The space of belowground processes is tremendously important but little understood, particularly for its global significance: belowground carbon productivity is estimated to account for 46% of total terrestrial carbon fixation. Integrating information about investments in belowground biomass has the potential to help us more effectively model the global carbon budget – especially as it might shift under global stressors – as well as to inform more sustainable farming practices. Other plant traits are defined well by trade-offs that occur along particular axes. The leaf economic spectrum (LES), for instance, describes the exchange between “fast-return” leaves with a resource acquisitive strategy and those with a “slow-return” resource conservative strategy.

Ecologists have investigated the existence of a similar spectrum for other traits – e.g. the root economic spectrum (RES). It was initially hypothesized that trade-offs existed between root diameter, specific root length, root tissue density, nitrogen content, and cortex fraction, and that these traits were associated with similar acquisitive and conservative strategies (i.e. growing fast requires high nitrogen density in the roots while thicker roots have longer lifespans and fare well in nutrient poor soils but are slower to uptake resources. However, more recent research indicates that the analogy between the LES and RES falls short: most of the variation in root traits is explained rather by the outsourcing of resources to mycorrhizal fungi. A major source of resource allocation in plants also consists of exudates – in fact, plants commit as much as 20% of their photosynthetic productivity to carbohydrates, proteins, and secondary metabolites. In doing so, plants foster beneficial microorganisms in their rhizosphere. However, it is relatively unknown how root exudation fits into the RES spectrum, and especially how resource allocation shifts in response to prolonged drought conditions. This has downstream effects on the microbial community, which may shift its metabolic strategy in the absence of favorable exudates.