Pre-Proposal Biota S05

In Biota S05, several projects have been started in phase 1 and 2, which should be continued in phase 3 in order to finish them and to get final conclusions. Another main objective is to combine the results with those of other subprojects (e.g. S02, S04, S06) and to analyze them with respect to ongoing patterns and processes.

With the gathered additional results (monitoring and functional processes), we approach the establishment of key parameters for modelling (small scale and landscape).

(a) Name of proposing person(s): Büdel, Friedl, Loris, Pfiz, Weber, Wessels

(b) Title of project: Biological soil crusts (BSCs): Biodiversity, functional diversity, their environmental determinants and role in the ecosystem.

(c) Regional focus and limits:
WP 1: Biodiversity assessment and monitoring - one observatory (pair) in each biome possessing BSCs
WP 2: Remote sensing for monitoring - Soebatsfontein, Rehoboth, Goedehoop
WP 3: Microclimate – Soebatsfontein, Rehoboth, Goedehoop
WP 4: Nitrogen and carbon input by BSCs, turnover-rate of BSCs – Knersvlakte, Soebatsfontein
WP 5: Human impact and recovery – Rehoboth exclosures
WP 6: Lichens vegetation - Namib Desert (Wlotzkas Baken and Gobabeb) and Alexander Bay

(d) Please explain how your proposal would contribute to our 5 overarching themes of BIOTA:
IMT 1: Natural dynamics in space and time
   WP 1: Biodiversity assessment and monitoring
   WP 2: Remote sensing for monitoring
   WP 4: Nitrogen and carbon input by BSCs, turnover-rate of BSCs
   WP 6: Lichen vegetation

IMT 2: Understanding natural processes of change of biodiversity
   WP 4: Nitrogen and carbon input by BSCs, turnover-rate of BSCs
   WP 3: Microclimate
   WP 5: Human impact and recovery
   WP 6: Lichen vegetation

IMT 3: Understanding human use, value and impact in space and time
   WP 5: Human impact and recovery

IMT 4: Interventions (tools, techniques, instruments) for sustainable use of biodiversity and biodiversity management
   WP 1: Biodiversity assessment and monitoring
   WP 2: Remote sensing for monitoring

IMT 5: Inform policy on local, national and international level
   Poster and reader on BSCs are developed and spread out to the public
(e) Proposed co-operating partners:
WP 1: Results should be combined with those of S02, S04, S06 and others if applicable
WP 2: S01
WP 4: S06
WP 5: S02, S06, S11
WP 6: S01, University of Namibia (Ocean Research Institute)

(f) Key questions:
WP1: What factors are responsible for microbial diversity in BSCs? What causes patterns in time and space?
WP2: Can different types of BSCs be classified in hyperspectral images? Establishment of a monitoring technique. What percentage of soil is covered by BSCs? Distribution patterns of BSCs?
WP3: What climatic factors drive BSC formation and patterns?
WP4: How does species composition influence nitrogen input and productivity of BSCs? Influence of BSCs on phanerogameous diversity.
WP5: Composition and distribution of BSCs with respect to grazing and trampling.
WP6: Influence of climatic ocean-mainland interactions (global change, storm impact) on the distribution and diversity of lichen vegetation

(g) Key activities:
WP1: Establishment of phylochip for rapid species determination.
Continuation of diversity assessment, including mosses and liverworts
WP2: Upscaling and generalization of classification techniques established during phase II. Validation of results by extensive field work.
Measurement and analysis of spectral response of BSCs throughout the year.
WP3: Installation of a third microclimate site.
Analysis of data from 2 existing microclimate sites.
Modification of microclimate site at Soebatsfontein in order to analyze the influence of Heuweltjies.
WP4: Further analyses of delta 15 N.
Measurement of carbon-input.
Experiment on turnover of BSCs
WP5: Assessment of crust composition, biomass and N-content within the four exclosures twice a year.
Combination of the results with those gathered by S02 and S06 at the same sites.
WP6: Microclimatic measurements along transects including ocean temperature.
Assessment of biomass and diversity disturbance after extreme climatic events.