**PACEVision**

**High Level Project Summary -**

We have developed a user-friendly website designed to help students understand and engage with NASA data more effectively. The platform is divided into two educational levels: primary and high school, ensuring accessibility for students across different age groups and learning stages.

The website offers in-depth explanations of NASA’s PACE (Plankton, Aerosol, Cloud, ocean Ecosystem) data, supported by visual aids, interactive learning materials, detailed images, and explanatory videos. In addition to these resources, students can also access quizzes and hands-on activities to reinforce their learning. The content is aligned with the educational standards for each level, ensuring that students not only gain knowledge but also build skills in data interpretation and environmental science.

Furthermore, the website includes a feedback mechanism, allowing students to track their progress and educators to monitor their students’ development. It serves as an innovative tool for fostering curiosity and understanding of complex environmental data among young learners.

**Detailed Project Description -**

**PACEVision** is an educational website designed to simplify complex NASA PACE (Plankton, Aerosol, Cloud, ocean Ecosystem) mission data for students. It provides detailed explanations of planktons, aerosols, clouds, and oceans using a variety of engaging resources, including satellite images, animated videos, and quizzes. The website categorizes content into two learning levels—primary and high school—making it accessible to a wide range of students. Each section offers in-depth knowledge through interactive learning materials that aim to enhance student understanding of Earth’s atmosphere and oceans.

The platform works by providing students with a visually rich, interactive learning environment. Satellite images from NASA’s Earth Sciences and Ocean Sciences serve as a core resource, helping students visualize real-world data. The content is broken down into easy-to-understand modules, each supported by educational videos and quizzes to test their knowledge. Students can navigate between topics, explore satellite data, and engage with quizzes to reinforce their learning. The website also provides progress tracking and feedback features, allowing students and teachers to monitor progress and engagement.

The key benefits of \*PACEVision\* include making NASA’s data accessible to students, promoting environmental awareness, and fostering curiosity in space and Earth sciences. By combining visual and interactive tools, the platform enhances learning and engagement, aiming to develop critical thinking and data interpretation skills. The project was developed using a combination of web development tools, including HTML, CSS, and JavaScript for the front-end design, along with Python and Flask for backend processing. NASA’s public API for satellite imagery and educational data was integrated, making the content dynamic and up-to-date.

**Hackathon Journey -**

The overall experience of the space apps challenge has been a constant learning process. We registered under the Amaravathi, Andhra Pradesh local event and the atmosphere provided to us at VIT-AP was very enthusiastic and motivating which made us go a step beyond what we thought we could do.

We chose this challenge because PACE has become a popular area of research and we would want to be a part of it through our innovation in design. As we have taken U-turn from one challenge to another challenge in the last minute, we could not model high level web design and restricted to the two levels of classroom grades as planned. We were really inspired by PACE MISSION of the NASA. We used a modular approach to develop the design. The major setback was THE TIME CONSTRAINT, since the work involves good and captivating web-design work. We would like to thank our local leads Ms. Deepthi G, Mr. Abhishek Jonnada, Ms. Chenna Suma dharani, and Ms. Nikitha G, VIT-AP Amaravathi, Andhra Pradesh, India for continuous guidance and support throughout the hackathon. We would also like to thanks all the other mentors from various other fields for giving us their valuable feedback. Special mention to the volunteers in all aspects.

**Space Agency Data -**

[**NASA PACE**](https://pace.oceansciences.org/home.htm)**:** This is a valuable resource for this challenge because it is the mission website and the official site to get all PACE related information. This should be a starting point for the challenge, and a good place to gather basic and in-depth information about PACE as well as explore resources detailing accessing and using PACE data.

[**NASA PACE: Access PACE Data**](https://pace.oceansciences.org/access_pace_data.htm)**:** This website holds data collected from PACE; it is a great place for challenge members to get familiar with the types of data that is being collected and how it can be used in various ways. The links included on this site range in age and experience level, and include options for accessing data.

[**NASA PACE: Get Ready to Work with PACE Data**](https://pace.oceansciences.org/work_with_pace_data.htm)**:** This website goes hand in hand with the accessing PACE data website and can be helpful when beginning to work with the data. There are options for complexity of data access, and there are some classroom resources to consider when creating your own resources.

[**Ocean Exploration Article**](https://oceanexplorer.noaa.gov/okeanos/edu/collection/media/wdwe_journey.pdf)**:** An example lesson plan about Ocean Exploration in association with NOAA. This website can be a good resource for challenge members who are unfamiliar with lesson plan structures and what information can be useful for facilitators to have and base their lesson upon. This lesson plan includes links to other websites, videos, and information that can be helpful when facilitating a lesson, and highlight areas and facts to emphasize. An important emphasis should also be on facilitating discussion and active participation amongst students.

[**Space to Learn**](https://www.nasa.gov/learning-resources/)**:** This website is full of NASA related resources to model classroom material after. It contains lots of examples about NASA missions and Earth Science, and links to worksheets, interactive games, lesson plans and more. An emphasis should be put on interactive lessons and this website has plenty of resources along that line.

[**NOAA Ocean Explorer**](https://oceanexplorer.noaa.gov/edu/materials.html)**:** This website has educational resources such as education modules, multimedia exploration, lesson plans and more. This website can be used to structure material off of, and get inspired for different types of activities to bring into the classroom.

[**Drama Based Pedagogy: Teaching Strategies**](https://dbp.theatredance.utexas.edu/teaching-strategies)**:** This website holds classroom games and activities that make lessons more engaging and insightful, and challenge team members to incorporate activities along these lines. Incorporating physical movement (to and extent) can often make lessons more exciting and engaging, and these activities are not limited. There are activities for all age groups and mobility-able groups, and these activities should be considered when creating a lesson plan for all ages, and should be considered if the material is going places other than classrooms as well (conferences, board meetings, etc.). For additional resources you could conduct an internet search to gather relevant information that may be useful. Potential search keywords could include Drama Based Pedagogy.

**Space Agency Partner Resources**

**European Space Agency (ESA)**

[**Aerosol**](http://cci.esa.int/data)**:** Aerosol particles in the atmosphere have an important influence on the Earth's radiative balance by directly reflecting sunlight back into space, as well as absorbing some sunlight and converting it into heat. Aerosols also have an impact on climate by acting as cloud condensation nuclei, which alters cloud properties and their radiative effects. Aerosol particles at surface level impact human health, and are associated with disruption to transport (desert dust storms and volcanic eruptions) and can reduce the solar irradiance available for solar power plants.

[**EarthCARE**](https://earth.esa.int/eogateway/missions/earthcare/data)**:** The objective of the EarthCARE mission is to make global observations of clouds, aerosols and radiation.

**Canadian Space Agency (CSA)**

[**Surface Water and Ocean Topography (SWOT)**](https://www.asc-csa.gc.ca/eng/satellites/swot/)**:** This page provides information about the Surface Water and Ocean Topography (SWOT) mission. This mission, led by NASA and Frances' space agency (CNES) with contributions from the CSA and the UK Space Agency, provides new and detailed information on one of the most important resources we share – water. This information should help participants better understand the importance of surface water.

**Project details –**

<https://drive.google.com/drive/folders/1lDIULtc-bVNOe0SZ_z8liXPrlxNAMsfG>

<https://github.com/SudheerReddyBandi/NASASPACEAPPSCHALLENGE2024>

**References –**

<https://pace.oceansciences.org/docs/ocean_color_brochure.pdf>

<https://pace.oceansciences.org/docs/pace_ocean_color_wheel.pdf>

<https://pace.oceansciences.org/docs/Plankton-Poster-High-Resolution-Kirsten-Carlson-Artist-at-Sea-SOI.pdf>

<https://pace.oceansciences.org/docs/what_color_is_the_ocean.pdf>

<https://pace.oceansciences.org/docs/PhytoplanktonStressors.pdf>

<https://pace.oceansciences.org/docs/OceanColor_508_lenticular.pdf>

<https://pace.oceansciences.org/whatispace_main.htm>

<https://pace.oceansciences.org/prop_of_light.htm>

<https://pace.oceansciences.org/color_determination.cgi>

<https://pace.oceansciences.org/atmos_light.cgi>

<https://pace.oceansciences.org/ocean_light.cgi>

<https://pace.oceansciences.org/aerosol_quiz.htm>

<https://pace.oceansciences.org/docs/PACE_Brochure_Series_Clouds_Aerosols_NP-2018-09-266-GSFC(rev_122).pdf>

<https://pace.oceansciences.org/docs/pace_2016_brochure.pdf>

<https://earth.gsfc.nasa.gov/climate/data/deep-blue/aerosols>

<https://www.youtube.com/watch?v=4eh6IKahbok>

<https://www.youtube.com/watch?v=lGNCrfKG7iM>

<https://www.youtube.com/watch?v=mT0zCQjbgJ8>

<https://www.youtube.com/watch?v=4y-zAWVlOV4>

<https://www.youtube.com/shorts/mTkX5pLmpY0>

<https://www.youtube.com/watch?v=uNqf5vbjJf8>

<https://www.youtube.com/watch?v=9XzP3jOJn5c>

<https://doi.org/10.1175/BAMS-D-18-0056.1>

<https://doi.org/10.1029/2008JD010774>

<https://iopscience.iop.org/article/10.1086/498413/fulltext/>

<https://doi.org/10.1117/12.2537146>

<https://www.nasa.gov/wp-content/uploads/2009/07/62317main_ics_clouds.pdf?emrc=85f32f>

<https://www.jpl.nasa.gov/edu/teach/activity/the-sky-and-dichotomous-key/>

<https://mynasadata.larc.nasa.gov/lesson-plans/cloudy-vs-clear-graphs>

<https://oceancolor.gsfc.nasa.gov/l3/>

**Tags -**

#pace #plankton #aerosol #cloud #ocean-ecosystem #classroom #primary #higher #nasa #space