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Background. The 'Arthropod Initiative' of the Center for Tropical Forest Science (CTFS) aims at monitoring key arthropod assemblages over long-term and studying insect-plant interactions over the network of the Forest Global Earth Observatories (ForestGEO, http://www.ctfs.si.edu/group/arthropod%20monitoring/). The Initiative integrates with ongoing monitoring of plant dynamics within the ForestGEO network, causes minimum possible impact to the plots and focus on a priority set of assemblages chosen for their ecological relevance, taxonomic tractability and ease of sampling. At each participating ForestGEO site, the first years of the program are usually devoted to a 'baseline' survey. The baseline survey is followed by longer-term programs of field work and analysis, organized into two main sub-programs: monitoring, and key interaction studies. The monitoring sub-program is directed to detecting long-term changes, as reflected in priority assemblages, driven by climatic cycles, climatic change and landscape scale habitat alteration. Monitoring protocols are derived from those used during the baseline survey. The food web approach of interaction studies targets interactions between plants and specific insect assemblages, with different protocols than those used for monitoring. So far, the Arthropod Initiative involves nine ForestGEO sites: Yasuni in Ecuador, Barro Colorado Island (BCI) in Panama, Rabi in Gabon, Khao Chong (KHC) in Thailand, Tai Po Kau (Hong Kong), Dinghushan and Xishuangbanna in China, Bukit Timah in Singapore and Wanang (WAN) in Papua New Guinea.

Monitoring – BCI, KHC and WAN. Year 2017 represented the ninth year of insect monitoring at BCI. So far, the BCI database contains data on 490,423 arthropods, including 2,196species (1,732 of which with pictures, 79%) and 60,843 pinned specimens in our collections (250 drawers). Instead of detailing statistics for each protocol performed on BCI during 2017, as we did for previous years, we present in the long version of this report the full text of an article on the saturniid moths of BCI. The abstract is detailed below. We consolidated two projects in Panama, one on analyzing long-term records of alate ants and termites, the other on testing the feasibility of using DNA metabarcoding for long-term monitoring of the soil fauna, both at BCI. At KHC (7 years of data) our database includes 159,497 specimens (32,901 pinned specimens in collections) and 2,266 species. At WAN (5 years of data) the ForestGEO insect database contains data on 43,782 specimens, but apart from butterflies and fruitflies, few of these specimens are yet identified.

Interaction studies. We also consolidated the field component of a project at BCI, KHC and WAN, where we monitor the survivorship of seedlings in control plots and in plots treated with insecticide, to evaluate the action of insect herbivores on seedlings. We successfully set up our protocols in routine mode, have sown 48 tree species with +45,000 seeds at the three study sites, and have monitored seeds/seedlings for 61-79 weeks. The monitoring data are considerable and include so far ca 1.9 million observations. Preliminary results indicate that the response to treatment is variable among study sites and tree species, as expected.

Scientific output In 2017, the ForestGEO Arthropod Initiative trained, at the sites of BCI, KHC and WAN, 19 assistants (7: BCI, 6: KHC, 6: WAN); 6 interns (all at BCI); 2 volunteers (BCI); one MsSc student (BCI) and 1 PhD student (BCI). The work of other PhD students and researchers was also facilitated at these three sites. We implemented the new ForestGEO Arthropod database at local sites during 2017. The local version is now 80% complete and is currently is in use by 9 sites: Ontogachi, Yasuni, Loja (Ecuador), BCI (Panama), XTBG, Tai Po Kau, Dinghushan (China), KHC (Thailand) and WAN (Papua New Guinea). The web version should be on-line early next year. The main goal is to provide an updated database for storing ForestGEO arthropod data that can be accessed by managers and users. In 2017, we initiated new collaboration with colleagues interested in the ForestGEO Arthropod Initiative and we expect these new collaborations to flourish in 2018 and to lead to an increasing number of exciting publications (in 2017: 4 publications, plus 4 additional publications involving the program coordinator).

The Saturniidae of Barro Colorado Island, Panama: A model taxon for studying the long-term effects of climate change?–Abstract.
We have little knowledge of the response of invertebrate assemblages to climate change in tropical ecosystems, and few studies have compiled long-term data on invertebrates from tropical rainforests. We provide an updated list of the 72 species of Saturniidae moths collected on Barro Colorado Island (BCI), Panama, during the period 1958-2016. This list will serve as baseline data for assessing long-term changes of saturniids on BCI in the future, as 81% of the species can be identified by their unique DNA Barcode Index Number, including four cryptic species not yet formally described. A local species pool of 60+ species breeding on BCI appears plausible, but more cryptic species may be discovered in the future. We use monitoring data obtained by light trapping to analyze recent population trends on BCI for saturniid species that were relatively common during 2009-2016, a period representing > 30 saturniid generations. The abundances of 11 species, of 14 tested, could be fitted to significant time-series models. While the direction of change in abundance was uncertain for most species, two species showed a significant increase over time, and forecast models also suggested continuing increases for most species during 2017-2018, as compared to the 2009 base year. Peaks in saturniid abundance were most conspicuous during El Niño and La Niña years. In addition to a species-specific approach, we propose a reproducible functional classification based on five functional traits to analyze the responses of species sharing similar functional attributes in a fluctuating climate. Our results suggest that the abundances of larger body-size species with good dispersal abilities may increase concomitantly with rising air temperature in the future, because short-lived adults may allocate less time to increasing body temperature for flight, leaving more time available for searching for mating partners or suitable oviposition sites.

Plate I. Representative activities/items for the ForestGEO Arthropod Initiative in 2017. (1) Local phylogeny of Saturniidae at BCI. (2) Time-series 2003-2017 for alate ants on BCI, raw data with lowess smoothing in red. (3-4) The two most common ant species as collected by Malaise traps on BCI during 2003-2017: *Rasopone arhuaca* (3) and *Ectatomma ruidum* (4). Pictures by S. Arizala. (5) Specimen flow of Collembola for the metabarcoding project on BCI. (6) A. Ramirez obtaining soil samples for metabarcoding on BCI. (7-9) Raw results for 61-79 weeks of monitoring seedlings at BCI, KHC and WAN: number of surviving seedlings in control (blue) and treatment (with insecticide, pink) plots. (10) R. Bobadilla showing the model of light trap in use at BCI. (11) Results of a phylogenetic path analysis to explain important predictors of the number of seed predators reared at WAN. (12) Scene of the SENACYT video featuring P. Polanco working on ants in Panama.