5.3A Themed Session B: Ecology of Indo-Pacific Fishes, 260-115, November 24, 2023, 10:30 AM - 12:30 PM

High vulnerability of coral reef food web and energy fluxes to global change

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Coral reefs are the most diverse marine ecosystem on Earth but are nowadays threatened by pervasive stressors, including coral bleaching, ocean acidification, overfishing and pollution. While the influence of these stressors on static community variables such as standing fish biomass or coral cover are well studied, trophic interactions are often overlooked. Hence, it is largely unknown how food webs and the energy fluxes that fuel coral reefs will respond to global changes.
Here, we combine the largest empirical global database of reef fish trophic interactions with fish-centric bioenergetic modelling and visual censuses to create, at a global scale, a coral reef weighted bipartite trophic networks database. Using this database, we delineate patterns of coral reef food webs structure and trophodynamics at a global scale and we explore how energy fluxes are impacted by environmental and anthropogenic pressures.
We found that the architecture of reef fish food webs are not homogeneous across oceans. First, we show that complex (i.e. species-rich) systems are more vulnerable, more compartmentalized and less connected than depauperate communities. On the other hand, sea temperature, coral cover, wave exposure and fishing intensity were all major determinants of reef fish food web architecture. Using Bayesian modelling, we eventually show that food web architecture is remarkably correlated with coral reef trophodynamics and regulates the amount of energy input from internal or oceanic production.
To conclude, our work sheds light on how reef fish food webs may evolve under global changes.