1. What are you trying to do? Articulate your objectives using no jargon?

Refined Answer:

"We aim to build and evaluate two models, ARIMA and LSTM, to predict short-term temperature changes. By comparing these models, we will identify which method produces more accurate forecasts over short periods, helping to improve weather prediction reliability."

Papers to Reference:

1. \*\*"Comparison between ARIMA and Deep Learning Models for Temperature Forecasting"\*\* (Eranga De Saa and Lochandaka Ranathunga)【75†source】

- This paper highlights the use of both ARIMA and LSTM for temperature prediction, showing how LSTM handles non-linear data more effectively. It supports the idea of comparing traditional methods like ARIMA with modern deep learning models like LSTM for weather forecasting.

2. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This paper emphasizes the comparison of ARIMA and LSTM models in time series forecasting, particularly noting LSTM's superiority in reducing prediction errors. It provides empirical evidence to justify the focus on comparing these models for temperature forecasting.

3. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This paper proposes a hybrid ARIMA-LSTM model, making it relevant for your project if you decide to explore hybrid methods. It also highlights the comparative strengths of each model, helping to define why such comparisons are necessary and beneficial in weather forecasting.

2. How is it done today? What are the limits of current practice?  
Refined Answer:

"Today, weather forecasting uses a mix of numerical models and statistical methods. Traditional approaches like ARIMA excel in handling linear trends and seasonality, making them popular in meteorological applications. However, ARIMA struggles with non-linear data, limiting its effectiveness for short-term, localized predictions. On the other hand, advanced techniques like LSTM, which can capture complex temporal dependencies, are increasingly being used. Although LSTM has shown promise in weather forecasting, it requires large datasets and significant computational resources to perform optimally, making it more challenging to implement in some cases."

Papers to Reference:

1. \*\*"Comparison between ARIMA and Deep Learning Models for Temperature Forecasting"\*\* (Eranga De Saa and Lochandaka Ranathunga)【75†source】

- This paper explains how ARIMA has traditionally been used for weather forecasting due to its ability to model linear trends but highlights its limitations when dealing with chaotic weather patterns. LSTM, while superior in handling non-linearities, requires more resources, which limits its widespread application in local, short-term forecasting.

2. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This study reinforces that ARIMA is widely applied for forecasting due to its simplicity but underperforms when compared to LSTM for non-linear data. LSTM’s ability to reduce prediction errors makes it promising, but its complexity is a notable drawback.

3. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This paper adds context by discussing how both models—ARIMA and LSTM—have been used in weather forecasting, and highlights how combining them can overcome the limitations of each model. This shows the current state of hybrid approaches aiming to address the shortcomings of traditional models.  
  
3. What's new in your approach? Why will it be successful?  
Refined Answer:

"Our approach introduces a direct comparison of ARIMA, a traditional statistical method, and LSTM, a deep learning technique, for short-term temperature forecasting. By evaluating both models on the same dataset, we aim to identify which is better suited for different conditions. **Additionally, we will explore a hybrid approach that combines ARIMA's strength in modeling linear trends with LSTM's ability to capture non-linear patterns. This could lead to more accurate and reliable forecasts by leveraging the best of both methods."**

Papers to Reference:

1. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This paper supports your hybrid approach by demonstrating how combining ARIMA and LSTM can lead to better prediction accuracy than using either model alone. The hybrid model outperforms both models in handling linear and non-linear weather patterns, making this reference ideal for explaining why your combined approach could be more successful.

2. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This paper justifies the need for comparing ARIMA and LSTM by showing how LSTM reduces prediction errors compared to ARIMA. Your project builds on this by conducting a direct comparison for temperature forecasting and determining the conditions where each model excels.

3. \*\*"Comparison between ARIMA and Deep Learning Models for Temperature Forecasting"\*\* (Eranga De Saa and Lochandaka Ranathunga)【75†source】

- This study explores how deep learning techniques like LSTM outperform ARIMA in non-linear scenarios, reinforcing the rationale behind comparing and potentially merging the two methods. It provides a good basis for explaining the potential success of your hybrid approach.   
  
4. Who cares?  
Refined Answer:

"This research is important for meteorologists, climate scientists, and industries that depend on accurate short-term weather forecasts. These include sectors such as agriculture, where better forecasts help with crop management, the energy industry for optimizing demand prediction, the transportation sector for planning logistics, and local governments for preparing emergency responses. Accurate forecasts improve decision-making in all these areas, reducing costs and improving safety."

Papers to Reference:

1. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This paper discusses how accurate weather predictions, especially in aviation, can improve operational safety and logistics, demonstrating the broader importance of weather forecasting across sectors like transportation and agriculture.

2. \*\*"Comparison between ARIMA and Deep Learning Models for Temperature Forecasting"\*\* (Eranga De Saa and Lochandaka Ranathunga)【75†source】

- This study highlights the significance of weather forecasting for various industries, such as airlines and agriculture, where accurate predictions are essential for efficient operations and safety.

3. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This paper shows the critical role of accurate forecasting in economic and financial sectors, and its methodology can easily be applied to climate-sensitive industries like energy, where demand prediction based on temperature is key.

5. If you're successful, what difference and impact will it make? How do you measure it?  
Refined Answer:

"**Success in this project would result in more accurate short-term temperature forecasts, which could improve decision-making in agriculture, energy, and emergency management sectors. By reducing prediction errors, we can help these industries optimize their planning and resource use. We will measure success using standard metrics like Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) to compare the performance of ARIMA, LSTM, and hybrid models against baseline forecasts."**

Papers to Reference:

1. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This paper emphasizes the importance of reducing prediction errors using RMSE and MAE, which are the key metrics for evaluating forecasting performance. It shows how LSTM models outperform ARIMA in reducing error rates by 84-87%, highlighting the potential impact of improved forecasts.

2. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This study demonstrates how hybrid models combining ARIMA and LSTM can improve forecast accuracy and stability. The impact of success in such models is measured using RMSE, which is a direct way to quantify improvements in prediction.

3. \*\*"Comparison between ARIMA and Deep Learning Models for Temperature Forecasting"\*\* (Eranga De Saa and Lochandaka Ranathunga)【75†source】

- This paper discusses the importance of accurate weather predictions for practical applications, such as agriculture and transportation, reinforcing the potential for your project's success to have a broad impact across different sectors.

6. What are the risks and payoffs?  
Refined Answer:

"The primary risks in this project include computational challenges, particularly with LSTM models, and the potential for overfitting due to insufficient high-quality data. Additionally, there is a risk that the methods may not generalize well to other regions or time scales. However, the potential payoffs are significant: improved accuracy in short-term temperature forecasting, a better understanding of the strengths and weaknesses of ARIMA and LSTM, and the possibility of developing hybrid models that outperform traditional approaches. If successful, the project could benefit multiple industries, from agriculture to energy management."

Papers to Reference:

1. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This paper discusses the risk of computational complexity when using LSTM, but also highlights the payoff of better forecasting accuracy when hybrid models are used. It aligns with your approach to balancing the risks with the potential for improved results.

2. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This study points out the challenge of overfitting in LSTM models due to their complexity, while also demonstrating the significant improvements in accuracy that can be achieved. This supports your risk-payoff analysis, especially regarding data quality and generalization issues.

3. \*\*"Comparison between ARIMA and Deep Learning Models for Temperature Forecasting"\*\* (Eranga De Saa and Lochandaka Ranathunga)【75†source】

- This paper shows that while ARIMA is easier to implement, it underperforms in non-linear scenarios. LSTM models, although more computationally intensive, offer higher accuracy, which is a crucial consideration in balancing the risks and rewards of your project.

7. How much will it cost?  
 Refined Answer:

"The primary costs for this project are related to computational resources needed for data processing and model training, especially when using complex models like LSTM. However, we plan to minimize expenses by using freely available weather datasets and open-source tools like R libraries. The main investment will be the time and effort of the research team, and any additional costs can be estimated as the project progresses."

Papers to Reference:

1. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This paper discusses the computational complexity of LSTM models, which aligns with the potential costs in terms of computational resources. The study also emphasizes using publicly available weather datasets, which helps minimize costs.

2. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This paper highlights the use of open-source tools and existing libraries to manage the costs of model development, especially when working with large datasets for training complex models like LSTM.

8. How long will it take?

Refined Answer:

"We estimate the project will take approximately 4-6 months. This timeline includes data collection and preprocessing, model development and training, testing, comparative analysis of results, and final documentation. The timeline also allows for multiple iterations of model tuning and evaluation to ensure optimal performance."

Papers to Reference:

1. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This paper outlines a similar project structure, including data collection, model development, and testing, which took several months to complete. It provides a good reference for estimating the time needed to develop and test complex forecasting models.

2. \*\*"Comparison between ARIMA and Deep Learning Models for Temperature Forecasting"\*\* (Eranga De Saa and Lochandaka Ranathunga)【75†source】

- This paper details the various stages of a weather forecasting project using ARIMA and LSTM, providing a realistic estimate of how long model training and testing might take based on available resources and data.

9. What are the midterm and final "exams" to check for success?  
Refined Answer:

\*\*Midterm evaluations\*\* will focus on:

- Completing data collection and preprocessing.

- Implementing initial versions of both ARIMA and LSTM models.

- Producing preliminary results from both models on a test dataset.

\*\*Final evaluations\*\* will include:

- A detailed comparison of ARIMA, LSTM, and any hybrid models across various performance metrics (e.g., RMSE, MAE).

- Analyzing the strengths and weaknesses of each model for different weather forecasting scenarios.

- Drawing a conclusion on the most effective method or combination of methods for short-term temperature forecasting.

- Documenting the process, results, and findings in a format suitable for academic or practical applications, including visualizations of forecast accuracy.

Papers to Reference:

1. \*\*"A Comparison of ARIMA and LSTM in Forecasting Time Series"\*\* (Sima Siami-Namini et al.)【76†source】

- This paper provides a framework for model evaluation using RMSE and MAE, which can guide your midterm and final evaluations. It also discusses the comparative strengths of ARIMA and LSTM in time series forecasting, helping set benchmarks for success.

2. \*\*"Weather Forecasting Using Merged Long Short-Term Memory (LSTM) and ARIMA Models"\*\* (Afan Galih Salman et al.)【77†source】

- This study emphasizes the importance of comparing model performance across different scenarios and metrics, aligning with your final evaluation goals. It also supports the development of hybrid models and their evaluation against standalone ARIMA and LSTM models.