

SECTION 2

Development of the Climatic Scenarios

2.1. Purpose

This section describes the range of climatic variations observed in Japan in recent history, and the scale of the changes that may accompany future increases in atmospheric carbon dioxide. The description provides a basis for the characterization of three types of climatic scenario that will subsequently be used to estimate the potential impact of climatic variations on rice yield and rice production in Japan:

- (1) The weather in extreme individual years selected from historical records of agroclimatic conditions.
- (2) The climate during anomalous sequences of years, also determined from historical records.
- (3) A simulated climate under doubled concentrations of atmospheric carbon dioxide based on estimations from the Goddard Institute for Space Studies (GISS) general circulation model.

Finally in this section, the patterns of climatic change implied in the scenarios for the Japan region are examined in relation to the synoptic climatological features that might explain them.

2.2. Climatic Changes in the Historical Period

Evidence for climatic variations in the period before instrumental meteorological observations have been assembled for two regions in eastern Asia, labeled broadly as China and Japan (*Figure 2.1*). Documentary information and proxy data were used to derive a temperature classification characterizing conditions in these two countries during the last two millennia. A composite chronology for East Asia is presented on the right of the diagram. The most striking features

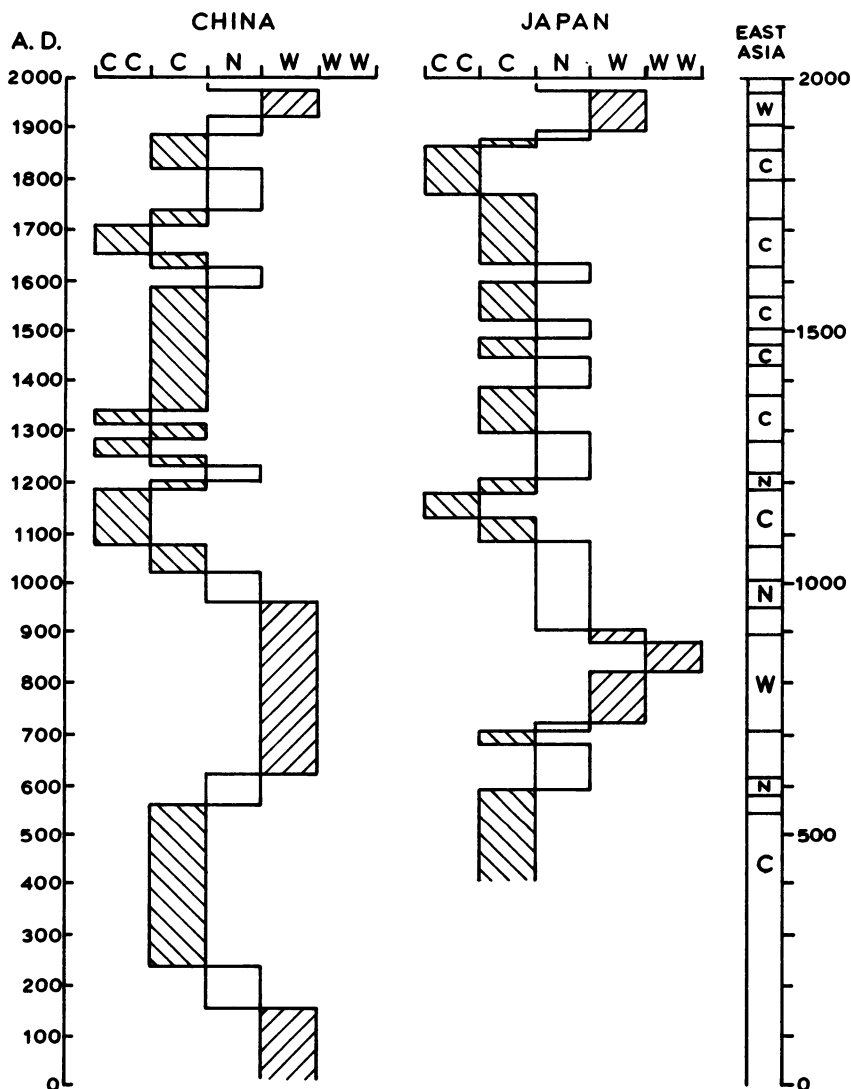


Figure 2.1. Temperatures in China and Japan during the historical period. CC, very cold; C, cold; N, normal; W, warm and WW, very warm. The temperature chronology for East Asia (right-hand column) is a composite of the other two graphs (after Yoshino, 1978b).

are the warm period from about AD 700–900 (with similar conditions to the climatic optimum or hypsithermal of 6000–5000 years BP), and the repeated cold periods between about 1070 and 1870, with a particularly cold spell in Japan in the early nineteenth century when the northern part of Honshu suffered frequently from severe famine due to crop failures in cool summers.