Comment on:

Xiaolong Zhou, Klaudia Kuiper, Jan Wijbrans, Katharina Boehm, Pieter Vroon

"Eruptive history and 40Ar/39Ar geochronology 1 of the Milos volcanic field, Greece"

By

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Zhou et al. present valuable Ar-Ar geochronological data, which is carefully evaluated and assessed. This is a welcome advancement for the understanding of the volcanic evolution of Milos, which prior to this work had only a limited range of geochronological data collected by modern techniques and sample locality distributions. Very few of these previous data have accompanying QA information and present just the age with uncertainty. Additionally samples rarely have clear geographical location information that enable the geological context to be assessed at an appropriate scale (e.g. 1:25 000 or smaller).

Zhou et al provide this sample information (as recorded in Zhou et al. Tabs. 2 & 3). However, we find a significant number of errors (in 11 from 23 samples) in the location of samples and the attribution of volcanic centres. These are described below and listed in our Tab. 1 below.

We use a high resolution airborne remote sensing survey that includes a LiDAR DEM (as shown in Ferrier et al. 2019) and aerial digital photography (accessible from the CEDA Archive project EM10/02), to georeference the various published geological maps (Fytikas 1977, Stewart and McPhie 2006, Zhou et al., in review) and plot the location of Zhou et al (in review) samples as recorded in their Tabs. 2 & 3 to ascertain and assess sample geological context.

This raises some issues with Zhou et al. Fig 2 as there are mismatches between this and the coordinates given in Zhou et al. Tabs. 2 & 3. Specifically, the 3.06±0.02 Ma located at Mavro Vouni-Krotiraki corresponds with the age given for sample G15M0015. According to the given Lat-Long coordinates this is someway (c. 2.7 km WNW) from the location given on Zhou et al Fig. 2 (see Fig. 1). There are other examples of this, e.g. GM150022, GM150007, GM150034 and GM150013 (see Fig 1 and Tab.1 for complete list). In any final publication, we hope that these will be corrected and account taken of any changes to the geological context.

The second issue we raise is with the attribution of dates to a certain volcanic centre. On Zhou et al. Fig. 2 they present the Fytikas et al (1986) 3.08±0.08 Ma age as being located on the Profitis Ilias – Chondro Vouno volcanic centre (see Figs. 1 & 2 below). This date is not from there, according to the Fytikas et al (1986) Fig. 1 and Tabs. 2 & 3, this date is from a locality on the southern coast (see 3.1 Ma age on Fig. 2 and compare with Fig. 1). Currently, there are no published ages that are clearly from the Profitis Ilias – Chondro Vouno volcanic complex. Fytikas et al (1986) have two K-Ar dates (2.03±0.09 and 2.04±0.06 Ma) close to Profitis Ilias (Fig 2). However, these are located in the Complex of Domes and Lavas, to the north of the Profitis Ilias and to the south of the Ralaki fault. It is important that this erroneous location of the 3.08±0.08 Ma age is corrected and any interpretation of volcanic centre attribution based on it amended.

We have a further concern about the samples within this work also attributed to the Profitis Ilias volcanic complex. Samples GM150017 and GM150015 labelled as "Coherent dacite of Profitis Illias volcano", according to the coordinates presented, are located in the volcanic centre to the south of the main Profitis Ilias volcano identified in Stewart and McPhie (2006) Fig. 2 as the andesitic complex associated with the Kleftiko fault (Fig. 3 below). In terms of geological context these samples are perhaps more related to sample GM150016 (2.66±0.01 Ma and wrongly located, c. 0.8 km SE of Lat-long coordinates on Zhou et al. Fig. 2), which is from a basaltic andesite dyke (Zhou et al. Tab. 4), rather than the Profitis Ilias volcanic complex.

Figure 4, below, also details the location of these samples against the Fytikas (1977) geological map and identifies key named geographical localities used by Zhou et al.

In view of this, we think the age of the Profitis Ilias volcanic centre activity has not yet been assessed and is still an open question and should be left as such.

Also, any geological interpretations should be made according to the correct locations. In any revision we would recommend that the authors consult the Fytikas (1977) geological map (not referenced in their submission) in addition to geological information published in variety of articles and theses, which is often at a much lower resolution than the 1:25 000 geological map of Milos. We do not think these errors significantly affect the merits of the submission identified by Reviewers 1 & 2. However, it is important they are corrected to ensure that they are not propagated in future publications on Milos.

References:

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Fytikas, M., Innocenti, F., Kolios, N., Manetti, P., Mazzuoli, R., Poli, G., Rita, F. Villari, L. (1986) Volcanology and petrology of volcanic products from the island of Milos and neighbouring islets. Journal of Volcanology and Geothermal Research, 28: 297–317.

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Tab. 1 Summary of volcanic units, sample numbers and location information as presented in Zhou et al (in review) Tabs 2 & 3 comparing Lat-Long coordinates with location presented in Zhou et al Fig. 2 (ibid)

VolcanicUnit	SampleID	Lat	Long	Comment
Adamas lava dome	G15M0004	36.7282	24.4315	Location on Fig.2 points to a different lava dome 0.7 km NE of that indicated by lat long coordinates
Kalegeros cryptodome	G15M0006	36.7643	24.5157	Lat-long location matches Zhou et al. Fig. 2
Trachilias Complex	G15M0007	36.7671	24.4124	Lat long location to the c. 1km W of that indicated in Fig.2 but in same volcanic unit
Fyriplaka Complex	G15M0008	36.6729	24.4670	Lat long location c. 0.8 km WSW of that indicated in Fig. 2 but in the same volcanic unit
Fyriplaka Complex	G15M0009	36.6716	24.4891	Lat-long location matches Zhou et al. Fig. 2
Fyriplaka Complex	G15M0012	36.6795	24.4828	Lat-long location matches Zhou et al. Fig. 2
Halepa lava dome	G15M0013	36.6716	24.4406	Lat long location on southern margin of volcanic unit, Fig 2 location on the northern margin of volcanic unit c. 2km NNW of lat-long location
Coherent dacite of Profitis Illias volcano	G15M0015	36.6629	24.3596	Zhou et al. Fig. 2 location close to Mavro Vouni, but lat-long coordinates are a significant distance (c. 2.7 km) to the WNW and volcanic units not necessarily comparable. This is also not part of the Profitis Ilias volcano
The dyke of Mavro Vouni lava dome	G15M0016	36.6668	24.3398	Lat-Long location c. 0.8 km NW of that indicated in Fig. 2 but in the same volcanic unit
Coherent dacite of Profitis Illias volcano	G15M0017	36.6596	24.3675	Not plotted on Fig 2. as age not reliable. In the same unit as G15M0015, same issues apply
Kontaro dome	G15M0019	36.7211	24.3950	Lat-long location matches Zhou et al. Fig. 2
Kontaro dome	G15M0020	36.7234	24.3952	Lat-long location matches Zhou et al. Fig. 2
Triades	G15M0021	36.7402	24.3397	Lat-long location to SW of 1.97 Ma in Zhou et al Fig 2
Triades	G15M0022	36.7402	24.3397	Duplicate locality? Age for this sample grouped with G15M0023 & G15M0024, but locality the same as G15M0021
Triades	G15M0023	36.7263	24.3420	Lat-long location matches Zhou et al. Fig. 2
Triades	G15M0024	36.7277	24.3415	Lat-long location matches Zhou et al. Fig. 2
Mavros Kavos lava dome	G15M0025	36.6876	24.3515	Lat-long location matches Zhou et al. Fig. 2
Mavros Kavos lava dome	G15M0026	36.6848	24.3500	Lat-long location matches Zhou et al. Fig. 2
Korokia dome	G15M0029	36.7465	24.5200	Lat-long location matches Zhou et al. Fig. 2
Dhemneghaki volcano	G15M0032	36.7084	24.5324	Lat-long location matches Zhou et al. Fig. 2
Kalamos lava	G15M0033	36.6662	24.4652	Lat-long location matches Zhou et al. Fig. 2
Trachilias	G15M0034	36.7550	24.4244	Lat-long location to c. 1km WNW of that indicated location in Fig.2. According to Fytikas (1977) lat-long cordinate in correct volcanic unit, but location marked in Zhou et al Fig. 2 is in different unit
Trachilias	G15M0035	36.7550	24.4244	Duplicate locality?

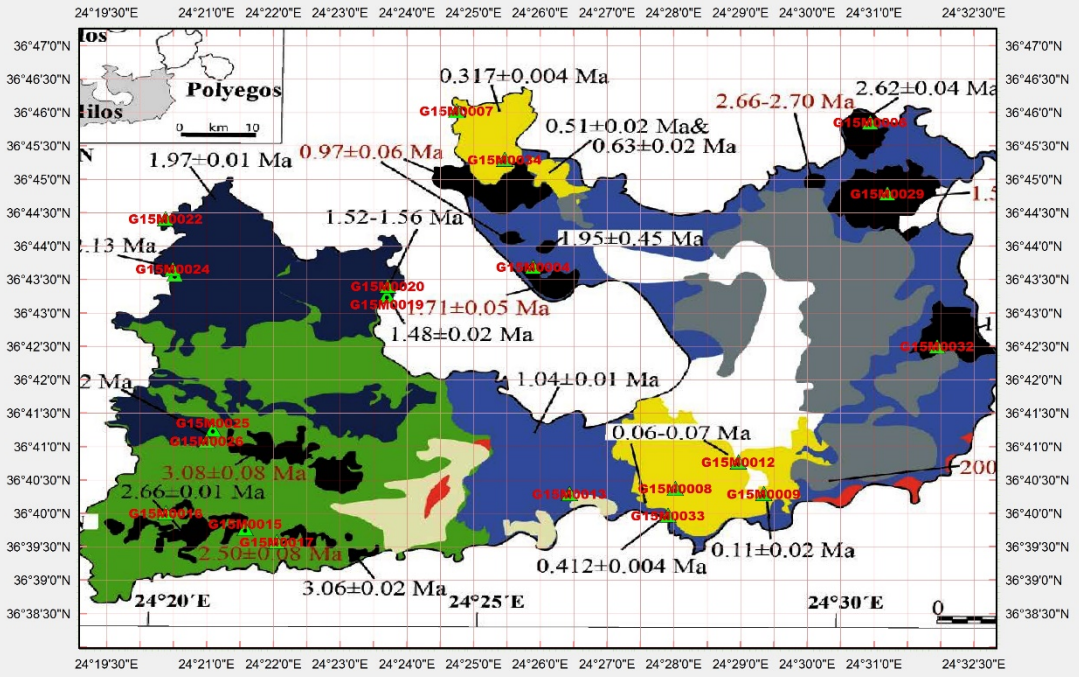

Fig. 1. Zhou et al Fig 2. map georeferenced with sample localities listed in Zhou et al Tabs. 2 & 3 plotted as green triangles (after Zhou et al., in review)

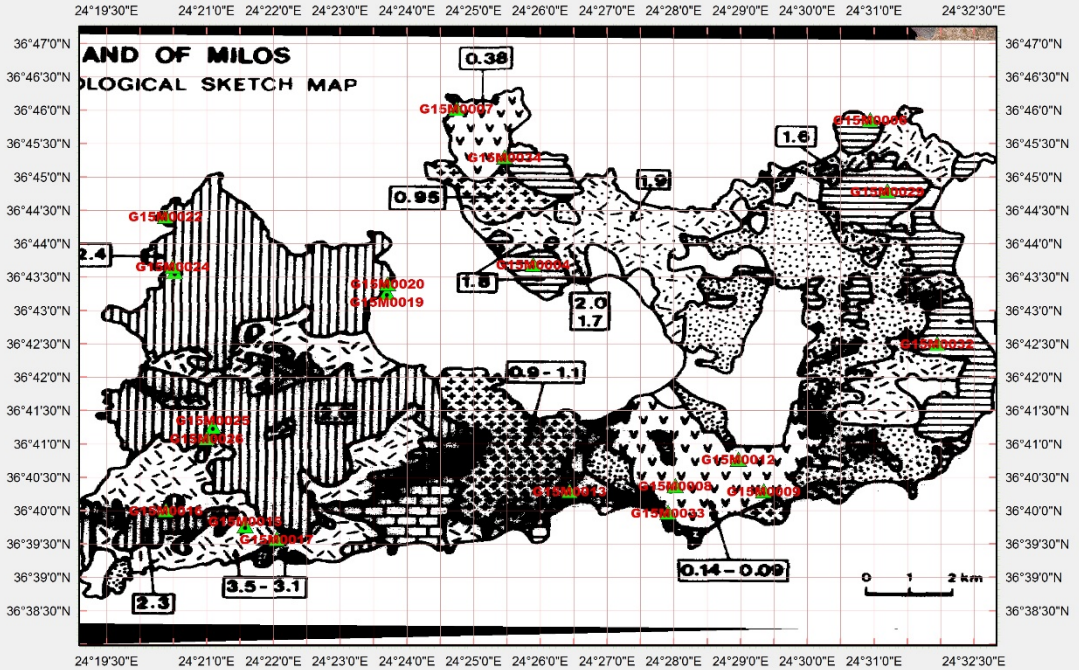

Fig 2. Fytikas et al (1986) Fig 1. map georeferenced with sample localities listed in Zhou et al Tabs. 2 & 3 plotted as green triangles (after Fytikas et al, 1986)

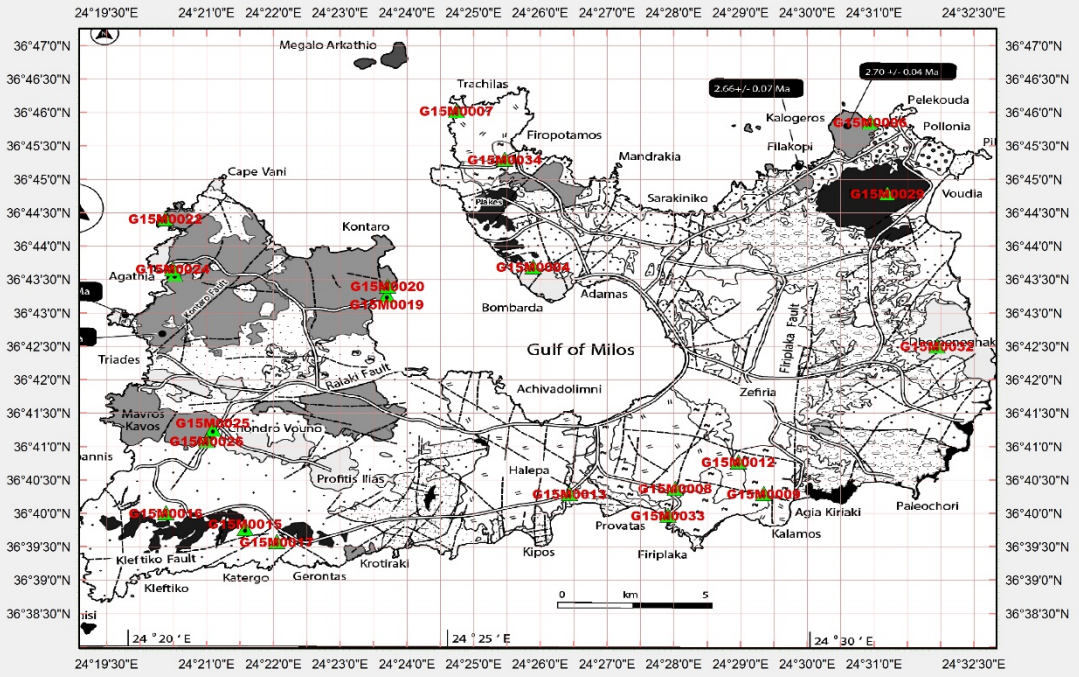

Fig 3. Stewart and McPhie (2006) Fig 2. map georeferenced with sample localities listed in Zhou et al Tabs. 2 & 3 plotted as green triangles (after Stewart & McPhie 2005)

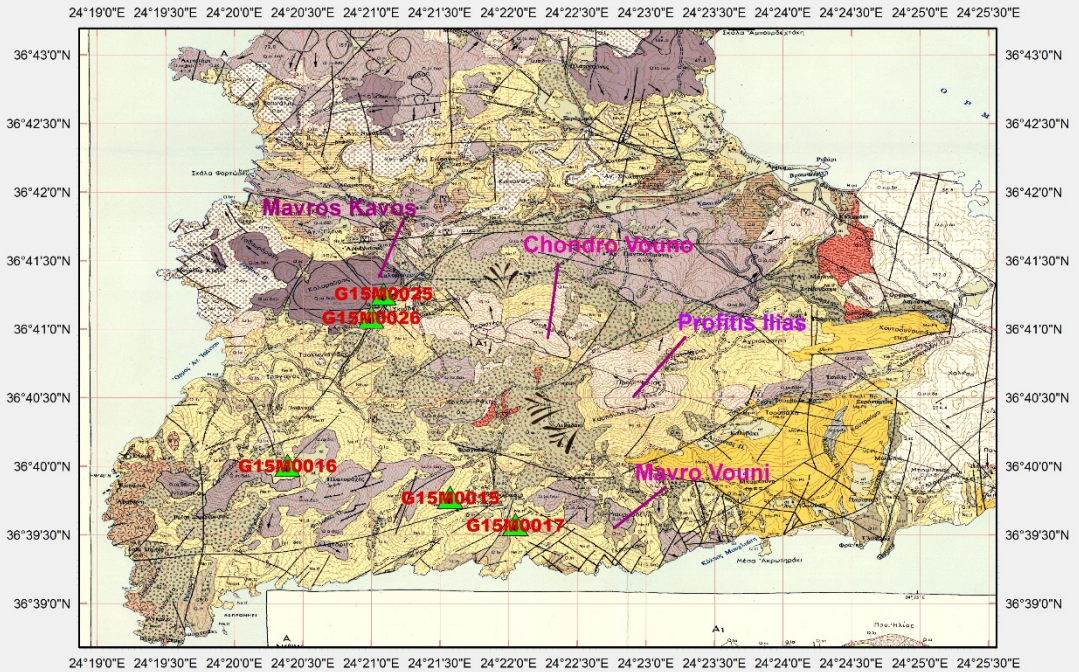

Fig 4. Fytikas (1977) geological map georeferenced with sample localities listed in Zhou et al Tabs. 2 & 3 plotted as green triangles (after Fytikas 1977)