable agreement with data on hydrated electrons.]

ALKIRE, B. D. Mechanical properties of sand-ice materials. *Dissertation Abstracts International*, B, Vol. 34, No. 2, 1973, p. 651–B. [Shear-strength, constant strain-rate and creep tests, both uniaxial and confined, on samples with various void ratios and ice contents. Abstract of Ph.D. thesis, Michigan State University, 1972. University Microfilms order no. 73-12656.]

ALLEN, L. C. Structural models for vitreous ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 13–18.) [Discusses the possible structures.]

ARNAU, J. L., *and* GIGUÈRE, P. A. Vibrational spectra and crystal structure of the dihydrate $H_2O_2 \cdot 2H_2O$. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 66–69.) [Study of hydrogen bonding in this hydrate which has similarities with ice.]

AUVERT, G., *and* VILLAIN, J. Entropy and correlation functions of ice Ih completely polarized in the *c* direction. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 303–05.) [Calculation of entropy in ice Ih if bonds parallel to *c*-axis are completely ordered but others obey Bernal–Fowler rules.]

AVIGNON, M. Shape stability of a two-dimensional nucleus. *Journal of Crystal Growth*, Vol. 13–14, 1972, p. 113–20. [Theoretical study of growth of disk-shaped nucleus on a substrate. Theory also applicable to disc nuclei of ice growing in supercooled water.]

BAKHANOVA, R. A., *and* KISELEV, V. I. IK-spektry vody adsorbirovannoy na iodistom serebre i floroglyutsine [Infra-red spectra of water adsorbed on silver iodide and phloroglucinol]. *Kolloidnyy Zhurnal*, Tom 35, Vyp. 4, 1973, p. 632–36. [Water adsorbed on these solids assumes ice Ih structure at positive Celsius temperatures. Deduction of hydrogen bond energy. English summary, p. 636.]

BARNAAL, D. [Discussion.] (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 222–25.) [Measurements of spin-lattice relaxation of HF-doped ice show change in activation energy.]

BERTIE, J. E., *and others*. The infrared spectra of ethylene oxide hydrate and hexamethylenetetramine hydrate at 100 K, [by] J. E. Bertie, D. A. Othen and M. Solinas. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 61–65.) [Study of far infra-red spectra of these two clathrate hydrates to deduce information about hydrogen bonds stretching modes including effects of deuteration.]

BLAIR, D. N., *and others*. Cloud chamber test of generators using acetone solutions of AgI-NaI, AgI-KI and AgI-NH_4I, [by] D. N. Blair, B. L. Davis and A. S. Dennis. *Journal of Applied Meteorology*, Vol. 12, No. 6, 1973, p. 1012–17. [AgI aerosol from AgI-NH_4I solutions nucleates at higher temperature than that from other solutions tested.]

BONED, C., *and* BARBIER, A. A study of the change with time of the dielectric properties of polycrystalline ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 208–11.) [Conductivity of ice changes with time after sample preparation, and activation energy also changes.]

BOROSON, H. R. Pulsed neutron experiment in D_2O water and ice. *Dissertation Abstracts International*, B, Vol. 33, No. 10, 1973, p. 4830–B [Values of diffusion coefficient and cooling coefficient for neutrons in D_2O ice down to −50° C. Evidence for discontinuity in cooling coefficient on freezing. Abstract of Ph.D. thesis, University of Maryland, 1972. University Microfilms order no. 73-9679.]

BOSI, P., *and others*. Lattice dynamics of hydrogen-bonded crystals: ice Ih, [by] P. Bosi, R. Tubino and G. Zerbi. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 98–102.) [Preliminary calculations of phonon dispersion curves in a model which ignores proton disorder.]

CAMPLIN, G. C., *and* GLEN, J. W. The dielectric properties of HF-doped single crystals of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 256–61.) [Experiments on dielectric properties of HF-doped ice show high-frequency dispersion as well as Debye dispersion. Results interpreted in terms of defect movements in ice.]

CHAMBERLAIN, J. S., *and others*. Neutron-diffraction study of H_2O ice at 77 K, [by] J. S. Chamberlain, F. H. Moore and N. H. Fletcher. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 283–84.) [HF-doped ice at 77 K shows neutron diffraction consistent with Pauling's statistical structure.]

COTTERILL, R. M. J., *and others*. Computer studies of perfect-crystal properties and defect structures in ice I, [by] R. M. J. Cotterill, J. W. Martin, O. V. Nielsen and O. B. Pedersen. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 23–27.) [Calculation of elastic stiffnesses and of defect energy.]

ECKENER, U., *and others*. Transit time measurements of protons in ice, [by] U. Eckener, D. Helmreich and H. Engelhardt. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 242–45.) [Measurement of drift mobility of injected protons.]

ENGELHARDT, H. Protonic conduction in ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 226–35.) [Survey of experimental data and new data suggests effect is due to impurities.]

EVRARD, G. Changes in the dielectric properties of ice formed by supercooling breakdown. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 199–203.) [Ice formed from supercooled droplets in an emulsion shows activation of dielectric relaxation which changes with time by series of quantized steps related to quantized temperatures of breakdown of supercooling.]

FLETCHER, N. H. The surface of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 132–36.) [Review of experimental and theoretical arguments for a quasi-liquid layer on ice surface and calculation of its thickness. Other possible substances that may show effect.]

FRANKS, F., *ed. Water: a comprehensive treatise. Vol. 2. Water in crystalline hydrates; aqueous solutions of simple non-electrolytes*. New York, London, Plenum Press, 1973. xix, 684 p. [Contains chapters on: "Water in stoichiometric hydrates", by M. Falk and O. Kopp, p. 55–113; "Clathrate hydrates", by D. W. Davidson, p. 115–234.]

FUKUDA, A., *and* HIGASHI, A. Dynamical behavior of dislocations in ice crystals. *Crystal Lattice Defects*, Vol. 4, No. 3, 1973, p. 203–10. [Velocity of dislocations measured and found to be proportional to stress.]

GARG, S. K., *and* DAVISON, D. W. N.M.R. properties of clathrate ices. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 56–60.) [Proton magnetic resonance study of the rotation and diffusion of water molecules in ice-like cage, and resonance studies of guest molecules.]

GENADIEV, N., *and others.* Sravneniye l'doobrazuyushchey aktivnosti chastits CuS, nakhodyashch ikhsya vnutri i na poverkhnosti pereokhlazhdennykh vodyanykh kapel' [Comparison of the ice-forming activity of CuS particles found inside and on the surface of supercooled water drops]. [By] N. Genadiev, L. Levkov, F. Anyzh. *Izvestiya Akademii Nauk SSSR. Fizika Atmosfery i Okeana*, Tom 9, No. 1, 1973, p. 98–100. [Method of introducing CuS particles affected freezing temperature of drop. English translation in *Izvestiya, Academy of Sciences, U.S.S.R. Atmospheric and Oceanic Physics*, Vol. 9, No. 1, 1973, p. 51–52.]

GENADIEV, N., *and others.* Über die Möglichkeit von Eisbildung auf PbI_2-Teilchen, [von] N. Genadiev, V. Dobisik, R. Pribil. *Doklady Bolgarskoy Akademii Nauk*, Tom 26, No. 7, 1973, p. 879–81. [Experimental study of ice nucleating ability of PbI_2 particles.]

GLEN, J. W. Closing remarks. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 400–01.) [Discussion of areas in ice physics shown in the symposium to need further study.]

GOLD, L. W. Activation energy for creep of columnar-grained ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 362–64.) [Measurement gives value consistent with deformation being controlled by diffusion process.]

GOUGH, S. R. [Discussion.] (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 220–21.) [Temperature variation of high-frequency limit of dielectric permittivity and its explanation.]

GOUGH, S. R., *and* DAVIDSON, D. W. Dielectric properties of clathrate ices. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 51–55.) [Survey of these properties and comparison with those of ice phases.]

GOVINDARAJAN, J., *and* HARIDASAN, T. M. Lattice dynamics of hexagonal ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 103–08.) [Theoretical calculation in which measured elastic constants are used to deduce molecular force constants and hence to derive phonon frequency distribution.]

GROSS, G. W. The role of atmospheric carbon dioxide in the charge separation and charge storage in ice. (*In* Perlman, M. M., *ed. Electrets, charge storage and transport in dielectrics.* Princeton, N.J., Electrochemical Society, Inc., 1973, p. 560–69.) [Effect of dissolved CO_2 by itself and in association with NH_3 or alkali metal ions on the dielectric properties of ice and relation to freezing-potential effects.]

HAIDA, O., *and others.* Enthalpy relaxation at glass transition temperature of heavy ice crystal, by O. Haida H. Suga and S. Seki. *Proceedings of the Japan Academy*, Vol. 49, No. 3, 1973, p. 191–95. [Anomalous temperature drift and annealing of heat capacity of D_2O ice studied. Heat capacity anomaly is 20 K higher than for H_2O ice and order attained similar. Activation energy of relaxation process is 26 ± 5 kJ mol^{-1}.]

HARDIN, A. H., *and* HARVEY, K. B. Temperature dependence of the ice I hydrogen bond spectral shifts—I. The vitreous to cubic ice I phase transformation. *Spectrochimica Acta*, Pt. A, Vol. 29A, No. 6, 1973, p. 1139–51. [Changes in the infra-red spectra found for H_2O and D_2O ice and interpreted in terms of H-bond changes.]

HELMREICH, D. Imperfection-induced phase transformation in D_2O ice Ih. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 291–94.) [Ultrasonic measurements on pure H_2O and pure and HF-doped D_2O ice crystals show anomaly below 150 K in HF-doped samples.]

HIGASHI, A., *and others.* Kōri takesshō no hizumi shōdon ni yoru kesshō seichō [Grain growth in polycrystalline ice subjected to repreated processes of strain-annealing]. [By] A. Higashi, A. Fukuda, H. Shōji, N. Kiso. *Seppyō*, Vol. 35, No. 3, 1973, p. 117–28. [Experimental study of size and orientation of recrystallized grains produced by strain-annealing ice at various temperatures. English summary, p. 127–28.]

HINDMAN, J. C., *and* SVIRMICKAS, A. Relaxation processes in water. Spin-lattice relaxation of D_2O in supercooled water. *Journal of Physical Chemistry*, Vol. 77, No. 20, 1973, p. 2487–89. [Behaviour measured down to homogeneous nucleation temperature. Activation energy similar to that of ice but activation entropy much larger.]

HUBER, H., *and others.* Channeling of H^+, D^+, and He^+ in ice: surface disorder and chlorine location, [by] H. Huber, C. Jaccard and M. Roulet. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 137–39.) [Experiments on freshly sublimated ice surface show presence of disordered layer. Evidence that Cl impurity in HCl-doped ice is substitutional.]

HUFFMAN, P. J. Supersaturation spectra of AgI and natural ice nuclei. *Journal of Applied Meteorology*, Vol. 12, No. 6, 1973, p. 1080–82. [Measurements show variation of ice nucleus concentration with temperature is real and primarily due to a supersaturation dependence.]

HUIGE, N. J. J., *and others.* Nucleation and growth kinetics for the crystallization of ice from dextrose solutions in a continuous stirred tank crystallizer with supercooled feed, by N. J. J. Huige, M. M. Senden, H. A. C. Thijssen. *Kristall und Technik*, 8. Jahrg., Ht. 7, 1973, p. 785–801. [Experiments analysed to give nucleation and growth rates as function of supercooling, concentration and amount of solid present.]

ISOBE, S. Evaporation of dirty ice particles surrounding early type stars. V. Variety of interstellar extinction curves. *Publications of the Astronomical Society of Japan*, Vol. 25, No. 2, 1973, p. 253–70. [Observed extinction curves agree well with theory based on graphite and ice grains.]

JOHARI, G. P., *and* WHALLEY, E. Orientational order in ice I, V, VI, and VII. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 278–82.) [Ice VI appears to be partly ordered at all temperatures, ice VII has some correlation beyond the Bernal–Fowler rules, but ices Ih and V show no signs of ordering.]

JONES, B. R. Adsorption on ice from solution and from the gas phase. *Dissertation Abstracts International*, B, Vol. 33, No. 12, Pt. 1, 1973, p. 5753-B–54-B. [Experiments on the adsorption of p-phenylazoaniline on ice both from n-hexane solution and from the gas phase show a change at $-35°$ C above which a liquid-like layer is

postulated on the ice surface. Experiments on CO_2 adsorption show that, at higher pressures, a slow massive uptake of CO_2 occurs attributable to the formation of the solid gas hydrate. Abstract of Ph.D. thesis, University of Southern California, 1973. University Microfilms order no. 73-14415.]

JONES, D. R. H. The temperature-gradient migration of liquid droplets through ice. *Journal of Crystal Growth*, Vol. 20, No. 2, 1973, p. 145–51. [Experiments with NaCl, KCl and HCl droplets. Rate controlled largely by solute transport through liquid, though in some cases crystal defects are important.]

JONES, S. J., *and* GILRA, N. K. Dislocations in ice observed by X-ray topography. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 344–49.) [Measurement of Burgers vectors. Effect of HF doping and strain.]

KAMB, W. B. Crystallography of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 28–41.) [Survey of our knowledge of the structures of the high pressure phases of ice and of the proton ordering that occurs in them. Discussion of ice I and short-range order found in it by neutron diffuse scattering.]

KAWABATA, K., *and others*. Radiation produced traps in crystalline ice, [by] K. Kawabata, S. Okabe and H. Horii. *Chemical Physics Letters*, Vol. 20, No. 6, 1973, p. 586–88. [Pulsed electron irradiation gives optical absorbance per pulse which increases with repeated pulses at 106 K. Traps disappear on annealing below 140 K.]

KEVAN, L. Properties of trapped and mobile electrons in pure ice and in alkaline ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 156–60.) [Studies of trapped electrons in γ-irradiated ice crystals and glassy alkaline ice; measurements of mobility of photoexcited electrons in alkaline ice.]

KHOKONOV, KH. L., *and others*. Kontaktnoye plavaniye v kriogidratnykh sistemakh [Contact melting in cryohydrate systems]. [By] Kh. L. Khokonov, A. A. Shebzukhov, P. A. Savintsev. *Zhurnal Fizicheskoy Khimii*, Tom 47, Vyp. 4, 1973, p. 1051–52. [Abstract. Measurement of rates of contact melting of ice with single and polycrystals of KCl, KBr, KI, NaCl and NaBr. Full paper deposited with VINITI (Vsesoyuznogo Institut Nauchnoy i Tekhnicheskoy Informatsii).]

KLINGER, J. Thermal conductivity of ice single crystals at low temperatures. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 114–16.) [Measurements on pure and HF-doped crystals show that conductivity change on doping develops with time.]

KLUG, D. D., *and* WHALLEY, E. The effect of orientational correlation on the far-infrared spectrum of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 93–97.) [Calculation of far-infra-red absorptivity of ice Ih due to translational vibrations taking into account disorder of protons.]

KOBAYASHI, T. Spiral steps and VLS growth observed on ice surfaces treated with AgI-NH_4I. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 149–55.) [Study of spiral steps and multiple terraces formed on basal plane of ice growing on slides treated with a solution of AgI and NH_4I in acetone.]

KUO, SHIOU-SAN. Stress and time effect on the creep rate of polycrystalline ice. *Dissertation Abstracts International*, B, Vol. 33, No. 11, 1973, p. 5279–B. [Uniaxial and triaxial creep tests at −4.45° C. Deduction of a creep equation. Confirmation of use of octahedral stress and strain in creep under triaxial conditions. Abstract of Ph.D. thesis, Michigan State University, 1972. University Microfilms order no. 73-12756.]

KUON, L. G., *and* JONAS, J. J. Effect of strain rate and temperature on the microstructure of polycrystalline ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 370–76.) [Study of structure of ice extruded at various rates and temperatures.]

KVAJIĆ, G., *and others*. Selective growth of ice crystals from dilute water solution, [by] G. Kvajić and V. Brajović, M. Milošević-Kvajić and E. R. Pounder. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 251–55.) [Observations of preferential growth of one crystal orientation when bicrystals grow in salt solution.]

LANGDON, T. G. Creep mechanisms in ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 356–61.) [Review of possible creep mechanisms in ice.]

LARIONOV, B. A. Ob intensivnosti massoperenosa v protsesse sublimatsionnoy sushki [Intensity of mass transfer during sublimation drying]. *Teplo- i Massoperenos*, Tom 6, 1972, p. 392–96. [Equations for calculating parameters governing sublimation rate of ice from capillary-porous material.]

LAYTON, R. G. Ice nucleation by silver iodide: a new size effect. *Journal of Colloid and Interface Science*, Vol. 45, No. 1, 1973, p. 215–16. [Reduction of effectiveness of nucleation with very small film thickness or particle size due to limitation on source of change in bulk.]

LEBEDEV, D. P., *and* DERKACHEV, V. I. Teplo- i massoobmen pri sublimatsii v vakuume iz pronitsayemoy plastiny [Heat and mass transfer during vacuum sublimation from a permeable plate]. *Teplo- i Massoperenos*, Tom 6, 1972, p. 364–73. [Model of process derived.]

LE PETIT, J. P. Microwave dielectric study of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 204–07.) [Discontinuities in dielectric permittivity of its variation with temperature observed in ice formed from supercooled water at definite quantized temperatures.]

MAENO, N. Measurements of surface and volume conductivities of single ice crystals. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 140–43.) [Measurement of electrical surface conductivity shows no orientation dependence, but is affected by air evacuation or chemical treatment.]

MATSUO, T., *and others*. Relaxational proton ordering in two-dimensional and three-dimensional ices, [by] T. Matsuo, M. Oguni, O. Haida, H. Suga and S. Seki. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 272–77.) [Measurement of specific heat capacity of ice and of a hydrated salt with ice-like water bonding. In ice there is evidence of an anomaly near 100 K.]

MILLER, S. L. The clathrate hydrates—their nature and occurrence. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 42–50.) [Survey of various clathrate structures and conditions of their formation. Discussion of where they may occur naturally in the solar system, deep in Antarctica and beneath permafrost.]

MINAGAWA, I. A theory of the mobility of $(H_3O)^+$ defects in ice crystal. *Journal of the Physical Society of Japan*, Vol. 35, No. 2, 1973, p. 357–63. [Theory of movement of H_3O^+ defect via proton tunnelling in ice taking account of both coherence in successive tunnelling steps and randomness of transfer direction.]

MOGENSEN, O., *and* ELDRUP, M. Positronium interaction with defects and impurities in ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 165–69.) [Studies of positronium annihilation in polycrystalline, single crystal and doped ice. Evidence for trapping in defects in the ice structure.]

MORACHEVSKIY, V. G., *and others*. Adsorbtsiya vody na l'doobrazuyushchikh poverkhnostyakh [Adsorption of water on ice-forming surfaces]. [By] V. G. Morachevskiy, N. A. Dubrovich, A. G. Popov, A. N. Potanin. *Kolloidnyy Zhurnal*, Tom 35, Vyp. 4, 1973, p. 779–81. [Infra-red spectroscopy used to study water adsorption on metaldehyde and silver iodide. English summary, p. 781.]

MORIOKA, Y., *and others*. Freezing of the capillary liquid condensing in fine pores, [by] Y. Morioka, J. Kobayashi and I. Higuchi. *Journal of Colloid and Interface Science*, Vol. 42, No. 1, 1973, p. 156–64. [Theory assuming conical pores developed and compared with experiments on, among others, water in porous glass.]

NAGLE, J. F. Improved calculations of the dielectric constant of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 175–78.)

NAKAMURA, T., *and* JONES, S. J. Mechanical properties of impure ice crystals. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 365–69.) [Constant strain-rate tests on ice with various doping impurities. HF, HCl and H_2O_2 showed softening, He a hardening. Other impurities had no measurable effect.]

NOLL, G. Influence of plastic deformation on the electrical properties of ice Ih single crystals. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 350–55.) [No effect observed in Debye dispersion, but some in space-charge range though smaller than the ageing effect.]

NYE, J. F. The motion of ice past obstacles. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 387–94.) [Theory of the passage of objects through ice by pressure-melting and refreezing and of the experimental evidence which indicates the need for more sophisticated theory.]

OFFENBACHER, E. L., *and others*. Friction, deformation, and recrystallization of single crystals of ice Ih under stress, [by] E. L. Offenbacher, I. C. Roselman and D. Tabor. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 377–81.) [Observations of recrystallization of ice single crystals during friction on a glass plate.]

OGURO, M., *and* HIGASHI, A. Stacking-fault images in NH_3-doped ice crystals revealed by X-ray diffraction topography. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 338–43.) [X-ray diffraction topographs of stacking faults of various types and their ageing.]

ONSAGER, L. Introductory lecture. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 7–12.) [Introductory survey of present state of understanding of structure and defects of ice.]

PALUCH, I. R., *and* SARTOR, J. D. Thunderstorm electrification by the inductive charging mechanism: I. Particle charges and electric fields. *Journal of the Atmospheric Sciences*, Vol. 30, No. 6, 1973, p. 1166–73. [Theory of ice particle charge acquired by successive collisions in electric field.]

PAREN, J. G. The electrical behavior of polar glaciers. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 262–67.) [Ice in polar glaciers has dielectric properties which differ from those of temperate glaciers. Impurities or thermal history discussed as possible reasons.]

PARUNGO, F. P., *and* PUESCHEL, R. F. Ice nucleation: elemental identification of particles in snow crystals. *Science*, Vol. 180, No. 4090, 1973, p. 1057–58. [Scanning field-emission electron microscope and X-ray analyser used to identify nuclei.]

PASSARELLI, R. E., *jr., and others*. Ice nucleation by solid solutions of silver-copper iodide, by R. E. Passarelli, Jr., H. Chessin, B. Vonnegut. *Science*, Vol. 181, No. 4099, 1973, p. 549–51. [Lattice misfit between ice and substrate reduced by substitution of Cu for Ag. Optimum nucleation agrees with best fit.]

PAVALOW, M., *and* ZAJAC, A. [Discussion.] (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 128–31.) [X-ray diffuse reflections used to determine anisotropy of oxygen vibrations and amplitude of hydrogen vibrations in ice.]

PLUMMER, P. L. M. Calculated intermolecular frequencies for clathrate and icelike water clusters. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 109–13.) [Calculation of how frequency distribution varies with number of molecules in cluster. Results may help explain difficulty of homogeneous nucleation of ice.]

RENKER, B. Lattice dynamics of hexagonal ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 82–86.) [Results for phonon dispersion curves of D_2O ice Ih from inelastic neutron scattering.]

RIEHL, N., *and others*. [Discussion.] [By] N. Riehl, P. Stächelin and E. Hahne. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 170–72.) [Use of luminescent dyes to identify liquid, or easily melted, regions on surface of ice crystals, within polycrystalline ice, and on passing a stressed wire through ice.]

ROZENTAL', O. M. Pereraspredeleniye ionov v kristallizatsionnoy yacheyke pri obrazovanii l'da v vode i rastvorakh [Redistribution of ions in a crystallization cell during the formation of ice in water and solutions]. *Zhurnal Fizicheskoy Khimii*, Tom 47, Vyp. 7, 1973, p. 1744–47. [Interfacial potential difference measured

during vertical freezing of solutions both upwards and downwards. Convection suppresses electrocrystallization phenomenon.]

ROZENTAL', O. M. Svyaz' strukturnykh svoystv ionnykh rastvorov s l'doobrazovaniyem [Relation of the structural properties of ionic solutions to ice formation]. *Zhurnal Strukturnoy Khimii*, Tom 14, Vyp. 5, 1973, p. 797–801. [Velocity of ice growth related to structure of solid phase.]

RUEPP, R. Electrical properties of ice Ih single crystals. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 179–86.) [Study of dielectric properties of pure and HF-doped ice crystals. Ageing effects found.]

SALA, I. On the buckling of a centrally loaded straight bar in the visco-elastic range. *Geophysica*, Vol. 12, No. 2, 1973, p. 177–88. [Theory and application to bars of wood and ice.]

SALA, I., *and* OLKKONEN, E. On the visco-elastic properties of ice and wood. *Geophysica*, Vol. 11, No. 2, 1971, p. 249–60. [Compression tests on ice frozen from tap water show behaviour which can be fitted to a visco-elastic model previously obtained for wood.]

SANTRY, D. P. Molecular-orbital studies on ice Ih. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 19–22.) [Calculations of differences in bond angle and length between ice Ih and isolated water molecule.]

SCHMIDT, V. H. Deuteron n.m.r. relaxation in D_2O ice Ih. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 212–17.) [Spin-lattice relaxation time and time for deuterons on bonds parallel to *c*-axis to mix with other deuterons determined.]

SIXOU, P., *and* JENEVEAU, A. Electric polarization and depolarization effects in pure and doped ice at low temperature: dipolar relaxation and ferroelectricity. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 295–302.) [Experiments and their interpretation.]

TAKAHASHI, T. Electrification of growing ice crystals. *Journal of the Atmospheric Sciences*, Vol. 30, No. 6, 1973, p. 1220–24. [Studies in ionized air of various ion concentrations during condensation and evaporation of ice. Results attributed to negative surface potential of ice due to charged dislocations at the ice surface.]

TAKAHASHI, T. The surface potential of ice and charge generation processes in clouds. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 144–48.) [Study of electric charge acquired by ice sphere or water sphere in ionized air, and by melting ice. Possible relation to thunderstorm electricity.]

TAUBENBERGER, R. Aging effects of electric properties of ice Ih single crystals. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 187–93.) [Dielectric measurements at various pressures showed ageing effects below 100 Hz.]

TAUBENBERGER, R., *and others*. Effect of hydrostatic pressure on the dielectric properties of ice Ih single crystals, [by] R. Taubenberger, M. Hubmann and H. Gränicher. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 194–98.) [Study of dielectric properties of pure and HF-doped ice crystals. Pressure variation supports Jaccard's theory.]

VIAUX, P. Eksperimental'noye izucheniye neustoychivosti poverkhnosti razdela voda-led [Experimental study of the instability of an interface between water and ice]. *Teplo- i Massoperenos*, Tom 9, Chast' 1, 1972, p. 218–32. [Method of microscopical observation of interface and results for differing temperature conditions.]

VILLAIN, J., *and* SCHNEIDER, J. Correlation functions in nonpolar ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 285–90.) [Theory of what correlation in proton positions the Bernal–Fowler rules predict, and how this would be altered by weak long-range forces.]

VLAHAKIS, J. G. The anomalous growth of ice crystals in flowing NaCl solutions. *Dissertation Abstracts International*, B, Vol. 33, No. 10, 1973, p. 4790–B. [Basal plane growth rate of ice crystals measured in flowing supercooled water and NaCl solutions. Results show rate in solutions is larger than that predicted by theory which assumes convective heat transfer is controlling mechanism. Abstract of Ph.D. thesis, Syracuse University, 1973. University Microfilms order no. 73-9573.]

VON HIPPEL, A. R., *and others*. Ice chemistry: is ice Ih a proton semiconductor? [By] A. [R.] Von Hippel, A. H. Runck and W. B. Westphal. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 236–41.) [New dielectric measurements suggest ice is not a proton semiconductor.]

WEERTMAN, J. Creep of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 320–37.) [Review of constant stress and constant strain-rate data for ice deformation and of dislocation theories of ice creep.]

WEY, JONG-SHINN. The batch crystallization of ice from brine solution. *Dissertation Abstracts International*, B, Vol. 34, No. 1, 1973, p. 204-B–05-B. [Study of particle size distribution shows nucleation rate depends on level of agitation and supersaturation but only slightly upon surface area of existing crystals. Abstract of Ph.D. thesis, Clarkson College of Technology, 1973. University Microfilms order no. 73-14856.]

WEY, JONG-SHINN, *and* ESTRIN, J. Modeling the batch crystallization process. The ice-brine system. *Industrial and Engineering Chemistry. Process Design and Development*, Vol. 12, No. 3, 1973, p. 236–46. [Theory of process constructed and solved numerically. Size distributions are determined by heat transfer properties of crystallizer, level of agitation, coolant temperature and number of seeds.]

WHALLEY, E. Lattice dynamics of ice. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 73–81.) [Survey of present knowledge of vibrational excitations in ice and of complications in interpretation due to proton disorder.]

WONG, P. T. T., *and others*. The Raman spectrum of the translational lattice vibrations of ice Ih, [by] P. T. T. Wong, D. D. Klug and E. Whalley. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice* . . . . Ottawa, Royal Society of Canada, 1973, p. 87–92.) [Interpretation of laser Raman spectra of H_2O and D_2O ice Ih to give phonon dispersion curves.]

LAND ICE. GLACIERS. ICE SHELVES

AGETA, Y. Nankyoku no shitsuryō shūshi to kongo no kadai [Mass balance of Antarctic ice sheet and future research problems]. *Seppyō*, Vol. 33, No. 4, 1971, p. 205–14.

ALESHIN, A. S. Opyt seysmicheskikh rabot na lednike Dzhankuat [Experimental seismic studies on Lednik Dzhankuat]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 213–15. [Firn–ice boundary clearly defined. English summary, p. 215.]

ALYAB'YEV, N. I., *and* ROTOTAYEV, K. P. Tayaniye poverkhnosti lednikov Kolka i Mayli posle bystroy podvizhki lednika Kolka osen'yu—zimoy 1969–70 g. [Superficial melting on Lednik Kolka and Lednik Mayli after the 1969–70 autumn–winter surge.] *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 131–35. [Caucasus. English summary, p. 135.]

AMBACH, W., *and others*. Seasonal variations in the tritium activity of run-off from an Alpine glacier (Kesselwandferner, Oetztal Alps, Austria), by W. Ambach, H. Eisner and M. Url. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 199–204. [Activity decreases during summer ablation, as water from old glacial ice has a lower tritium content than that from melted snow.]

APOLLONIO, S. Glaciers and nutrients in Arctic seas. *Science*, Vol. 180, No. 4085, 1973, p. 491–93. [Significantly higher concentrations of nitrate and silicate were found in glaciated waters.]

BARANOWSKI, S. Geyser-like water spouts at Werenskioldbreen, Spitsbergen. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 131–33. [Describes spouts, about 60 m high, occurring at noon on 28 July 1957, and suggests they were related to rainfall and strong ablation during the previous night.]

BAZHEV, A. B. Infiltration and run-off of melt water on glaciers. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . . 1973*, p. 245–50. [Describes field observations on glaciers in the Arctic, Pamir and Caucasus, and discusses results.]

BAZHEV, A. B. Rol' vnutrennego infil'tratsionnogo pitaniya v balanse massy lednikov i metody yego opredeleniya [The role of internal infiltration feeding in glacier mass balance and methods of measurement]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 219–31. [English summary, p. 230–31.]

BAZHEV, A. B. Zakonomernosti tayaniya iskusstvenno zapylennoy poverkhnosti lednika [Regularities in melting of artificially blackened snow and ice]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 124–35. [Describes results of artificial dusting of glaciers on increase of surface melting. English summary, p. 135.]

BAZHEV, A. B., *and others*. Variatsii izotopa O^{18} v tolshche Marukhskogo lednika (Zapadnyy Kavkaz) [The variations of isotope ^{18}O in the thickness of Lednik Marukh (western Caucasus)]. [By] A. B. Bazhev, F. G. Gordiyenko, K. Ye. Smirnov. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 198–203. [Presents and discusses results. English summary, p. 230.]

BERIKASHVILI, V. SH., *and others*. Raschet koeffitsiyenta otrazheniya ot lozha lednika s pomoshch'yu EBM [Calculations of the reflection coefficient from the glacier bed by an I.B.M. computer]. [By] V. Sh. Berikashvili, V. S. Luchininov, Yu. Ya. Macheret. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 236–40. [English summary, p. 240.]

BERTONE, M. Aspectos glaciologicos de la zona del hielo continental patagónico. *Contribución del Instituto Nacional del Hielo Continental Patagónico*, No. 1, 1972, [128] p. [Well-illustrated description of glaciological features of Patagonia, with particular reference to the area between the southern great lakes and the Pacific Ocean.]

CAMPBELL, W. J. Structure and inferred circulation of South Cascade Lake, Washington, U.S.A. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 259–62. [Study of dynamic interplay between South Cascade Glacier and its terminal lake.]

CAMPBELL, W. J., *and* RASMUSSEN, L. A. The production, flow and distribution of melt water in a glacier treated as a porous medium. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 11–27. [Relates melt-water outflow of a glacier to its meteorological environment and applies model to South Cascade Glacier with reasonable approximation.]

CARR, R. A., *and* WILKNISS, P. E. Mercury in the Greenland ice sheet: further data. *Science*, Vol. 181, No. 4102, 1973, p. 843–44. [New data support contention that the mercury content has not increased dramatically in recent years but rather is distributed nonhomogeneously through the ice sheet.]

CHERNOGAYEVA, G. M. The water balance of a high mountain glacierized territory, with reference to the Alps. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 231.) [Abstract. Describes method.]

CHERNOVA, L. P. Stok vzveshennykh nanosov v prilednikovoy zone [The run-off of suspended deposits in the proglacial zone]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 101–08. [Analyses data on deposits and silt in glacier-nourished rivers of the Caucasus, Soviet Central Asia, Norway and Baffin Island. English summary, p. 108.]

CHUDAKOV, V. I., *and* SHALYGIN, A. M. Nekotoryye rezul'taty radiolokatsionnykh issledovaniy pokrovnogo lednika [Some results of radar investigations of the ice sheet]. *Trudy Sovetskoy Antarkticheskoy Ekspeditsii*, Tom 59, 1973, p. 147–52. [Measurements along line from "Molodezhnaya" to "Bellingshausen" stations.]

CHURSKI, Z. Rozwój sieci wodnej na przedpolu lodowca Skeidarárjökull (Islandia) [Evolution of the hydrographic system in the Skeiðarárjökull forefield]. *Czasopismo Geograficzne*, Tom 44, Zeszyt 2, 1973, p. 271–89. [Distinguishes between four types of streams: glacier and groundwater streams, streams fed by water from dead ice, and those derived from spring snow melt. English summary, p. 288–89.]

DANSGAARD, W., *and others*. Stable isotope glaciology, by W. Dansgaard, S. J. Johnsen, H. B. Clausen and N. Gundestrup. *Meddelelser om Grønland*, Bd. 197, Nr. 2, 1973, 53 p. [Reviews basic relationships, geographical distribution of relative concentration of isotopes, and seasonal and climatic effects, and describes work of the Greenland Ice Sheet Program (G.I.S.P.).]

DAVIDOVICH, N. V., *and* POPOVA, V. S. Nekotoryye modifikatsii turbulentnogo obmena na gornum lednike [Some modifications of turbulent exchange on a mountain glacier]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 169–73. [Discusses meteorological factors affecting ablation of Lednik Gergetskiy. English summary, p. 173.]

DERIKX, L. Glacier discharge simulation by ground-water analogue. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 29–40. [Prediction of glacier run-off as the integral response of a glacier basin to variable weather conditions, and application to Peyto Glacier, Alberta, Canada.]

DIONNE, J.-C. La notion de pied de glace (icefoot) en particulier dans l'estuaire du Saint-Laurent. *Cahiers de Géographie de Québec*, Vol. 17, No. 41, 1973, p. 221–50. [Discusses problems in defining and classifying the term "icefoot" with particular reference to the two main types found in the St. Lawrence estuary.]

DOLGUSHIN, L. D., *and others*. Morfometricheskaya kharakteristika sovremennogo oledeneniya gor Sredney Azii [Morphometric characteristics of glacierization in the mountains of Central Asia]. [By] L. D. Dolgushin, G. B. Osipova, O. V. Rototayeva. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 169–84. [General survey of characteristics of glaciers in this area. English summary, p. 184.]

DOLGUSHIN, L. D., *and others*. Vliyaniye eolovoy zapylennosti lednikov i poverkhnostnoy moreny na tayaniye lednikov Sredney Azii [The influence of natural dusting and moraines on melting of glaciers in Central Asia]. [By] L. D. Dolgushin, I. M. Lebedeva, G. B. Osipova, O. V. Rototayeva. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 108–16. [Calculates natural dusting in ablation areas to be from 100 to 500 g/m². English summary, p. 115–16.]

DOROFEYEV, I. G. Izmeneniya ob"yema l'da lednika Fedchenko za tridtsatiletniy period (1928–1958 gg.) [Changes in ice volume of Lednik Fedchenko for thirty years (1928–58)]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 187–93. [Greatest decrease in volume took place in lower 50 m of glacier. English summary, p. 192–93.]

DYURGEROV, M. B. Oshibki opredeleniya poverkhnostnoy ablyatsii l'da v tochke [Errors in determination of ice surface ablation]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 145–51. [Attempts to classify sources and types of errors. English summary, p. 151.]

DYURGEROV, M. B., *and* FREYDLIN, V. S. Raschet poverkhnostnoy ablyatsii lednika (na primere gorno-lednikovogo basseyna Dzhankuat) [Calculation of ice surface ablation (mountain glacier basin Dzhankuat)]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 151–56. [Day-to-day ablation related to point-to-point on surface of glacier. English summary, p. 156.]

DYURGEROV, M. B., *and others*. Stok vzveshennykh nanosov v basseyne lednika Dzhankuat letom 1970 g. [The run-off of suspended sediments from the Dzhankuat glacier basin, summer 1970]. [By] M. B. Dyurgerov, V. S. Freydlin, L. P. Chernova. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 253–54. [Central Caucasus.]

ELLISTON, G. R. Water movement through the Gornergletscher. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 79–84. [Limnigraph records show a diurnal rhythm superimposed upon a base flow whose volume varies more slowly.]

FABER, T. Rusty Glacier basin, Yukon Territory, Canada: results of the 1968 hydrological field work. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 197. [Abstract. Output of Rusty Glacier is considerably lower than that of the other two glaciers discharging into the basin.]

FISHER, D. Subglacial leakage of Summit Lake, British Columbia, by dye determinations. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 111–16. [Dye tests proved continuous subglacial leak exists.]

FLITVUD, O. Elektroprovodnost' vody, snega i l'da v basseyne lednika Kolka [Water, snow and ice electroconductivity in the Kolka glacier basin]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 177–80. [Suggests high values obtained are due to 1969 surge of Lednik Kolka. English summary, p. 180.]

GARELIK, I. S., *and* GRINBERG, A. M. Forma i dvizheniye lednika Kolka posle podvizhki i vozmozhnyy yeye mekhanizm [The form and movement of Lednik Kolka after the surge and its possible mechanism]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 135–42. [Discusses velocity and deformation of different parts of the glacier. English summary, p. 142.]

GILBERT, R. *Drainings of ice-dammed Summit Lake, British Columbia*. Ottawa, Environment Canada. Inland Waters Directorate. Water Resources Branch, 1972. viii, 17 p. (Scientific Series No. 20.) [Mechanisms of drainings studied and discussed.]

GOBEDZHISHVILI, R. G. Sovremennoye i drevneye oledeneniye v basseyne r. Chveshuri (Glyavnyy Kavkazskiy khrebet) [Recent and ancient glaciation in the Chveshuri river basin (Great Caucasus mountains)]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 218–22. [Southern Caucasus. English summary, p. 222.]

GOLDTHWAIT, R. P. Jerky glacier motion and melt water. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 183–88. [Suggests jerky surficial motion is caused by water development at crystal boundaries and pore-pressure changes. Describes conditions in which these effects may take place.]

GOLUBEV, G. N. Analysis of the run-off and flow routing for a mountain glacier basin. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 41–50. [Discusses hydrologic conditions of a small mountainous glacier basin, referring to Lednik Karabatkak, Tyan'-Shan', and Lednik Dzhankuat, Caucasus.]

GOLUBEV, G. N. Skhema rascheta vodnogo balansa oblastey pitaniya lednikov [A scheme of calculation of the water balance of glacier accumulation areas]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 136–45. [Presents mathematical model. English summary, p. 145.]

GOLUBEV, G. N. Vodnyy rezhim glyatsiologicheskikh zon [Water regimes of glaciological zones]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 75–82. [Run-off from glaciers. English summary, p. 82.]

GOLUBEV, G. N., *and* DYURGEROV, M. B. Balans massy lednika Dzhankuat v 1967–1971 gg. i metody yego izmereniya i rascheta [Mass balance of Lednik Dzhankuat in 1967–71 and methods of measurement and computation]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 80–88. [Glacier lost about 1% of its mass in this period. English summary, p. 88.]

GOW, A. J. The hydrology and compositional structure of the Koettlitz Glacier tongue, McMurdo Sound, Antarctica. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 257. [Abstract. Reports study of accretion, ablation and forward movement, and supports Debenham's hypothesis.]

GROSVAL'D, M. G., *and others*. *Oledeneniye Zemli Frantsa-Iosifa* [*Glaciers of Zemlya Frantsa-Iosifa*]. [*By*] *M. G. Grosval'd, A. N. Krenke, O. N. Vinogradov, V. A. Markin, T. V. Psareva, N. G. Razumeyko, V. L. Sukhodrovskiy*. Moscow, Izdatel'stvo "Nauka", 1973. [352] p. [Introduction and chapters on glacial morphology, glacio-climatic conditions, heat balance of the surface of the ice sheets, accumulation and redistribution of snow on the surface of glaciers, surficial ablation, transformation of snow into ice and zones of ice formation, temperature regime of glaciers, glacier movement, tectonics of glaciers, metamorphism of glacier ice, present-day processes in the periglacial zone, history of glaciers on the archipelago in the late Pleistocene and Holocene, and mass balance and current changes of glaciers.]

GUS'KOV, A. S. Nablyudeniya v reprezentativnom lednikovom basseyne reki Bol'shaya Khadata v 1969–70 balansovom godu [Observations in representative glacier basins of the Bol'shaya Khadata river in 1969–70 balance year]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 241–45. [Polar Ural.]

GUS'KOV, A. S. Nablyudeniya v reprezentativnom lednikovom basseyne reki Bol'shaya Khadata v 1970–71 balansovom godu [Observations in the representative glacier basin of the Bol'shaya Khadata river in 1970–71 balance year]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 208–12. [English summary, p. 212.]

HOLDSWORTH, G. Evidence of a surge on Barnes Ice Cap, Baffin Island. *Canadian Journal of Earth Sciences*, Vol. 10, No. 10, 1973, p. 1565–74. [Reviews evidence for a surge having taken place in this century.]

IVANOV, I. P., *and* CHUDAKOV, V. I. Vozmozhnost' opredeleniya skorosti dvizheniya lednikov po dopplerovskomu effektu v opticheskom kvantovom generatore [The possibility of determining the velocity of glacier movement by the Doppler effect in the optic quantum generator]. *Trudy Sovetskoy Antarkticheskoy Ekspeditsii*, Tom 59, 1973, p. 143–46. [Research near "Molodezhnaya" station, 1969–70.]

JONES, S. J. *Radio depth-sounding on Meighen and Barnes ice caps, Arctic Canada*. Ottawa, Environment Canada. Water Resources Branch. Inland Waters Directorate, 1972. v, 13 p. (Scientific Series No. 25.) [Techniques described and discussed. Values obtained agreed with previous radio echo sounding depths and with gravity measurements.]

KASSER, P. Influence of changes in the glacierized area on summer run-off in the Forte du Scex drainage basin of the Rhône. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 221–25. [Glacierized area was 17.9% of total in 1876 and 13.6% in 1968. Demonstrates influence of change on run-off figures from April to September for 1916 to 1955.]

KEMMERIKH, A. O. Rol' lednikov v stoke rek Srednev Azii [The contribution of glaciers to the river run-off of Central Asia]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 82–94. [Presents and discusses some figures. English summary, p. 94.]

KEMMERIKH, A. O. Vliyaniye lednikov na izmenchivost' godovogo stoka rek Famira i Pamiro-Alaya [The effects of glaciers on the variability of the annual river run-off of the Pamir and Pamir-Alay mountains]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 174–77. [Run-off from fifteen rivers compared and reasons for differences discussed. English summary, p. 176–77.]

KHODAKOV, V. G. Raschet ablyatsii l'da pod sloyem moreny [Calculation of ice ablation under moraine layer]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 105–08. [Describes method. English summary, p. 108.]

KHODAKOV, V. G. Raschet i prognoz ablyatsii morenosoderzhashchego l'da [Calculation and forecast of moraine-cored ice ablation]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 215–18. [Presents method and applies to snout of Lednik Kolka. English summary, p. 218.]

KHODAKOV, V. G., *and* MOISEYEVA, G. P. Potentsial'naya ablyatsiya l'da na territorii SSSR [Potential ice ablation in the U.S.S.R.]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 70–74. [Defines and discusses the term "potential ablation". English summary, p. 74.]

KOREYSHA, M. M. Nekotoryye osobennosti issledovaniya lednikov i naledey severo-vostoka SSSR [Some peculiarities of the investigations of glaciers and naleds in the north-east of the U.S.S.R.]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 245–47.

KOTLYAKOV, V. M. Novoye v terminologii i raschetakh balansa massy lednikov [New aspects in terminology and computation of glacier mass balance]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 205–18. [Glacier mass balance terms defined and new methods of study discussed. English summary, p. 231.]

KOTLYAKOV, V. M. Novyy etap v issledovanii lednikovogo pokrova Antarktidy [A new stage in studies of the Antarctic ice sheet]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 51–79. [Describes in detail the International Antarctic Glaciological Project (I.A.G.P.). English summary, p. 65.]

KOTLYAKOV, V. M., *and others*. Ob izmeneniyakh klimata i oledeneniya vysokogornogo Kavkaza v istoricheskoye vremya [On the climatic and glacial variations in the Caucasus mountains in historic times]. [By] V. M. Kotlyakov, V. A. Gerasimov, A. L. Devirts, M. Ch. Zalikhanov, L. R. Serebryannyy, V. G. Khodakov, A. M. El'mesov. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 185–88. [Presents results of radiocarbon dating. English summary, p. 188.]

KRENKE, A. N. Run-off formation and water-balance structure of a Caucasian glacial basin. *Union Géodésique . . . .*

Symposium on the Hydrology of Glaciers, . . . 1969, . . ., 1973, p. 251. [Abstract. Results from the upper basin of the Marukha river.]

La Casinière, A. C. de. Bilan thermique de la Vallée Blanche. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 243. [Title only. Paper published in *Journal of Glaciology*, Vol. 13, No. 67, 1974, p. 55–72.]

Lang, H. Variations in the relation between glacier discharge and meteorological elements. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 85–94. [Discusses effect of specific seasonal conditions in glacierized drainage basins on this relation.]

Lebedeva, I. M. Ispareniye s lednikov Sredney Azii [Evaporation from the glaciers of Central Asia]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 94–105. [Highest intensity of evaporation from glacier snouts up to 5 000 m in Shakhdarinskiy Khrebet, southern part of Pamir. English summary, p. 104.]

Luchininov, V. S., *and* Macheret, Yu. Ya. Interpretatsiya dannykh radiolokatsionnogo zondirovaniya teplykh gornykh lednikov [Interpretation of radar sounding data for temperate glaciers]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 195–200. [English summary, p. 200.]

Macheret, Yu. Ya. Rezul'taty gravimetricheskikh izmereniy tolshchiny l'da na lednike Obrucheva (Polyarnyy Ural) [Results of gravimetric measurements of ice thickness on Lednik Obruchev (Polar Ural)]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 195–97. [Maximum thickness was about 100 m. English summary, p. 197.]

Maksimov, Ye. V., *and* Bazheva, V. Ya. Basseyny levykh pritokov r. Chu nizhe ust'ya r. Komorchek [Basins of the left bank tributaries of the river Chu below the mouth of the river Komorchek]. *Katalog lednikov SSSR [Catalogue of glaciers of the U.S.S.R.]*, Tom 14, Vyp. 2, Chast' 2, 1973, [70] p. [Part of I.H.D. catalogue giving details of what is known of the glaciers in this part of Kirgizskaya S.S.R. The Tom and Vyp. numbers correspond with those of *Resursy poverkhnostnykh vod SSSR [Surface water resources of the U.S.S.R.]*.]

Markin, V. A. Elementarnyye tsirkulyatsionnyye mekhanizmy o vneshniy massoenergcobmen na poverkhnosti lednikov Sval'barda [Elementary circulation mechanisms and external mass and energy exchange on Svalbard glaciers]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 116–24. [English summary, p. 124.]

Markin, V. A. Potentialities of the artificial intensification of glacier run-off in Central Asia in connection with different weather patterns. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 213. [Abstract. Experiments with coal dust.]

Mathews, W. H. Record of two jökulflhlaups [*sic*]. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 99–110. [Presents detailed records of jökulhlaups, from Summit Lake, British Columbia, draining through or under Salmon Glacier in November 1965 and September 1967.]

Menshutin, V. M. Balans massy Marukhskogo lednika za 1968–1970 gg. [Mass balance of Lednik Marukh in 1968–70]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 164–68. [Presents results. English summary, p. 168.]

Mikhalev, V. I., *and others*. K metodike izucheniya mekhanizma kolebaniy lednikov (na primere lednika Obrucheva, Polyarnyy Ural) [On the methods applied to the study of the mechanism of glacier fluctuations (for example Lednik Obruchev, Polar Ural)]. [By] V. I. Mikhalev, D. G. Tsvetkov, P. A. Shumskiy. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 221–36. [Observations on glacier surface height changes, ice movement and external mass exchange are discussed. English summary, p. 236.]

Miller, M. M. A principles study of factors affecting the hydrological balance of the Lemon Glacier system and adjacent sectors of the Juneau Icefield, southeastern Alaska, 1965–69. *Michigan State University. Institute of Water Research. Technical Report* No. 33, 1972, [x], [313] p. [Factors affecting relationship between mass water and heat balances, and assessment of meteorological parameters.]

Miller, M. M., *and* Helmers, A. E. Glacio-hydrology of the Lemon-Ptarmigan-Thomas glaciers system, Juneau Icefield, Alaska. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 205. [Abstract. Describes studies carried out between 1964 and 1969.]

Müller, F., *and* Iken, A. Velocity fluctuations and water regime of Arctic valley glaciers. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 165–82. [Annual, seasonal and short-period velocity fluctuations were linked to the discharge capacity of the intra- and subglacial drainage system, though other factors were also influential.]

Nye, J. F. Water at the bed of a glacier. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 189–94. [Reconciles dual, apparently conflicting, roles of the water film at the bottom of a temperate glacier or at the bottom of a cold glacier with a temperate base.]

Nye, J. F., *and* Frank, F. C. Hydrology of the intergranular veins in a temperate glacier. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 157–61. [Suggests that a temperate glacier is filled with a three-dimensional network of veins of water between the grains and describes mode of flow of water downwards.]

Oradovskiy, S. G. Nekotoryye osobennosti khimicheskogo sostava propaynogo Antarkticheskogo l'da [Some characteristics of the chemical composition of Antarctic fast ice]. *Trudy Sovetskoy Antarkticheskoy Ekspeditsii*, Tom 59, 1973, p. 107–14. [Research in the Mirny area, 1969–70.]

Oswald, G. K. A., *and* Robin, G. de Q. Lakes beneath the Antarctic ice sheet. *Nature*, Vol. 245, No. 5423, 1973, p. 251–54. [Discusses evidence from radio echo sounding which points to the existence of water pockets or lakes a few kilometres wide under parts of the Antarctic ice sheet.]

Pinchak, A. C. Effect of diurnal flow variations on the morphological development of a glacier melt-water stream. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 147. [Abstract. Field work proved effect takes place.]

PSAREVA, T. V., *and* SUROVA, T. G. Palinologicheskiye dannyye k kharakteristike snezhno-firnovoy tolshchi lednika Gergeti [Palynological data for the characteristics of snow-firn thickness of Lednik Gergetskiy]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 180–85. [Annual horizons of snow and firn could be distinguished visually by pollen analysis. English summary, p. 185.]

REID, I. A., *and* PATERSON, W. S. B. Simple method of measuring the average amount of water produced annually by melting of ice on a glacier. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 215–18. [Suggests two simple methods for estimating the average annual loss of ice from the ablation area, using Athabasca Glacier, Alberta, Canada, as an example.]

RÖTHLISBERGER, H. Water pressure in subglacial channels. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 97. [Abstract. Full paper published in *Journal of Glaciology*, Vol. 11, No. 62, 1972, p. 177–203.]

SHADRINA, O. V. Izmeneniye soderzhaniya glavneyshikh ionov na Marukhskom lednike letom 1970 g. [Changes in the composition of the main ions on Lednik Marukh, summer 1970]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 254–56. [Caucasus.]

SHUMSKIY, P. A., *and others*. Kolebaniya lednika Obrucheva (Polyarnyy Ural), ikh mekhanizm i prichiny. Kinematika poverkhnosti [The variations of Lednik Obruchev (Polar Ural), their mechanism and causes. Surface kinematics]. [By] P. A. Shumskiy, V. I. Mikhalev, D. G. Tsvetkov. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 35–69. [English summary, p. 69.]

SIL'NITSKAYA, V. I., *and* CHERNOVA, L. P. Basseyny rek Kazyra, Kana. Basseyn r. Kemchika. Basseyn verkhov'yev r. Yeniseya vyshe ust'ya r. Kemchika. Basseyny verkhov'yev rek Oki, Udy [Basins of the Kazyr and Kan rivers. Basin of Kemchik. Basin of the upper reaches of the Yenisey above the mouth of the river Kemchik. Basins of the upper courses of the Oka and Uda]. *Katalog lednikov SSSR [Catalogue of glaciers of the U.S.S.R.]*, Tom 16, Vyp. 1, Chast' 3–5, Vyp. 2, Chast' 1, 1973, 64 p. [Part of I.H.D. catalogue giving details of what is known of glaciers in the Angaro-Yeniseyskiy region. The Tom and Vyp. numbers correspond with those of *Resursy poverkhnostnykh vod SSSR [Surface water resources of the U.S.S.R.]*.]

STENBORG, T. Some viewpoints on the internal drainage of glaciers. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 117–29. [General survey of drainage problems concerning non-polar valley glaciers.]

SUSLOV, V. F., *and* AKBAROV, A. A. Hydrological regime of glaciers in the Alay range, Central Asia. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 235–38. [Evaluation of regime.]

TSIGEL'NAYA, I. D. Role of ice run-off in the water balance of the mountain area of Central Asia. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 227–30. [Water balance of area is calculated by means of complex differential equations.]

TYULINA, T. YU. O primenimosti sushchestvuyushchikh modeley dvizheniya k raschetu rolya skorosti gornykh lednikov (na primere lednika Tsentral'nyy Tuyuksu) [On the application of existing movement models for calculation of the velocity field of mountain glaciers (for example Lednik Tsentral'nyy Tyuksu)]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 88–95. [Discusses existing relations. English summary, p. 95.]

VINOGRADOV, O. N., *and others*. Novyye dannyye o sovremennom i drevnem oledenenii gor Suntar-Khayata (po materialam issledovaniy 1970 g.) [New data on present-day and ancient glaciation of the Suntar-Khayata mountains (1970 investigations)]. [By] O. N. Vinogradov, N. A. Golodkovskaya, M. M. Koreysha, L. R. Serebryannyy. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 80–91. [Results of air and ground observations. English summary, p. 91.]

VIVIAN, R. A., *and* ZUMSTEIN, J. Hydrologie sous-glaciaire au glacier d'Argentière (Mont-Blanc, France). *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 53–64. [Reports observations of subglacial hydrology and seasonal changes in properties of the water.]

VOLOSHINA, A. P. Sravneniye osnovnykh metodov rascheta turbulentnykh potokov tepla i vlagi, primenyayemykh v usloviyakh lednikovykh inversiy [Comparison of the main methods for the calculation of turbulent heat and moisture fluxes under conditions of glacier inversions]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 201–07. [Favours Laikhtman's method. English summary, p. 207.]

VOLOSHINA, A. P. Teplovoy balans poverkhnosti Marukhskogo lednika [The surface heat balance of Lednik Marukh]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 67–80. [Total and mean radiation components and heat balance of glacier surface were obtained in four different weather conditions. Results analysed and discussed. English summary, p. 79–80.]

VOLOSHINA, A. P., *and* INASHVILI, SH. V. Osobennosti meteorologicheskogo rezhima lednikov Verkhney Svanetii v period ablyatsii [Peculiarities of the meteorological regime of glaciers in upper Svanetiya during the ablation period]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 124–30. [Caucasus. English summary, p. 130.]

VOYTKOVSKIY, K. F. O mekhanizme pul'satsiy lednikov [On the mechanism of glacier surges]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 47–53. [Theory discussed. English summary, p. 53.]

WARDLE, P. Variations of the glaciers of Westland National Park and the Hooker Range, New Zealand. *New Zealand Journal of Botany*, Vol. 11, No. 2, 1973, p. 349–88. [Post-glacial variations of eighteen glaciers were studied, using maps, photographs, historical records, counts of growth rings of trees, lichenometry, stages of development of vegetation, and ^{14}C determinations.]

WEERTMAN, J. Can a water-filled crevasse reach the bottom surface of a glacier? *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 139–45. [Suggests that the presence of water in a crevasse has a profound effect on the depth to which the crevasse can penetrate the glacier, pushing against the walls to act as a wedge.]

WHILLANS, I. M. State of equilibrium of the west Antarctic inland ice sheet. *Science*, Vol. 182, No. 4111, 1973, p. 476–79. [Discusses possibility that the ice sheet near "Byrd" station may be thinning.]

YEMELYANOV, YA. N. Accumulation, ablation and run-off on Lednik Abramov (Alay range, U.S.S.R.). *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 239. [Abstract. Presents some facts about this receding glacier.]

ZALIKHANOV, M. CH. The formation of run-off on the glaciers of the central Caucasus. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 218. [Abstract. Investigations on Lednik Bashil.]

ICEBERGS. SEA, RIVER AND LAKE ICE

AKAGAWA, M. The characters of atmospheric circulation in the years with abnormal sea ice conditions along the Okhotsk coast of Hokkaido, Japan. *Oceanographical Magazine*, Vol. 24, No. 2, 1973, p. 81–100. [Unusual conditions between 1946 and 1972 studied.]

ARYA, S. P. S. Contribution of form drag on pressure ridges to the air stress on Arctic ice. *Journal of Geophysical Research*, Vol. 78, No. 30, 1973, p. 7092–99. [Found that form drag on pressure ridges may be much larger than frictional stress on ice surface, especially under stably stratified conditions.]

BARNES, J. C., *and* BOWLEY, C. J. Mapping sea ice from the Earth Resources Technology Satellite. *Arctic Bulletin* (Washington, D.C., Office of Polar Programs, National Science Foundation), Vol. 1, No. 1, 1973, p. 6–13. [Reviews results in the Canadian Arctic and neighbouring seas.]

BERKSON, J. M., *and others*. Mapping the underside of Arctic sea ice by backscattering sound, [by] J. M. Berkson, C. S. Clay, T. K. Kan. *Journal of the Acoustical Society of America*, Vol. 53, No. 3, 1973, p. 777–81. [Using narrow-beam scanning sonar at 48 kHz on spring pack ice in Beaufort Sea, 175 km NNE. of Point Barrow.]

CAMPBELL, W. J., *and* MARTIN, S. Oil and ice in the Arctic Ocean: possible large-scale interactions. *Science*, Vol. 181, No. 4094, 1973, p. 56–58. [Diffusion and transport mechanisms operating in pack ice combined with slow rate of biodegradation under Arctic conditions would combine to diffuse oil spill over the sea and eventually deposit it on the ice surface where it would lower the albedo over a large area.]

EMMOTT, N. W. Monitoring our moving ice. *Canadian Geographical Journal*, Vol. 87, No. 2, 1973, p. 32–37. [Describes sea ice reconnaissance and forecasting activities carried out by the Ice Division of the Atmospheric Environment Service of the Department of the Environment, Canada.]

FAYKO, L. I. Novyy sposob iskusstvennogo umen'sheniya mekhanicheskoy prochnosti i teploprovodnosti ledyanogo pokrova vodoyemov [A new method of artificial decrease of mechanical rigidity and thermoconductivity of ice cover in reservoirs]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 159–63. [Describes method of control of growth and development of ice cover. English summary, p. 163.]

FOSTER, T. D. Haline convection in polynyas and leads. *Journal of Physical Oceanography*, Vol. 2, No. 4, 1972, p. 462–69. [Theoretical analysis of haline convection induced by freezing of sea-water is made for a turbulent ocean, and it is concluded that it is probably an effective process as a precursor to formation of Antarctic bottom water.]

FROLOV, A. D. Vliyaniye fazovogo sostava i struktury morskogo l'da na yego uprugiye i dielektricheskiye svoystva [The influence of phase composition and structure upon the dielectric and strength properties of sea ice]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 203–09. [Describes new methods of investigation. English summary, p. 208–09. Also abstracted in *Soviet-Bloc Research in Geophysics, Astronomy and Space*, No. 306, 1973, p. 43.]

GRÖTERUD, O. Ice analyses. Data from three Norwegian lakes. *Hydrobiologia*, Vol. 40, No. 3, 1972, p. 371–91. [Different parts and different layers of the ice were investigated to find out the vertical and horizontal distribution of the components.]

HUTTER, K. On the fundamental equations of floating ice. *Mitteilungen der Versuchsanstalt für Wasserbau, Hydrologie und Glaziologie an der Eidgenössischen Technischen Hochschule* (Zürich), Nr. 8, 1973, xviii, 150 p. [Aimed at deriving governing dynamic equations, which would lead the way to answering a broad variety of questions.]

KAPITKIN, B. T. Issledovaniya dielektricheskikh svoystv morskogo l'da v diapazone SVCh [Research into the dielectric properties of sea ice in the VHF spectrum]. *Trudy Arkticheskogo i Antarkticheskogo Nauchno-Issledovatel'skogo Instituta*, Tom 298, 1972, p. 116–20.

KARNOVICH, V. N., *and* SINOTIN, V. I. Zatory l'da na Dnestre i nekotoryye predlozheniya po predotvrashcheniyu vyzyvayemykh imi navodneniy [Ice jams on the Dnestr and some proposals for the prevention of floods caused by ice jams]. *Meteorologiya i Gidrologiya*, 1973, No. 5, p. 78–85.

KOVACS, A. Ice scoring marks floor of the Arctic shelf. *Oil and Gas Journal*, Vol. 70, No. 43, 1972, p. 92, 97–98, 101, 103. [Describes general features of Arctic sea ice before reviewing what is known about scouring.]

LAKE, R. A., *and* WALKER, E. R. Notes on the oceanography of d'Iberville Fiord. *Arctic*, Vol. 26, No. 3, 1973, p. 222–29. [Includes effects of ice formation.]

LOSEV, K. S. Estimation of run-off from Antarctic and Greenland ice sheets. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 253–54. [Estimates of ice loss due to iceberg calving may be too low; it is suggested that it may be more than 3 000 km³ per year.]

MAKINEN, E. Wartsila icebreaking model basin. *Northern Engineer*, Vol. 5, No. 2, 1973, p. 15–17. [Describes model tank used in Finland for testing designs of icebreakers and ice-going ships.]

PESCHANSKIY, I. S., *and* CHIKOVSKIY, S. S. O fiziko-mekhanicheskikh svoystvakh ledyanogo pokrova morey Karskogo i Laptevykh [On the mechanical properties of ice cover in the Kara and Laptev seas]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 149–53. [Discusses seasonal variations in properties and use in forecasting conditions. English summary, p. 153.]

RHOADS, E. M. Ice crossings. *Northern Engineer*, Vol. 5, No. 1, 1973, p. 19–24. [Describes techniques developed for improving upon the natural freezing process to increase the capacity and duration of ice crossings.]

ROMANOV, A. A. Optimal'nyye ledovyye trassy i prodolzhitel'nost' navigatsii v vodakh vostochnoy Antarktiki [Optimum ice routes and length of the navigation period in eastern Antarctic waters]. *Trudy Sovetskoy Antarkticheskoy Ekspeditsii*, Tom 59, 1973, p. 77–84. [Studies by the fifteenth Soviet Antarctic Expedition, 1969–70.]

SCHAUS, R. H., *and* GALT, J. A. A thermodynamic model of an Arctic lead. *Arctic*, Vol. 26, No. 3, 1973, p. 208–21. [A time-dependent, two-dimensional thermodynamic model of an open lead in central Arctic sea ice is presented, and the effects of advective parameterizations and temperature and salinity profiles on the nature of ice formation are investigated as the lead refreezes.]

SHPAYKHER, A. O. Sovremennyye tendentsii izmeneniy ledovitosti Severnogo Ledovitogo okeana [Present-day tendencies of changes in sea ice cover of the Arctic Ocean]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 143–49. [Discusses changes in extent of ice cover, number of icebergs, water temperature and ablation period in various regions of ocean. English summary, p. 148–49.]

STARHEIM, O. K., *and* BROOKS, P. N. *A review of ice penetration by kinetic energy penetrators*. Quebec, Defence Research Board. Defence Research Establishment Valcartier, 1972. iv l., 72 p. (DREV TN-1979/72.) [Reviews feasibility of placing a sonobuoy for Arctic operation under the ice by means of a kinetic energy penetrator.]

TŌKAIRIN, A. Kohyōmen ni okeru shōka sokudo no chokusetsu kantei [Direct measurements of rate of sublimation from ice surface]. *Seppyō*, Vol. 33, No. 1, 1971, p. 10–15. [Results of measurements on ice surface of lake showed minimum evaporation between 07 00 and 10 00 h. English summary, p. 15.]

TOOMA, S. G., *jr.*, *and* TUCKER, W. B. Statistical comparison of airborne laser and stereophotogrammetric sea ice profiles. *Remote Sensing of Environment*, Vol. 2, No. 4, 1973, p. 261–72. [Describes techniques used and results obtained from data collected 610 m over the Lincoln Sea, north of Greenland.]

TSYKIN, YE. N., *and* TSYKINA, G. A. O nekotorykh zakonomernostyakh obrazobaniya zatorov i raschet tipa protivozatoriykh meropriyatiy [Formation of ice jams and consideration of methods of preventing them]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 154–59. [Discusses factors causing ice jams and subsequent flooding in rivers, with reference to the Dnestr and Pechora rivers. English summary, p. 159.]

WALKER, J. M., *and* PENNEY, P. W. Arctic sea-ice and maritime transport technology. *Weather*, Vol. 28, No. 9, 1973, p. 358–67, 369–71. [Reviews the nature of the problem in some detail, and describes progress made towards its solution.]

WEEKS, W. F., *and* CAMPBELL, W. J. Icebergs as a fresh-water source: an appraisal. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 255. [Abstract. Expanded version of paper presented at symposium is published in *Journal of Glaciology*, Vol. 12, No. 65, 1973, p. 207–33.]

YESKIN, L. I. Ledovyye usloviya v navigatsionnyy period v vodakh vostochnoy Antarktiki [Ice conditions of eastern Antarctic waters during the navigation period]. *Trudy Sovetskoy Antarkticheskoy Ekspeditsii*, Tom 59, 1973, p. 61–76. [Studies by the fifteenth Soviet Antarctic Expedition, 1969–70.]

ZUBAKIN, G. K. O spektre vetrovykh voln u kromki l'da [On the spectrum of wind waves at the ice edge]. *Meteorologiya i Gidrologiya*, 1973, No. 5, p. 95–97. [Experiment in the Arctic Basin.]

GLACIAL GEOLOGY

ADAM, D. P. Ice ages and the thermal equilibrium of the Earth. *Journal of Research of the United States Geological Survey*, Vol. 1, No. 5, 1973, p. 587–96. [Suggests that changes in the Earth's energy budget may be explained by interactions between the heat storage characteristics of the oceans and changes in albedo.]

ALESHIN, A. S., *and others*. Opyt primeneniya geofizicheskikh metodov dlya izycheniya gidrogeologicheskikh i strukturnykh osobennostey moren lednika Dzhankuat [Application of geophysical methods to the study of hydrological and structural peculiarities of moraines on Lednik Dzhankuat]. [By] A. S. Aleshin, B. L. Berri, A. D. Zhigalin, A. A. Ogil'vy, V. R. Rasul Aga. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 157–63. [Describes results of using various methods for investigating structure of moraines, determining the groundwater level and mapping the groundwater seepage zones. English summary, p. 163.]

ANDREWS, J. T. The Wisconsin Laurentide ice sheet: dispersal centers, problems of rates of retreat, and climatic implications. *Arctic and Alpine Research*, Vol. 5, No. 3, Pt. 1, 1973, p. 185–99. [Discusses rates of marginal recession of ice sheet with emphasis on retreat rates experienced during deglaciation of the northern United States, southern Canada and the Canadian Arctic between 18 000 and 7 000 years ago.]

AVSYUK, G. A., *and others*. Paleoglyatsiologiya: predmet i metody, zadachi i uspekhi [Palaeoglaciology: subject and methods, tasks and achievements]. [By] G. A. Avsyuk, M. G. Grosval'd, V. M. Kotlyakov. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 92–98. [General discussion of problems and approaches to their solutions. English summary, p. 98.]

BARDIN, V. I., *and* SUYETOVA, I. A. Ob istorii razvitiya antarkticheskogo lednikovogo pokrova [The history of the Antarctic ice sheet]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 118–25. [Study of moraines in Dronning Maud Land. English summary, p. 125.]

BELDERSON, R. H., *and* WILSON, J. B. Iceberg plough marks in the vicinity of the Norwegian Trough. *Norsk Geologisk Tidsskrift*, Vol. 53, No. 3, 1973, p. 323–28. [Side-scan sonar pictures show presence of large furrows which are attributed to action of icebergs ploughing into sediment as they touch bottom.]

BELDERSON, R. H., *and others*. Iceberg plough marks in the northeast Atlantic, [by] R. H. Belderson, N. H. Kenyon and J. B. Wilson. *Palaeogeography, Palaeoclimatology, Palaeoecology*, Vol. 13, No. 3, 1973, p. 215–24. [Side-scan sonar records reveal furrows on sea floor west of the British Isles, from the Faeroe Islands to Porcupine Bank (west of southern Ireland).]

BERKLAND, J. O., *and* RAYMOND, L. A. Pleistocene glaciation in the Blue Ridge province, southern Appalachian Mountains, North Carolina. *Science*, Vol. 181, No. 4100, 1973, p. 651–53. [Glacial polish, grooves and striations found at 1 370 m on Grandfather Mountain indicate former existence of alpine glaciation at latitude 36° 07′ N.]

BERKSON, J. M., *and* CLAY, C. S. Microphysiography and possible iceberg grooves on the floor of western Lake Superior. *Geological Society of America. Bulletin*, Vol. 84, No. 4, 1973, p. 1315–27. [Describes three distinct physiographic regions, based on echogram character. Zone at 54 to 165 m depth shows intersecting network of grooves probably formed by scouring by icebergs 9 600 to 11 550 years B.P.]

BEZINGE, A., *and others*. Phénomènes du lac glaciaire du Gorner, par A. Bezinge, J. P. Perreten et F. Schafer. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 65–78. [Discusses behaviour of this ice-dammed lake.]

BIRD, J. B. The Wisconsin deglaciation of Canada. Introduction and summary. *Arctic and Alpine Research*, Vol. 5, No. 3, Pt. 1, 1973, p. 165–68. [Comments on topics discussed at the IGU/INQUA symposium held at the 22nd International Geographical Congress, Montreal, Canada, 15 August 1972.]

CESTRE, G. Plans d'eau glaciaires et isostasie dans les bassins de la haute Ware et la rivière Otter, Massachusetts (2e partie). *Cahiers de Géographie de Québec*, Vol. 17, No. 41, 1973, p. 251–64. [Further discussion on water level of ancient glacial lakes in Massachusetts in relation to isostatic events.]

CHUMAKOV, N. M. Continental ice sheets and Precambrian shields: discussion. *Geological Society of America. Bulletin*, Vol. 84, No. 5, 1973, p. 1839–40. [Comments on W. A. White's paper, ibid., Vol. 83, No. 4, 1972, p. 1037–56.]

COGLEY, J. G. Meanders. On runoff at the time of deglaciation. *Area*, Vol. 5, No. 1, 1973, p. 33–37. [Calculations for a model ice cap suggest that discharges during deglaciation were greater than they are today. Climatic changes postulated by Dury may therefore be unnecessary to explain examples of underfit streams.]

CZERWIŃSKI, J. Niektóre elementy mikroreliefu na przedpolu Breidamerkurjökull (Islandia) i zagadnienie tzw. "fluted moraine" [Some microrelief elements in the forefield of Breiðamerkurjökull (Iceland) and the problem of fluted moraines]. *Czasopismo Geograficzne*, Tom 44, Zeszyt 2, 1973, p. 305–14. [Describes microrelief of marginal zone of glacier, including patterned ground, polygons and fluted moraines. English summary, p. 313–14.]

DENT, B. Glacial exhumation of impact craters on the Canadian Shield. *Geological Society of America. Bulletin*, Vol. 84, No. 5, 1973, p. 1667–72. [Distribution of impact events explained by W. A. White's theory of deep glacial erosion, ibid., Vol. 83, No. 4, 1973, p. 1037–56.]

EVENSON, E. B. Late Pleistocene shorelines and stratigraphic relations in the Lake Michigan basin. *Geological Society of America. Bulletin*, Vol. 84, No. 7, 1973, p. 2281–97. [Defines southern limit of last ice advance into basin and reports on stratigraphic relations in Two Creeks–Valders area, Wisconsin.]

FAUSTOVA, M. A. Osobennosti rel'yefoobrazovaniya v zonakh ledorazdelov (na primere Lovatskoy lopasti poslednego pokrovnogo oledeneniya) [Specific features of relief formation in the zones of ice division (a case study of the Lovatsk part of the last glaciation)]. *Izvestiya Akademii Nauk SSSR. Seriya Geograficheskaya*, 1973, No. 4, p. 102–11.

GERASIMOV, V. A. O nekotorykh obshchikh chertakh verkhnechetvertichnogo i istoricheskogo oledeneniy na Kavkaze i Tyan'-Shane [Some common features of the upper Quaternary and historical glaciation in the Caucasus and Tyan'-Shan']. *Materialy Glyctsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 146–53. [Compares features in relation to different stages of glaciation. English summary, p. 153.]

GROSVAL'D, M. G., *and* CHERNOVA, L. P. O snizhenii granitsy pitaniya lednikov yevropeyskoy Arktiki v pleystotsene [On the decrease of the equilibrium line on the glaciers of the European Arctic in the Pleistocene]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 112–18. [Evidence from Svalbard discussed with reference to Barents Sea area. English summary, p. 118.]

GROSVAL'D, M. G., *and* IOFFE, D. YA. Glyatsigennyye skladki nagnetaniya v osadochnykh porodakh lednikovogo lozha i ikh znacheniye dlya paleogeografii [Glacigenous pressure folds in subglacier sedimentary rocks and their palaeogeographic implications]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 115–24. [Discusses these complex anticline folds. English summary, p. 124.]

KENNETT, J. P., *and* BRUNNER, C. A. Antarctic late Cenozoic glaciation: evidence for initiation of ice rafting and inferred increased bottom-water activity. *Geological Society of America. Bulletin*, Vol. 84, No. 6, 1973, p. 2043–52. [Presents evidence from piston cores that show initial stages of resumption of large-scale glaciation in Antarctica following warm middle Miocene and preceding cold middle Gilbert palaeomagnetic epoch.]

KONDRAT'YEVA, K. A., *and others*. Osnovnyye etapy kaynozoyskoy sedimentatsii v yuzhnoy chasti Yano-Indigirskoy nizmennosti [Primary stages of Tertiary sedimentation in the southern part of the Yana-Indigirka lowland]. [By] K. A. Kondrat'yeva, S. F. Khrutskiy, N. F. Rybakova, L. G. Pirumova. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 26–42. [Includes account of permafrost studies in Yakutskaya A.S.S.R.]

KRÖNER, A., *and* CORREIA, H. Further evidence for glaciogenic origin of late Precambrian mixtites in Angola. *Nature, Physical Science*, Vol. 246, No. 155, 1973, p. 115–17. [Presents evidence, including striated clasts and dropstones, which suggests large-scale glaciation in the lower Congo region.]

KURTÉN, B. *The ice age*. London, Rupert Hart-Davis, 1972. 179 p. [Popular account of Pleistocene glaciations and interglacials; originally published in Stockholm in 1969.]

KVASOV, D. D. Gipoteza o vozmozhnykh prichinakh chetvertichnogo oledeneniya [An hypothesis of possible causes of Quaternary glaciation]. *Izvestiya Akademii Nauk SSSR. Seriya Geograficheskaya*, 1973, No. 4, p. 79–83.

LINKLETTER, G., *and others*. Soils and glacial deposits in the Beacon Valley, southern Victoria Land, Antarctica, [by] G. Linkletter, J. Bockheim, F. C. Ugolini. *New Zealand Journal of Geology and Geophysics*, Vol. 16, No. 1, 1973, p. 90–108. [Includes detailed survey of geomorphology and discussion of glacial history.]

LISTER, H. Glacial origin of pro-glacial boulders. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers,*

. . . *1969*, . . . , 1973, p. 151–55. [Suggests subglacial origin of much rock debris with discrete, though temporary, subglacial channels.]

LLIBOUTRY, L. A. Observations de lacs proglaciaires dangereux dans la Cordillera Blanca (Pérou). *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969*, . . . , 1973, p. 135. [Abstract. Describes some catastrophic drainings of proglacial lakes in Peru and discusses causes.]

LUCHINSKAYA, T. N., *and* TROITSKIY, L. S. K diagnostike lednikovykh i lednikovo-morskikh otlozheniy i form rel'yefa na Shpitsbergene [The diagnostics of glacial and sea-glacial deposits and relief forms in Spitsbergen]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 160–68. [Study of moraines. English summary, p. 168.]

MCLAREN, P., *and* HILLS, L. V. Cirque analysis as a method of predicting the extent of a Pleistocene ice advance. *Canadian Journal of Earth Sciences*, Vol. 10, No. 8, 1973, p. 1211–25. [Suggests low degree of accuracy may be due to effect of climatic variables in the cirque at the time of advance.]

MAKAROVA, N. V., *and* MAKAROV, V. I. Asimmetriya chetvertichnykh oledeneniy v khrebtakh Tyan'-Shanya [Asymmetry of Quaternary glaciations in the Tyan'-Shan' mountains]. *Izvestiya Akademii Nauk SSSR. Seriya Geograficheskaya*, 1973, No. 4, p. 90–94.

MAKSIMOV, YE. V. Ritmicheskaya sushchnost' pleystotsena [Rhythmic nature of the Pleistocene]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 138–46. [Presents theoretical scheme of the Upper Pleistocene in Europe and North America and correlates stages of regression of mountain glaciers and continental ice sheets. English summary, p. 145–46.]

MARK, D. M. Analysis of axial orientation data, including till fabrics. *Geological Society of America. Bulletin*, Vol. 84, No. 4, 1973, p. 1369–73. [Discusses error in significance test associated with rotational vector procedure for analysis of axial orientation data, and points out advantages of alternative approach.]

MODEL', YU. M. Priroda antarkticheskikh oazisov i problema ikh proiskhozhdeniya [The nature of Antarctic oases and problems of their origin]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 108–15. [Discusses effect of glacier action. English summary, p. 115.]

MÖRNER, N.-A. The first report on "till wedges" in Europe: a reply. *Geologiska Föreningens i Stockholm Förhandlingar*, Vol. 95, Pt. 2, No. 553, 1973, p. 273–76. [Refutes P. Worsley's criticisms, ibid., Vol. 95, Pt. 1, No. 552, 1973, p. 152–55.]

MÖRNER, N.-A. A new find of till wedges in Nova Scotia, Canada. *Geologiska Föreningens i Stockholm Förhandlingar*, Vol. 95, Pt. 2, No. 553, 1973, p. 272–73. [Brief description.]

OCCHIETTI, S. Les structures et déformations engendrées par les glaciers—essai de mise au point. 1. Déformations et structures glaciotectoniques. *Revue de Géographie de Montréal*, Vol. 27, No. 4, 1973, p. 365–80. [Study of glaciogenetic structures.]

PASIERBSKI, M. Przebieg deglacjacji i formy terenu północnej części wysoczyzny Krajeńskiej [The course of deglaciation and the landforms in the northern part of the Krayna plateau]. *Studia Societatis Scientiarum Torunensis* (Toruń), Sec. C, Vol. 8, Nr. 1, 1973, 100 p. [Detailed study of end moraines. English summary, p. 94–99.]

PHEASANT, D. R., *and* ANDREWS, J. T. [The Quaternary history of northern Cumberland Peninsula, Baffin Island, N.W.T. Part 7.] Wisconsin glacial chronology and relative sea-level movements, Narpaing Fiord, Broughton Island area, eastern Baffin Island, N.W.T. *Canadian Journal of Earth Sciences*, Vol. 10, No. 11, 1973, p. 1621–41. [Presents evidence on glacial chronology of the last glaciation in this area and relates relative sea-level changes to sequence, suggesting that this record spans the last 120 000±radiometric years.]

RAUKAS, A. V. Znacheniye analiza rukovodyashchikh valunov i oriyentirovki dlinnykh osey galek v morenakh pri izuchenii dinamiki lednikovykh pokrovov (na materialakh Pribaltiki) [The significance of the analysis of erratic blocks and orientation of elongated pebbles' axes in the moraines in the study of the dynamics of ice sheets (materials of the Baltic region)]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 154–60. [Discussion. English summary, p. 160.]

SANTANA-AGUILAR, R. La glaciation quaternaire dans les Andes de Rancagua (Chili central). *Bulletin de l'Association de Géographes Français*, 50e An., Nos. 406–07, 1973, p. 473–83. [Field observations suggest two glacial advances occurred during the Quaternary. Discussion, p. 483.]

SCHUMM, S. A., *and* SHEPHERD, R. G. Valley floor morphology: evidence of subglacial erosion? *Area*, Vol. 5, No. 1, 1973, p. 5–9. [Undulating valley floors are result of fluvial erosion, not necessarily subglacially formed.]

SEREBRYANNYY, L. R. O zonal'nosti lednikovoy morfoskul'ptury severnoy Yevropy i yeye paleoglyatsiologicheskoy interpretatsii [On the zones of glacial morphosculpture in northern Europe and their palaeoglaciological interpretation]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 188–91. [English summary, p. 191.]

SEREBRYANNYY, L. R. Radiokhronometriya pokrovnogo oledeneniya v verkhnem pleystotsene [Radiochronometry of the European ice sheet in the Upper Pleistocene]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 103–11. [Subdivisions established. English summary, p. 111.]

SHACKLETON, N. J., *and* OPDYKE, N. D. Oxygen isotope and palaeomagnetic stratigraphy of equatorial Pacific core V28-238: oxygen isotope temperatures and ice volumes on a 10^5 and 10^6 year scale. *Quaternary Research*, Vol. 3, No. 1, 1973, p. 39–55. [Boundaries representing high and low northern hemisphere Pleistocene ice volumes are recognized and dated. Record is interpreted in terms of northern hemisphere ice accumulation.]

STEINER, J., *and* GRILLMAIR, E. Possible galactic causes for periodic and episodic glaciations. *Geological Society of America. Bulletin*, Vol. 84, No. 3, 1973, p. 1003–18. [According to galactic model derived, the solar system experiences a periodically and episodically varying galactic parameter during its orbits as far back as 3 000 million years. Minima of parameter correlate well with Phanerozoic and Precambrian glaciations.]

TELLER, J. T. Preglacial (Teays) and early glacial drainage in the Cincinnati area, Ohio, Kentucky, and Indiana. *Geological Society of America. Bulletin*, Vol. 84, No. 11, 1973, p. 3677–88. [Discusses new and existing informa-

tion on sediments in area and suggests sequence of events leading to abandonment of the Teays River drainage system and establishment of the present Ohio River system.]

TRAINER, F. W. Formation of joints in bedrock by moving glacial ice. *Journal of Research of the United States Geological Survey*, Vol. 1, No. 2, 1973, p. 229–35. [Presents evidence in support of hypothesis.]

TROITSKIY, L. S. *O genezise plosko-vypuklykh valunov* [*On the genesis of plano-convex boulders*]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 191–93. [Such boulders, found in Quaternary deposits, may be formed by river and sea ice. English summary, p. 193.]

TRYGGVASON, E. Surface deformation and crustal structure in the Myrdalsjökull area of south Iceland. *Journal of Geophysical Research*, Vol. 78, No. 14, 1973, p. 2488–97. [Variations of ground tilt correlated with amount of snow on the ice field; this is interpreted as the response of variable load on an elastic plate floating on a liquid substratum.]

TUCHOLKE, B. E., *and* HOLLISTER, C. D. Late Wisconsin glaciation of the southwestern Gulf of Maine: new evidence from the marine environment. *Geological Society of America. Bulletin*, Vol. 84, No. 10, 1973, p. 3279–96. [Discusses evidence which suggests grounded glacial ice advanced 18 900±600 years B.P. and persisted until 15 300±800 years B.P.]

VINOGRADOV, O. N., *and* KONOVALOVA, G. I. Nekotoryye rezul'taty analiza morfologicheskikh osobennostey rayonov oledeneniya po dannym Kataloga lednikov SSSR [Some results of the analysis of morphometric characteristics of glaciation on the basis of data from the glacier inventory of the U.S.S.R.]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 175–87. [Brief analysis presented in English summary, p. 186–87.]

WALKER, M. J. C. The nature and origin of a series of elongated ridges in the Morley Flats area of the Bow Valley, Alberta. *Canadian Journal of Earth Sciences*, Vol. 10, No. 8, 1973, p. 1340–46. [Suggests that these are drumlins formed by process of basal accretion beneath ice of Bow Valley glacier.]

WHITE, W. A. Deep erosion by infracambrian ice sheets. *Geological Society of America. Bulletin*, Vol. 84, No. 5, 1973, p. 1841–43. [Suggests that widespread and deeply eroded unconformity between Precambrian crystalline rock and Palaeozoic sediment is the result of erosion by ice sheets.]

YEVTEYEV, S. A. Evolyutsiya oledeneniya Antarktidy [Evolution of Antarctic glaciation]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1973, p. 223–32. [Although progress has been made recently, much remains obscure about the Quaternary glaciation of Antarctica. English summary, p. 232.]

FROST ACTION ON ROCKS AND SOIL. FROZEN GROUND. PERMAFROST

ALVAREZ, R. Lunar permafrost. *Science*, Vol. 179, No. 4078, 1973, p. 1122–23. [Discusses typical response to electromagnetic excitations that may be expected from a permafrost layer in the Moon.]

CEGŁA, J. Próba wyjásnienia genezy gruntów strukturalnych SW Spitsbergenu w świetle teorii układów niestatecznego warstwowania gęstościowego [Tentative explanation of origin of patterned ground in south-west Spitsbergen in the light of the hypothesis of systems with reversed density gradient]. *Czasopismo Geograficzne*, Tom 44, Zeszyt 2, 1973, p. 237–43. [English summary, p. 243.]

CHAMBERLAIN, E., *and others*. The mechanical behaviour of frozen earth materials under high pressure triaxial test conditions, [by] E. Chamberlain, C. Groves and R. Perham. *Géotechnique*, Vol. 22, No. 3, 1972, p. 469–83. [Describes and discusses results of triaxial compression tests conducted on ice-saturated frozen soils to a confining pressure of 275 MN m^{-2} at $-10°$ C.]

CHIZHOV, A. B. Voprosy gidrogeotermii merzloy zony [Hydrogeothermic characteristics of the permanently frozen zone]. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 90–96. [Studies in the Aldan depression, Yakutskaya A.S.S.R.]

CZUDEK, T., *and* DEMEK, J. Die Reliefentwicklung während der Dauerfrostbodendegradation. *Rozpravy Československé Akademie Věd. Řada Matematických a Přírodních Věd*, Ročník 83, Sešit 2, 1973, 69 p. [Discusses the development of various forms of relief in ground subjected to freezing temperatures with reference to Yakutskaya A.S.S.R.]

DYLIK, J. Znaczenie badán wiecznej zmarzliny dla pełniejszego poznania peryglacjalnej morfogenezy w Polsce plejstoceńskiej [The importance of research on the pergelisol for the better understanding of periglacial phenomena in Poland]. *Czasopismo Geograficzne*, Tom 44, Zeszyt 2, 1973, p. 207–15. [Points out that studies on permafrost in polar regions lead to a better understanding of fossil periglacial features in Poland, and their formation during the Pleistocene. French summary, p. 214–15.]

GAVRILOV, A. V. O printsipakh otobrazheniya sostava porod na melkomasshtabnykh merzlotnykh kartakh [The principles of portraying rock structure on small-scale permafrost maps]. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 97–103. [Permafrost map of the U.S.S.R., scale 1 : 2 500 000.]

GAVRILOV, A. V., *and* KONDRAT'YEVA, K. A. Printsipy i metody ratsional'nogo izobrazheniya usloviy formirovaniya merzlykh tolshch na melkomasshtabnykh merzlotnykh kartakh [Principles and methods of rational portrayal of conditions of permanently frozen strata formation on small-scale permafrost maps]. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 104–09. [Permafrost maps of the U.S.S.R.]

GOŹDZIK, J. Geneza i pozycja stratygraficzna struktur peryglacjalnych w środkowej Polsce [Origin and stratigraphical position of periglacial structures in central Poland]. *Acta Geographica Lodziensia*, 31, 1973, 117 p. [Pays special attention to the fissures of thermal contraction and the involutions. English summary, p. 104–17.]

HARLAN, R. L. Analysis of coupled heat–fluid transport in partially frozen soil. *Water Resources Research*, Vol. 9, No. 5, 1973, p. 1314–23. [Presents mathematical model based on analogy between liquid transfer in partially frozen soils and that in unsaturated soils, and applies to analysis of coupled heat–fluid transfer phenomena in partially frozen soil.]

HARTWELL, A. D. Classification and relief characteristics of northern Alaska's coastal zone. *Arctic*, Vol. 26, No. 3, 1973, p. 244–52. [Four main genetic coastal types are proposed to classify the shoreline. Includes effect of snow and ice on morphology.]

JAHN, A. *Zagadnienia strefy peryglacjalnej* [*Problems of periglacial zones*]. Warszawa, Państwowe Wydawnictwo Naukowe, [c1970]. 202 p. [Discusses periglacial problems in the northern hemisphere.]

KHRUTSKIY, S. F. Predgornyye denudatsionno-akkumulyativnyye ravniny Yano-Indigirskoy nizmennosti i osobennosti ikh merzlotnykh usloviy [Foothill denudation and accumulation plains of the Yana-Indigirka lowland and their permafrost conditions]. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 56–65.

KOREYSHA, M. M. Naledi i gorakh Suntar-Khayata [Naleds in the Suntar-Khayata mountains]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 247–50.

KRIVONOGOVA, N. F., *and* KAGAN, A. A. K osobennostyam inzhenerno-geologicheskikh usloviy pribrezhnykh rayonov arkticheskikh nizmennostey [Characteristics of engineering geological conditions of the coastal regions of the Arctic lowlands]. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 232–38. [Effects of frozen ground on engineering works and structures in the Soviet Arctic.]

KRIVONOSOV, B. M. Geneticheskaya kharakteristika naledey Gornogo Altaya [Genetic characteristics of naleds in the Altay mountains]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 163–68. [Includes detailed descriptions of naleds of specific areas, and their formation and ablation. English summary, p. 168.]

KUDRYAVTSEV, V. A., *and others*. K 20-letiyu kafedry merzlotvedeniya MGU [20 years of the department of permafrost studies at Moscow University]. [By] V. A. Kudryavtsev, N. F. Poltev, E. D. Yershov. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 3–17.

LEVASHOV, A. A. Opredeleniya skorosti deformatsiy nekotorykh kharakternykh morfologicheskikh obrazovaniy v rusle reki Nadym [Determination of deformation rate of some characteristic morphological formations in the Nadym river bed]. *Meteorologiya i Gidrologiya*, 1973, No. 3, p. 92–95. [Deformations mainly along river banks composed of frozen soil. Tyumenskaya Oblast'.]

LOTSPEICH, F. B. Depth and time of freezing of silty soils. *Northern Engineer*, Vol. 5, No. 2, 1973, p. 11–14. [Ranged from 0.8 m for a mild winter to 1.8 m for a severe one in an undisturbed permafrost-free forested site near Fairbanks, Alaska.]

MAKSIMOVA, L. N., *and* MINAYLOV, G. P. Zavisimost' mnogoletney dinamiki sezonnogo protaivaniya gruntov ot izmeneniy ikh predzimney vlazhnosti [The dependence of long-term dynamics of seasonal thawing of soils on their pre-winter humidity]. *Merzlotnyye Issledovaniy*, Vyp. 13, 1973, p. 110–15. [Studies in Amurskaya Oblast'.]

NAKANO, Y., *and* ARNOLD, R. Acoustic properties of frozen Ottawa sand. *Water Resources Research*, Vol. 9, No. 1, 1973, p. 178–84. [Ultrasonic velocities of dilatational and shear waves as well as damping of dilatational waves were measured as a function of water content by using the critical angle method at a frequency of 1 MHz.]

NIXON, J. F. Thaw-consolidation of some layered systems. *Canadian Geotechnical Journal*, Vol. 10, No. 4, 1973, p. 617–31. [Examines consequences of melting in two common two-layer soil profiles, and proposes basis for evaluation of stability and remedial measures for such soils.]

NIXON, J. F., *and* MORGENSTERN, N. R. The residual stress in thawing soils. *Canadian Geotechnical Journal*, Vol. 10, No. 4, 1973, p. 571–80. [Describes simple method of measurement, and uses this to obtain values for residual stress in natural and reconstituted samples of frozen soil. Results discussed.]

POPOV, A. I., *and* TUSHINSKIY, G. K. *Merzlotovedeniye i glyatsiologiya (kratkiy kurs). Dopushcheno Ministerstvom vysshego i srednego spetsial'nogo obrazovaniya SSSR v kachestve uchebnogo posobiya dlya studentov geograficheskikh fakul'tetov universitetov* [*Permafrost studies and glaciology (a short course). Recognized by the Ministry of higher and secondary education of the U.S.S.R. as a textbook for students in university geographical faculties*]. Moscow, "Vysshaya Shkola", 1973. 271 p.

ROMANOVSKIY, N. N. O geologicheskoy deyatel'nosti naledy [The geological activity of icings]. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 66–89. [Characteristics and migrations of icings in north-east Siberia and their influence on relief.]

SHILO, N. A., *ed.* Periglyatsial'nyye protsessy [Periglacial processes]. *Akademiya Nauk SSSR. Trudy Severo-Vostochnogo Kompleksnogo Instituta*, Vyp. 38, 1971, 195 p. [Thirteen articles on general topics.]

SHMELEV, L. M. Ledyanyye zhily na poluostrove Yamal [Ice veins in the Yamal peninsula]. *Izvestiya Akademii Nauk SSSR. Seriya Geograficheskaya*, 1973, No. 4, p. 115–18.

SMITH, H. T. U. Photogeologic study of periglacial talus glaciers in northwestern Canada. *Geografiska Annaler*, Vol. 55A, No. 2, 1973, p. 69–84. [Describes, compares and discusses origin of rock glaciers in the Norman Wells area.]

TAKASHI, T., *and* MASUDA, M. Kōsokuatsu-ka ni okeru tsuchi no tōjōryō to kangeki suiidō ni tsuite [An experimental study of the effect of loads on frost heaving and soil moisture migration]. *Seppyō*, Vol. 33, No. 3, 1971, p. 109–19. [Presents results of laboratory study. English summary, p. 118–19.]

TRUSH, N. I., *and* NISTRATOVA, T. A. Sostav i svoystva otlozheniy ledovogo kompleksa Yano-Indigirskogo mezhdurech'ya [Composition and properties of the ice complex deposits of the Yana-Indigirka interfluve]. *Merzlotnyye Issledovaniya*, Vyp. 13, 1973, p. 43–55. [Study of glacial deposits and composition of frozen rocks.]

VEDYAYEV, YU. M., *and* KUBASOV, V. A. Iskusstvennyye materialy—osnova rekonstruktsii teplogo rezhima gruntov v severnykh rayonakh [Artificial ways of changing the heat regime of soils in northern regions]. *Problemy Severa*, Vyp. 17, 1972, p. 50–55.

WATSON, G. H., *and others*. Determination of some frozen and thawed properties of permafrost soils, [by] G. H. Watson, W. A. Slusarchuk and R. K. Rowley. *Canadian Geotechnical Journal*, Vol. 10, No. 4, 1973, p. 592–606. [Describes procedures for sampling, sample transportation, and sample preparation, and for thaw-settlement and strength. Results discussed.]

METEOROLOGICAL AND CLIMATOLOGICAL GLACIOLOGY

ALYEA, F. N. Numerical simulation of an ice age paleoclimate. *Dissertation Abstracts International*, B, Vol. 33, No. 12, Pt. 1, 1973, p. 6005-B–06-B. [Model of general atmospheric circulation in northern hemisphere shows dynamic activity during ice age was substantially greater than today. Abstract of Ph.D. thesis, Colorado State University, 1972. University Microfilms order no. 73-13022.]

BIGG, E. K. Ice nucleus concentrations in remote areas. *Journal of the Atmospheric Sciences*, Vol. 30, No. 6, 1973, p. 1153–57. [Measurements of nucleus concentrations over ocean between Australia and Antarctica imply nuclei are not of local continental origin.]

CHIZHOV, O. P. Ob izmeneniyakh klimata i rasprostraneniya l'dov v severnom polusharii so vremeni maksimuma poslednego oledeneniya [The changes of climate and ice distribution in the northern hemisphere since the maximum of the last glaciation]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 126–37. [Review and discussion. English summary, p. 137.]

ECCLES, P. J., *and* ATLAS, D. A dual-wavelength radar hail detector. *Journal of Applied Meteorology*, Vol. 12, No. 5, 1973, p. 847–54. [Description of system to distinguish hail from rain.]

GOODISON, B. *The distribution of global radiation over Peyto Glacier, Alberta.* Ottawa, Environment Canada. Inland Waters Directorate. Water Resources Branch, 1972. iv, 22 p. (Scientific Series No. 22.) [Presents method of determining the distribution of global radiation over the glacier, and shows its relationship to glacier melt.]

HATTERSLEY-SMITH G. F. Climatic change and related problems in northern Ellesmere Island. *Acta Universitatis Ouluensis*, Ser. A. No. 3, Geologica No. 1, 1972, p. 137–48. [Describes effects of climatic change on land and sea ice.]

HICKS, J. R., *and* GABOR, V. Ice nucleation in clouds by liquefied propane spray. *Journal of Applied Meteorology, Vol. 12, No. 6, 1973, p. 1025–34. [Nucleation due to cooling when propane droplets evaporate studied* experimentally.]

HOBBS, P. V. Ice in the atmosphere: a review of the present position. (*In* Whalley, E., *and others, ed. Physics and chemistry of ice . . . .* Ottawa, Royal Society of Canada, 1973, p. 308–19.)

KASHIMURA, R., *and* ŌTSUKI, A. Taisetsu kōzō daiyōryō sōden shikensen ni yoru chakuhyō chakusetsu no kansoku kekka [Observation of icing and snow accretion on snow-resisting large power transmission test lines]. *Seppyō*, Vol. 35, No. 1, 1973, p. 17–28. [Results of three winters' observations on thermal resisting aluminium alloy conductor steel reinforced bundled conductors. English summary, p. 27–28.]

LIST, R., *and* AGNEW, T. A. Air bubbles in artificial hailstones. *Journal of the Atmospheric Sciences*, Vol. 30, No. 6, 1973, p. 1158–65. [Wind-tunnel experiments show dependence of bubble size and concentration on liquid water content and temperature.]

MERCER, J. H., *and* LAUGENIE, C. A. Glacier in Chile ended a major readvance about 36,000 years ago: some global comparisons. *Science*, Vol. 182, No. 4114, 1973, p. 1017–19. [This evidence provides further support for severe global cooling centred about 35 000 ^{14}C years ago.]

NELSON, W. G. A numerical analysis of ice fog produced by automobiles. *Dissertation Abstracts International*, B, Vol. 33, No. 9, 1973, p. 4296-B–97-B. [Model of exhaust plume developed to predict concentration and size distribution of ice particles produced from automobile exhaust in Arctic conditions. Abstract of Ph.D. thesis, Oregon State University, 1973. University Microfilms order no. 73-7842.]

ORVILLE, H. D., *and* HUBBARD, K. On the freezing of liquid water in a cloud. *Journal of Applied Meteorology*, Vol. 12, No. 4, 1973, p. 671–76. [Theory of heat released from freezing of liquid water in a cloud shows commonly accepted value to be imprecise.]

PITMAN, G. T. K. A lichenometric study of snow patch variation in the Frederikshåb district, south-west Greenland, and its implications for studies of climatic and glacial fluctuations. *Meddelelser om Grønland*, Bd. 192, Nr. 7, 1973, 31 p. [Mean annual temperatures back to 1680 were estimated.]

ROBBINS, R. C., *and others*. Analysis of ancient atmospheres, by R. C. Robbins, L. A. Cavanagh and L. J. Salas, E. Robinson. *Journal of Geophysical Research*, Vol. 78, No. 24, 1973, p. 5341–44. [Bubbles from ice recovered from deep in Antarctic and Greenland ice sheets analysed. CH_4 has about half present levels but CO is about same.]

RUDDIMAN, W. F., *and* MCINTYRE, A. Time-transgressive deglacial retreat of polar waters from the North Atlantic. *Quaternary Research*, Vol. 3, No. 1, 1973, p. 117–30. [Shows that faunal, floral, lithologic and isotopic parameters showing evidence for a sudden deglacial warming may not be time-synchronous.]

RYE, P. J., *and* MACKLIN, W. C. Interpretation of crystallographic orientations in accreted ice. *Journal of the Atmospheric Sciences*, Vol. 30, No. 7, 1973, p. 1421–26. [Theoretical study of factors governing peaks of *c*-axis distribution in accretions of ice and possible use in determining growth conditions of hailstones.]

SAVEL'YEV, B. A. Usloviya obrazovaniya, sostoyaniye i svoystva l'da vblizi tverdykh poverkhnostey inorodnykh materialov [The conditions of formation, state and properties of ice in the vicinity of hard surface of foreign materials]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 195–203. [Deals with the formation of ice on various surfaces in connection with the development of anti-icing methods for ships. English summary, p. 203.]

SCHROEDER, R. A., *and* BADA, J. L. Glacial-postglacial temperature difference deduced from aspartic acid racemization in fossil bones. *Science*, Vol. 182, No. 4111, 1973, p. 479–82. [Results indicate 4 deg change at Mediterranean coast and 5–6 deg change for East Africa.]

WARBURTON, J. A. The distribution of silver in precipitation from two seeded Alberta hailstorms. *Journal of Applied Meteorology*, Vol. 12, No. 4, 1973, p. 677–82. [Measurements in seeded and unseeded storms. Determination of circulation times.]

WEICKMANN, H. K. Snow crystals forms and their relationship to snowstorms. *Journal de Recherches Atmosphériques*, Vol. 6, Nos. 1–3, 1972, p. 603–15. [Typical snow crystal forms are discussed and it is shown how they are related to large-scale storm structure.]

WENDLER, G., *and* ISHIKAWA, N. Heat balance investigation in an Arctic mountainous area in northern Alaska. *Journal of Applied Meteorology*, Vol. 12, No. 6, 1973, p. 955–62. [Short-term heat balances measured simultaneously for moraine, ice and snow.]

Snow

ARAKAWA, H. *Shōwa-38-nen 2-gatsu 20-asa no Kuroishi-shi Asaseishi-gawa jōryū Aoni-zawa nadare* [Avalanche at Aoni-zawa, Kuroishi-shi, Aomori-ken on 20 February 1963]. *Seppyō*, Vol. 33, No. 2, 1971, p. 87–88.

BISSELL, V. C., *and* PECK, E. L. Monitoring snow water equivalent by using natural soil radioactivity. *Water Resources Research*, Vol. 9, No. 4, 1973, p. 885–90. [Describes method utilizing the attenuation by snow cover of natural γ radiation emitted from soil which serves as an index to the water equivalent of the snow cover.]

BOZHINSKIY, A. I. O razmeshchenii snegouderzhivayushchikh protivolavinnykh sooruzheniy na sklonakh gor [Positioning of avalanche engineering constructions on mountain slopes]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 20, 1972, p. 185–94. [Factors affecting disposition of avalanche defence structures discussed. English summary, p. 194.]

BROWN, R. L., *and others*. A failure criterion for snow, [by] R. L. Brown and T. E. Lang, W. F. St. Lawrence and C. C. Bradley. *Journal of Geophysical Research*, Vol. 78, No. 23, 1973, p. 4950–58. [A failure criterion based on the deformation history is proposed for describing the fracture strength of materials with fading memory, and applied to snow.]

CLARK, R. Dirt waves on snow surfaces. *Weather*, Vol. 28, No. 11, 1973, p. 458–62. [Describes erosion of snow and deposition of dirt by wind, followed by inversion of topography during ablation. Deception Island, South Shetlands, 1955.]

DYUNIN, A. K., *ed*. Proyektirovaniye, postrok postroyka i soderzhaniye zheleznykh dorog v slovnykh fiziko-geograficheskikh usloviyakh [Planning, construction and maintenance of railways in complicated geographical conditions]. *Trudy Novosibirskogo Instituta Inzhenerov Zheleznodorozhnogo Transporta*, Vyp. 141, 1972, 220 p. [Twenty-two articles on problems of engineering glaciology, especially in regions liable to snowstorms and avalanches.]

ENDŌ, Y., *and* FUJIWARA, K. Characteristics of the snow cover in east Antarctica along the route of the JARE South Pole traverse and factors controlling such characteristics. *Japanese Antarctic Research Expedition. Scientific Reports. Ser. C. Earth Sciences*, No. 7, 1973, [ii], [38] p. [Studies of upper 10 m of ice sheet, 1968–69, by means of pits and analyses of snow cores.]

FINDLAY, B. F., *and* MCKAY, G. A. Comments on "Three modifications to produce more accurate measurements of snowfall and evapotranspiration", by Stuart A. Harris. *Canadian Geographer*, Vol. 17, No. 3, 1973, p. 280–82. [Critical comments on paper, ibid., Vol. 16, No. 3, 1972, p. 271–77.]

GIRARD, G., *and others*. Utilisation d'un modèle de fonte de neige à mailles physiographiques, [par] G. Girard, G. Morin et R. Charbonneau. *Hydrological Sciences Bulletin*, Vol. 18, No. 1, 1973, p. 27–32. [Describes model from which daily flows may be derived at any point from knowledge of distribution of rain or, more especially, snow melt water over the basin.]

GREEN, F. H. W. Changing incidence of snow in the Scottish Highlands. *Weather*, Vol. 28, No. 9, 1973, p. 386–88, 391–94. [Discusses occurrence of more snow at the beginning and end of winter than during mid-winter, and attempts to relate this to trends in general atmospheric circulation in the northern hemisphere.]

GRISHIN, I. S. Svyaz' perenosa snega s prodolzhitel'nost'yu meteley [Relation of snow transport to duration of snow-storms]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 21, 1973, p. 96–101. [Work on snow drifting. English summary, p. 101.]

HARRIS, S. A. "Three modifications to produce more accurate measurements of snowfall and evapotranspiration": a reply. *Canadian Geographer*, Vol. 17, No. 3, 1973, p. 282–87. [Answers comments by Findlay and McKay, ibid., p. 280–82.]

HIGUCHI, K. On the possibility of artificial control of the mass balance of a perennial snow patch. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969, . . .*, 1973, p. 207–12. [Field tests showed that sheets of polystyrene foam reduced melting and might aid eventual production of an artificial glacier.]

HIGUCHI, K. Yūsetsu no jinkō seigyo [The artificial control of snow melting]. *Saiensu: Scientific American [Japanese edition]*, Vol. 3, No. 9, 1973, p. 46–60. [Reviews methods of accelerating or retarding rate of melting of snow and their possible applications for seasonal snow, glaciers and icebergs.]

HOWARD, K. A. Avalanche mode of motion: implications from lunar examples. *Science*, Vol. 180, No. 4090, 1973, p. 1052–55. [Apollo 17 avalanche described. Shows lunar avalanches can flow despite lack of lubricating or cushioning fluid.]

ISAYENKO, E. P. O proyektirovanii snegouderzhivayushchikh sooruzheniy i terras na lavinoopasnykh sklonakh zheleznykh dorog [Design of snow retarding structures and terraces on the avalanche slopes of railways]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 209–16. [General discussion of problem. English summary, p. 216.]

KIMURA, T. Hensō furyokusa-hō ni yoru sekisetsu gansuiritsu no kijun keisoku (yobi jikken) [A preliminary experiment of standard measurement of liquid water content of snow by buoyancy difference method with phase change]. *Seppyō*, Vol. 33, No. 1, 1971, p. 1–9. [Describes method, which is based on the difference in buoyancy of ice and water in a suitable liquid (kerosene). English summary, p. 8–9.]

KINOSHITA, T., *and others*. Kōkū shashin ni yoru Ogurokawa ryūiki no sekisetsu, yūsetsu narabi ni ryūshutsu kaiseki [Analysis of snow depth, snow melt and run-off based on photogrammetry]. [By] T. Kinoshita, N. Katō, H. Taura, C. Bōjō. *Seppyō*, Vol. 33, No. 2, 1971, p. 60–70. [English abstract, p. 70.]

KITAMURA, M., *and others*. Sugi yōreirin ni okeru sekisetsu-shin to bisai chikei to no kankei ni tsuite (2) [On the relation between the depth of snow on the young stand of sugi and the microtopographic factors. (2)]. [By] M. Kitamura, S. Sutō, H. Tsukahara. *Seppyō*, Vol. 33, No. 2, 1971, p. 82–86. [Observations carried out for five years on stand of *Cryptomeria Japonica*. English summary, p. 86.]

KOHNEN, H., *and* BENTLEY, C. R. Seismoglaziologische Untersuchungen nahe Byrd Station, Antarktis. *Archiv für Meteorologie, Geophysik und Bioklimatologie*, Ser. A, Vol. 22, No. 2–3, 1973, p. 311–24. [Differences between velocity-depth functions at this station and at a site 30 km away are attributed to differences in snow densification rates.]

KOJIMA, K. Sekisetsu hyōmensō no netsu-shūshi to yūsetsu no kansokurei (shōryūiki-nai no basho ni yoru sai to Sapporo de no jikanteki henka) [Observations on heat exchange at the surface layer and melting of snow cover]. *Seppyō*, Vol. 33, No. 4, 1971, p. 260–69.

KUROIWA, D. Capillary potential of snow. *Union Géodésique . . . . Symposium on the Hydrology of Glaciers, . . . 1969*, . . . , 1973, p. 243. [Abstract. Method of measurement described.]

LABARRE, N., *and others*. Lead contamination of snow, by N. LaBarre, J. B. Milne and B. G. Oliver. *Water Research*, Vol. 7, No. 8, 1973, p. 1215–18. [Snow from near roads has sufficient lead content to affect water quality if dumped near water-courses.]

LANGHAM, E. J. Un modèle du manteau nival relié à sa méso-structure. *Hydrological Sciences Bulletin*, Vol. 18, No. 1, 1973, p. 33–43. [Model is proposed for the flow of melt water in ice layers in snow cover.]

MAKSIMOV, N. V. Usloviya obrazovaniya gidronapornykh lavin i vozmozhnosti ikh pronozirovaniya (na primere lavin severnogo sklona Kirgizskogo khrebta) [Conditions for the formation of water-pressurized avalanches and possibilities of forecasting them (from the example of avalanches of the northern slope of Kirgizskiy Khrebet)]. *Meteorologiya i Gidrologiya*, 1973, No. 3, p. 66–72.

MATSUDA, U., *and* NOOMOTE, M. Kaidan zōrin ni tsuite (1) [On the terraced plantation (1)]. *Seppyō*, Vol. 33, No. 3, 1971, p. 120–25. [To protect trees planted on slopes from damage caused by movement of accumulated snow, the slopes should be terraced to a width of at least 150 cm. English summary, p. 125.]

MERLIVAT, L., *and others*. Tritium and deuterium content of the snow in Groenland, by L. Merlivat, J. Ravoire, J. P. Vergnaud and C. Lorius. *Earth and Planetary Science Letters*, Vol. 19, No. 2, 1973, p. 235–40. [Accumulation values determined from tritium profiles decreased from 54.7 cm of water p.a. on the west coast to 18.1 cm on the east. Correlation demonstrated between tritium deposition rate and altitude of precipitation collection site.]

NAKAGAWA, M., *and* FUKAI, S. Raichō-zawa nadare chōsa hōkoku [Snow avalanche at Raichō valley]. *Seppyō*, Vol. 33, No. 2, 1971, p. 71–77. [Describes studies on ruins of house destroyed by avalanche thought to have occurred on 15 January 1968. English summary, p. 76–77.]

NOVIKOV, B. I. O dal'nosti vybrosa lavin kak funktsii plotnosti lavinoobrazuyushchego snega [The distance of avalanching as a function of avalanche snow density]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 217–20. [Presents results of observations on factors affecting avalanching. English summary, p. 220.]

ONODERA, H., *and* WAKABAYASHI, R. Sekiatsu ni taiō suru jumoku no seikatsu-kei [Life-forms of trees adapted to snow pressure]. *Seppyō*, Vol. 33, No. 2, 1971, p. 78–81. [Describes how trees will adapt themselves by bending and growing adventitious roots. English summary, p. 81.]

ŌNUMA, T. "Yuki makuri" [Snow rollers]. *Seppyō*, Vol. 35, No. 1, 1973, p. 9–16. [Discusses formation in relation to meteorological conditions. English summary, p. 16.]

ØSTREM, G. The transient snowline and glacier mass balance in southern British Columbia, Canada. *Geografiska Annaler*, Vol. 55A, No. 2, 1973, p. 93–106. [Position of transient snowline gives indication of mass balance variations during summer.]

PECK, E. L., *and* BISSELL, V. C. Aerial measurement of snow water equivalent by terrestrial gamma radiation survey. *Hydrological Sciences Bulletin*, Vol. 18, No. 1, 1973, p. 47–62. [Describes method and discusses accuracy of results.]

REESE, D. L., *and others*. Alternative methods of estimating snow water parameters, [by] D. L. Reese, H. F. Mayland, C. E. Brockway. *Water Resources Research*, Vol. 9, No. 5, 1973, p. 1433–39. [Describes successful use of recurrence technique.]

SAEKI, M., *and* KAWA., E. Niigata-ken Muikamachi jōnai no hyōsō nadare [Surface avalanche at Muikamachi, Niigata-ken, occurred in March 1970]. *Seppyō*, Vol. 33, No. 1, 1971, p. 44–45.

SAITŌ, H., *and others*. Irihirose ni okeru sekisetsu no danmen kansoku [Profile observation of snow cover in Irihirose-mura, Niigata-ken]. [By] H. Saitō, T. Ikarashi, M. Shimizu, K. Kenmotsu. *Seppyō*, Vol. 33, No. 1, 1971, p. 16–22. [Discusses structure, vertical distribution of density, free water content and hardness of snow cover in March. English summary, p. 22.]

SAITŌ, K. Sekisan kion ni yoru yūsetsu shussui yosoku [Forecast of thawing inundation by integrated temperature]. *Seppyō*, Vol. 33, No. 2, 1971, p. 55–59. [Date of inundation predicted on basis of correlation between integrated atmospheric temperature during a certain period of time and data of snow thaw. English summary, p. 59.]

SHIDEI, T. Sekisetsu to jumoku no seikatsu-kei [Snow cover and growth form of trees]. *Seppyō*, Vol. 33, No. 1, 1971, p. 42–43.

SHIMIZU, H., *and others*. Kurobe Kyōkoku Shiai-dani no nadare. I. Shiai-dana nadare no yobi chōsa [Study on the avalanche in the Shiai-dani valley, Kurobe canyon. I. Preliminary observation]. [By] H. Shimizu, E. Akitaya, M. Nakagawa, T. Okabe. *Seppyō*, Vol. 35, No. 1, 1973, p. 1–8. [Assessment of magnitude of avalanche, which occurred in February–March 1972. English summary, p. 7–8.]

SHIMOMURA, C. Nadare seigyodan ni tsuite [On avalanche control projectiles]. *Seppyō*, Vol. 33, No. 3, 1971, p. 126–30.

VOZOVIK, YU. I., *and others*. Lavinnyye akkumulyativnyye konusy kak ob"yekty paleoglyatsiologicheskikh issledovaniy [Avalanche accumulative cones as objects of palaeoglaciological investigations]. [By] Yu. I. Vozovik, S. M. Myagkov, V. G. Peunov, T. A. Salova. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 168–74. [Possible to trace back 8 000 years of avalanche activity. English summary, p. 173–74.]

WATANABE, S., *and* NEZU, S. Karamatsu no kansetsu jikken (2) [Experiment on snow crown of Japanese larch (2)]. *Seppyō*, Vol. 35, No. 3, 1973, p. 140–43. [Reports observations on the effects of weight of snow on trees aged between 15 and 53 years. English summary, p. 143.]

YAMAGUCHI, H. Yūsetsu shussui yohō no jitsurei (yūsetsu yohō) [An example of forecasting run-off]. *Seppyō*, Vol. 33, No. 4, 1971, p. 276–81.

YAMAOKA, I. Yūsetsu ryūshutsu no kaisekirei (Kanayama Damu ryūiki) [An example of run-off analysis (Kanayama dam catchment area)]. *Seppyō*, Vol. 33, No. 4, 1971, p. 270–75.

ZALIKHANOV, M. CH. Rol' lavin v pereraspredelenii snega v gorakh [The role of avalanches in the redistribution of snow in mountains]. *Meteorologiya i Gidrologiya*, 1973, No. 3, p. 62–65. [Studies in the Caucasus.]

ZYABKIN, V. V. Laviny i ikh rol' v pitanii lednika Inyl'chek [Avalanches and their role in the nourishment of Lednik Inyl'chek]. *Materialy Glyatsiologicheskikh Issledovaniy. Khronika. Obsuzhdeniya*, Vyp. 19, 1972, p. 251–53.