

Efficiency of Polystyrene Insulated Cement Blocks in Arid Regions

Student: Mohammed I. Al Shuraim

Supervisor: Dr. Muawia A Dafalla

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محادثة البيت العلمي
DEANSHIP OF SCIENTIFIC RESEARCH

Outlines

- Introduction
- Materials
- Experiment Procedure
- Results and Discussion
- Conclusion



Introduction

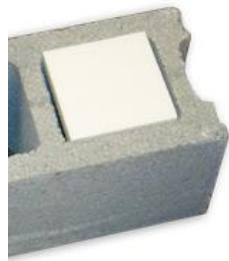
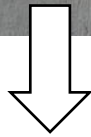
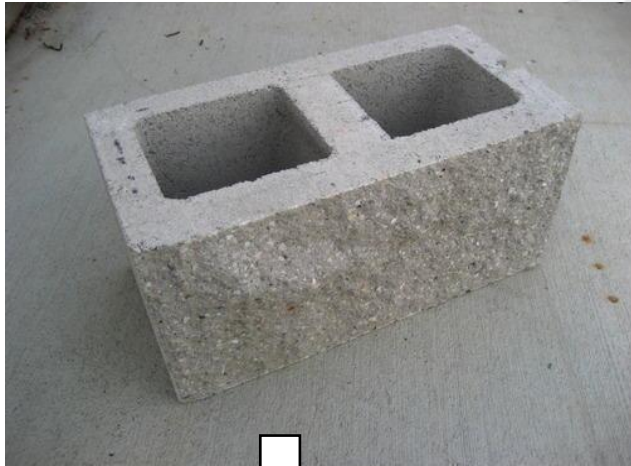
- Thermal Insulation
- Thermal Conductivity
- Heat Transfer
- Expanded Polystyrene



Source: www.diasen.com

Introduction

1- Cuboid filled cavity



2- V-groove Polystyrene filled.



Source: www.indiamart.com

Materials and Experiment Procedure

Commercial cement blocks of dimensions:
200mmx250mmx400mm



1- With Polystyrene Insulation



2- Without Polystyrene Insulation

Materials and Experiment Procedure

- Two Chambers
1m*1m*1m



Materials and Experiment Procedure

- **Two Chambers**
Covered with a plywood board



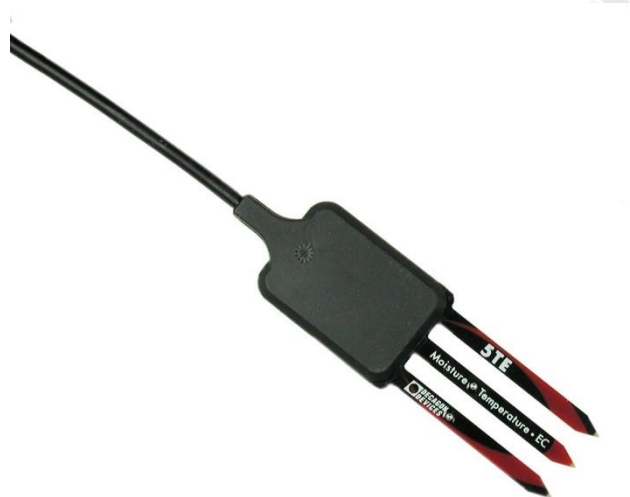
Materials and Experiment Procedure

- Mortar prepared with 1:2 water cement ratio and 1:2 cement sand ratio.
- Thin mortar between layers.
- No plastering.



Materials and Experiment Procedure

- 5TE Decagon sensors
- Em50 data logger



Source: www.decagon.com



Materials and Experiment Procedure

- PVC Tubes



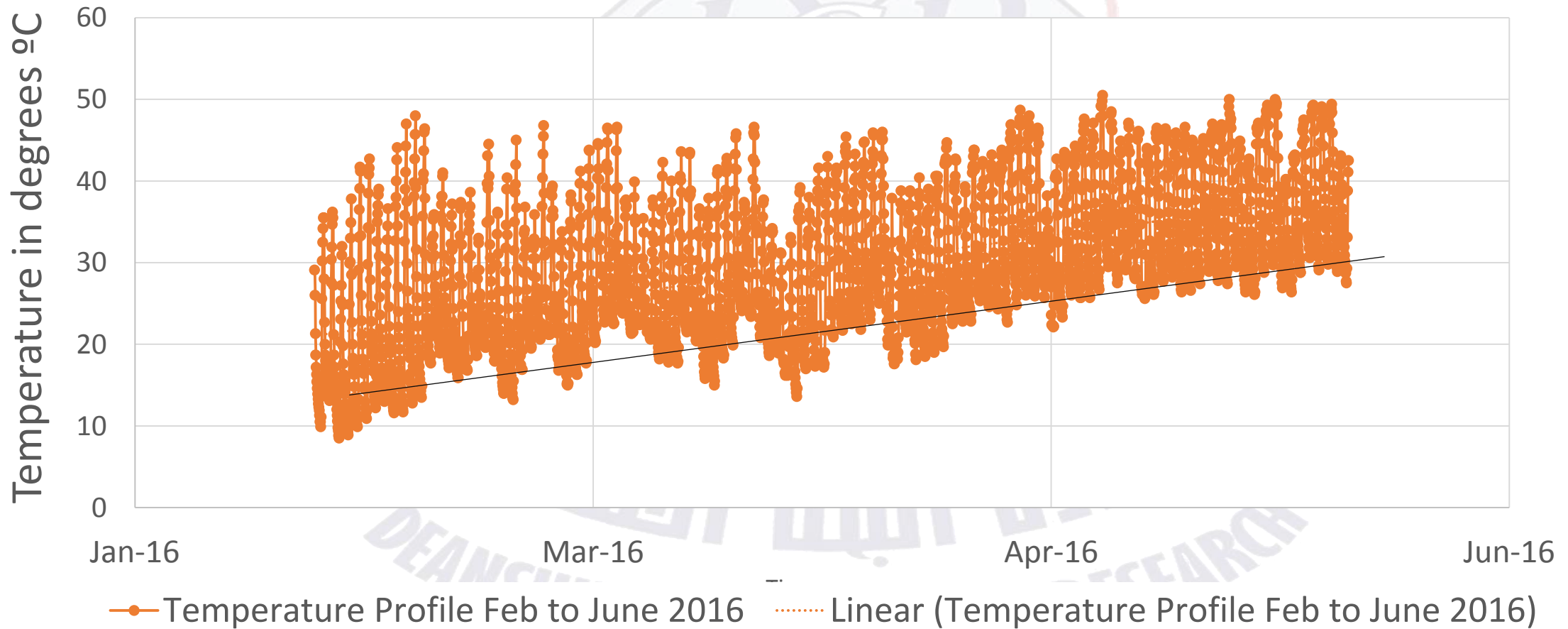
Materials and Experiment Procedure

- 0.86207 kg/m³
- 0.045 ~ 0.065 W / (m.k)
- V-Groove



Results and Discussion

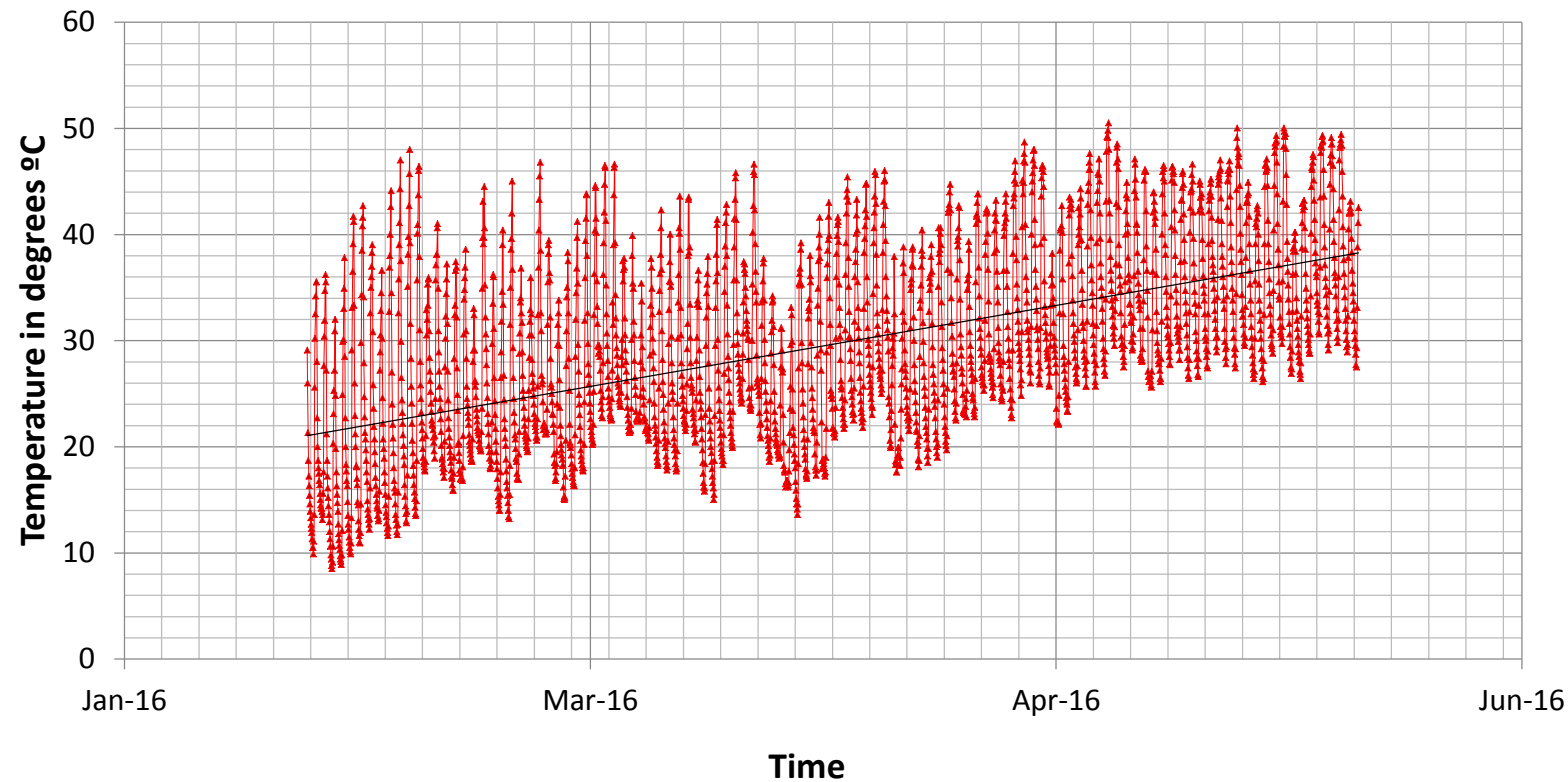
- Comparing between two periods



Results and Discussion

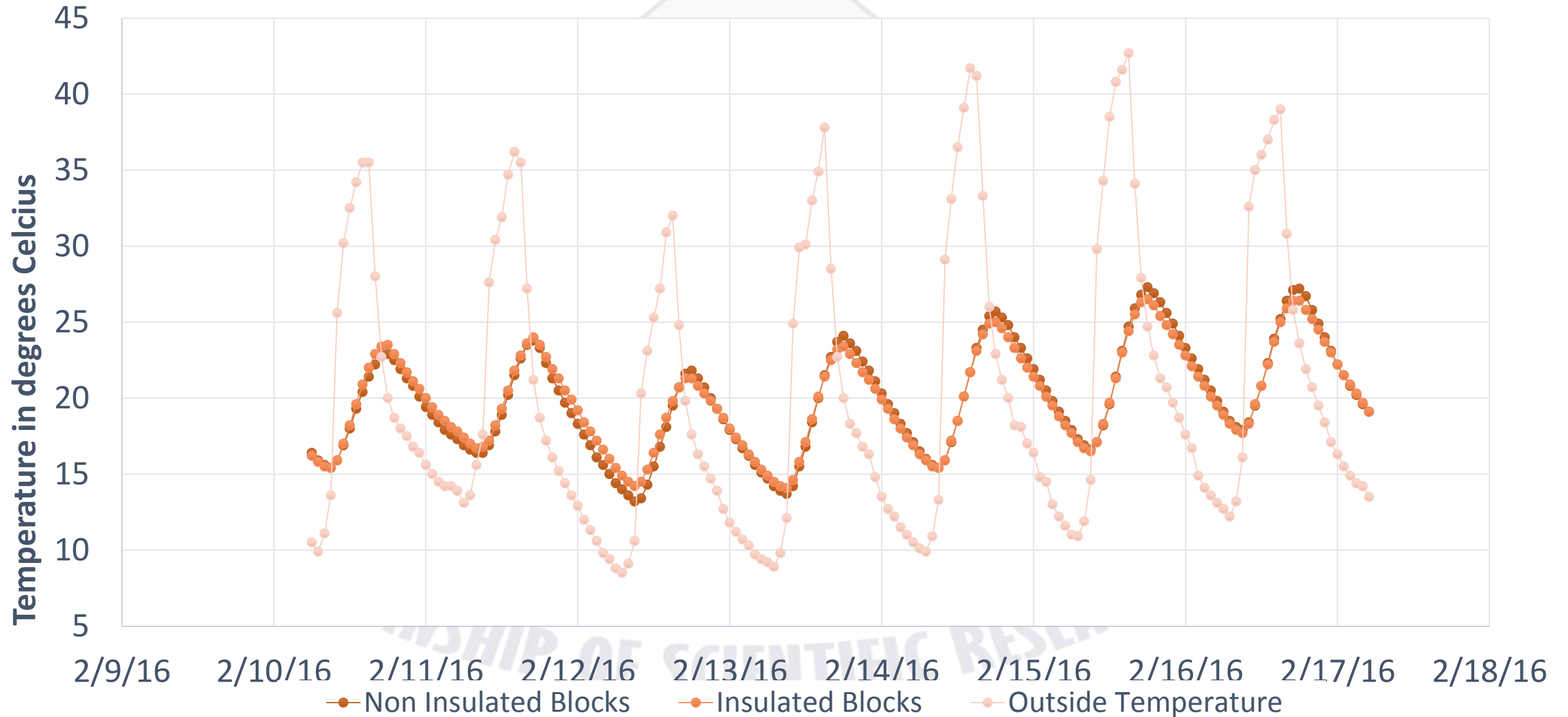
- The first period:
- February month.
- Moderately hot
- Range (10 °C to 35 °C)

- The second period:
- End of May.
- Hot
- Range (25 °C to 48 °C)



— Temperature Profile Feb to June 2016

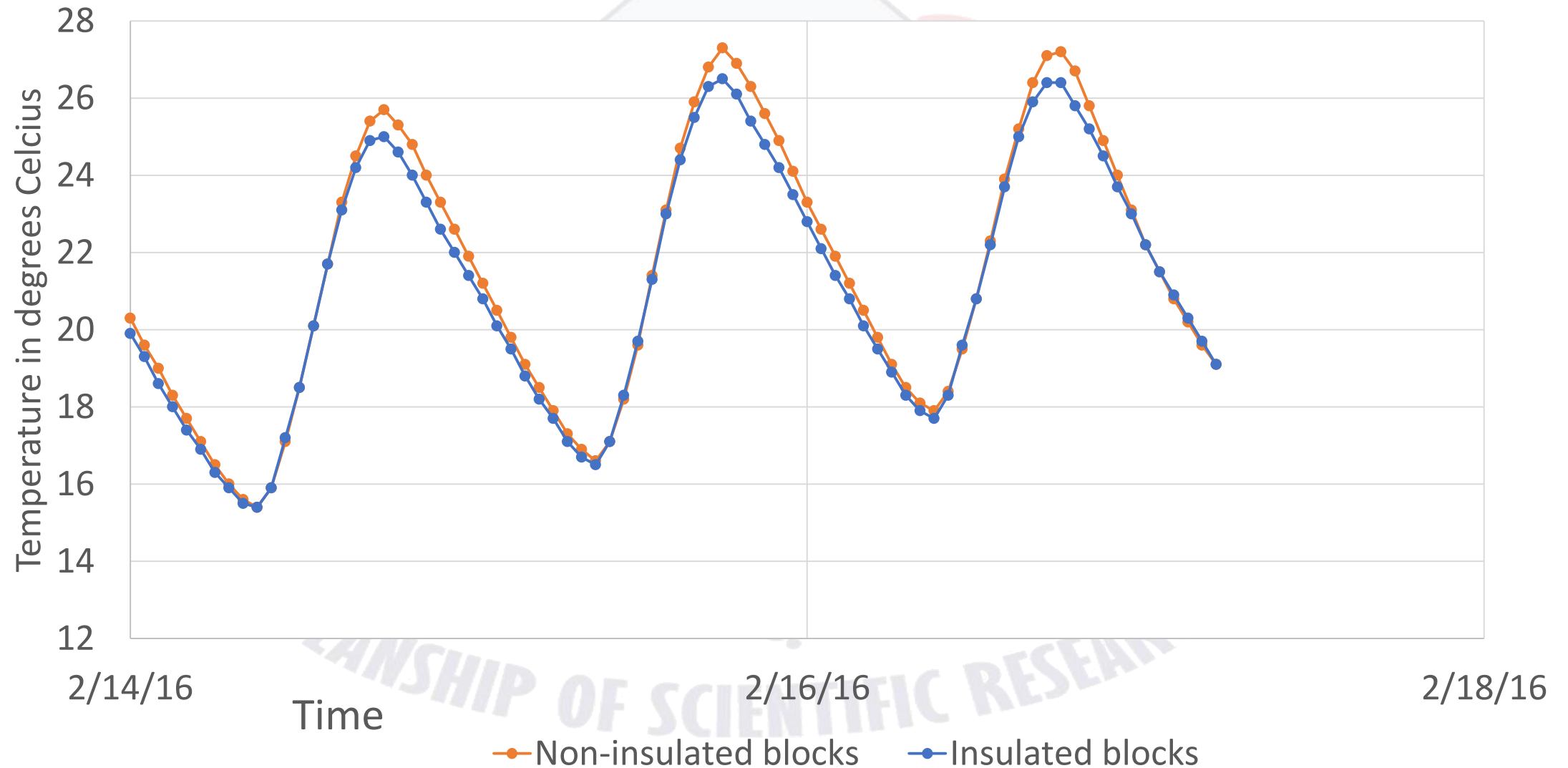
Temperature of insulated and non-insulated blocks compared to **outside temperature**:



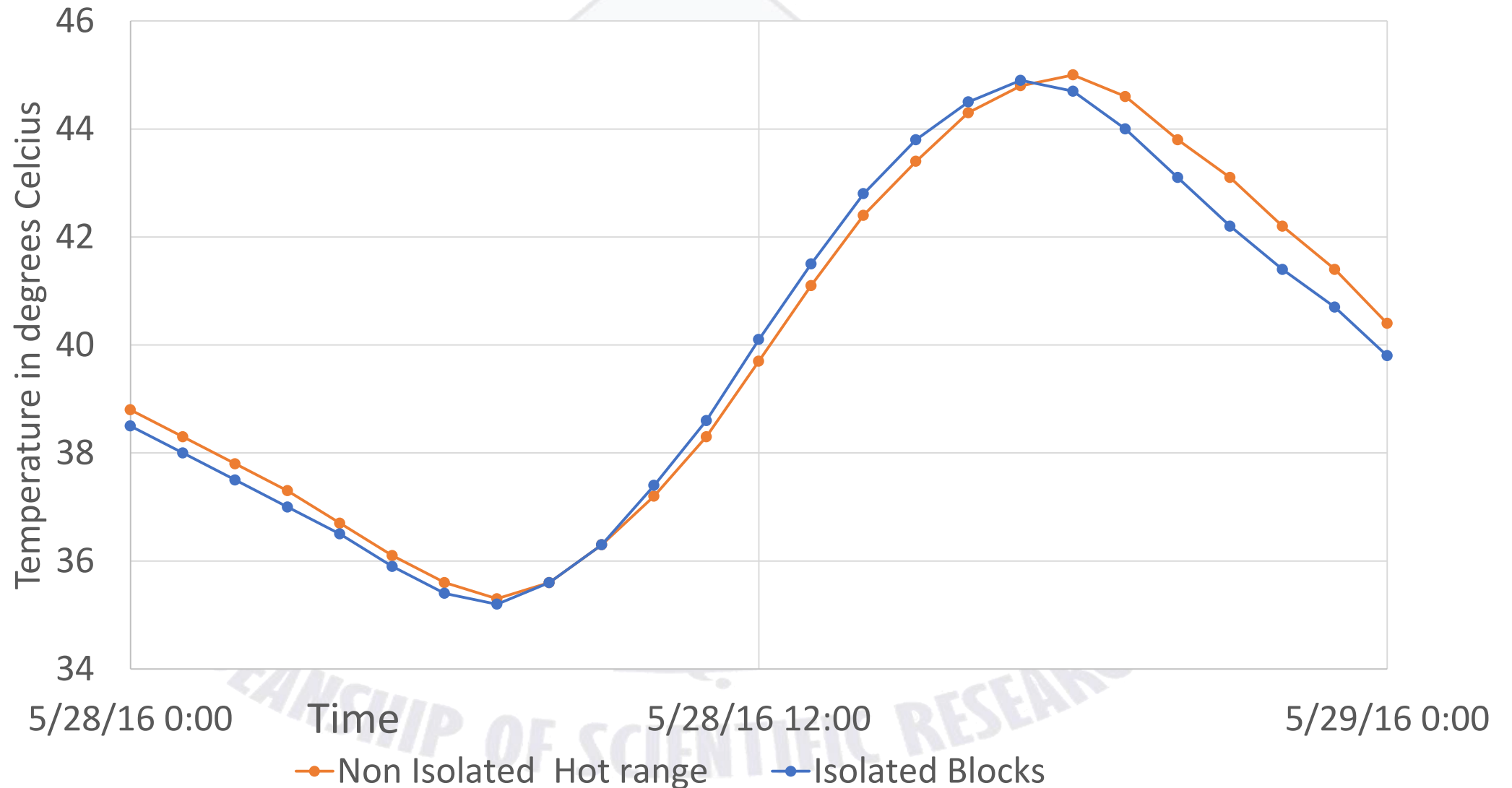
Results and Discussion

- Both have heat shield.
- Reduce the **maximum daily** temperature from 35 °C to 24 °C.
- Elevate the **minimum** temperature from 10 °C to 16 °C.
- The improvement of heat insulation **indicated 1 °C or less than 2 °C** degrees difference.
- The improvement during the hot period **is less** compared to the moderately hot period.

Comparing Insulated and non-insulated blocks - Moderately hot period (February)



Comparing Insulated and non-insulated blocks - Hot period (end of May)



Conclusion

- Difference in performance for different temperatures.
- The insulation provided by the blocks as constructed is **very poor**.
- The temperature gradient has influence on the polystyrene insulation material.
- External and internal heat insulation using polystyrene boards can be more efficient.

References

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Thank you

- Student: Mohammed I. Al Shuraim
434100886@student.ksu.edu.sa

- Supervisor: Dr. Muawia A Dafalla
mdafalla@ksu.edu.sa