Enhancing air quality decision-making activity in Indian megacities through assimilation of NASA Earth observations and development of a decision support system

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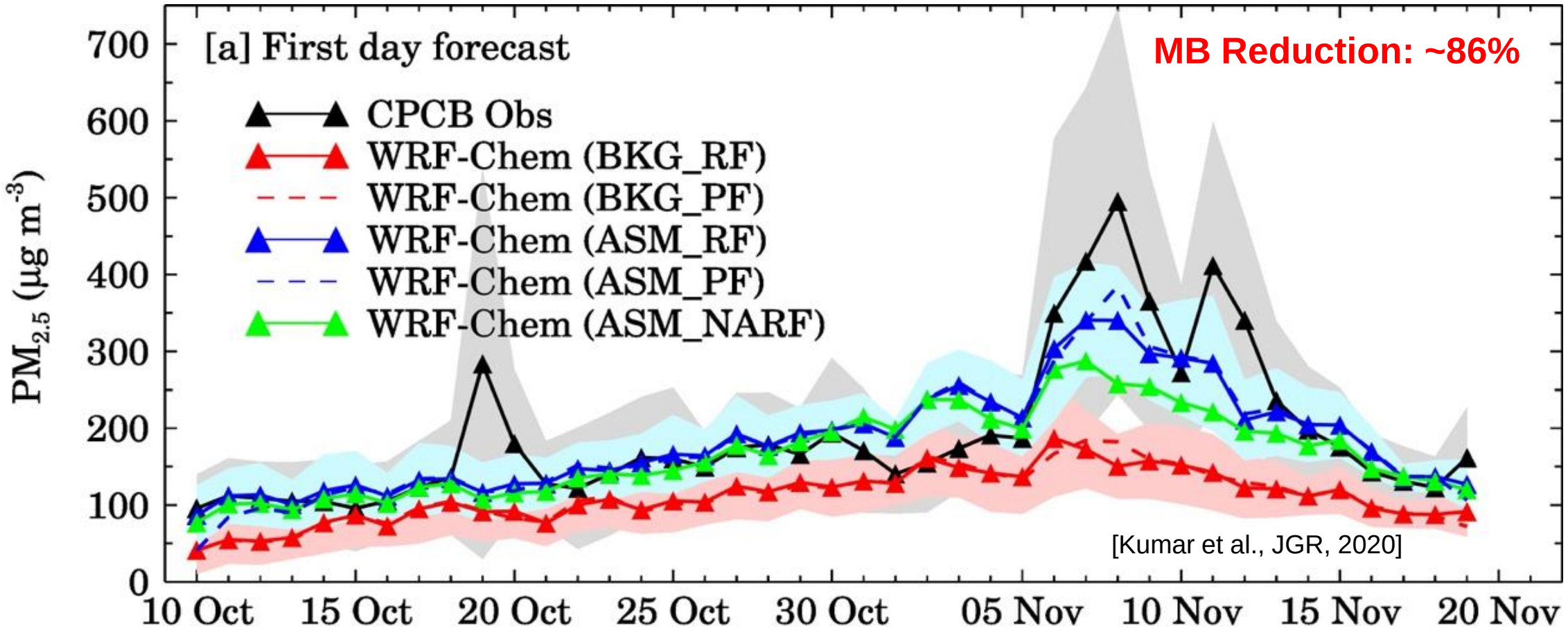
Poor Air Quality is a severe environmental issue in India

MODIS AOD retrievals have been extremely useful in Delhi



- Improved initialization of WRF-Chem via assimilation of MODIS AOD improved the accuracy of 72-h PM2.5 forecasts in Delhi by 70-86%.
- About 75% improvement in the forecast result from assimilation of MODIS AOD and 25% improvement result from aerosol-radiation interactions.

Project objectives

1) Develop a decision support system (DSS) that will help decision-makers to assess the relative importance of controlling target emission sources predefined in GRAP and to implement the most effective control measures.

2) Develop high-resolution (400 m x 400 m) AQEWS for five additional Indian megacities namely Ahmedabad, Bengaluru, Pune, Indore, and Bhubaneswar.

3) Integrate new capabilities in the information dissemination system (https://ews.tropmet.res.in/) .

4) Transition new capabilities to IITM (Indian Institute of Tropical Meteorology) and IMD (India Meteorological Department).

Project tasks

1) Set-up air quality forecasting system (WRF-Chem)

2) Set-up chemical data assimilation system (GSI; MODIS/VIIRS AOD and MOPITT/TROPOMI CO)

3) Develop a Decision Support System for New Delhi (physics- and ML-based).

4) Develop Air Quality Early Warning System for entire South Asia at 10 km resolution and for five cities at 400 m resolution.

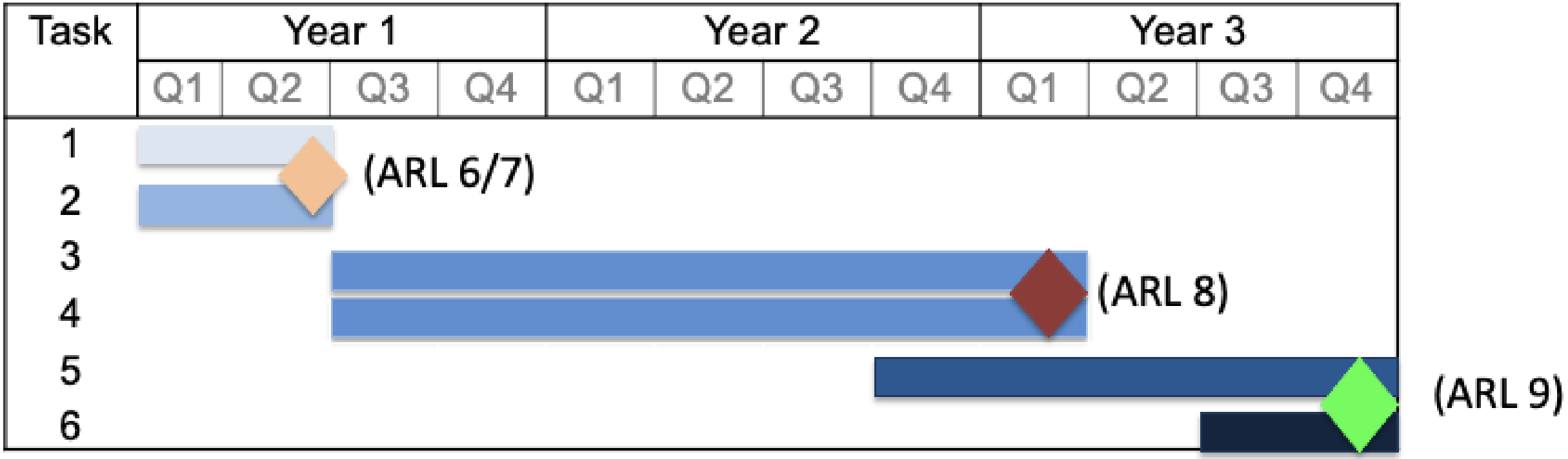
5) Integrate new capabilities in the information dissemination system.

6) Transition to operations.

Project team

1) NCAR:
    - Rajesh Kumar (PI. ; Air quality modeling and chemical data assimilation expert)
    - John Schreck (Co-I; Machine learning scientist)
    - Gabriele Pfister (Co-I; Air quality modeling and source attribution modeling)
    - Carl Drews (Co-I; Website developer)
    - David Edwards (Co-I; Satellite remote sensing expert)
    - Helen Worden (Collaborator; US PI of the MOPITT instrument)
2) IITM:
    - Sachin Ghude (Co-PI; Lead scientist for Delhi AQEWS)
3) IMD:
    - Vijay Kumar Soni (Co-PI; Lead scientist for disseminating air quality forecasts)
4) WRI:
    - Jessica Seddon (Co-I; Global lead of WRI air quality program)
    - Ajay Nagpure (Collaborator; Lead developer of 400 m resolution emission inventory for Indore)
5) WMO:
    - Alexander Baklanov (Collaborator; WMO liaison for the MAP-AQ project and AQ activities in India)

Task schedule and proposed ARL achievements



Thank You!