

# A Study on concordias in the Uranium-Series Method for Dating

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# 1991 Fiscal Year Final Research Report Summary

## A Study on concordias in the Uranium-Series Method for Dating

Research Project

### Project/Area Number

02640607

### Research Category

Grant-in-Aid for General Scientific Research (C)

### Allocation Type

Single-year Grants

### Research Field

Stratigraphy/Paleontology

### Research Institution

Kanazawa University

### Principal Investigator

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### Project Period (FY)

1990 – 1991

### Keywords

U-series dating / Riukiu Limestone / Kikai Island / Concordia / Discordia

### Research Abstract

Two kinds of concordias, [ $^{230}\text{Th}/^{234}\text{U}$ ]-[ $^{234}\text{Th}/^{238}\text{U}$ ] and [ $^{230}\text{Th}/^{234}\text{U}$ ]-[ $^{231}\text{Pa}/^{235}\text{U}$ ] diagrams, in the uranium-series dating, are examined in terms of a criterion to evaluate a  $^{230}\text{Th}/^{234}\text{U}$  date of fossil coral. Because they are most useful to check if a coral sample has been preserved in appropriate condition for dating.

More than 70% isotopic data on corals from the Pleistocene Riukiu Limestone (Hanzawa, 1935), were not consistent with the [ $^{230}\text{U}/^{234}\text{U}$ ]-[ $^{234}\text{U}/^{238}\text{U}$ ] concordia, but were plotted in the higher  $^{234}\text{U}/^{238}\text{U}$  range. That is, the initial  $^{234}\text{U}/^{238}\text{U}$  activity ratio estimated from those corals, is not necessarily agreeable with  $1.144 \pm 0.002$  as the value of the present-day sea water, reported by Chen et al. (1986). These facts imply that  $^{234}\text{U}/^{238}\text{U}$  activity ratio of sea water at the time when fossils grew was somewhat (1 to 2%) higher than the value of Chen et al., or that the uranium isotopes were redistributed in those samples during their diagenetic alteration, as pointed out by Ku et al. (1990).

The reliability of some  $^{230}\text{Th}/^{234}\text{U}$  dates were critically evaluated by using the [ $^{230}\text{Th}/^{234}\text{U}$ ]-[ $^{231}\text{Pa}/^{235}\text{U}$ ]

concordia. All results on isotopic analyses were plotted on the concordia for wellpreserved corals (of 100 to 95% aragonite) from Kikai Island, whereas those for partly recrystallized or calcite-cemented samples were not on it. Data points from a group of fossil corals seemed, however, to give significantly a straight line. In the case that such line was regarded as a discordia, two ages, namely ages of death and alteration of those samples, can be estimated to 230+50-30 ka and 4<plus-minus>4 ka, respectively. Therefore, the<sup>[<sup>230</sup>Th/<sup>234</sup>U]-[<sup>231</sup>Pa/<sup>235</sup>U]</sup> concordia has a possibility to give a reliable uranium-series date for other carbonate-secreting organisms like echinoderms and molluscs, which have been considered not to be appropriate materials for uranium-series dating, due to the open system for uranium isotopes after death of organisms.▲ Less

# Research Products (24 results)

		All	Other
		All	Publications (24 results)
[Publications]	大村 明雄他: "日本海海底堆積物中のウランおよびトリウム同位体組成:南部の3ピストンコア堆積物間と比較" 金沢大学日本海研究所報告. 22. 1-16 (1990)		▼
[Publications]	太田 陽子他: "南・北大東島のサンゴ礁段丘からみた第四紀後期の地殻変動" 地学雑誌. 100. 317-336 (1991)		▼
[Publications]	大村 明雄他: "南・北大東島産後期更新世サンゴ化石の <sup>230</sup> Th/ <sup>234</sup> U年代" 地学雑誌. 100. 337-350 (1991)		▼
[Publications]	木庭 元晴他: "北大東島産サンゴ化石のESR年代とその検討" 地学雑誌. 100. 351-366 (1991)		▼
[Publications]	河名 俊男他: "南・北大東島の後期更新世サンゴ化石の非破壊γ線による <sup>226</sup> Ra/ <sup>238</sup> U年代" 地学雑誌. 100. 367-377 (1991)		▼
[Publications]	Ota,Yoko et al.: "Uplift rate comparison based on coral reef terraces on different plates,southwestern Japan." Bulletin of INQUA Neotectonic Comission. no.14. 13-15 (1991)		▼
[Publications]	Oba,Tadamichi et al.: "Paleoenvironmental changes in the Japan Sea during the last 85,000 yaers." Paleoceanography. 6. 499-518 (1991)		▼
[Publications]	Ota,Yoko et al.: "Late Quaternary shorelines in the Japanese Lslands." The Quaternary Research (Daiyonki-Kenkyu). 30. 175-186 (1991)		▼
[Publications]	大村 明雄他: "三浦半島津久井累層産単体サンゴの <sup>230</sup> Th/ <sup>234</sup> U年代" 第四紀研究. 30. 291-295 (1991)		▼
[Publications]	Grun,Reiner et al.: "ESR and U-series analyses on corals from Huon Peninsula,New Guinea." Quaternary Science Review.		▼
[Publications]	Ota,Yoko et al.: "Late Quarnary tectonic movements as deduced from raised coral reefs from Minami-and Kita-Daito Islands,Japan." Quaternary International.		▼
[Publications]	Ota,Yoko et al.: "Tectonic control on the formation of coralreef terraces on the Ryukyu Islands,Japan." Quaternary International.		▼
[Publications]	Omura, Akio and Osawa, Tsutomu: "Uranium and thorium isotopic composition in the subbottom sediment of the Sea of Japan : comparison among threepiston core sediments form the southern areas." Bull. Japan Sea Res. Inst., Kanazawa Univ.no. 22. 1-16 (1990)		▼
[Publications]	Ota, Yoko et al.: "Late Quaternary tectonic movements as deduced from raised coral reefs of Daito Islands of the Philippine Sea Plate." Jour. Geogr.100, no. 3. 317-336 (1991)		▼
[Publications]	Omura, Akio et al.: " <sup>230</sup> Th/ <sup>234</sup> U dates of late Pleistocene corals obtained from Kita- and Minami-Daito Islands, Okinawa, Japan." Jour. Geogr.100, no. 3. 337-350 (1991)		▼
[Publications]	Koba, Motoharu et al.: "Electron spin resonance coral ages obtained from a raised atoll, Kita-Daito Island in the North Philippine Sea." Jour. Geogr.100, no. 3. 351-366 (1991)		▼
[Publications]	Kawana, Toshio et al.: "226Ra/238U dates by non-destructive gamma-ray spectrometry of late Pleistocene corals in Minami- and Kita-Daito Islands, Okinawa, Japan." Jour. Geogr.100, no. 3. 367-377 (1991)		▼

[Publications] Ota, Yoko and Omura, Akio: "Uplift rate comparison based on coral reef terraces on different plates, southwestern Japan. 1991." Bull. INQUA Neotectonic Commission. no. 14. 13-15

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[Publications] Grun, Reiner et al.: "ESR and U-series analyses on corals from Huon Peninsula, New Guinea." Quat, Sci, Rev.

[Publications] Ota, Yoko and Omura, Akio: "Tectonic control on the formation of coral reef terraces on the Ryukyu Islands, Japan." Quat. Int.

[Publications] Ota, Yoko et al.: "Late Quaternary Tectonic movements as deduced from raised coral reefs from Minami- and Kita- Daito Islands, Japan." Quat. Int.

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