Darwin Initiative/Darwin Plus Projects
Half Year Report
(due 31st October 2020)

Project reference	DPLUS093
Project title	HOT: Hadal zones of our Overseas Territories
Country(ies)/territory(ies)	South Georgia and The South Sandwich Islands (SGSSI)
Lead organisation	British Geological Survey
Partner(s)	Newcastle University
Project leader	Heather Stewart
Report date and number (e.g. HYR3)	HYR2
Project website/blog/social media	None https://www.darwininitiative.org.uk/project/DPLUS093/

1. Outline progress over the last 6 months (April – Sept) against the agreed project implementation timetable (if your project has started less than 6 months ago, please report on the period since start up to end September).

- Activity 1: Project Board and Stakeholder Group:
  - During the reporting period a total of 2 formal project board meetings have taken place virtually (Activity 1.4) on 23rd April and 8th September. Additional informal meetings took place 14th May and 3rd August, 8th September. Specifically, delays on laboratory analyses contributing to the biological elements of Activity 2.4 were discussed as project critical. To this end, a change request was submitted June 2020 and approved 12th August 2020. It is anticipated that a Stakeholder Group meeting will take place in December 2020/January 2021, although an informal meeting with Stakeholder Group members Dr Susie Grant and Dr Martin Collins on 4th June (virtually).
  - Next steps, schedule virtual Stakeholder Group meeting for December 2020/January 2021; continue formal Project board meetings every 3 months, informally as required.
- Activity 2: Processing and analysis of acoustic and ground-truthing data, geological and biological samples:
  - The processed data for the South Sandwich Trench (Activity 1.2) have been submitted as part of a peer-review data and Open Access dataset (submitted to Geoscience Data Journal 7th September 2020[1]). Additionally these data will be included in a new bathymetric compilation for the South Sandwich Islands and Trench to be submitted as a paper to a special publication of Deep-Sea Research Part II[2] by April 2021.
  - Geomorphological maps of the greater trench area (>4000 m water depth) using lower-resolution GEBCO_2020 data have been completed (Activity 2.6). The results (including comparison with high-resolution mapping completed in Y1) are being written up into a peer review paper due to be submitted by end November 2020[3]. Additionally, a meeting with Oliver Hogg (Cefas) took place on 3rd July to take forward broad-scale "Landscape Mapping and modelling" to include the improved resolution for the trench area (this project) as per

published maps in Hogg et al. 2016. This work will take place from January 2021 onwards and will be submitted as a paper to a special publication of Deep-Sea Research Part II[4] by April 2021.

- Analysis of the video and still camera data from the 7 scientific lander sites has been completed by Newcastle University (Activity 2.4). Three new species of snailfish (family Laiparidae) and a macrourid endemic to the hadal zone of the South Sandwich Trench have been identified. This appears to be a new depth record for macrourid. Decapoda, larvacea and hydromedusae appear to be absent from the data obtained for this project. The fish community are observed approximately 1500 m shallower than predicted due to sub-zero temperatures encountered by the South Sandwich Trench which perturbs cellular ability to tolerate high hydrostatic pressures. Furthermore, high density populations of Ophiuroidea at 6500 m water depth appears unique to the South Sandwich Trench, although further literature searches are ongoing to confirm this observation. At 7-8000 m water depth the density of Holothuroidea of the Elipididae family were high, indicative of very high organic loading in the seafloor sediments. These observations have been included in 2 peer review papers due to be submitted by end November 2020[5,6].

- Activity 3: Knowledge Transfer Phase:
  - During the reporting period two workshop presentations (ongoing Activity 3.2) have taken place which promoted the project and its outcomes[7,8].
  - Activity 3.1 will take place in Q1/2 of 2021 as it comprises the final presentation of results to the Stakeholder Group. Activities 3.3 and 3.4 will also be completed during Jan-September 2021. Due to the ongoing Covid-19 pandemic and the number of conferences that have been postponed, we are currently examining which conferences and other promotional events are relevant.
  - A communications plan is in the final stages of development with J-P Orsi and C Buchanan at the British Geological Survey to coincide with published outputs and the final 9 months of the project. Project dissemination was highlighted in the Annual Project Report. Steps have been taken to address this (evidence: virtual meetings on 18th May and 14th September 2020).

[1]BONGIOVANNI, C, STEWART, H A, JAMIESON, A J. (Submitted) High-resolution multibeam sonar bathymetry of the deepest place in each ocean. *Geoscience Data Journal.*

[2]BOHRMANN, G, et al. (In Prep) South Georgia, South Sandwich Islands and South Sandwich Trench Bathymetry. *Deep-Sea Research Part II.*

[3]STEWART, H A, DOVE, D, JAMIESON, A J, BONGIOVANNI, C, HENDERSON, A F E. (In prep) Geomorphological Mapping of the South Sandwich Trench. *Journal of Maps.*

[4]HOGG, O, STEWART, HA ET AL. (In Prep) Habitat mapping in the South Shetland Trench. *Deep-Sea Research Part II.*

[5]LINLEY, T D, JAMIESON, A J, STEWART, H A, BONGIOVANNI, C. (In Prep) Abyssal and hadal fishes of the Atacama, South Shetland and South Sandwich trenches.

[6]SWAN, J. JAMIESON, A.J., LINLEY, TD., YANCEY, P.H. (In prep) Maximum depth limit of Decapoda (Penaeoidea and Oplophoroidea) across the abyssal-hadal transition zone of eleven subduction trenches and five other deep-sea features. *Journal of Crustacean Biology*.

[7]HA STEWART & D DOVE, 2020. Geomorphology of the South Sandwich Trench: escarpments, seamounts and deeps. *British Antarctic Survey Ecosystems South Sandwich Islands Seminar. Thursday 4th June, Virtual Presentation*. 69 online participants.

[8]AJ JAMIESON, 2020. Fish and other fauna of the South Sandwich Trench at depths >6000 m. *British Antarctic Survey Ecosystems South Sandwich Islands Seminar. Thursday 4th June, Virtual Presentation*. 69 online participants.

2a. Give details of any notable problems or unexpected developments/lessons learnt that the project has encountered over the last 6 months (for Covid-19 specific delays/problems, please use 2b). Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.

None (except Covid-related: see below) encountered.

2b. Please outline any specific issues which your project has encountered as a result of Covid-19. Where you have adapted your project activities in response to the pandemic,

please briefly outline how you have done so here. Explain what residual impact there may be on your project and whether the changes will affect the budget and timetable of project activities.
The lead organisation submitted at a Change Request in June 2020 in order to re-profile the project budget and also to apply for a 6 month extension to the project to significant delays encountered at specialist international laboratories. This was approved in August 2020. Update: the laboratory based biological analyses is now moving forward following multiple delays due to the COVID-19 pandemic and significant restrictions to access of laboratory and sequencing facilities. On 19th October 2020, we received the *Bathycallisoma* RADseq sequencing data (~70 Gb) from UC Davis, California. Newcastle University's Bioinformatics Support Unit is supporting us with the bioinformatics and data analysis. In addition, project personnel have completed complementary DNA barcoding laboratory work on the specimen set. The DNA barcoding samples are currently being sequenced at Eurofins, Germany, and the data is due to arrive imminently.
2c. Have any of these issues been discussed with LTS International and if so, have changes been made to the original agreement?
Discussed with LTS: Yes
Formal change request submitted: Yes
Received confirmation of change acceptance Yes

3a. Do you currently expect to have any significant (e.g. more than £5,000) underspend in your budget for this year?
Yes ☐ **No** ☒ Estimated underspend: £
3b. If yes, then you need to consider your project budget needs carefully. Please remember that any funds agreed for this financial year are only available to the project in this financial year. **If you anticipate a significant underspend because of justifiable changes within the project, please submit a rebudget Change Request as soon as possible. There is no guarantee that Defra will agree a rebudget so please ensure you have enough time to make appropriate changes if necessary. Please DO NOT send these in the same email as your report.**

4. Are there any other issues you wish to raise relating to the project or to Darwin's management, monitoring, or financial procedures?
None at this time.

If you were asked to provide a response to this year's annual report review with your next half year report, please attach your response to this document.

Please note: Any planned modifications to your project schedule/workplan can be discussed in this report but should also be raised with LTS International through a Change Request. Please DO NOT send these in the same email.

Please send your **completed report by email** to Darwin-Projects@ltsi.co.uk. The report should be between 2-3 pages maximum. **Please state your project reference number in the header of your email message e.g. Subject: 25-001 Darwin Half Year Report**