

# Subsurface geology of Kansai International Airport, central Japan

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## ABSTRACT

The subsurface sediments of Kansai International Airport (KIX) is composed mainly of Pliocene – Pleistocene sediments called Osaka Group. The Osaka Group is characterized by alternating sequences of marine and nonmarine strata. The stratigraphy at KIX established by micropaleontological, tephrochronological and magnetostratigraphical method and correlated with the standard stratigraphy of Osaka Group using marine clay and volcanic ash layers. The sedimentary sequence at KIX is divided into two main units (Kukojima and Sennanoki Formations in ascending order) with the unconformable relation. Although thick marine clay units are main components of the subsurface sequence, characteristics of coarser sediment units have an important role of moving of water during construction of the reclaimed land. Coarser units (S1 – S10) of the Kukojima Formation, which is the uppermost unit of the subsurface sequence, are characterized from the viewpoint of evaluation of coarser sand units on the basis of sedimentary environmental analysis and characteristics of distribution of coarser sand units. Especially, S1 and S10 units have the characteristics of more permeable rather than other coarser units

## 1. INTRODUCTION

Tectonic sedimentary basins aligned in the central part of Japan during Quaternary (Takemura, 1985). Thick sediments deposited in these basins provide useful records of tectonic and climatic changes throughout Quaternary. The Osaka sedimentary basin including Osaka Bay and area of Kansai International Airport is one of them. The Quaternary Osaka sedimentary basin has developed at an eastern contractional bend of a major transcurrent fault system named the Median Tectonic Line, which divides the southwest Japan arc. The thickness of Pliocene – Pleistocene sediments reaches to ca 3500m at the deepest part (Yokokura et al., 1998 etc). These sequences are called the Osaka Group and are distributed in the Osaka Bay and exposed in the surrounding mountain areas (Fig.1). The Osaka Group is characterized by alternating sequences of marine and nonmarine strata. The stratigraphy of the Osaka Group on land was sum-

marized on the basis of intercalation of marine clay beds and volcanic ash layers (Iihara, 1961). The intercalated marine clays were labeled as Ma1 to Ma8 in ascending order. Ikebe et al (1970) reported the subsurface stratigraphy in the Osaka plain area on the basis of deep drilling data (OD-1 to OD-9). They defined additional clay beds, termed Ma 9 to Ma12, below Holocene transgressive sediments, which lately called Ma13. Itoh et al. (2000) summarized that marine clays are correlated with eustatic sea level highstands. Subsurface structure around Kansai International Airport was introduced by seismic reflection survey (Itoh et al., 2001) and Inoue et al. (2003) summarized integrated subsurface structure by gravity and seismic reflection survey in the Osaka Bay region and stratigraphy of Kobe district with that of KIX region.

## 2. PRECISE STRATIGRAPHY OF SUBSURFACE SEDIMENTS AND CORRELATION

The subsurface stratigraphy around the Kansai International Airport was summarized by Nakaseko et al. (1984) based on micropaleontological and tephrochronological correlations of more than 70 drilling cores. The method introduced by Nakaseko et al. (1984) is very useful for correlating the sedimentary sequence each other. Lastly, they divided the submarine sequences into two main units on the basis of characteristic sandy strata and defined an unconformity. The upper unit was called the Kukojima Formation, which includes eight massive clays deposited in marine environments with abundant calcareous fossils (Fig.2). The Azuki volcanic ash layer of ca 900 ka intercalated in the Ma 3 marine clay bed provides an important marker bed for correlation between the land and submarine sequence known as the Sennan-oki Formation.

Sugano et al. (1986) did the analysis of new core located close to the area of standard deep drilling (OD-1) at Osaka Plain using the same method as Nakaseko et al. (1984), and correlated the submarine sequence at the Kansai International Airport to the standard stratigraphy of the Osaka Group, including marine clays, Ma7 to Ma13.

Offshore drillings around KIX were carried out in 1994 and 1995 in order to investigate the lithologic character and geotechnical data of the Quaternary strata (Fig.3). The detailed stratigraphy and age of core samples surrounding KIX on the basis of micropaleontological, tephrochronological and paleomagnetic analyses were defined including the transitional sedimentary units related to marine transgression and regression. The chronological assignments of the sequence and the correlations with environmental changes and glacial /interglacial cycles were discussed.

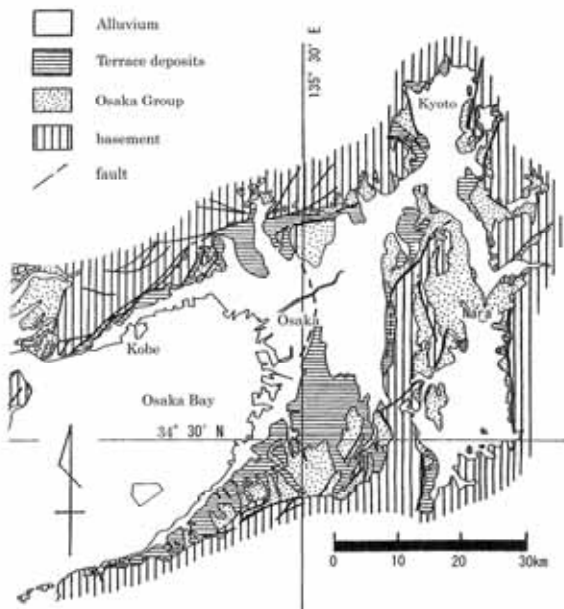


Figure 1. Geology around the Osaka Sedimentary basin and the location of Kansai International Airport.

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