Kalpana Chawla Space Academy

SPACE SPECTRUM

e-newsletter

May 2025

Foreword

Greetings to everyone reading the KCSA Space Spectrum,

It brings us immense pleasure to announce the launch of the first edition of KCSA's e-newsletter in November 2024. We aim to present a collection of scientific articles that explore diverse dimensions of science, technology, and space science.

**The views expressed by the authors in their articles are solely their own.*

Aim

To theorize, sight see, augment knowledge baskets with literary work on science, technology and space science in form of e-newsletter among budding scientists, parents, researchers, academicians and industrial practitioners.

Purpose

- To provide engaging content that educates readers about current space science topics, discoveries, and innovations, fostering a greater understanding of the universe.

- To inspire and equip readers for careers in space science, helping them navigate educational and professional pathways.

- To foster connections among KCSA members and the wider community by sharing stories, events, and achievements, while inspiring engagement in space-related activities and discussions.

Space Spectrum

The KCSA e-newsletter, Space Spectrum, serves as a vibrant hub for all things related to space science. Designed to educate and inspire, it delivers the latest updates, discoveries, and research from the cosmos. Each issue offers in-depth articles that break down complex topics into digestible insights, making the wonders of the universe accessible to everyone.

Space Spectrum fosters a strong sense of community among KCSA members, spotlighting individual achievements and collaborative projects. Readers can share their stories, engage in discussions, and contribute their own articles, enhancing the collective knowledge and experience.

In addition to educational content, the newsletter highlights upcoming events, from workshops and lectures to hands-on activities. Members are encouraged to participate, fostering connections and promoting a culture of learning and exploration.

The newsletter also features a dedicated section for career opportunities, offering guidance for aspiring space scientists. With profiles of professionals in the field, readers gain valuable insights into potential career paths and networking tips.

Overall, Space Spectrum is not just an e-newsletter; it's a dynamic platform that nurtures curiosity among young minds, builds community, and celebrates the endless possibilities of space science. Join us in exploring the universe, one edition at a time!

Editorial Desk

Welcome to the inaugural edition of Space Spectrum, KCSA's e-newsletter created to connect our community with the fascinating world of space science. Our mission is to inform, engage, and inspire by sharing the latest advancements in science, technology, and space exploration.

Each edition will cover a wide range of topics, from groundbreaking discoveries to insights from leading scientists, simplifying complex ideas for everyone to enjoy. We believe that exploring the universe should be accessible to all, and this newsletter is designed to ignite that curiosity.

Space Spectrum is also a platform for our community. We encourage you to share your experiences, projects, and questions, fostering vibrant discussions among members. Your contributions are vital to shaping our content.

Additionally, we'll feature updates on events, workshops, and career opportunities to keep you connected and informed. This newsletter aims to be a hub for growth, learning, and collaboration.

Join us in celebrating the wonders of space science and the remarkable efforts within KCSA. Together, let's explore, learn, and inspire the next generation of space enthusiasts.

Thank you for being part of our journey. We look forward to your insights and contributions in future editions of Space Spectrum.
Happy reading!

Editor
Dr. Pushpendu Rakshit
Program Director, KCSA

Dr. P.J. Blount

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What Kind of Space do We Want?

The 1967 Outer Space Treaty proclaims that space should be used for the benefit of all humankind. This is a noble aspiration that historically has had to contend with the tension between civil and military uses of space. Today, however, the increasing commercialization of the space environment gives new dimension to the notion of space for all.

SpaceX serves as a clear example of what is at stake. The company has revolucompany has been a leader in space technology. But what about its leader?

In January of this year as part of the inauguration celebrations for the new American president, Elon Musk gave a Nazi salute on stage, foreshadowing the deep-set white nationalism now found in American politics. This comes after repeated allegations of sexual harassment at the company and against Musk personally, and allegations of racial discrimination have also been brought against the company.

As part of the contract to obtain services from the company, users must accept that no Earth based government has authority over the company on Mars. Though this is not true in fact, it also raises the question of whether these activities are for the benefit of all humankind or whether they are targeted at personal gain. If we are hitching ourselves to the coat-tails of billionaires in order to expand ourselves into the space environment, then what sorts of values will we take with us? Space is an expensive endeavor, but at what cost comes the dream of space for everyone.

tionized launch technology, made advances in human spaceflight, and deployed the first very large constellation. It goes without saying that the

Despite the recognition of its importance, Earth science is barely considered a science subject in our educational curriculum, not country-specific, but universally. Perhaps it is time our science education is re-structured so that Earth and Environmental sciences get their due at par with the status as enjoyed by Physics, Biology and Chemistry. At the Kalpana Chawla Space Academy (KCSA) we proposed to address this issue by launching a new curriculum to familiarize the students about the “Workings of the Earth: past, present, and future”.

The objective of the course is to expose the students to the history of the earth, and processes that shape the earth. The course would focus on and how these processes lead to hazards that threaten the humanity, and how the anthropogenic activities accelerate these threats and how the society must equip itself to address these issues, starting with a good understanding of the underlying processes.

Dr. Khusala Rajendran
Professor (retired) Centre for Earth Sciences;
Indian Institute of Science, Bengaluru, India

Workings of the Earth: past, present, and future

Sustainability of life and empowerment of human civilization depends upon how we understand the processes that shape our planet. First, the earth processes that affect us must be visualized as the outcome of various interacting feedback systems. For example, weather patterns affect the agricultural production, both by scarcity and excess of water resources. Earthquakes, tsunamis, volcanic eruptions, hurricanes, landslides, and floods kill and destabilize large population and cause excessive property damage around the world. These processes not only affect individuals, communities and nations but also bring about changes on our planet. In fact, processes that occur today are just a continuation of events that shaped the earth for the past 4.3 billion years. The expanding human footprint increases demand on natural resources and challenge the healthy and sustainable future of the earth. Overexploitation would certainly impose limits to the pace of growth and deprive the posterity from experiencing the Earth with its richness and splendor.

To protect our earth and its environment, and to understand its natural system and processes, our journey to the future must start with a sound understanding of Earth systems. Why is the knowledge of Earth science more relevant than ever before, in today's context? We live at a time that is witnessing unprecedented challenges due to several mad-made and natural causes. The Earth has never been subject to the multitudes and scales of changes as being witnessed today-climate change, environmental degradation, and human-human and human-nature conflicts among them. These issues can be tackled only if societies are aware of the way the earth systems work and are equipped to address pertinent issues such as urban planning, global climate change, and the use and management of natural resources including water, forest, wetlands etc. In essence, a deeper understanding of the earth processes is requires to think globally and act locally, that is to make decisions that change the lives of individuals, societies and make the earth a better place to live. This can be achieved only through creating a society that recognizes the workings of the earth system and benefits from Earth science education starting from elementary to higher levels and spreading to community levels. Perhaps we can start with a slogan that "Earth science education benefits all and saves the Earth".

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Need of Space Education in Indian Scenario

Dr. Pushpendu Rakshit
Program Director
Kalpana Chawla Space Academy

Space science education is of great importance in India, especially as the country rapidly advances in space exploration and technology. With successful missions like **Chandrayaan**, **Mangalyaan**, and the upcoming **Gaganyaan** project, India has demonstrated its growing capabilities in space research. To sustain and build on these achievements, it is essential to cultivate a strong foundation of space science education among students and youth.

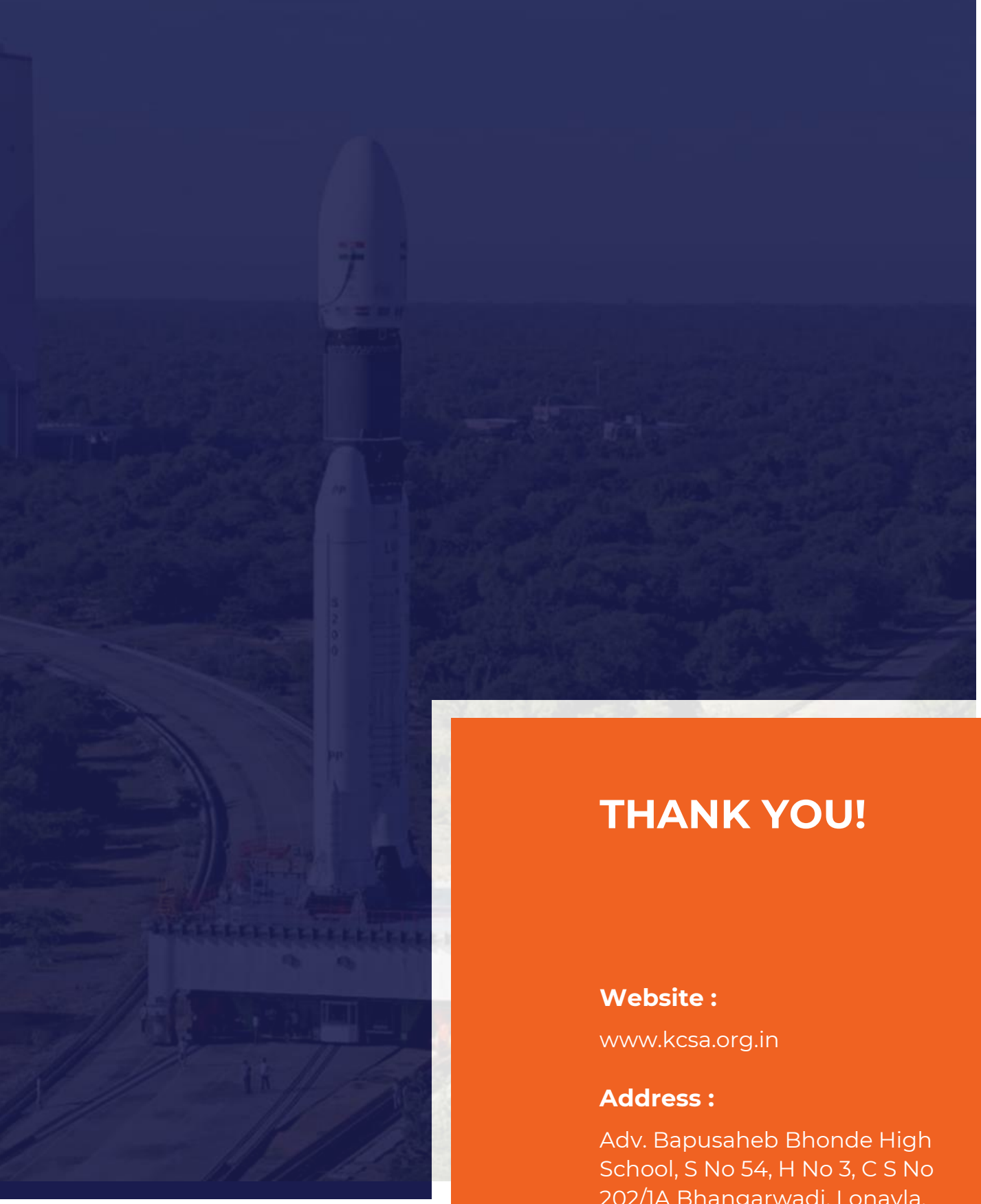
Space science education helps students understand the universe, Earth's place within it, and the technologies that make space exploration possible. It integrates multiple disciplines—**physics, mathematics, engineering, computer science, environmental science, and even biology**—which encourages critical thinking, innovation, and interdisciplinary learning. These skills are not only crucial for careers in space and aerospace but are also transferable to a wide range of scientific and technical fields.

In a developing country like India, space science also plays a practical role in solving real-world problems. Satellites help with **agriculture, weather forecasting, disaster management, navigation, and telecommunications**, all of which directly benefit the economy and daily life. Educating the next generation in this field ensures that India continues to develop indigenous technologies and reduces dependency on foreign expertise. Moreover, space science education fosters **scientific temper and curiosity**, inspiring young minds to explore, question, and innovate. It aligns with national initiatives like **Digital India, Skill India, Start-Up India**, and the **Atmanirbhar Bharat** mission, which focus on building a self-reliant and technologically advanced nation. Expanding space education to schools, colleges, and public programs—especially in rural and underrepresented areas—can democratize access to scientific opportunities and nurture a new generation of space scientists, engineers, and explorers.

In short, **space science education is not just about rockets and satellites**—it is about preparing India for a future where space technology plays a central role in development, security, and innovation.

The future of space education in India is bright and full of potential, as the country continues to establish itself as a major spacefaring nation. With the success of missions like Chandrayaan, Mangalyaan, and the ambitious Gaganyaan human spaceflight program, there is a growing need to cultivate a new generation of scientists, engineers, and innovators. Space education in India is evolving rapidly, with more schools and universities introducing specialized courses in space science, astrophysics, and aerospace engineering. Initiatives under the National Education Policy (NEP) 2020 are also promoting interdisciplinary and practical learning, making space education more accessible and engaging for students.

The rise of private space companies such as Skyroot Aerospace, Agnikul Cosmos, and Pixxel, supported by government agencies like IN-SPACe and ISRO, is creating numerous opportunities for collaboration, internships, and research. Practical learning through model rocketry, satellite design, drones, and AI in space applications is becoming increasingly common. Moreover, efforts are being made to bring space education to rural and semi-urban areas through online platforms, mobile science labs, and affordable educational kits. As India moves towards human spaceflight, lunar exploration, and satellite-based development, space education will play a crucial role in building a skilled, future-ready workforce capable of driving innovation and technological growth.



THANK YOU!

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