

Natural History of Hokkaido as revealed in soils

Re-edited for 2019, Part 1

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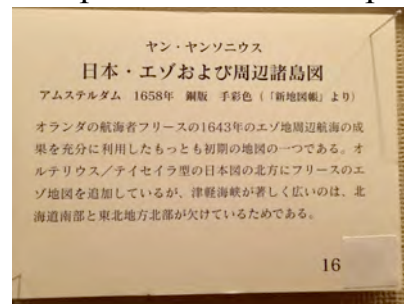
Map of Japan/Hokkaido, Amsterdam Yan Yansonius (1658)



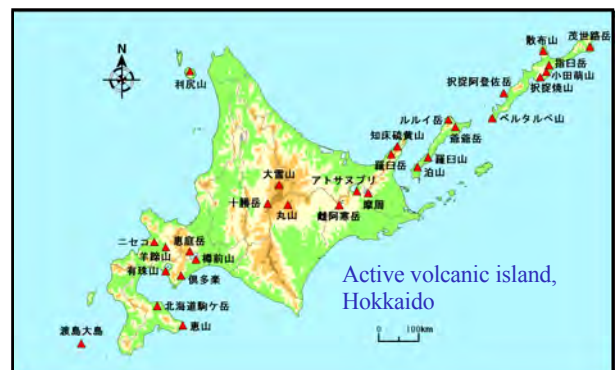
Same map showing the eastern part of Hokkaido.
Tokachi is designated as “Tacapsy”, while Hidaka
mountains as “Snowy mountains”.



Explanation of the map



- Hokkaido had been the most unknown part in the world. Even the people in the main island of Japan did not know the detail of Hokkaido 300 years ago. But native people lived here since more than 20,000 years ago and a special culture has been cultivated.



Active volcanoes in Japan

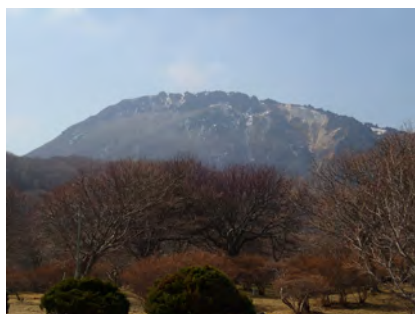
Komagatake (near Hakodate)



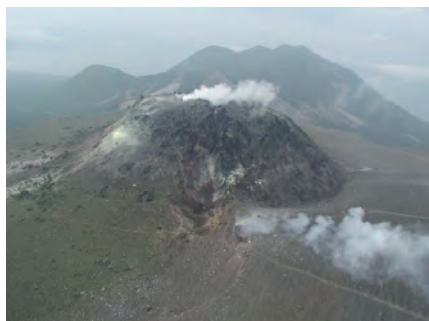
Komagatake



Esan

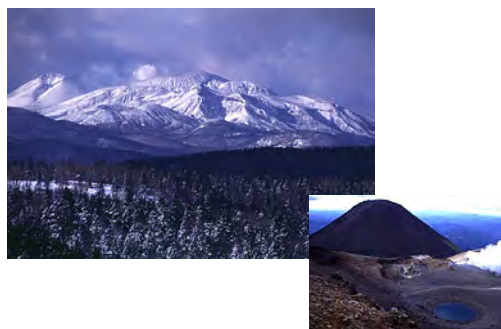


Usu-zan



Tarumae-san (from Shikotsu lake)

Meakan&Akan-Fuji



Eruption site

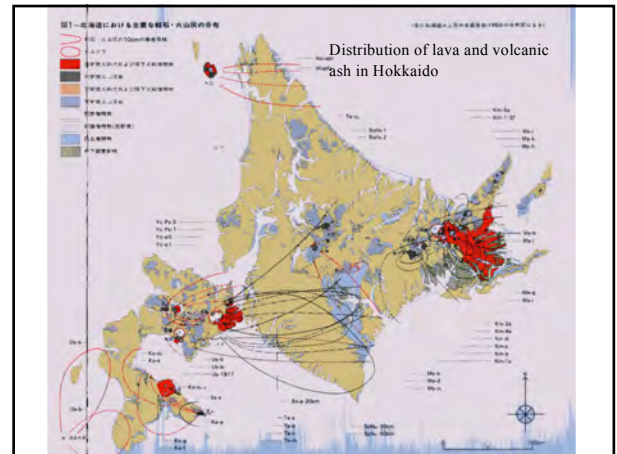
Kussharo-lake



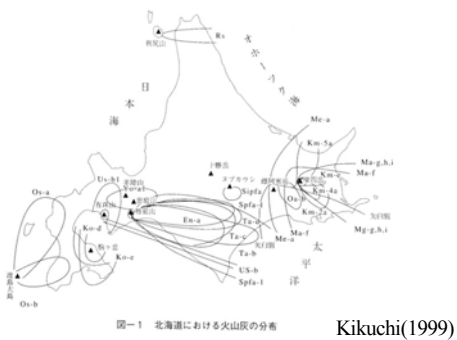
Mashu-lake



Mashu-lake



Distribution of Volcanic ashes in Hokkaido



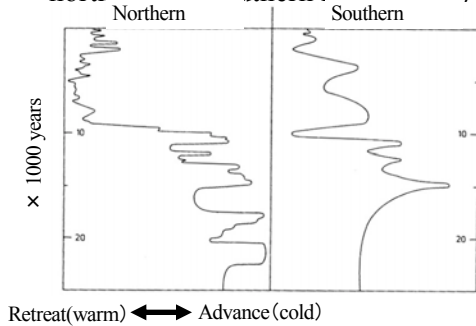
Major volcanic ashes fallen in Tokachi plain

- Tarumae a (Ta-a)** 1739 AD
- Komagatake c₂(Ko-c₂)** 1694 AD
- Tarumae b (Ta-b)** 1667 AD (Rebellion of Ainu people led by Shakushain)
- Usu b (Us-b)** 1663 AD (Southern Tokachi plain)
- Tarumae c (Ta-c)** ca BC1000 (Wide distribution)
- Tokachi c₂ (To-c₂)** 3000-4000 BP (Cold again)
- Tarumae d (Ta-d)** 8940 ± 160 BP (Rising sea level)
- Eniwa soft loam** 11,940 ± 240 BP
- Eniwa Ball shaped loam** 15,010 ± 400 BP (Warming again)
- Eniwa a (En-a)** 17,000-19,000 BP (Glacial maximum)
- Shikotsu 1 (Spfa-1)** 39,000-41,000 BP (Sub-interglacial)

Climate change in last 40,000 years

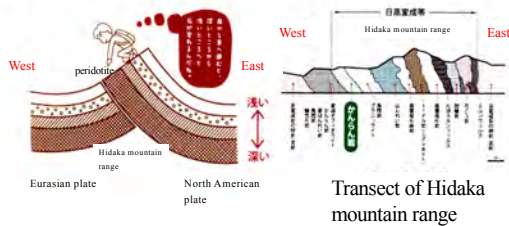
- Getweidel Sub-interglacial period (44,000~29,000BP) warm
- Glacial maximum in Wurm (25,000~16,500BP) coldest
- Late-glacial period (16,500~10,000BP) getting warm
- Holocene (After 10,000BP)
- 8,500BP Raise in sea water level (transgression)
- 6000BP Highest sea water level
- 5000~4000BP Cool climate again. Regression of sea level
- 4000~2000BP Warming again
- After 2000BP Cooling

Advance (cold climate) and retreat (warm climate) of glacier in last 20,000 years in northern and southern hemisphere)



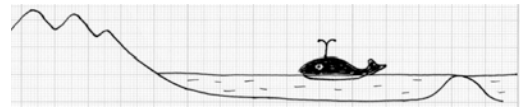
13 million years ago (Neogene period), Hidaka mountain range started to lift up due to the collision of two tectonic plates.

2.衝突によって生まれた日高山脈とアポイ岳 | 「アポイ岳ジオパーク」公式サイト—北海道博物館を丸ごと楽しむ大地の公園



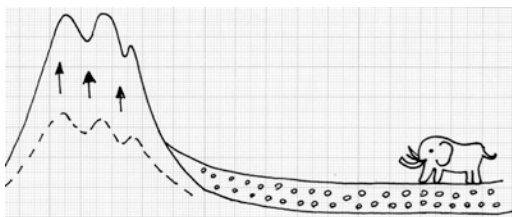
Early stage of Pleistocene (1640000~78000 years BP)

Tokachi plain was a bay connected to ocean



Middle stage of Pleistocene (780,000~130,000 years BP)

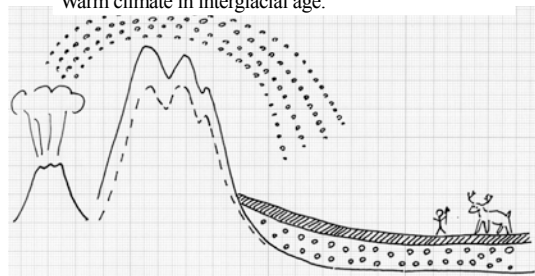
Hidaka mountain range uplifted, and enormous amount of soil and gravel accumulated in plain.



Late stage of Pleistocene

(130,000~40,000 years BP)

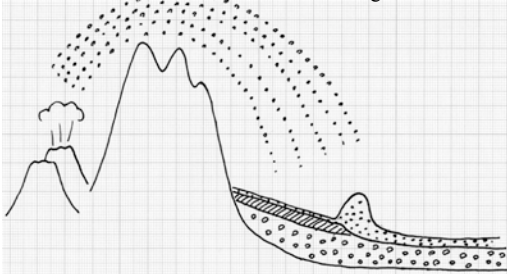
Volcanic ashes fell (from Mt. Kuttara and Shikotsu). Warm climate in interglacial age.



Last stage of Pleistocene

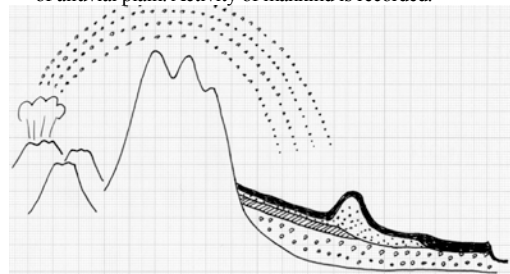
(40,000~10,000 years BP)

Terrace was eroded and new volcanic ashes fell (Eniwa-a). Ancient sand dune was formed. Glacial age.

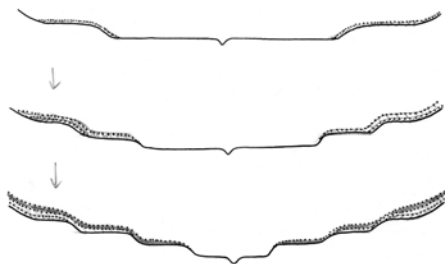


Holocene epoch (<10,000 years BP)

Climate warming. Progress and retreat of sea. Fall of new volcanic ashes. Erosion of terrace and formation of alluvial plain. Activity of mankind is recorded.



How terraces were formed and volcanic ashes were accumulated. Recently, contribution of yellow dust from China is also considered remarkable.



How terraces were formed

- When mountains were raised,
- Soils eroded from hills were accumulated in plain, and cliffs along the terraces were formed.
- In the glacial period, the sea retreated and wide plain were formed. Erosion of hills proceeded in accordance.
- In the interglacial period, accumulation of sediments occurred preferentially.
- When volcanoes erupted, the plain was covered with volcanic ash. However, the volcanic ash on the lower terrace is removed due to erosion.
- In the higher terrace, old volcanic ashes were remained.

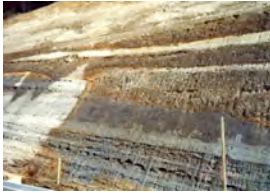
Activity of people in Tokachi

- 120,000 BP Fossil of Nauman Elephant and primitive stoneware
- 21,500 BP Fine stone ware for hunting below Eniwa-a volcanic ash (17,000 BP) at Kawanishi C site.
- 19,300 BP Obsidian knife shaped stone ware below Eniwa-a volcanic ash (17,000 BP) at Kami-shihoro.
- 14,000 BP Earthenware showing the evidence of cooking fish (Taisho, Obihiro)
- 9000BP Fine stone blade culture in Kami-itaira below Tarumae-d volcanic ash (9000BP)
- 6000BP Earthenware in Yachiyo. Trace of Oldest House and Village in Tokachi

Activity of people in Tokachi (continued)

- BC5000 Active fishery Archaeological remain in Urahoro town)
- BC4000 Johmon designed earthen ware in Furumai
- BC3000 Spitz-based earthen ware in Memuro
- BC2000 Flat-based earthenware in Satsunai
- BC1000 Pipe-shaped earthenware
- BC 200 Ironware
- AD1300 Start of Agriculture Tokachi-buto

Peat layer from which a Fossil of Nauman Elephant was found



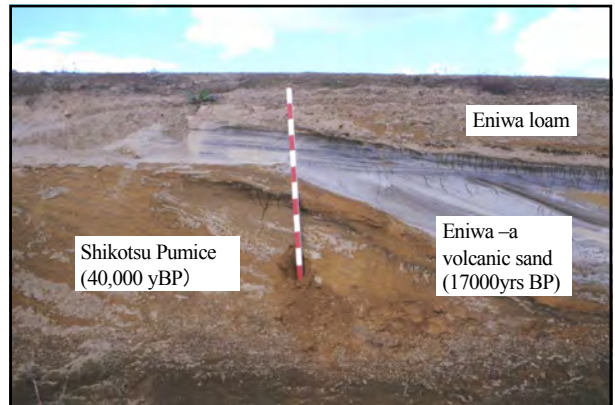
Rearranged Nauman Fossil



Stone tool like materials found in the Nauman fossil layer



120,000 yrs ago



Volcanic ash sand dune (Kawanishi town, Obihiro)

Glacier (Jung-frau in Europe Alpen)



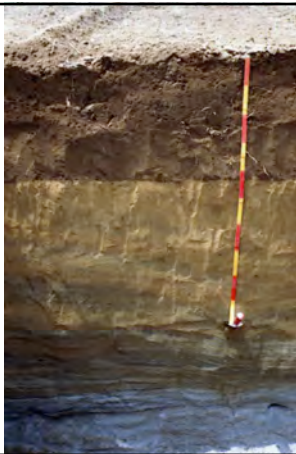
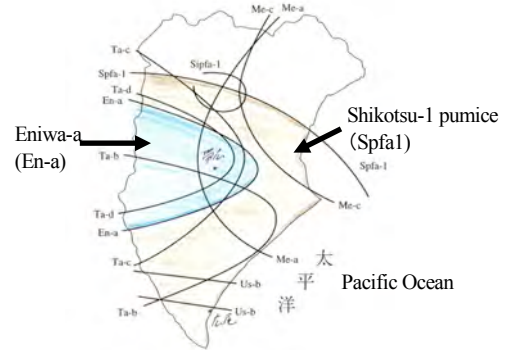
Peri-glacial Relief in Soya Hill Area



The Age when En-a volcanic ash fell.

- 17,000 yBP
- Stone age, Pre-earthenware age
- Very cold and dry glacial age

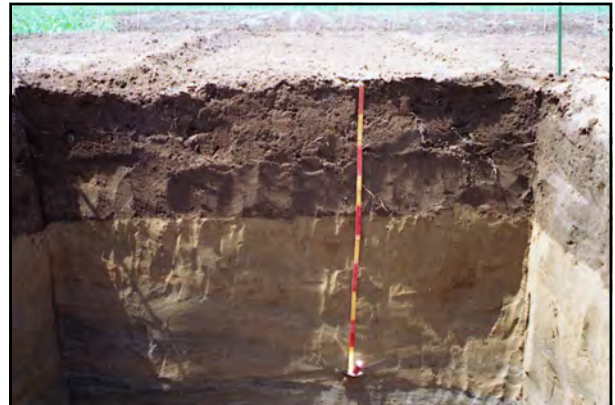
En-a Volcanic ash distribution



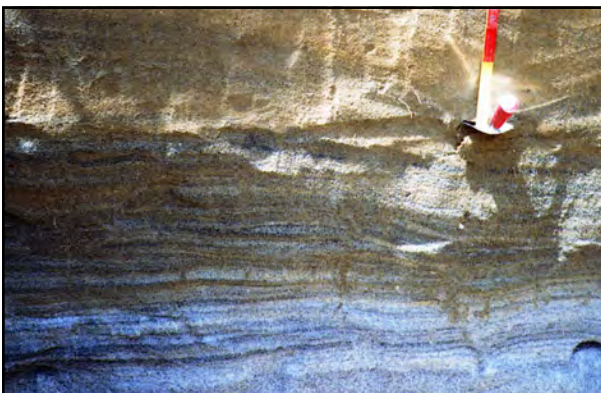
Andosol profile in OUAVM farm

Eniwa loam (mixed with long range aeolian dust) 15000-12000 yBP

Eniwa sand 17000yBP



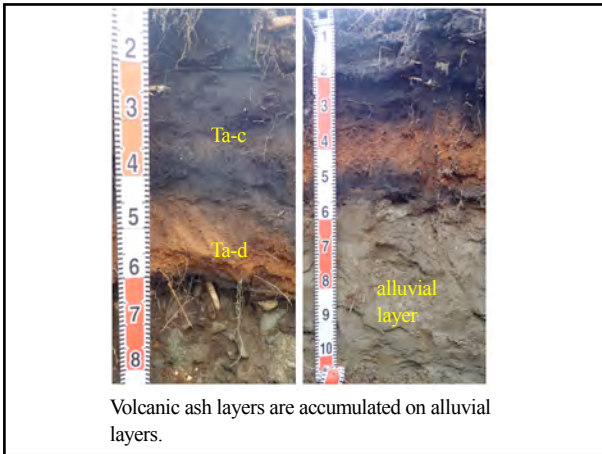
Andosol on Eniwa loam (OUAVM Farm)



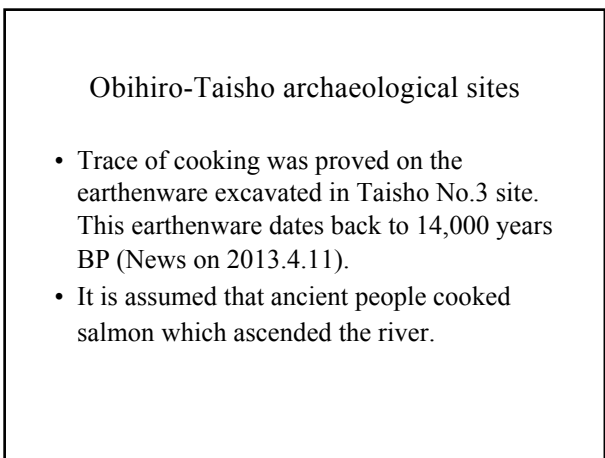
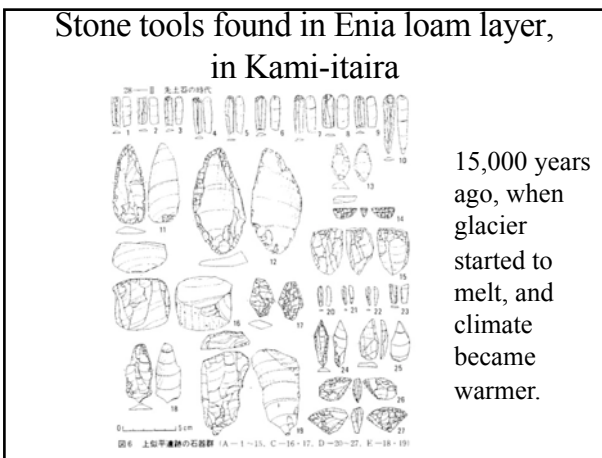
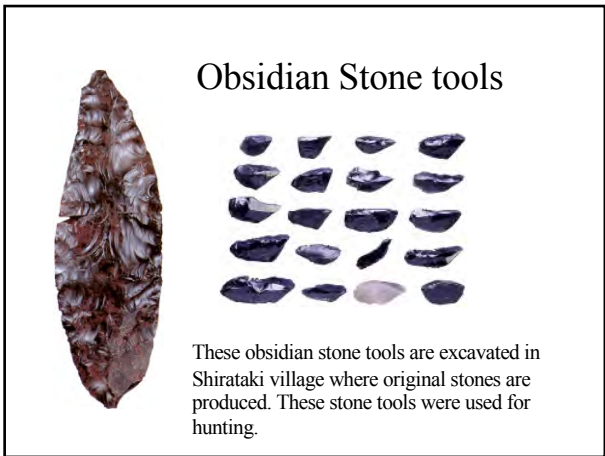
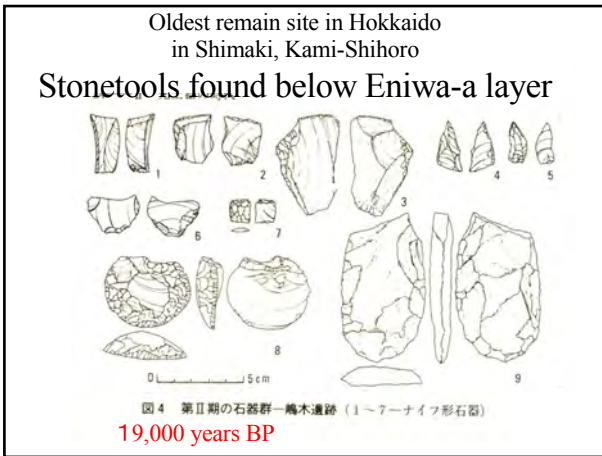
Eniwa sand with lamina like layers



Soil profile on the lower terrace in the forest of Obihiro Agricultural High School



Volcanic ash layers are accumulated on alluvial layers.



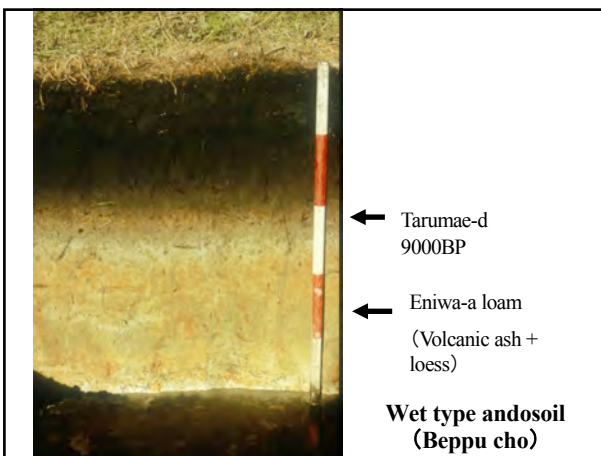
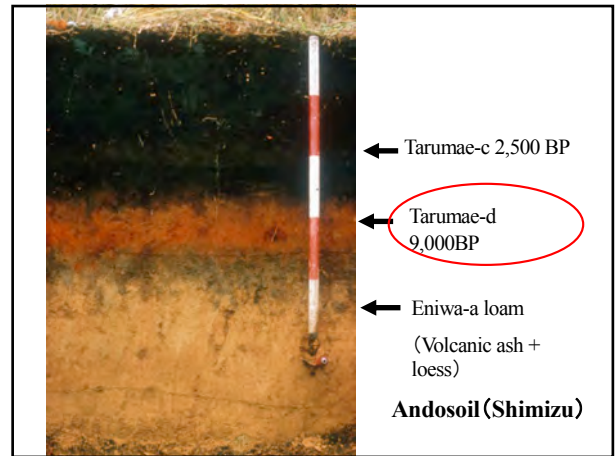
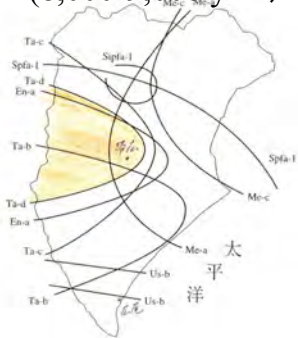
Earthenware excavated in Taisho, Obihiro(14,000 yBP), with the trace of cooking. **Oldest record in the world.**



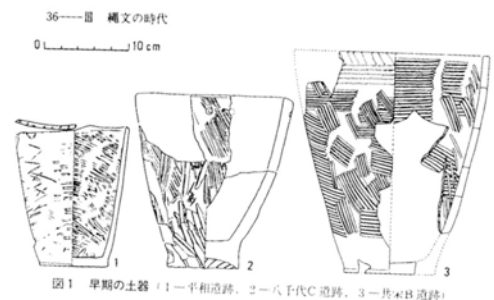
The Age when Ta-d Ash fell.

- 9,000 yBP
- Rapid Warming
- Rise in Sea level (peaked in 6000 yBP)
- Early Jomon Age

Distribution of Ta-d Ash (8,000-9,000 yBP)



Earthenware in Early Jomon Age



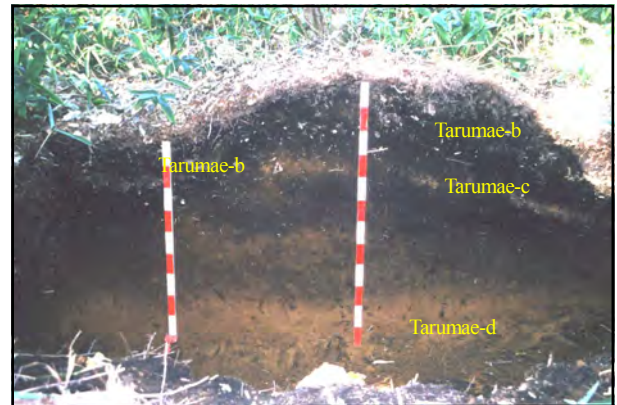
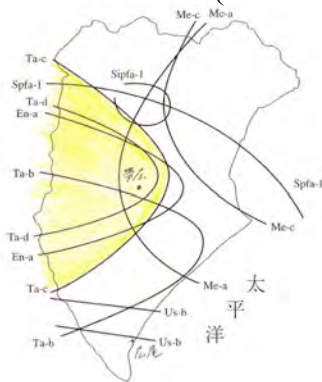
Archaeological remain at Heiwa in Urahoro town

- Early Jomon Era 7000BP~5000BP
- Necklace stone made of jade, **oldest record in Japan**
 - Jade produced in Hidaka mountain range, Hokkaido, had been used (nephrite) .

The Age when Ta-c Ash fell.

- Fell in 2,500~3,000BP
- Late Jomon Era
- Volcanic ash separating Jomon Era and younger era
- Regression of sea
- Climate had been cold for 2000 years before the fall of Ta-c volcanic ash.
- Formation of Tokachi Bouzu (Earth hammock)

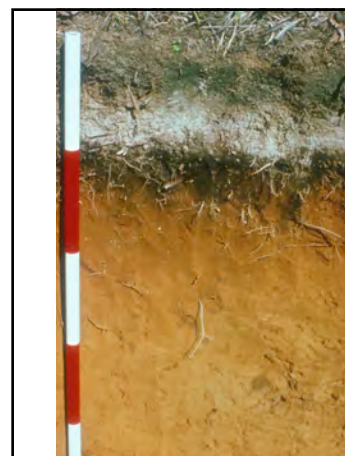
Distribution of Ta-c (2500-3000 yBP)



Tokachi Bozu (earth hammock in OUAVM)



Soil in wet type forest in Obihiro Univ.

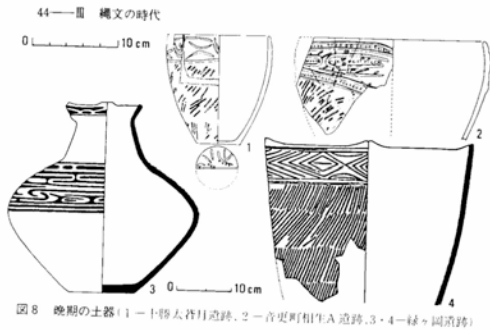


Tarumae c
(2,500 yBP)

Taruma d
(9,000 yBP)

**Andosoil
(Sarabesu)**

Earthenware in late Jomon Age



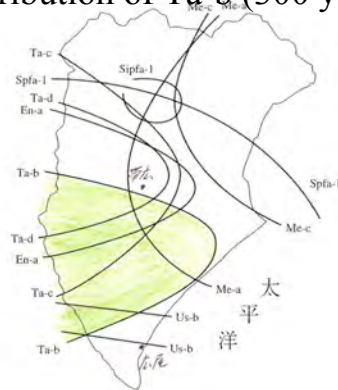
Fashionable lady in Jomon Era (Exhibition of the Hokkaido Museum, Sapporo)



The Age when Ta-b Ash fell.

- Mt Tarumae erupted in 1667 AD.
- Establishment of Matsumae feudal domain (in 1604 by Tokugawa shogunate regime)
- Tokachi market ruled by Kakizaki family
- Background of rebellion by Shakushain Ainu people (1669)

Distribution of Ta-b (300 years ago)



Rebellion of Shakushain

Rebellion of Ainu people occurred in 1669 in Iburi area.

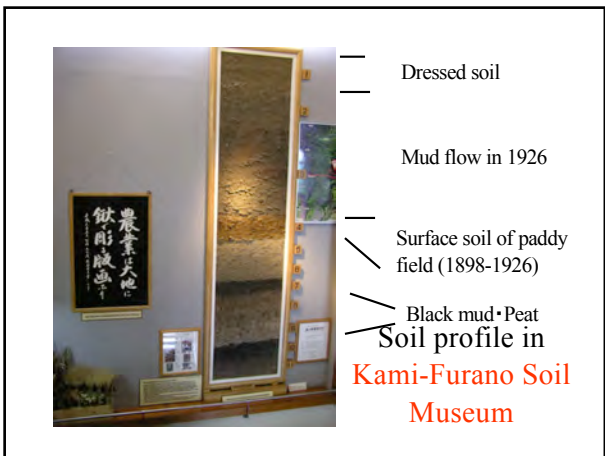
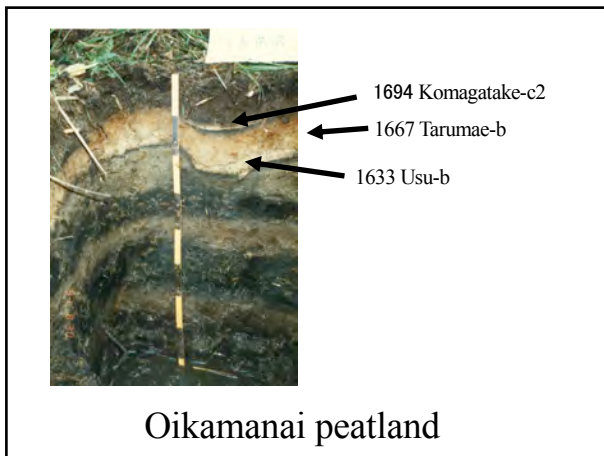
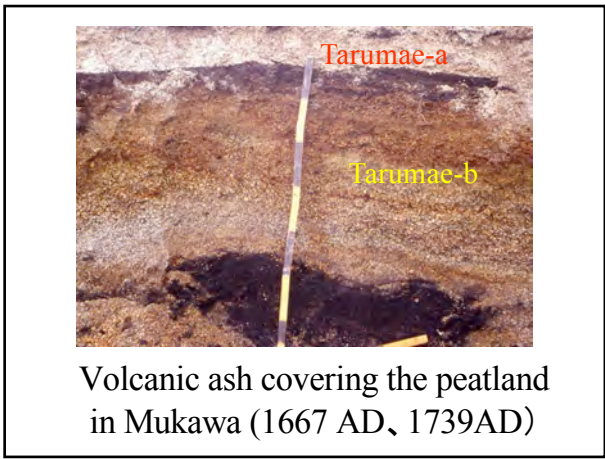
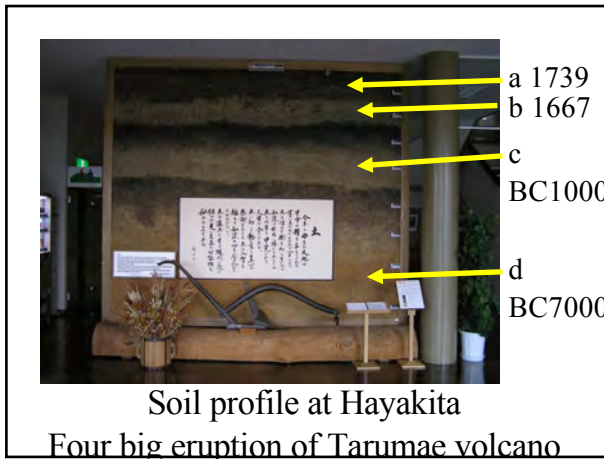
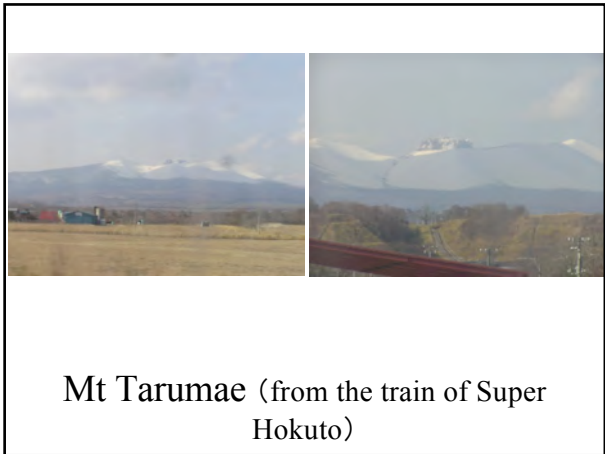
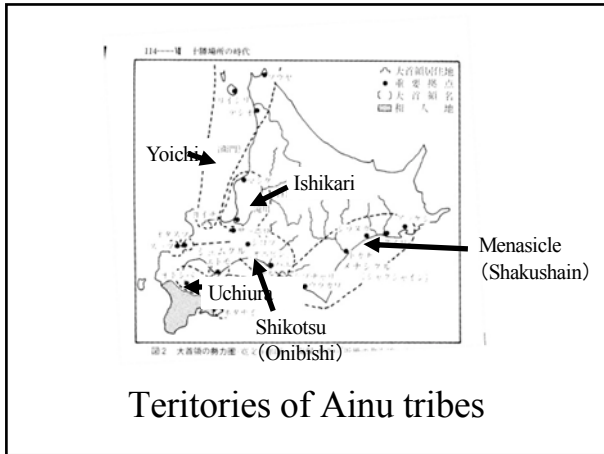
Several Ainu Tribes were consolidated and a regional war occurred between Japanese soldiers, managers, and Ainu people

Leader of Ainu people, "Shakushain" was killed on the occasion of peace talk negotiation.

Eruption of Mt. Tarumae in 1667 (Tarumae-b volcanic ash) might have been one of the cause.



Shakushain
Leader of Ainu

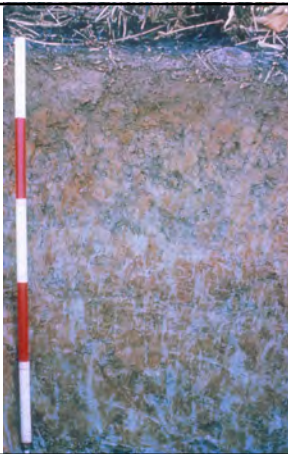


Soil in Biei Hill

(Very old pyroclastic flow deposit from Mt. Tokachi)



Soil in Biei Hill (easily eroded)



Pyroclastic flow once sedimented below water
Clayey, very hard
Iron mottles are formed

Gray terrace soil (Takikawa)

Gray terrace soil (Takikawa)



Gray terrace soil (Takikawa)



Gray terrace soil (Takikawa)

