

## Annotated example on how to write a summary paragraph

Aerosols, small suspended particles, are ubiquitous in the atmosphere and play a large role in human driven climate change. The role of aerosol particles in cloud and precipitation forming processes represents the largest uncertainty in the future understanding of climate change. While the knowledge about greenhouse gas concentrations before the pre-industrial era is accurately available, the knowledge about aerosol-cloud-precipitation interaction for the present era, however, is impossible to comprehend. Availability of such knowledge will greatly help in reducing future climate related uncertainties.

Here, I hypothesize that the COVID-19 lockdown, which has greatly resulted in reducing the aerosol burden over India, has provided a unique opportunity to understand and assess the baseline aerosol pollution, which can then be compared to the pre-industrial era. Using the publicly available data over India, I intend to investigate the difference between pre-lockdown pollution levels and that during-lockdown. This study will greatly help me scientifically unravel the potential sources of major pollutants in metro-cities and the possible mechanism of mitigating the strongest sources in the future. The analyses expected out of this project are expected to be important and of direct societal relevance, as the pollution level during lockdown could be considered as the background concentration of pollutants against which human impact can be assessed.

One or two sentences setting up a basic introduction to the field of research, understood by a researcher of any discipline.

One or two sentences explaining a more detailed background, understood by a researcher in the very specific field.

One or two sentences identifying the problem in terms of the “larger picture”.

One sentence on the “magic wand” that may help in addressing the above problem in whatever way possible.

One or two sentences indicating your general hypothesis regarding the attempted problem (using words such as “Here I hypothesize” or “Here I intend to address” or “Here I use the technique of AI to solve”)

Two to three sentences about your approach/methodology such as experiments, modeling or a combination of both.

What is the larger picture that you expect will emerge from this project if successfully completed? How and why will it be a game changer?

### Example and tips for writing the problem statement:

A problem statement can always be framed with typical “WH” questions such as “what”, “when” or “why”.

- Where and when did the problem start emerging?
- What are the implications and solution required to solve this problem?

Example:

With the onset of industrialization in the early 18<sup>th</sup> century, when humans discovered the use of combustion processes to convert energy to work, the first-time anthropogenic activities emitted greenhouse gases into the atmosphere. Within a very short time, the spatial scale of technology enhanced multifold and the entire world became a source of atmospheric greenhouse gases. The implication of this is the enhanced and rapid increase in global atmospheric temperature and start of global warming. To better understand the impact of climate change, we require long-term data on temperature and greenhouse gases.

- How can this problem be tackled?
- Who is getting affected by this?
- Why is studying the Greenhouse Effect important?

**Example:**

Once we have the long-term data on and understanding of the temperature increase and greenhouse gases, we can tackle this problem by identifying the potential sources and different potentials of greenhouse gases. The rapid and strong increase in Greenhouse Effect is affecting the entire ecosystem on the planet. Studying the Greenhouse Effect is important because we can then come up with various technologies to reduce the greenhouse gases and decide on a policy of “adopt and mitigate” for a green future.

**Example and tips on “why is this study important?”**

- Try to emphasize how the results of this research, if successful, are going to be a game-changer in providing great ideas to tackle this problem. It is fine even if you are not able to completely resolve the problem.
- Note that not each study needs to be novel; but it must be comprehensive.

**Example:**

The finding of this study will redound to the understanding of the basics of the Greenhouse Effect and enhance our knowledge of the remedies required to reduce the emission of greenhouse gases. Until a breakthrough in renewable energy is obtained, the greater demand for energy will keep causing the emission of greenhouse gases into the atmosphere. Thus, for the researcher, it is important to uncover the critical ideas to open up the technological enhancement for reduction of emission of greenhouse gases from industrial sources.

**Example and tips on “advances in current understanding and impact your study represents”**

- Here you can actually pickup from the points mentioned in the problem statement and elaborate on them.
- How to frame the potential impact/implication of your work?
  - Have you attempted to challenge any critical and well-established thinking in your work?
  - If your study becomes a success who should take this forward (professionals) and what way individuals or group benefit if your study is successful.
  - How do you think your study to be implemented or looked into to emerge as game changer.