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Identification of prospective geosites that show features of the active continental margin in eastern Kii Peninsula, Southwest Japan

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ABSTRACT

The eastern Kii Peninsula exhibits a variety of rock outcrops, fossils, and other geological features that illustrate the formation history of the Japanese Islands. This work aims to describe the geotourism potential of the region based on the significant rock exposures, and sets out the basis for establishing geosites in this region in the future. Geologically important sites have been selected, together with places of unique history and culture within the northern part of the eastern Kii Peninsula, including the Ise and Toba areas. The results of this study include a detailed description of the geology and history of the region, together with an evaluation of the relative value of each selected locality as a geosite. Proper development and promotion of the proposed sites would make the sites available for education and tourism, and provide opportunities for suitable development and the popularization of geological knowledge.

Key words: Kii Peninsula, Ise Jingu Grand Shrine, MTL, geosite

INTRODUCTION

The Japanese Islands were a part of the Asian continent until the opening of the Japan Sea during the Early–Middle Miocene (c. 20−15 Ma). This led to the development of the islands that currently form an active subduction-related arc–trench system at the junction of four major plates: the Pacific and Philippine Sea oceanic plates, and the Eurasian and North American continental plates. The complex geological history of the islands formation is reflected in a remarkable diversity of geological elements whose variety and character offer substantial potential for geotourism. Publication of the first list of 100 geosites in Japan has resulted in a great expansion of Japanese geoparks and a growing interest in geotourism. The current list includes 120 sites, with 43 areas in the country certified as national geoparks (JGN) in December 2016, 8 of which are also recognized members of the UNESCO Global Geopark Network (GGN).

Since the establishment of the JGN in 2008, a number of large disasters have damaged Japanese geopark areas; e.g., volcanic eruptions in Kirishima Geopark in 2011, and many landslides caused by heavy local rains in Aso Geopark in 2012 and in Izu-Oshima Geopark in 2013. The recent Kumamoto Earthquake damaged Aso Geopark in 2016. The Sanriku coastal areas of NE Japan were affected by the destructive tsunami caused by the 2011 Tohoku earthquake, and were subsequently incorporated into the Sanriku Geopark in 2013, which provides an excellent example of using the recognition afforded by geosites to assist with reconstruction and disaster prevention.

The eastern Kii Peninsula (Fig. 2) contains a range of geological features illustrative of an active continental margin formed by plate subduction, such as accretionary complexes and high-pressure metamorphic rocks, as well as offering outstanding local culture and historical elements. Increasing knowledge about the geology of the region may open new opportunities for geotourism development, with potential accompanying economic benefits. This paper aims to identify several significant locations for geosites in the Ise and Toba areas (Suzuki, 2014), and to determine the quality and accessibility of each site with respect to geotourism potential that is currently unfulfilled, with most of the significant geological sites being poorly known.

BRIEF GEOLOGICAL HISTORY OF THE JAPANESE ISLANDS

The core of Japan's basement geology developed from the off-scraping of sedimentary cover from oceanic plates subducting along the Asian continental margin over the past 500 Myr, resulting in the episodic development of accretionary complexes stepping progressively farther seaward over time. Phases of accretion are well preserved from the Permian, Jurassic, Cretaceous and Paleogene periods, alternating with episodes of tectonic erosion (Fig. 1; e.g.; Isozaki et al., 2011). Parts of the Paleozoic accretionary complexes were metamorphosed under high-P/T conditions to generate the metamorphic rocks of the Renge belt (~350−280 Ma; Tsujimori and Itaya 1999), the Suo belt (~220 Ma; Tsutsumi et al., 2000), and the Chizu belt (~180 Ma; Shibata and Nishimura, 1989). Cretaceous accretionary complexes were metamorphosed, forming the high P/T Sanbagawa belt in the Late Cretaceous (e.g., Miyashita and Itaya, 2002) and the highest-grade rocks in the Kamuikotan zone (145–100 Ma; Shibakusa and Itaya, 1992).

Subduction of the Izanagi-Kula and Pacific plates beneath the former eastern Asian continent (130−85 Ma) produced a large volume of granitic magma that intruded the pre-Cretaceous accretionary complexes and thermally metamorphosed surrounding rocks, forming the low-P/T metamorphic rocks of the Abukuma metamorphic belt (~110 Ma) and the Ryoke metamorphic belt (100−90 Ma; Suzuki, et al., 1996).

The Median Tectonic Line (MTL), a major fault zone separating the Ryoke and Sanbagawa metamorphic belts, formed initially as a normal fault that presumably affected the emplacement of older Ryoke granitic rocks (Okudaira and Suda, 2011) and juxtaposed the low-P/T Ryoke metamorphic belt against the high-P/T Sanbagawa belt at c. 60 Ma (Takagi et al. 2010). These two belts are commonly described as forming a paired metamorphic belt system (Miyashiro, 1961).

Cretaceous–Paleogene accretionary complexes are exposed in the Shimanto belt and in the eastern Hokkaido (Hidaka and Tokoro) belts. Back-arc spreading in the Shikoku Basin (19−15 Ma) caused the opening of the Japan Sea, accompanied by volcanism (e.g., Kano et al., 1991). Continued rifting of the Shikoku Basin during the Miocene led to eastward migration of the Philippine Sea plate, bringing the Izu–Bonin Arc into contact with central Honshu, with which it collided after c. 17 Ma (Sako and Hoshi, 2014). The spreading that formed the Japan Sea produced a 30°–40° anti-clockwise rotation of Northeast Japan (Hoshi and Takahashi, 1999) and clockwise rotation of Southwest Japan by ~45° to its present position at ~15 Ma, consistent with a 'double-door' model for the opening of the Japan Sea (Otofuji et al. 1994). Between these two blocks of the Japanese Islands, a large basin structure (*Fossa Magna*) developed, which was filled by a thick sequence of Neogene sediments and volcaniclastics. The Itoigawa–Shizuoka Tectonic Line (ISTL) is the western bounding fault of the *Fossa Magna* (e.g., Takeuchi, 2004).

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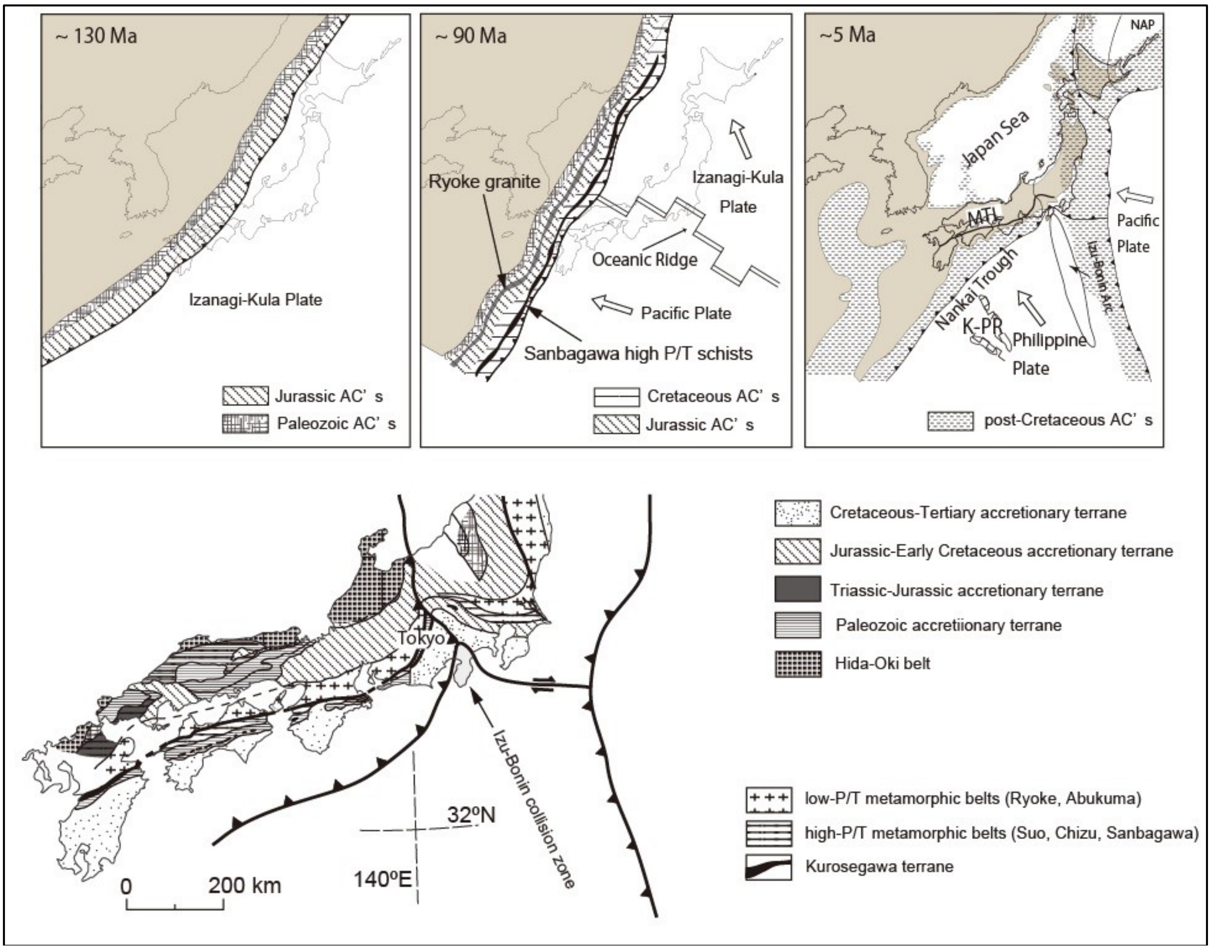

Fig. 1 Post-Jurassic tectonic development of the Japanese Islands (after Maruyama, 1997; Taira, 2001; Isozaki et al., 2011). AC: accretionary complex, ISTL: Ito–Shizuoka Tectonic Line, K-PR: Kyushu–Palau Ridge, MTL: Median Tectonic Line, NAP: North America Plate.

Since the Quaternary, the Japanese island arc system has been strongly compressed by westward to northwestward subduction of the Pacific plate and the Philippine Sea plate. Arc–arc collision and further accretion of the Izu–Bonin Arc to the Honshu arc after 15 Ma has resulted in intensive deformation of central Honshu (e.g., Takahashi, 1994). Deep subduction of the Philippine Sea plate at the Nankai Trough has formed a frontal accretionary prism to the Southwest Japan forearc (e.g., Hayman et al., 2012). The western side of the MTL is currently active, and accommodates dextral motion.

GEOLOGY OF THE STUDY AREA

The geology of Shima Peninsula located at the east side of Kii Peninsula, the northern and eastern parts of which are studied here, is a product of oceanic plate subduction. In this area, the eastward-trending belts of variably metamorphosed Jurassic–Cretaceous accretionary complexes and associated igneous rocks are dissected by faults, illustrating the dynamism of the formation of the Japanese Islands.

The Upper Cretaceous Ryoke granites in the north of this region are juxtaposed against schists of the Sanbagawa metamorphic belt along the Median Tectonic Line (MTL). The precise location of this ENE–WSW striking fault has recently been confirmed in the region (Suzuki et al., 2015). The surface trace of the MTL starts to bend gradually eastward as it crosses the peninsula into the Chubu region, as a result of the middle Miocene (c. 15 Ma) to recent collision of the Izu–Bonin arc with the Honshu arc.

The Sanbagawa metamorphic belt is distributed continuously across the region to the south as the Mikabu greenstone unit, which includes large ultramafic bodies. To the southeast of the Mikabu unit, the Chichibu belt, composed mainly of Jurassic accretionary complexes with Cretaceous forearc basin deposits, extends parallel to the MTL. These sedimentary sequences are divided into the Northern and Southern Chichibu belts by the Gokasho–Arashima Tectonic Line (G–A Line), a group of faults within serpentinite mélange. The G–A Line is considered to represent the extension of the Kurosegawa Terrane, which comprises lenticular bodies of pre-Jurassic sediments and metamorphic rocks with serpentinite (Saka et al., 1988). The southern margin of the Chichibu belt is defined by the Butsuzo Tectonic Line, along which the sedimentary sequences of the Chichibu belt are thrust over the Cretaceous Shimanto belt to the south (Kato & Saka, 2006).

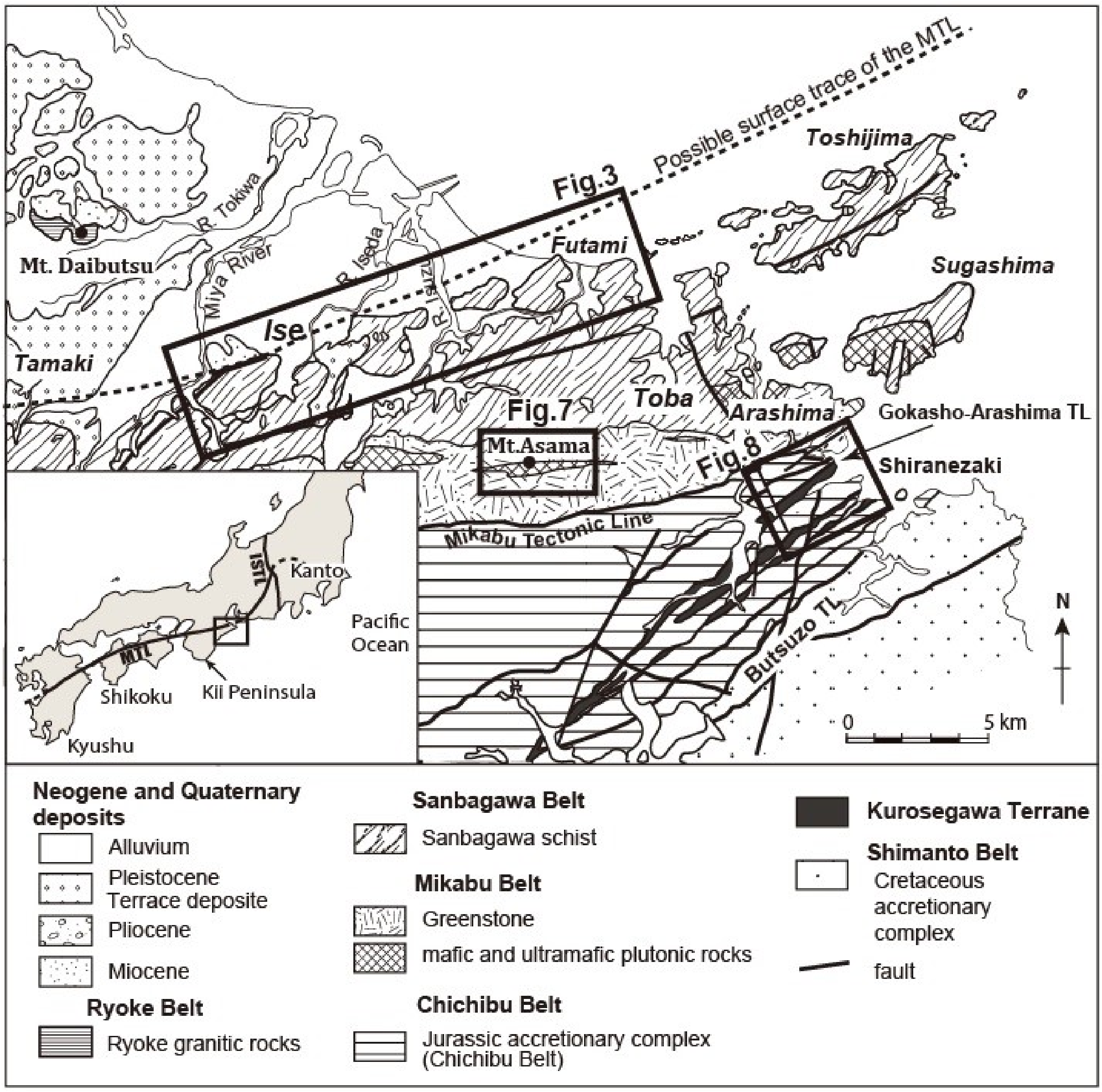

Fig. 2 Geological map of the Ise and Toba areas (compiled from the 1:200,000 geological map "Ise", after Nishioka et al., 2010).

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METHODS

We identify and describe the most significant geological localities in the Ise and Toba areas in order to facilitate later discussion of their potential use as geosites, and their consequent transformation into geotourism destinations. The analyzed area can be divided into three principal domains: the Ise (Fig. 3), Mt. Asama (Fig. 7), and Arashima Coast areas (Figs. 8). Initial identification of prospective sites was based on a survey of literature describing the geomorphology and history of the Ise and Toba areas (references are given in the following sections), together with geological data collected from surface exposures to define a detailed distribution map of potential geosites. Each site of interest was then classified and evaluated using the method proposed by Suzuki and Takagi (2017), with a set of six main values (listed in detail in Table 1) assigned to every location, using a four-point (1 to 4) scale to, to determine which of their attributes are currently favorable for the establishment and promotion of a geosite, and which would need improvement. The results are displayed on radar graphs with axes corresponding to each of the six primary geosite attributes (Fig. 9).

GEKU SHRINE

Ise Grand Shrine is Japan's holiest Shinto shrine complex, and is located in the most beautiful part of Ise City, surrounded by sacred mountains and forests. The buildings of the two main shrines of Naiku (Inner Shrine) and Geku (Outer Shrine) are examples of the pre-Budhist architectural style called *shinmei-zukuri*, characterized by extreme simplicity (Havens and Inoue, 2003). Both the main sanctuaries and the Uji Bridge in front of Naiku are rebuilt every 20 years during the *shikinen sengu* ceremony that was established over 1300 years ago. This ritual plays an important role in preserving and conveying the roots of Japanese culture to the next generation. Japanese people have made pilgrimages to the sacred sites on the Kii Peninsula since ancient times, using a series of trails today called Kumano Kodo, which is one of only two UNESCO World Heritage registered

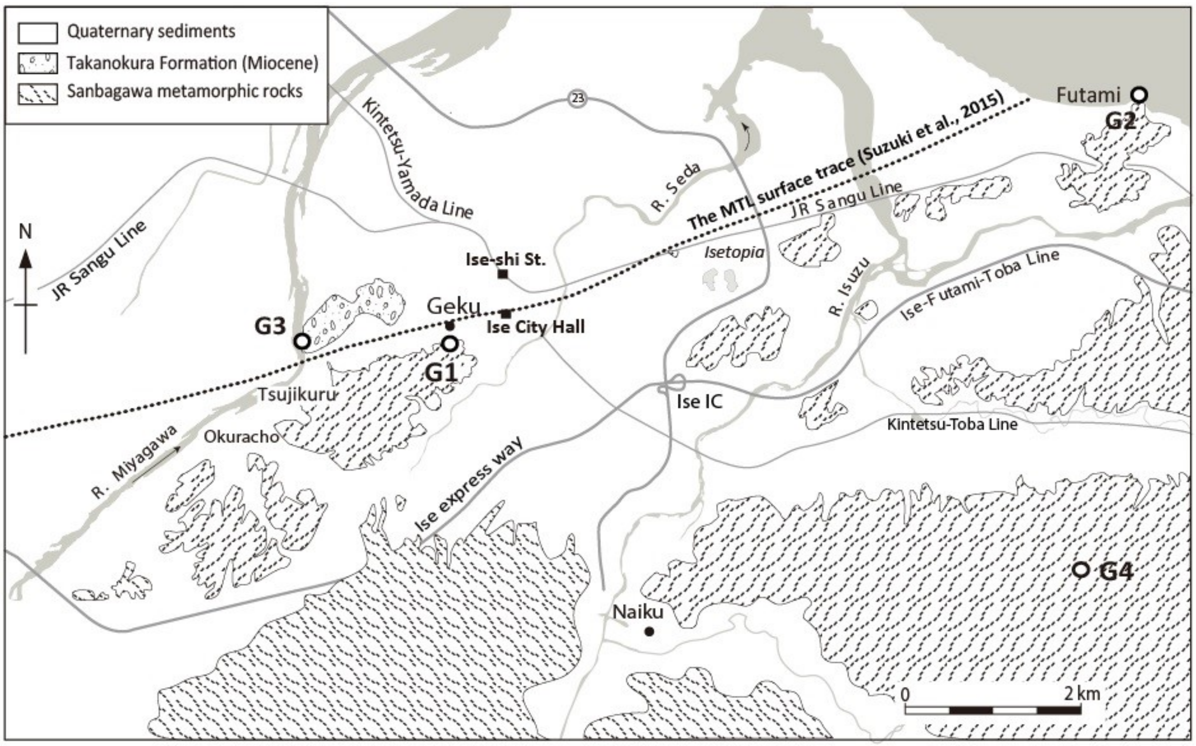

Fig. 3 Simplified geological map of the Ise city area along the MTL surface trace with location of proposed sites G1-G-4 (source: own research)

Tab. 1 Criteria for the evaluation of geosites (after Suzuki & Takagi, 2016).

Educational value (Ved)	**Scientific value (Scv)**	**Tourism value (Vtr)**
Ved_1: Ease of understanding the geosite's story	**Vsc_1**: Research significance	**Vti_1**: Emotional/aesthetic value such as beauty or impressiveness
Ved_2: Representativeness	**Vsc_2**: Clarity and up-to-date nature of the scientific story on information panels, guidebooks and web sites	**Vti_2**: Other natural/ anthropogenic values
Ved_3: Ease of understanding information panels at the geosite	**Vsc_3**: Rarity in the region	**Vti_3**: Other tourist attractions in the vicinity
Safety and Accessibility (Vsa)	**Conservation and site sustainability (Vcs)**	**Value of tourism information (Vti)**
Vsa_1: Safety condition of geosite and footpath access	**Vcs_1**: Current state of conservation	**Vti_1**: Information panels describing the approach to the geosite
Vsa_2: Travel time from the base (information) point to the area's attractions	**Vcs_2**: Legal protection	**Vti_2**: Geosite information on web sites, pamphlets, guidebooks, etc
Vsa_3: Walking time from bus/train stops or parking lot	**Vcs_3**: Site sustainability	**Vti_3**: International usefulness of information panels and web sites (multilingual)

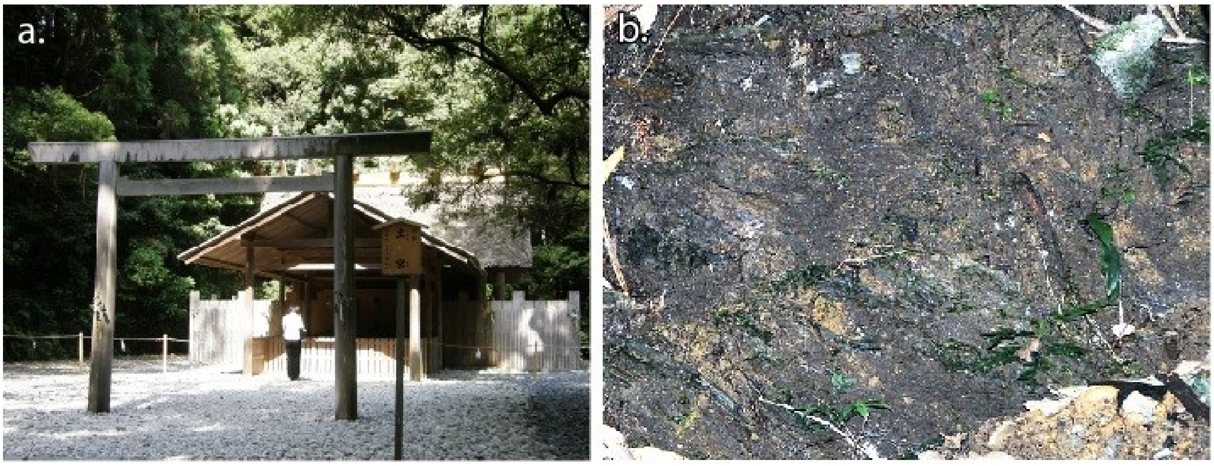

Fig. 4 Sanbagawa schist at the Geku Grand Shrine is exposed in (a) the hillside behind Tsuchinomiya Shrine, and (b) at Shimonomii Shrine where the MTL fault transects the area. (Photo by: H. Takagi)

pilgrimage routes in the world (Kumano Kodo Route official web site).

The Ise Shrine Naiku (formally known as *Kotai-jingu*) was originally built in the 4th century AD as a place to worship the Sun Goddess (*Amaterasu*), who is believed to be the ancestral spirit of the Imperial Family and guardian of Japan. The sanctuary stands along the Isuzu River in the foothills of Mt Shimaji and Mt Kamiji, which are densely covered with cedar and cypress trees. The Outer Shrine (*Toyouke-Daijingu*) was built several kilometers to the northwest in the 5th century AD to honor the Goddess of Agriculture and Industry (*Toyouke*). Its ancient buildings are situated at the northern foot of Mt Takakura in a sacred park of cedar trees (e.g. Rambelli, 2014; Ise Grand Shrine. Ancient History Encyclopedia, 2017).

In contrast to its history, the region's geology is poorly known to most visitors. The flat topography of the northern Isea area is characterized by a thick succession of Quaternary sediments several tens of meters deep, the thickness of which increases eastward. In the central part of this area, the Sanbagawa schists form mountainous topography, including Mt Takanokura near Geku Shrine. These rocks are composed mainly of pelitic schist and greenschist, with minor amounts of quartz schist, and are sporadically exposed near the MTL fault trace. To the south of the

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Sanbagawa schist unit, the hills and mountains of Naiku territory are underlain by the Mikabu greenstones, transected by the Isuzu River.

MEOTO-IWA, ISE CITY

The Sanbagawa schist is well exposed along the coast of Futami Bay, where a pair of symbolic rocks, *Meoto-iwa* (Fig. 5), sits in front of Futami Okitama Shrine. These outcrops have been shaped over time by coastal erosion, and represent the northernmost exposure of the Sanbagawa metamorphic belt in Ise city. The *Meoto-iwa* (couple rocks) comprise well-preserved greenschist stacks displaying a distinctive schistosity. Further exposure of this lithology continues in front of the site, along the footpath to the shrine.

Of historical interest, the name 'Futami' derives from the Japanese term for 'looking twice', and is probably related to a myth reflecting the particular beauty of the landscape. The famous Futami Okitama Shrine was established at this site about 1300 years ago because the rock formation was thought to possess spiritual qualities. It is said that the best season to observe the rocks is around the summer solstice, with viewing at sunrise offering a particularly high aesthetic value. In a special ceremony the rope of rice straw (called *Shimenawa*) connecting the *Otoko-iwa* (man rock) with the *Onna-iwa* (women rock), symbolizing marriage, is replaced several times each year by worshippers from the shrine (Shinto Shrines of Japan. Futami Okitama Shrine, 2012). As a result, the Futami Okitama Shrine is a popular destination for visitors seeking matchmaking and marital harmony.

Rock samples of the Sanbagawa schist were collected from Futami by Kenji Miyazawa, the famous Japanese poet and fairytale writer. However, the geological origin of the *Meoto-Iwa* is unknown to most visitors. Promotion of the geology of the region, including the presence of the MTL fault in the Geku Shrine and inferences that can be made from surface outcrops, could attract people to the geological history of the area.

MIOCENE CONGLOMERATE ALONG THE MIYA RIVER

Miocene conglomerate is locally exposed near the Geku Shrine (Kimura et al., 1965), particularly at the Miya River outcrop known as *Hira-iwa* (Fig. 6). This is part of the Miocene Takakura Formation, which is correlated with the upper part of the middle Miocene Ichishi Group and consists of conglomerate containing well-rounded and poorly sorted pebble, cobble, and occasionally boulder clasts. These sediments are considered to have originally been deposited in a shallow sea to the north of the MTL (Ryoke belt) at c. 18 Ma, as shown in Fig. 3, and they must therefore have been rotated together with the MTL during the Miocene opening of the Sea of Japan, as mentioned above. The rock types of clasts include granite, sandstone, chert, gneiss, hornfels, granitic mylonite or cataclasite, greenstone, and greenschist, and the conglomerates are locally intercalated with sandstone layers (Suzuki et al., 2015). The granitic, gneissose and mylonitic, and hornfels clasts were derived from the Ryoke belt, while the schist and greenstone clasts are correlated with the Sanbagawa metamorphic rocks. These relationships suggest that the paired metamorphic belts juxtaposed along the MTL were already exposed in the Ise area during the lower Miocene.

The scientific significance of this exposure would allow the Miya River site to serve as an open-air geological museum, providing an important education facility for understanding the geological processes that have shaped Japan, such as the origin of the paired metamorphic belt. The river is also known for its pristine waters and is used during the Grand Geku Shrine relocation ceremony in Ise City. These combined aspects offer substantial value for

Fig. 5 Ggreenschist exposure (*Meoto-Iwa*) in front of the Futami Okitama Shrine in Futamigaura, Ise city. Photo by: D. Suzuki

the creation of a geosite at this locality, which could serve to both protect the conglomerate exposure and promote geotourism in the region.

ASAMA MOUNTAIN (ASAMAGATAKE) IN TOBA CITY

Mt Asama is the highest mountain (555 m) in Ise-Shima National Park. The mountain consists of the Asama igneous body, which is intruded into Jurassic Mikabu greenstones that were metamorphosed to low grades during the high-P/T Sanbagawa metamorphism. As reported by Nakamura (1971) and Agata (1998), the igneous complex consists of a layered sequence of mafic and ultramafic rocks that are lithologically divided into three zones. The lowermost zone consists of peridotites, the middle zone of alternating gabbros and peridotites, and the upper zone of gabbroic rocks (Fig. 7). Most of the olivine and orthopyroxene grains in the peridotites from the lower and middle zones are replaced by serpentine, the formation of which was possibly related to the Sanbagawa regional metamorphism. The petrology of the Asama plutonic rocks indicates that their parental magma was generated in an oceanic island setting, and covered by accreted sediments.

This mountain area is one of the most popular tourist spots in eastern Mie prefecture, and is currently easy to access. The historical status of the "holy mountain" led to the development of an important pilgrim road through the area to connect travelers from Toba to the Ise-Jingu Shrine. The famous Zen temple Kongoshoji is located near the top of the mountain. This temple was originally built in the middle of the 6th century AD to worship *Uhou-Douji* as *Amaterasu,* and to protect the Ise shrines from the northeast.

Mt Asama is also of growing interest to collectors looking for valuable minerals. A number of rock exposures exist along roads crossing the mountain and near the mountain observatory, which also provides a panoramic view over the Futami area, and in particular the MTL-fault-related linear alignment of islands to the NE. The serpentinite-derived soil of the area, which is dry and low in essential nutrients, supports unusual plant species of significant conservation value, such as Japanese Buxus and Jingu Azalae**.** An existing information board offers a brief introduction to the geology and related plant life of the mountain area.

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Fig. 6 Conglomerate outcrop along the Miya River in Ise City. (a) explanation board about the MTL already in place in front of the exposure; (b) conglomerate exposure visible from the eastern bank of the river. (Photo by H. Takagi)

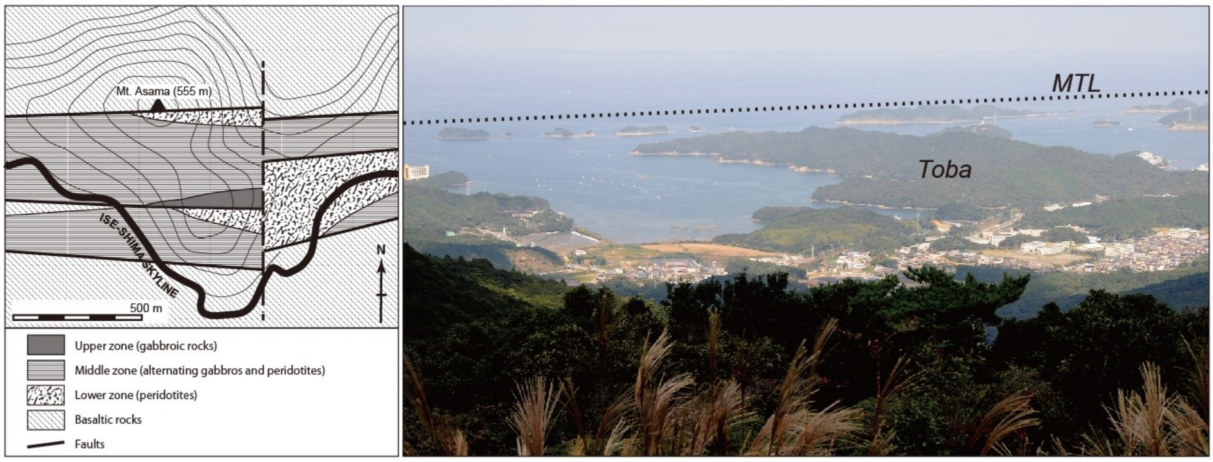

Fig. 7 Geology of Mt. Asama area, illustrating the structural layering of the igneous complex and the main faults (after Agata, 1998). The photo on the right, taken from the mountaintop observatory,demonstrates how the inferred MTL trace (dotted line) and related lineaments continue to the northeast from the Kii Peninsula (Futami area) to the Chubu Region in Japan. Photo credit: H. Takagi.

SIGNIFICANT ROCK EXPOSURES DEMONSTRATING GEODIVERSITY ALONG THE ARASHIMA COAST, TOBA CITY

The prospective geosite consists of four sections of rock exposures along 1.5 km of coastline, from the east of Arashima town to the northwest of Uramura town in Toba city. The first two sites (Gt-1 and Gt-2 in Fig. 8) show shallow-marine deposits along the seashore in the Arashima area, commonly consisting of sandstone, mudstone, chert, and locally acidic tuffs. An exposure in the middle part of this sequence shows the recently recognized Shiranezaki Formation in unconformable contact with the Matsuo Group (Ohta, et al, 2012). In the Futaji area isolated masses of chert crop out along with locally adjacent bedded sandstone and mudstone (Gt-3). These sediments are known for the significant fossils they have yielded, including a partial skeleton and footprints of a sauropod and concentrated beds of oysters and other bivalves (Mie Prefecture Excavation and Research Group for Dinosaur Fossils, 1997). The last section includes the Shiranezaki area (Gt-4), where the Aonomine Group of the Chichibu belt is exposed (Fig. 8b). This section contains a weakly metamorphosed mélange of flattened sandstone and chert blocks of various sizes, together with small

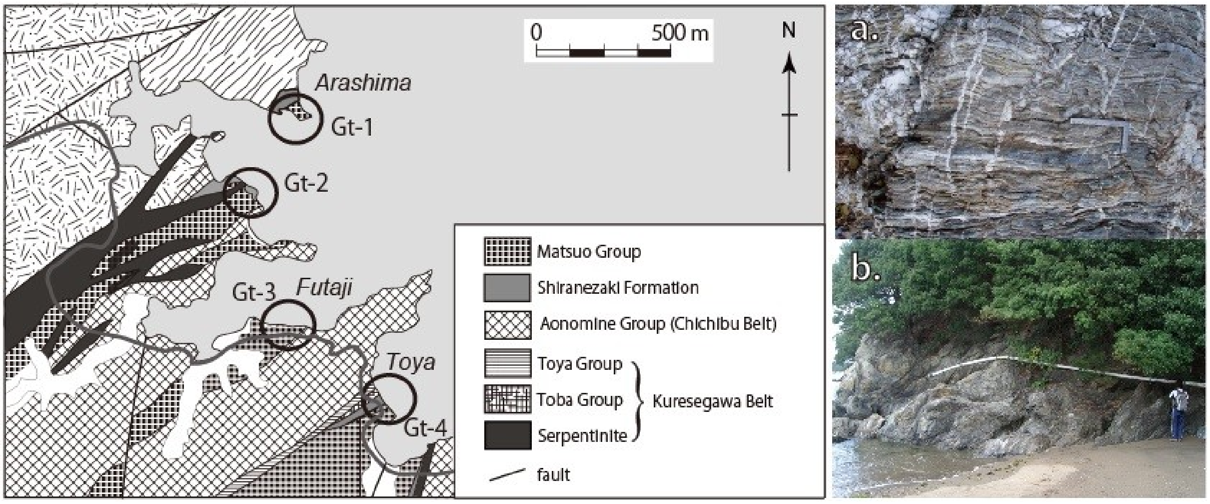

Fig. 8 Geological map of the study area showing details of its geology and the distribution of proposed geosites (after Ohta et al., 2012). Photos on the right side: (a) white and red chert, exposed south of the Arashima Swimming Beach; (b) outcrop of glaucophane schist of the Kurosegawa Terrane along the coast south of the Shiranezaki area.

amounts of greenstone and limestone set in a muddy matrix. Small masses of glaucophane schist are visible within the serpentinite mélange, which probably branches off from the G-ATL; therefore, these high-P/T metamorphic rocks are likely to correspond to the Paleozoic Kurosegawa belt.

Although all of these sites are located within a popular tourist area that offers pleasant coastal scenery, the geology of the area is poorly communicated to the public at present. Other than the famous site at Futaji, most of the significant rock exposures are generally outside the knowledge and interest of visitors. This situation might be improved by the provision of proper information on boards placed next to relevant exposures. Further promotion of the geology by local organizations, which are currently focused primarily on the fossil sites, could also enhance the popularity of the new localities and help emphasize the role of accretionary complexes in the formation of Japanese Islands.

RESULTS AND DISSCUSSION

This paper highlights five potential geosites in the Ise−Toba area, and offers suggestions outlining how their development might help tourists to better understand the geological background of the area when visiting. The locations identified could also play an important role in supporting the education of people in Japan about the geological history of their country, helping to mitigate the impacts of natural disaster that can result from or be enhanced by a lack of knowledge and awareness of natural hazards, as well as from a fear of the unknown. For example, a large typhoon (Isewan typhoon or Typhoon Vera) struck a wide area around Ise Bay in 1959, with nearly 5000 fatalities. Exploring the Ise-Shima coast area and understanding its history might increase public awareness of the occurrence of such unexpected events and other potential disasters such as tsunamis, which are thought to be highly likely to occur within the next c. 50 years as the result of a large earthquake along the Nankai Trough.

The rating results for each of the selected locations may serve as a basis for future activities in regard to their planning and management for geotourism. The Miocene conglomerate (G3) and Meoto-Iwa (G2) geosites received the highest overall score in this exercise, and the Arashima area (G5) the lowest, due in large part to the lack of information about this site that is suitable

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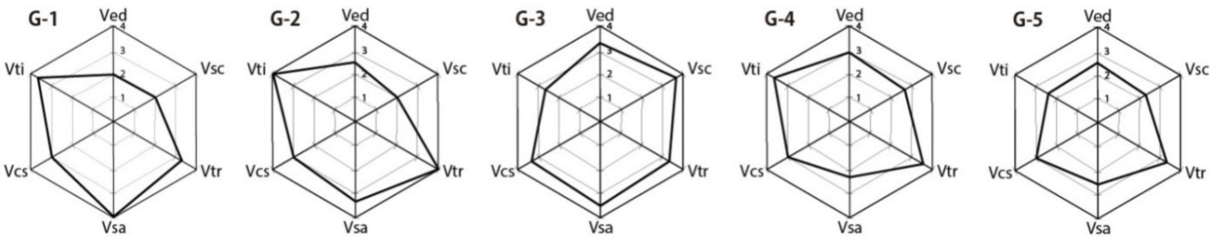

Fig. 9 Evaluation result for the proposed sites employing the criteria of Suzuki and Takagi (2017).

for education purposes. Significant differences are noted between the relative education and safety values for the prospective geosites. Other than the conglomerate exposure (G3), most of the sites are characterized by low representativeness; however, a dominant anthropogenic value may raise the total attractiveness of all the sites studied in Ise city. In fact, an integration of cultural and geological experience in future tourist programs would have increased people's interest in and satisfaction from visiting this region.

The Grand Geku Shrine could offer a substantial attraction to assist with the promotion of the sites located in its vicinity. Restrictions on tourism within the shrine territory should be taken into account, however, as these may place limits on the accessibility and popularity of the proposed geosites. Urban areas of Ise City might also have a negative impact on the representativeness of site G2, reducing its importance. A number of the highlighted rock formations are exposed in coastal areas and are therefore vulnerable to typhoon and tsunami damage, as well as destructive landslides that may occur in serpentinite-dominated areas. Consequently, appropriate measures aimed at the use and protection of the sites should be incorporated into plans for their development.

Overall, the locations presented require more promotion activities. Information boards are currently only available in front of the Miya River outcrop and at the discovery site of the Toba Dinosaur in Toba City. The significance of other sites is probably only known to individual researchers, and thus better access to geological information might enhance their attractiveness. Furthermore, geosite development should give regard to the most efficient and/or attractive ways of disseminating geological information throughout society. It can be, for example, a geo-tour, educational or local festival, during which can be introduced the geo-story of each object, made with the help of local authorities and tour operators. A geo-route connecting the geosites in Ise city, together with improvements to existing facilities, might offer original experiences of great value for geotourism activities in this area. For example, the Japan Railways Sangu Line between Iseshi and Futamigaura stations, originally built for pilgrims to the Ise Grand Shrines, runs approximately along the MTL surface trace across the region (Fig. 4), and thus might offer the conceptual option of a 'geo-tetsu' (geo-train) connecting the sites. The geological importance of the Arashima area might be linked to other natural and cultural sites in Ise Shima. In regard to the individual needs and motives of geotourists, selected localities might be more or less attractive, and thus further study on geotourist expectations in the region should be undertaken.

CONCLUSIONS

The combination of interesting geologic features with the unique history of the Ise and Toba areas could offer a popular attraction and support future geotourism development in the region. The evaluation of selected locations was carried out in relation to three main assessment categories, with the aim of indicating both the relative potential and specific demands required for development of each locality as a geosite. Further steps should include conservation and protection planning, which would require broad cooperation between local authorities and geoscientists, and the approval of local communities for the creation of geosites. Development of geosites should also be accompanied by the distribution of high-quality information on the Internet and within Ise-Shima National Park that would attract tourist's attention in a particular site.

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