COMMISSION FOR AIR QUALITY MANAGEMENT
IN NATIONAL CAPITAL REGION AND ADJOINING AREAS

3rd Floor, Indian Oil Bhawan
1, Sri Aurobindo Marg, Yusuf Sarai, New Delhi-110016

F.No. A-110014/10/ 2020/CAQM-SB/670-677 Dated: 16.08.2021

Subject: Standard Protocol for Estimation of Crop Residue Burning Fire Events using Satellite Data

1. WHEREAS, Ministry of Environment, Forest and Climate Change, Government of India, in exercise of the powers conferred under Section 3 of the Commission for Air Quality Management in National Capital Region and Adjoining Areas Ordinance 2021, has constituted the Commission for Air Quality Management in National Capital Region and Adjoining Areas (hereinafter referred to as the Commission);

2. WHEREAS, Section 30 of the Ordinance, 2021 provides that anything done or any action taken under the erstwhile Ordinance 2020 shall be deemed to have been done or taken under the corresponding provisions of the Ordinance 2021;

3. WHEREAS, under Section 12 (1) of the Ordinance, the Commission has power to take all such measures, issue directions, etc., as it deems necessary or expedient for the purpose of protecting and improving the quality of the air in the National Capital Region and Adjoining Areas;

4. WHEREAS, Section 12 (2) (xi) of the Ordinance, empowers the Commission to issue directions in writing to any person, officer, or any authority and such person, officer or authority shall be bound to comply with such directions;

5. WHEREAS, the Commission has observed that emissions from burning of agricultural crop residue/ Stubble have serious adverse consequences on air quality in the National Capital Region and Adjoining Areas;

6. WHEREAS, the Commission has noted that there is a need to develop and implement standardized methodology across NCR and adjoining areas for the monitoring of fire events;

7. WHEREAS, the matter was pursued with ISRO in the meetings dated 3rd December, 2020 and 10th December, 2020, wherein it was decided to develop a protocol for effective monitoring of the crop residue burning using appropriate satellites under the leadership of ISRO in consultation with stakeholder agencies like State Remote Sensing Centers and IARI;

8. WHEREAS, the standard protocol developed by ISRO in consultation with major stake holders for effective monitoring of crop residue burning events which shall avoid a diverse assessment of fire events/counts is at **Annexure**;

9. WHEREAS, the matter was discussed in the fourth meeting of the Commission held on 5th August, 2021 and it was decided to issue directions, under the relevant provisions of the Ordinance, 2021 to the State Governments concerned to adopt the standard protocol developed by ISRO for estimation of crop residue burning fire events using satellite data;

10. NOW THEREFORE, in view of the above position and the compelling need to monitor and control air pollution from stubble burning, the Commission constituted under the provisions of "Commission for Air Quality Management in National Capital Region and Adjoining Areas, Ordinance, 2021", hereby directs Government of Punjab as under:-

(i) To ensure adoption and application of the standard protocol for estimation of Crop Residue Burning Fire Events using Satellite Data.

(ii) To develop a time bound comprehensive action plan, in consultation with stakeholder agencies responsible for monitoring and reporting of agriculture residue burning events, based on the protocol.

(iii) The standard protocol for estimation of crop residue fire counts as developed by ISRO shall be adopted uniformly across the states of Punjab, Haryana, Uttar Pradesh, Rajasthan and GNCTD, and not restricted to the states of Punjab and Haryana alone as noted in the report of the Committee set up by ISRO.

11. NRSC shall also take the remote sensing centers in the states of Uttar Pradesh and Rajasthan "on-board" and impart necessary training and know-how for implementing the methodology and provisions of the standard protocol.

A compliance report on adoption of the Standard protocol based on the above direction be submitted to the Commission by 30th August, 2021.

Sd/-

(Arvind Nautiyal)
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To:

The Chief Secretary, Government of Punjab, 6th Floor, Punjab Civil Secretariat-1, Sector-1, Chandigarh -160 001

Copy to:

1. The Principal Secretary, Science, Technology and Environment, Government of Punjab
2. The Additional Chief Secretary, Agriculture, Government of Punjab
3. The Director General, Indian Council of Agricultural Research, Krishi Bhavan, New Delhi -110 001
4. The Chairman, Central Pollution Control Board, Parivesh Bhawan, C.B.D. Cum Office Complex, East Arjun Nagar, Shahdara, Delhi-110032
5. The Director, Indian Institute of Remote Sensing, ISRO, Govt. of India, 4, Kalidas Road, Dehradun-248001
6. The Director, National Remote Sensing Center, ISRO, Govt. of India, Hyderabad, 500037
7. The Director, Indian Agricultural Research Institute, Pusa, New Delhi-110012
8. The Member Secretary, Punjab Pollution Control Board, Vatavaran Bhavan, Nabha Road, Patiala, Punjab-147001

(Arvind Nautiyal)

ANNEXURE

Common Protocol for Estimation of Crop Residue Fire Counts Using Satellite Data

Summary of Inter Centre Committee Report

Background:

In the recent years the pollution and increase in the suspended particulate matter in the months of October and November is becoming a concern as it has the potential to cause serious health hazard to the population residing in the region. The aerosol and the smog over the Delhi NCR region is due to a number of factors like the changes in the wind direction and pattern, transboundary transport of aerosol, vehicular pollution and biomass burning. The crop residue/stubble burning during the months of October and November in the North Indian states of Punjab and Haryana also significantly contribute towards the pollution and aerosol load in the NCR region.

Highlighting various effects of atmospheric pollution, a brainstorming meeting was organized on 27 December 2020 with senior scientists and researchers working in this field to deliberate on "Space Based Inputs for Air Pollution Monitoring and Information Dissemination". The participants in the meeting were from Commission for Air Quality Management (GOI), New Delhi; EOS , ISRO HQ, Bengaluru; IIRS, Dehradun; SAC, Ahmedabad; MNCFC, New Delhi; NDMA, New Delhi; NRSC, Hyderabad; IIT Delhi; IMD, New Delhi.

The meeting highlighted the need for capturing the real time air quality information and sparse distribution of the monitoring stations in the country. There is a need for generation of integrated spatial distribution of aerosol and gaseous pollutions from space based and ground monitoring stations and integrating the same into the assimilation systems for various models. To have a proper estimate of the sources of air pollution there especially from the crop residue/stubble

burning was needed. The need for single source of numbers of stubble burning fires and need for proper protocol for data generation and dissemination was emphasized and further Estimation of emission from residue using emission factors at local level/ need for crop specific emission factors was highlighted.

A committee was constituted by Director, NRSC to look into the various aspects of space-based estimation of crop residue burning in Punjab and Haryana and bring out a common protocol for estimation of the above mentioned which will be followed by all the institutions involved in estimation of the crop residue burning.

Recommendations:

Committee noted the differences in the spatial resolution of MODIS Aqua and Terra and VIIRS SNPP and the significant number of fire counts detected in MODIS. Based on this observation, it is recommended to use both MODIS along with -VIIRS are for reporting the crop residue fire counts to the administration to ensure continuity of the data till MODIS is phased out. The peer-reviewed methodology will be implemented at National Remote Sensing Centre (NRSC), Haryana Remote Sensing Application Centre (HARSAC) Punjab Remote Sensing Centre (PRSC) and Indian Agricultural Research Institute (IARI) for providing harmonized data to the concerned institutions with crop map provided by Mahalanobis National Crop Forecast Centre (MNCFC). Common inputs and methodology to be followed for generating the crop residue fire counts are as follows:

I. The threshold to be adopted by all institutions (NRSC, PRSC, HRSAC and IARI) will be as follows:
   a. For MODIS 30% threshold
   b. For SNPP-VIIRS 7 threshold

I. Analysis ready spatial data in crop coverage (Resampled 375m compatible crop mask) will be provided by MNCFC by 1st week of

September for rice and 3rd week of March for wheat.

II. Administrative boundary layers would be provided by the respective States

III. NRSC will provide the data (with no threshold applied) to HARSAC, PRSC and IARI for generating the final report on crop residue fire counts using the thresholds identified in (I). The data will have all the attributes available from the satellite sensor. For any break down in the data processing chain at NRSC, IARI would provide the data until the services are restored at NRSC.

IV. NRSC will process the data with the above common procedure as applicable to other three institutes for placing on Bhuvan portal to avoid any discrepancy.

V. The period of crop residue burning and fire count reporting would be as follows:

a. For paddy stubble burning: 15th September to 30th November
b. For wheat stubble burning: 1st April to 30th May

Conclusion:

The standardized methodology will be used to provide the harmonized information on crop residue burning events from different organizations, viz. NRSC, HARSAC and PRSC. Furthermore, in view of the perceived air pollution over the National Capital Region (NCR) during the crop residue-burning period, the Committee also recommends extending the study to develop procedures to estimate crop residue biomass burnt, aerosol and greenhouse gas emissions and their dispersion for quantitatively assessment of its impact on air.