

# **Understanding the solar activity and exploring the scope of space weather prediction**



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for the Award of  
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*by*  
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## List of Publications

1. Pawan Kumar, **Akash Biswas**, and Bidya Binay Karak. Physical link of the polar field buildup with the Waldmeier effect broadens the scope of early solar cycle prediction: Cycle 25 is likely to be slightly stronger than Cycle 24. *Mon. Not. R. Astron. Soc.*, 513(1):L112–L116, June 2022a. doi:10.1093/mnrasl/slac043.
2. \* **Akash Biswas**, Bidya Binay Karak, and Robert Cameron. Toroidal Flux Loss due to Flux Emergence Explains why Solar Cycles Rise Differently but Decay in a Similar Way. *Phys. Rev. Lett.*, 129(24):241102, December 2022. doi:10.1103/PhysRevLett.129.241102.
3. \*\* **Akash Biswas**, Bidya Binay Karak, Ilya Usoskin, and Eckhard Weisshaar. Long-Term Modulation of Solar Cycles. *Space Sci. Rev.*, 219(3):19, April 2023. doi:10.1007/s11214-023-00968-w.
4. § Elena M. Golubeva, **Akash Biswas**, Anna I. Khlystova, Pawan Kumar, and Bidya Binay Karak. Probing the variations in the timing of the Sun's polar magnetic field reversals through observations and surface flux transport simulations. *Mon. Not. R. Astron. Soc.*, July 2023. doi:10.1093/mnras/stad2254.
5. † **Akash Biswas**, Bidya Binay Karak, and Pawan Kumar. Exploring the reliability of polar field rise rate as a precursor for an early prediction of solar cycle. *Mon. Not. R. Astron. Soc.*, 526(3):3994–4003, December 2023a. doi:10.1093/mnras/stad2966

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\*Presented in Chapter 2

\*\*Presented in Chapter 3

§Presented in Chapter 4

†Presented in Chapter 5

6. ‡ **Akash Biswas**, and N. Gopalswamy. Forecasting the geoeffectiveness of CMEs using Artificial Neural Network aided by forward modelling. (Under Preparation)

## **Conferences / Presentations**

- 1. Poster presentation** titled **‘Exploring the predictability of the solar cycle from the polar field rise rate: Results from observations and simulations’** in the **International Astronomical Union Symposium 365**, held in Yerevan, Armenia.
- 2. Oral presentation** titled **‘The role of nonlinear toroidal flux loss due to flux emergence in the long-term evolution of the solar cycle’** in the **International Astronomical Union Symposium 365**, held in Yerevan, Armenia.
- 3. Poster presentation** titled **‘Explaining why all solar cycles rise differently by decay in the same way’** in March 2023, at the 41st Annual meeting of the **Astronomical Society of India (ASI)** hosted by the Indian Institute of Technology Indore.
- 4. Invited talk** (young researcher participant) titled **‘Toroidal flux loss due to flux emergence explains why all solar cycles decay in the same way’** in June 2022, at the **“Solar and Stellar Dynamo: A New Era”** workshop organized by the **International Space Science Institute (ISSI)** in Bern, Switzerland.
- 5. Oral presentation** titled **‘Scope of an early prediction of solar cycle: Linking the Waldmeier effect with the polar field rise rate’** in June 2022 at the meeting of the **International Space Science Institute (ISSI) Team 474** led by Prof. K. Petrovay in Bern, Switzerland.
- 6. Poster presentation** titled **‘Toroidal flux loss due to flux emergence explains why all solar cycles decay in the same way’** in March 2022, at the 40th Annual meeting of

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*Dedicated to my Parents.*



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