CEDAR Community Statement on DYNAMIC

The CEDAR community is concerned about NASA's future plans for the DYNAMIC mission. The NASA FY 2023 President's Budget Request[1] (page HELIO-24) states "Pre-formulation work on the Dynamical Neutral Atmosphere-Ionosphere Coupling (DYNAMIC) mission is no longer supported within STP Future Missions." DYNAMIC is the key mission to explore how near-Earth's space environment responds to lower atmosphere weather. Without DYNAMIC, the heliophysics community will not be able to discover the role of wave processes in neutral-plasma coupling that are fundamental to all planetary atmospheres.

Recommended by the 2013 Decadal Survey[2] (recommendation R3.2: "Implement a DYNAMIC-like mission."), the 2020 Midterm Assessment[3] (recommendation 3.4: "NASA should take the steps necessary to prepare for the release an AO for a DYNAMIC-like mission") fully affirmed the urgent need for DYNAMIC. The 2021 Space Weather Gap Analysis Report[4] further concluded that thermospheric and ionospheric data (that DYNAMIC is expected to provide) are amongst the highest-ranking observations needed to advance space weather forecasting capabilities. DYNAMIC's main science goals are (1) to resolve lower atmosphere influences on the AIM system by measuring the height evolution of the wave spectrum in the thermosphere that produces spatio-temporal variability within the system and (2) to provide the much needed day and nighttime wind measurements throughout the whole thermosphere to study ion-neutral interactions and dynamo processes.

The CEDAR community fully and unequivocally supports the science goals of DYNAMIC. Only with such a mission will we be able to substantially advance understanding of the variability in space weather driven by meteorological weather. The CEDAR community further supports NASA's Community Announcement[5] NNH22ZDA004L from October 23, 2021, that states "Due to the strong overlap in the necessary measurement capabilities to accomplish the science recommended for the Geospace Dynamics Constellation (GDC) and the DYNAMIC mission, NASA is leveraging its implementation of GDC to execute DYNAMIC in a cost-effective and resource-efficient manner." As part of this, the portions of GDC objectives that could have provided observations of atmospheric waves below 200 km altitude were removed from the PEA (Program Element Appendix) for the GDC mission (specifically, Objectives 1.4 2.4 and 2.5 put forth in the GDC Science and Technology Definition Team report). DYNAMIC will thus be able to fill this gap and maximize science return from GDC for the benefits of the heliophysics community.

The CEDAR community urges NASA to consider DYNAMIC a high-priority mission and to continue pre-formulation work on DYNAMIC. The CEDAR scientists also believe it is imperative to prepare an Announcement of Opportunity for a DYNAMIC mission to be implemented in coordination with GDC to maximize the science return of both missions.

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[1]NASA FY 2023 Congressional Justification (full budget request):
https://www.nasa.gov/sites/default/files/atoms/files/fy23_nasa_budget_request_full_opt.pdf

[2]National Research Council 2013. Solar and Space Physics: A Science for a Technological Society. Washington, DC: The National Academies Press. https://doi.org/10.17226/13060.

[3]National Academies of Sciences, Engineering, and Medicine 2020. Progress Toward Implementation of the 2013 Decadal Survey for Solar and Space Physics: A Midterm Assessment. Washington, DC: The National Academies Press. https://doi.org/10.17226/25668.

[4]NASA 2021 Space Weather Gap Analysis Report: https://science.nasa.gov/science-pink/s3fs-public/atoms/files/GapAnalysisReport_full_final.pdf

[5]DYNAMIC Community Announcement (NNH22ZDA004L, October 23, 2021): https://soma.larc.nasa.gov/stp/dynamic/announcements.html

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