

1. Record Nr.	UNINA9910299431603321
Autore	Leppäranta Matti
Titolo	Freezing of Lakes and the Evolution of their Ice Cover // by Matti Leppäranta
Pubbl/distr/stampa	Berlin, Heidelberg : , : Springer Berlin Heidelberg : , : Imprint : Springer, , 2015
ISBN	3-642-29081-7
Edizione	[1st ed. 2015.]
Descrizione fisica	1 online resource (309 p.)
Collana	Springer Earth System Sciences
Disciplina	551.5/248
Soggetti	Physical geography Environmental monitoring Biotic communities Geophysics Environmental geology Aquatic ecology Earth System Sciences Monitoring/Environmental Analysis Ecosystems Geophysics/Geodesy Geoecology/Natural Processes Freshwater & Marine Ecology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Preface; Contents; 1 Introduction; 2 Freezing of Lakes; 2.1 Lake Types and Characteristics; 2.1.1 Classification and Geometry of Lakes; 2.1.2 Physical Properties of Lake Waters; 2.2 Weather and Climate; 2.2.1 General Regional Climate; 2.2.2 Air Pressure; 2.2.3 Precipitation; 2.2.4 Air Temperature, Humidity and Wind; 2.2.5 Radiation Balance; 2.3 Water Budget of Lakes; 2.3.1 General Form; 2.3.2 Inflow and Outflow; 2.3.3 Lake--Atmosphere Water Fluxes; 2.3.4 Budgets of Impurities; 2.4 Ice-Covered Lakes; 2.4.1 Zonation of Freezing Lakes; 2.4.2 Seasonal Lake Ice Zone; 2.4.3 Lakes with Perennial Ice 2.5 Lake Ice Climatology 3 Structure and Properties of Lake Ice; 3.1 Ice

Ih: The Solid Phase of Water on Earth; 3.1.1 Ice Crystal Structure; 3.1.2 Ice Nucleation; 3.1.3 Ice Formation in Lakes; 3.1.4 Physical Properties of Lake Ice; 3.2 Lake Ice Types and Stratigraphy; 3.2.1 Ice Structure Analysis; 3.2.2 Lake Ice Stratigraphy; 3.2.3 Snow Cover; 3.2.4 Case Study; 3.3 Impurities in Lake Ice Cover; 3.4 Light Transfer Through Ice Cover; 3.4.1 Solar Radiation; 3.4.2 Radiance and Irradiance; 3.4.3 Light Transfer in Ice-Covered Lakes; 3.5 Ice Mass Balance; 4 Thermodynamics of Seasonal Lake Ice
 4.1 Heat Budget of Lakes 4.1.1 Total Heat Budget; 4.1.2 Solar Radiation; 4.1.3 Terrestrial Radiation; 4.1.4 Turbulent Heat Exchange with the Atmosphere; 4.1.5 Linearized Heat Flux; 4.2 Ice Growth and Melting; 4.2.1 Thermodynamic Principles; 4.2.2 Congelation Ice Growth; 4.2.3 Superimposed Ice Growth; 4.2.4 Frazil Ice Growth; 4.2.5 Ice Melting; 4.3 Analytic Models; 4.3.1 Basic Principles; 4.3.2 Congelation Ice; 4.3.2.1 Atmospheric Surface Layer as a Buffer; 4.3.2.2 Influence of Snow Cover on Congelation Ice Growth; 4.3.2.3 Heat Flux from the Lake Body; 4.3.3 Snow-Ice; 4.3.4 Frazil Ice
 4.3.5 Melting 4.3.6 Multi-year Ice; 4.4 Numerical Models; 4.4.1 Structure of Models; 4.4.2 Quasi-steady Models; 4.4.3 Time-Dependent Models; 5 Mechanics of Lake Ice; 5.1 Rheology; 5.1.1 Stress; 5.1.2 Strain and Rotation; 5.1.3 Rheological Models; 5.2 Ice Cover as a Plate on Water Foundation; 5.2.1 Elastic Lake Ice Cover; 5.2.2 Viscous Behaviour of Lake Ice; 5.2.3 Thermal Cracking and Expansion; 5.2.4 Displacements in the Ice Cover; 5.3 Bearing Capacity of Ice; 5.4 Ice Forces; 5.4.1 Ice Load Problems; 5.4.2 Estimation of Ice Loads; 5.5 Drift Ice in Large Lakes; 5.5.1 Drift Ice Material
 5.5.2 Equations of Drift Ice Mechanics 5.5.3 Static Ice Cover; 5.5.4 Models of Drift Ice Dynamics; 5.5.5 Ice Thickness and Compactness Profiles; 5.5.6 Numerical Modelling; 6 Proglacial Lakes; 6.1 Ice Sheets and Glaciers; 6.2 Epiglacial Lakes; 6.2.1 Occurrence of Epiglacial Lakes; 6.2.2 Physics of Epiglacial Lakes; 6.3 Supraglacial Lakes; 6.3.1 Occurrence of Supraglacial Lakes; 6.3.2 Structure of Supraglacial Lakes; 6.3.3 Thermodynamics of Supraglacial Lakes; 6.3.4 Case Study; 6.4 Subglacial Lakes; 6.4.1 Formation and Diversity; 6.4.2 Lake Vostok; 7 Lake Water Body in the Ice Season
 7.1 Ice Formation

Sommario/riassunto

A large number of boreal lakes are ice-covered in winter. However, research and literature of these lakes concerns by far only the open water season. In particular, no textbook on physics of ice-covered lakes exists, and now it would be a proper time to prepare such. Winter limnology has become an increasing active field of research recently. A series of winter limnology symposia was started in 2008 in Finland with nearly 100 participants. The second symposium was held in Berlin in 2010 and the third one is coming in 2012 in Norway. Winter limnologists need strongly a textbook on lake ice physics since the ice acts as their boundary condition.