

Completed Research



When a project moves to Completed Research (CR) status, the contract with RIHN is concluded. Research teams disperse to university research, teaching, and other duties. Project publications and other communications and contributions may follow for several years. At RIHN, each project forms part of the institute's heritage; project results and data are entered into the RIHN archives upon which future RIHN projects may be formulated.



Fiscal Year Completed	Leader	Research Project
2006	HAYASAKA Tadahiro	Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia
	KANAE Shinjiro	Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives
	WATANABE Tsugihiro	Impact of Climate Changes on Agricultural Production System in the Arid Areas
	NAKAWO Masayoshi	Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes
	YACHI Shigeo	Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed
2007	FUKUSHIMA Yoshihiro	Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment
	ICHIKAWA Masahiro	Sustainability and Biodiversity Assessment on Forest Utilization Options
	AKIMICHI Tomoya	A Trans-Disciplinary Study on Regional Eco-History in Tropical Monsoon Asia: 1945-2005
2008	SEKINO Tatsuki	Interaction between Environmental Quality of the Watershed and Environmental Consciousness
	TAKASO Tokushiro	Interactions between Natural Environment and Human Social Systems in Subtropical Islands
2009	SHIRAIWA Takayuki	Human Activities in Northeastern Asia and their Impact on Biological Productivity in the North Pacific Ocean
2010	TANIGUCHI Makoto	Human Impacts on Urban Subsurface Environments
	YUMOTO Takakazu	A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago
	SATO Yo-Ichiro	Agriculture and Environment Interactions in Eurasia: Past, Present and Future
2011	KAWABATA Zen'ichiro	Effects of Environmental Change on the Interactions between Pathogens and Humans
	KUBOTA Jumpei	Historical Interactions between Multi-Cultural Societies and the Natural Environment in a Semi-Arid Region in Central Eurasia
	OSADA Toshiki	Environmental Change and the Indus Civilization
	UCHIYAMA Junzo	Neolithisation and Modernisation: Landscape History on East Asian Inland Seas
	UMETSU Chieko	Vulnerability and Resilience of Social-Ecological Systems
2012	OKUMIYA Kiyohito	Human Life, Aging and Disease in High-Altitude Environments: Physio-Medical, Ecological and Cultural Adaptation in "Highland Civilizations"
	SAKAI Shoko	Collapse and Restoration of Ecosystem Networks with Human Activity
	MOJI Kazuhiko	Environmental Change and Infectious Disease in Tropical Asia
2013	HIYAMA Tetsuya	Global Warming and the Human-Nature Dimension in Siberia: Social Adaptation to the Changes of the Terrestrial Ecosystem, with an Emphasis on Water Environments
	NAWATA Hiroshi	A Study of Human Subsistence Ecosystems in Arab Societies: To Combat Livelihood Degradation for the Post-oil Era
	KADA Ryohei	Managing Environmental Risks to Food and Health Security in Asian Watersheds
2014	MURAMATSU Shin	Megacities and the Global Environment
2015	KUBOTA Jumpei	Designing Local Frameworks for Integrated Water Resources Management
2016	HABU Junko	Long-term Sustainability through Place-Based, Small-Scale Economies: Approaches from Historical Ecology
	SATO Tetsu KIKUCHI Naoki	Creation and Sustainable Governance of New Commons through Formation of Integrated Local Environmental Knowledge
	ISHIKAWA Satoshi	Coastal Area-capability Enhancement in Southeast Asia
	TANAKA Ueru	Desertification and Livelihood in Semi-Arid Afro-Eurasia
2017	ENDO Aiko	Human-Environmental Security in Asia-Pacific Ring of Fire: Water-Energy-Food Nexus
2018	NAKATSUKA Takeshi	Societal Adaptation to Climate Change: Integrating Palaeoclimatological Data with Historical and Archaeological Evidences

Societal Adaptation to Climate Change: Integrating Palaeoclimatological Data with Historical and Archaeological Evidences

Project Leader **NAKATSUKA Takeshi** RIHN

We have reconstructed the last 5000 years of climate variations in Japan and Asia using high-resolution paleoclimate archives such as tree rings, coral rings, old diaries, and sediments. Tree-ring cellulose oxygen isotope ratios have disclosed variations in summer precipitation (annual resolution) since the Jomon-era, by which we have elucidated climate variations behind Japanese history at all time scale from 1 to 1000 years. Comparisons of the paleoclimate data with paleographic and archaeological archives have been drastically improving our understanding of the climate-history relationship in Japan. Numerous works of literature on disasters like cold summer, flood and drought since the Ancient period have been confirmed paleoclimatologically. We have found a tight relationship between climate variations and socio-economic indices like agrarian production, prices of commodities and regional population in Medieval and Early Modern periods and the correspondence of village distribution and irrigation development to precipitation changes in the Prehistorical period. We have also developed a new dendrochronological method to date archaeological wood using oxygen isotope ratios for better chronological comparisons of climate change and the ways in which prehistorical people responded. By comparing the paleoclimate data with famine and war records, we have realized that multi-decadal large variations in temperature and/or precipitation bring serious negative impacts on human societies (Figure 1). Moreover, we have discovered the fact that multi-decadal climate variability is enhanced regularly at about 400-year intervals when simultaneous political regime shifts occur over wide areas including Japan and China, which suggests the importance of climate variations as a key factor of global history studies.

Although we have confirmed tight linkages between

climate and Japanese history, this was not the final goal. We can contribute to studies of global environmental issues in two ways besides making science-based predictions of future climate. One is to extract universal lessons from historical climate adaptations. Although past people often got into difficulties when they encountered the enhancement of multi-decadal climate variation, they eventually overcame it by modifying societal systems. We should learn from historical lessons to make new sustainable societies by overcoming difficulties such as enhancement of social inequality due to natural and social environmental changes. Our work also contributes to the issue of faithfully confronting the diversity of past people. As our sense of values is different from those of Pre-Modern people, values of future generations must be different from those of ours. To establish a “furable” society, one of RIHN’s aims, we should recognize how temporal change and value change are linked, so that we may understand the real sense and meaning of people and societies responses to climate variation.

We are editing six Japanese volumes and one English volume to synthesize project results as well as many original papers and books in the fields of paleoclimatology, history, and archaeology. We have already started a new inter-disciplinary research project on “reevaluation of calendar ages and climate-history relationship in the prehistorical Japanese archipelago using tree-ring oxygen isotope ratios” by collaborating with many archaeological investigators belonging to many local governments in Japan. A huge amount of paleoclimate data obtained in this project are to be used in the framework of historical big-data analyses on paleography and disaster prevention and reduction research for contemporary societies.

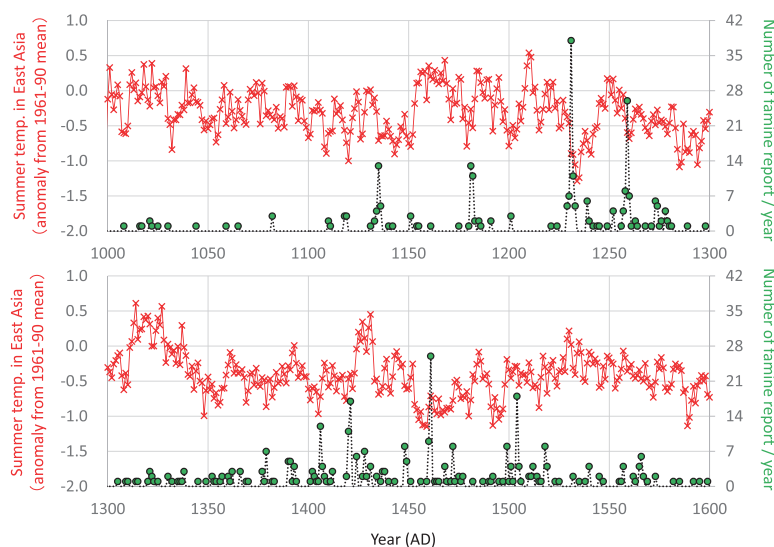


Figure 1 Variations in East Asia summer temperature (red: reconstructed from tree ring width database in Asian wide region) and famine reports in Japan (green: number of old documents from each year containing famine-words) during Medieval period.



Above: Maximilian SPIEGELBERG, Exploring Dochula, Bhutan

Bottom: NAKAHARA Satoe, A diving fisherman and his grandson, Mejjatto Islet, Marshall Islands. Local people believe that ocean currents carried the float to the islands from Japan after the March 2011 Tsunami.