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Annual Report of Chinese Taipei to SC11

Chinese Taipei

Annual Report of Chinese Taipei on Squid Fishery in the SPRFMO Convention Area in 2022 to the 11th Scientific Committee Meeting

Summary

Jumbo flying squid widely distributes in the eastern Pacific Ocean and has been targeted by Chinese Taipei's squid-jigging fleet during 2002-2021. There was no fishing activity in the SPRFMO Convention Area in 2022 fishing season for Chinese Taipei's fishing fleet. The number of fishing vessels varied from 2 to 29 during 2002–2021 with catches of 665 to 39450 tons. The major fishing grounds located around 13°–18°S and 80°–85°W, while several vessels operated in the equatorial waters (around 1°–4° S and 95°–106° W). Data of logbook, observer, transshipment, and landing have been collected entirely and submitted to the Secretariat of SPRFMO. The research on the stock status and spatial dynamics of Jumbo flying squid have been conducted. Using weight category and length frequency of the samples, the monthly length composition of Jumbo flying squid was estimated. Based on statolith microstructure analysis, the hatching months of the squid peaked in April and June.

1. Description of the Fishery

Jumbo flying squid (*Dosidicus gigas*) is a large pelagic squid inhabiting in the eastern Pacific Ocean, distributing across about latitudinal 50 degrees for both north and south hemispheres. Since 2002, this species has been targeted by Chinese Taipei's distant-water squid-jigging fleet in the Southeast Pacific Ocean. The number of operating vessels from Chinese Taipei was decreased since 2020, and there was no squid jigger fishing in the SPRFMO Convention Area in 2022.

In summary, the number of operating vessels varied from 2 to 29 during 2002-2021, with catches of 665 to 39450 tons (Fig. 1). The monthly number of vessels fluctuated inter-annually over the recent five fishing seasons (during 2017–2021; Fig. 2).

2. Catch, Effort and CPUE Summaries

Chinese Taipei has no vessels conducting squid-jigging fishing in the SPRFMO Convention Area in 2022. Therefore, no catch and effort can be provided for 2022 fishing season (Table 1). The nominal CPUE was decreased since 2015 (Fig. 3).

According to the previous studies, the major fishing grounds, based on previous data, located in the area of 13°–20° S and 80°–85° W, and in the equatorial area of 1° –3° S and 95°–106° W (Fig. 4).

3. Fisheries Data Collection and Research Activities

3.1. Data collection

The captains of Chinese Taipei's squid-jigging fishing vessels, who participate in the squid fishery in the Southeast Pacific, are required to report the fisheries data via electronic logbook system (e-logbook) on a daily basis.

As for landing and transshipment practices, the operators or captains who schedule to land or transship the products (catch) are required to submit the Landing/Transshipment

Notice to the competent authority of Chinese Taipei for approval. When the landing or transshipment practices are completed, the operators or captains are required to submit the Landing/Transshipment Declaration to the competent authority of Chinese Taipei. The competent authority of Chinese Taipei will verify the amounts of products (catch) with e-logbook data and other available information to ensure that those products (catch) are legal and traceable.

In accordance with its domestic regulations and SPRFMO CMM 02-2022, Chinese Taipei has collected transshipment and landing data of Jumbo flying squid fishery in the Southeast Pacific and submitted to the Secretariat of SPRFMO since 2013.

3.2. Research activities

The research program on stock status and spatial dynamics of Jumbo flying squid in the Southeast Pacific have been conducted by the scientists of Chinese Taipei. The results showed that high aggregation of squid abundance was located in the waters off central and southern Peru and off norther Chile. In recent years, the large-sized group of the squid has dominated in the catches during October–December. The preliminary results suggested that the variation of squid abundance could be explained by the temporal and spatial variables to a degree. It might be an integrated result of migration patterns for the squid, which experienced different oceanographic environments during their life cycles, and possessed considerable plasticity in life history traits. However, a decreasing trend of the squid abundance index since 2005 is noted.

4. Biological Sampling and Length/Age Composition of Catches

4.1. Biological sampling

There was no squid sample in 2022 fishing season for Chinese Taipei's fishing fleet. During 2019-2021, a total of 124 squid samples were examined (Table 2). The squid

samples from similar areas for 2019 and 2020, while several samples from equatorial waters in 2021.

The statolith microstructure of the squid were examined. The hatching month were calculated from dates of catch and number of increments within the statolith. The hatching month peaked during April–June in 2019, while peaked during June–August in 2020 (Fig. 5). The hatching month peaked during April–June in 2021, while the squid in equatorial waters seemed likely to be hatched earlier than those in the waters off Exclusive Economic Zones of Peru.

4.2. Length/Age composition of catches

The catch data of the squid is categorized by size composition (commercial weight category) into A, <1 kg; B, 1-2 kg; C, 2-3 kg; and D, >3 kg (or miscellaneous). The category D typically comprises extra-large size individuals (>3 kg), although various size categories of the squid may be included. The amounts of category D is usually in a condition of processed products, comprised heads, fins and mantle of the squid. The original body weight of category D was then calculated by an empirical equation of fraction between head, mantle weight and body weight of the squid.

In summary, the annual size composition of catch for Jumbo flying squid during 2007–2022 was dominated by the large-sized group (Table 3).

5. Ecosystem Approach considerations

There was no fishing activity in the SPRFMO Convention Area in 2022 fishing season for Chinese Taipei's fishing fleet.

6. Observer Implementation Reports

To comply with SPRFMO CMM 16-2019, which was superseded by CMM 16-2021,

CMM 16-2022 and CMM 16-2023, Chinese Taipei applied for the certification of the squid-jigging fishery observer programme in 2021 and received the accreditation in the 10th Annual Meeting of the SPRFMO Commission.

The squid-jigging fishery observer programme was implemented since 2021, and one observer was onboard one squid-jigging vessel in 2021 fishing season. The coverage rate of observer was 50% in number of vessels, whereas was 43% in fishing days (observed 82 days).

Table 1. Annual catch and effort information of Jumbo flying squid for Chinese Taipei's squid-jigging fleet in the Southeast Pacific Ocean during 2007–2022.

Year	No. of vessels	Fishing effort (vessel-day)	Catch (tons)
2007	13	1,393	14,750
2008	13	2,744	31,161
2009	13	1,403	12,319
2010	20	2,874	29,206
2011	21	3,597	35,418
2012	14	2,211	14,177
2013	9	1,045	7,759
2014	5	474	4,795
2015	9	616	10,072
2016	11	1,880	12,989
2017	13	1,228	7,338
2018	14	1,396	3,848
2019	10	611	2,085
2020	5	817	2,087
2021	2	189	665
2022	0	0	0

Table 2. Sample information of jumbo flying squid in the Southeast Pacific for Chinese Taipei fishing fleet during 2019–2021.

Year	Month	Latitude	Longitude	Sample size	ML (cm)	BW (kg)	Age	Maturity
2019	Oct. ~ Dec.	16°36'S ~ 18°42'S	78°58'W ~ 80°59'W	24	41.8 – 54.5	2.69 – 5.72	113 - 240	III ~ IV
2020	Oct. ~ Dec.	14°49'S ~ 18°34'S	79°21'W ~ 83°51'W	25	21.6 ~ 89.3	2.55 ~ 31.1	77 ~187	IV ~ V
2021	Aug. ~ Nov.	3°10'S ~ 17°08'S	79°27'W ~ 98°10'W	75	20.8 ~ 77.3	0.27 ~ 20.0	91 ~ 218	II ~ V

Table 3. Annual size composition (in live weight, tons) of catch of Jumbo flying squid for Chinese Taipei's squid-jigging fleet in the Southeast Pacific Ocean during 2007–2022 (Category: A, <1 kg; B, 1-2 kg; C, 2-3 kg; D, >3 kg or miscellaneous)

Year	A	B	C	D	Total
2007	45	23	476	14206	14750
2008	144	59	807	30151	31161
2009	80	0	0	12239	12319
2010	163	7	0	29036	29206
2011	57	3	3	35356	35418
2012	1485	138	81	12472	14177
2013	205	0	12	7542	7759
2014	50	1	1	4743	4795
2015	33	41	1	9996	10072
2016	210	62	23	12694	12989
2017	123	12	6	7197	7338
2018	671	25	49	3104	3848
2019	70	12	237	1767	2085
2020	316	125	67	1579	2087
2021	95	0	0	570	665
2022	0	0	0	0	0

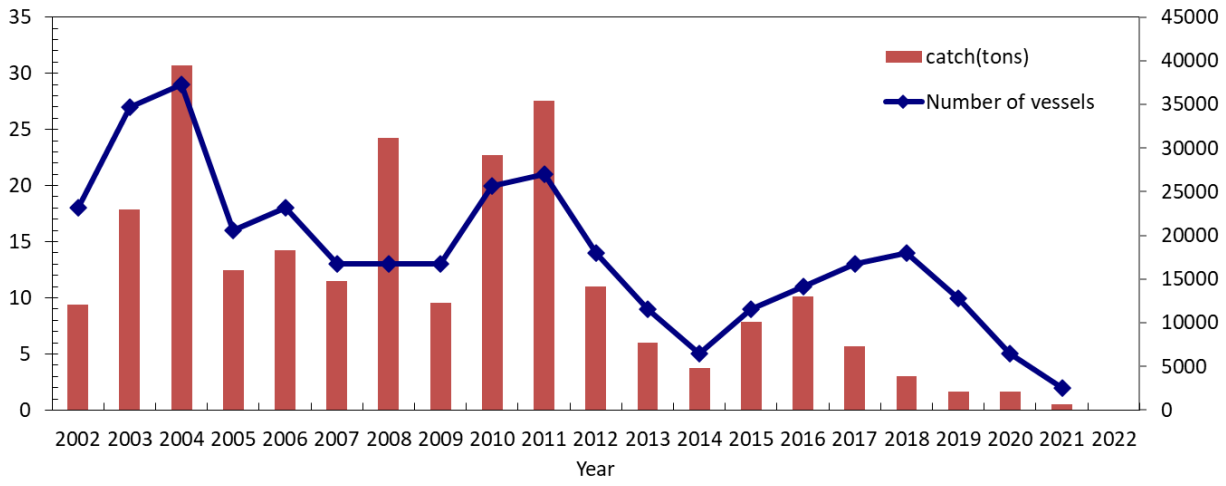

Figure 1. Annual variations in catch and number of vessels for Chinese Taipei's squid-jigging fleet in the Southeast Pacific Ocean during 2002–2022.

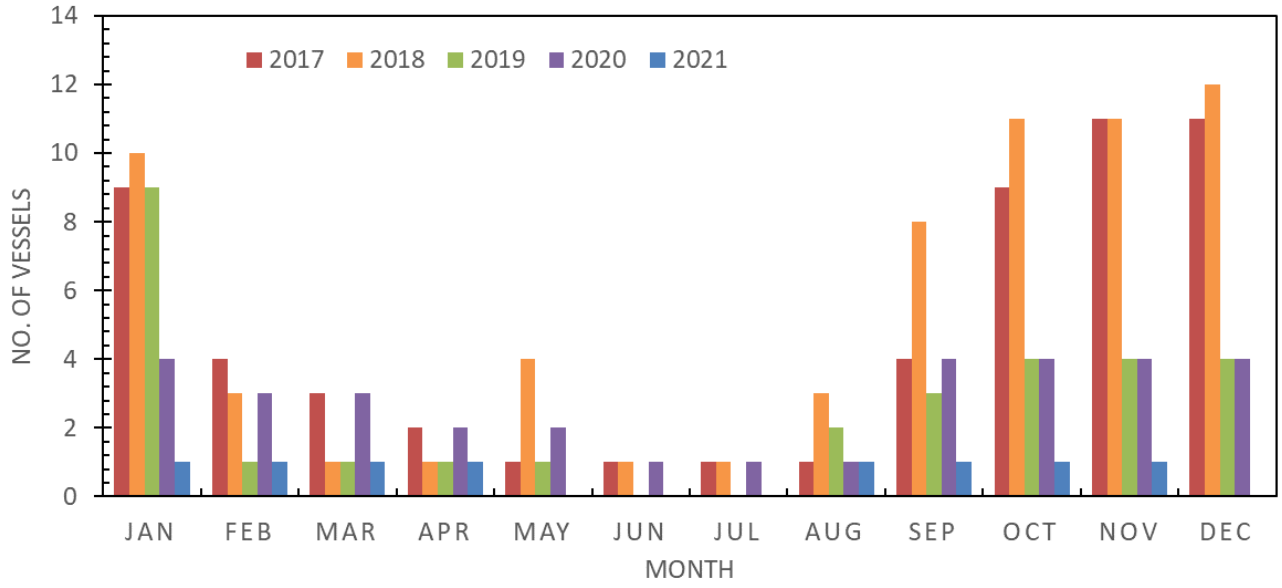

Figure 2. Monthly variations in number of vessels for Chinese Taipei's squid-jigging fleet in the Southeast Pacific Ocean for recent five fishing seasons (during 2017–2021).

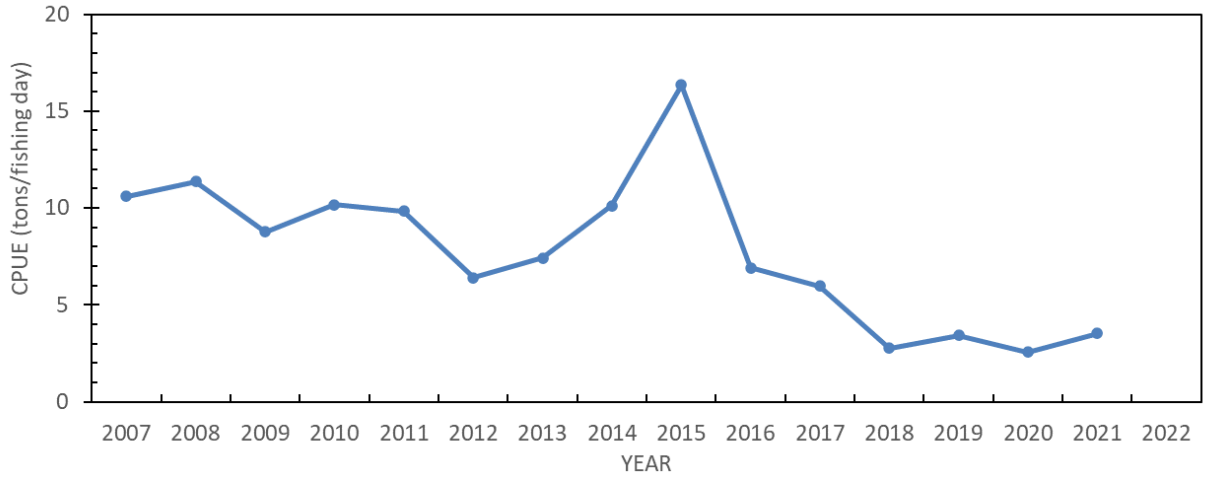

Figure 3. Annual nominal CPUE of Jumbo flying squid of Chinese Taipei's squid-jigging fleet in the Southeast Pacific Ocean during 2007–2022.

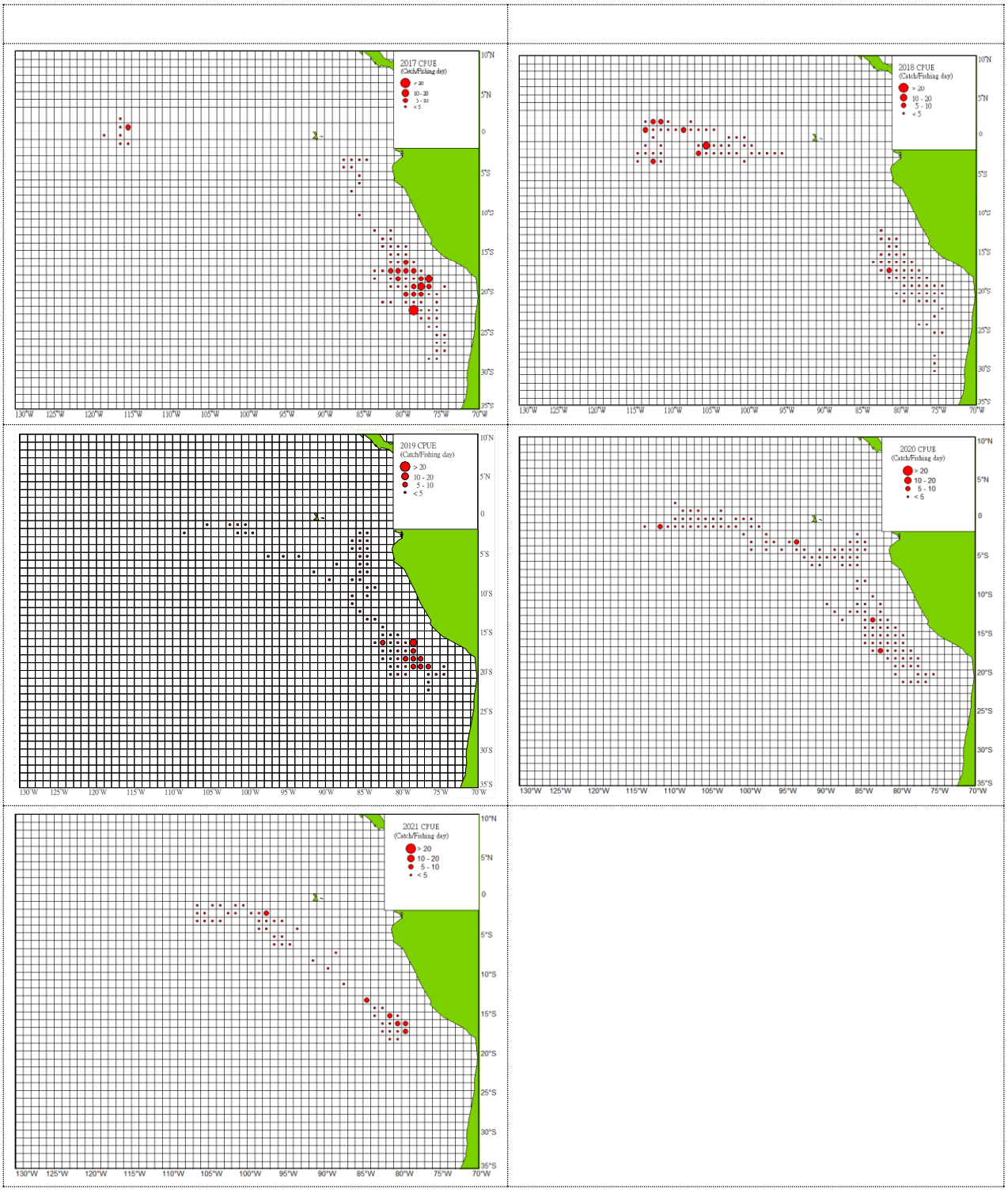

Figure 4. Spatial distributions of annual average CPUE of Jumbo flying squid for Chinese Taipei's squid-jigging fleet in the Southeast Pacific Ocean during 2017–2021.

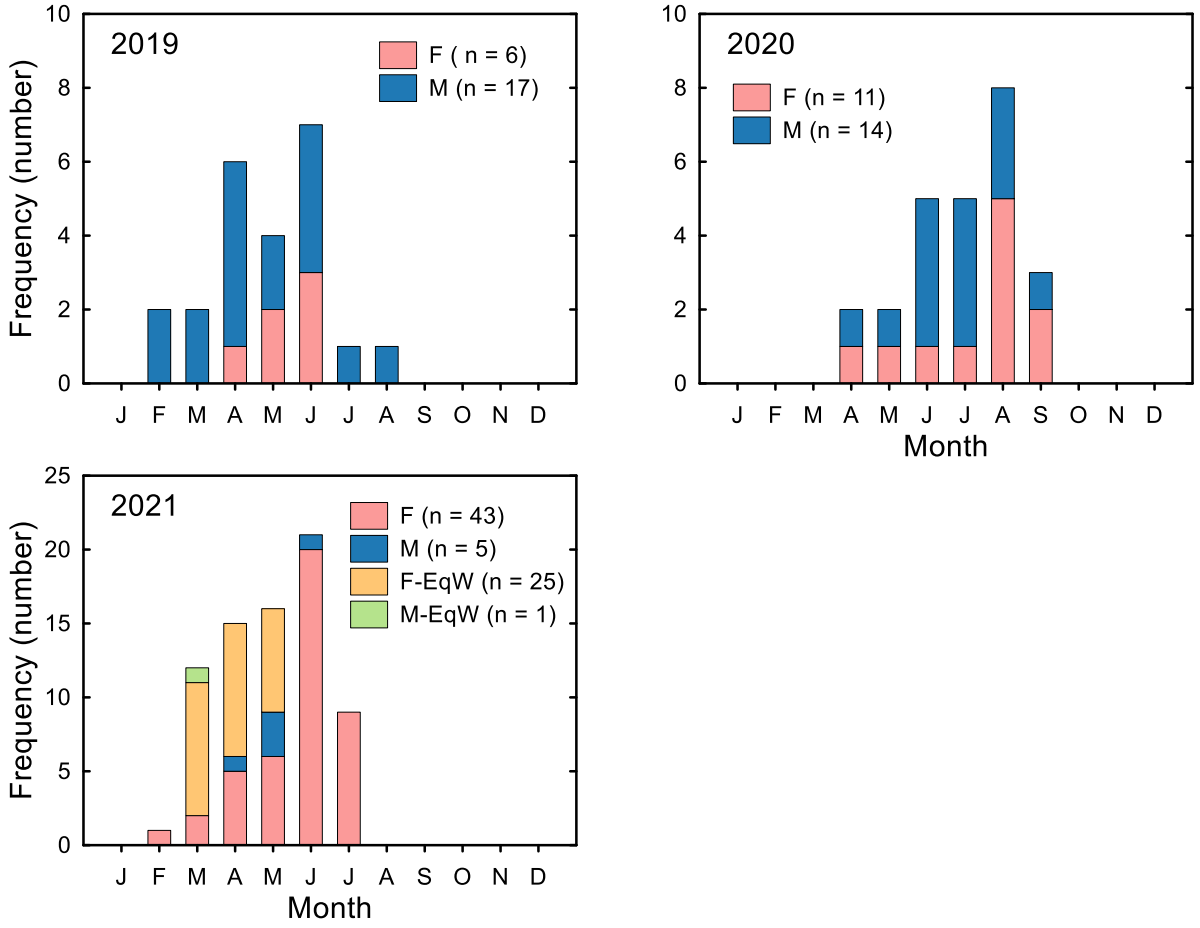

Figure 5. Hatching month distribution of Jumbo flying squid based on statolith microstructure analysis during 2019-2021.