First Global Forum on Heat and Health

Hong Kong

17-20 December, 2018

Session 2

Observations, Forecasts and Information Products to Inform Action

Indian Heat Early Warning System: Observations, Forecasts and Information Products

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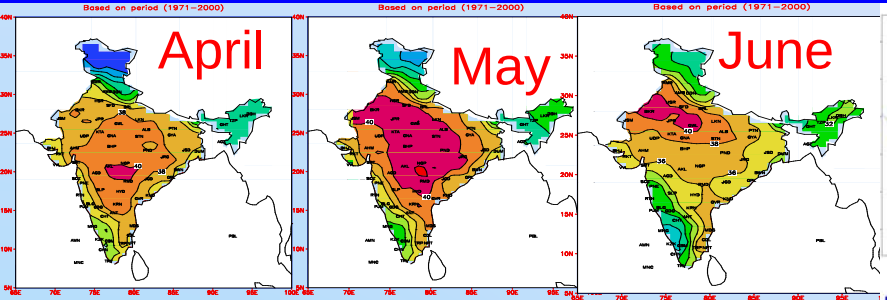
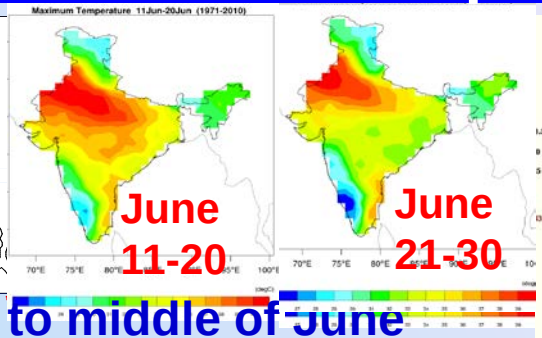
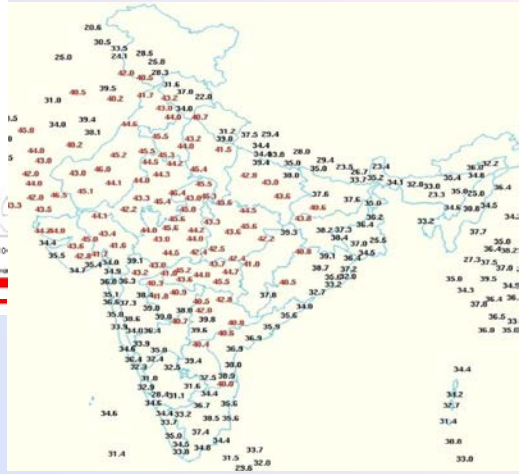
भारत मौसम विज्ञान विभाग

INDIA METEOROLOGICAL DEPARTMENT

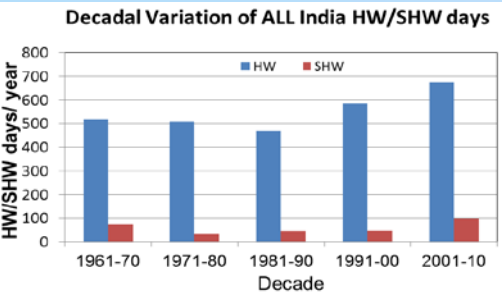
Main Heat Wave Period in India: April-June

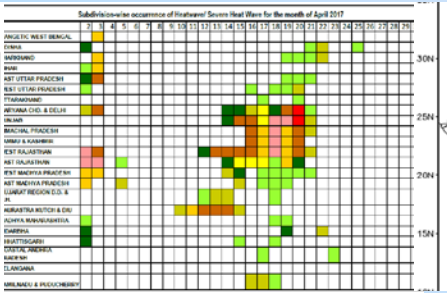


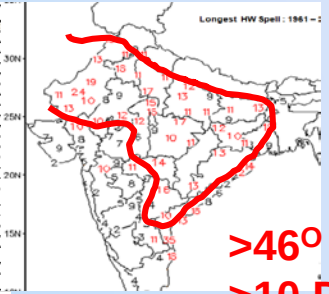




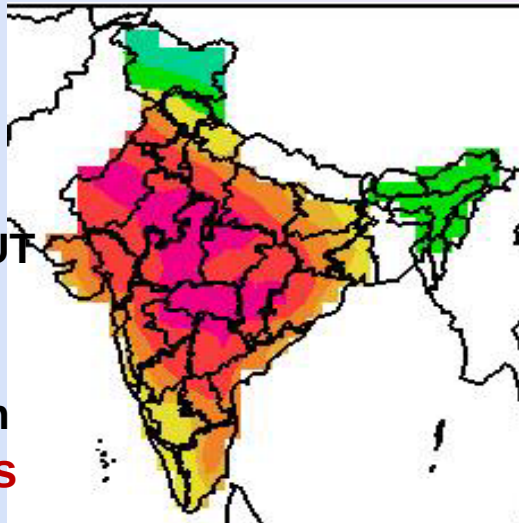
Central & Eastern parts quite HOT up to middle of June







>46^{O} C
>10 Days



Observations

A network of ~ 300 real-time reporting stations Long period BUT All districts not covered. **Supplemented by ~625 AWS** (quality, consistency and continuity of data, **No Normals**)

Gridded Temp. Products 0.5x0.5 Deg resolution (Extrapolation smoothing). **Real-time and Historical obn. Available for studies**

Heat Wave defined in India

a) Based on Departure from Normal

Heat Wave/Severe HW : Departure 4.5°C to 6.4°C/ >6.4°C IF

Actual Tmax. is 40°C or more in the plains and 30°C or more in the Hills

b) Based on Actual Maximum Temperature

Heat Wave/Severe HW : Maximum Temperature ≥ 45°C/ ≥47°C

c) Coastal stations: Tmax dep ≥4.5°C & actual Tmax is ≥ 37°C.

The Issues:

1) Based only on deviations of Tmax from NORMALS. Not based on impacts nor provide any advisory or suggestions to different levels of stakeholders. Also Normals are not available for all stations. Heat Wave for such cities ???

2) Same Tmax: HW on one date may not be on other (SAME CITY) or HW in one city not in another one (normals are different)

3) Use of Heat Index discontinued due to unrealistic values. (45 C/15 % = HI 44.5 , 35 C/75 % = HI 50.2). Nor PERCENTILES. Use of HI and percentiles ???

- Need to establish thresholds to provide impact based forecasts with advisories for different stakeholders (Used in cities with Thresholds)

Special Operational Forecast Setup for Heat Wave Season

A special desk works at National Weather Forecasting Centre, New Delhi from dawn to dusk during hot weather period - 01 April to 30 June for

- **Monitoring of Temperature related observations and Preparation of forecast product (both operational and NWP system generated)**
- **A detailed Temperature/Heat Wave related Information, Observation, Forecast & Warnings bulletin (for next 4 days) issued daily at 1600 hrs**
- **A special bulletin for TODAY by 0800 IST for immediate actions, if any.**
- **A Weekly bulletin for temperatures and heat wave every Thursday with a summary of past week and outlook for next two weeks (for planning).**
- **Intra and Inter-departmental coordination/ Special Tasks**

COLOR CODE SYSTEM

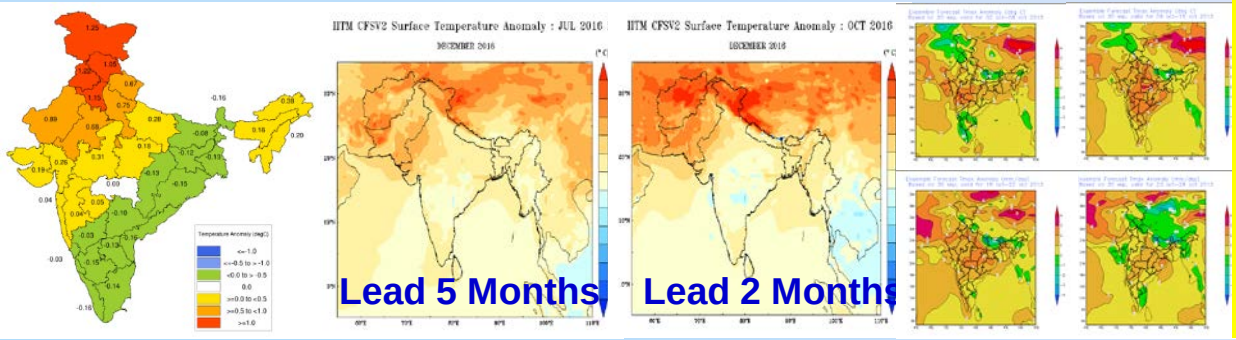
Green (No action)	**Normal Day**	**Maximum temperatures are near normal**
Yellow (Be updated)	**Heat Alert**	**Heat wave persists for 2 days**
Orange Alert (Be prepared)	**Severe Heat Alert for the day**	**(i) Severe heat wave conditions for 2 days (ii) Not severe, but heat wave persists for 4 days or more**
Red Alert (Take Action)	**Extreme Heat Alert for the day**	**(i) Severe heat wave persists for > 2 days. (ii) Total No. of HW/SHW days is more than 6.**

Forecasts and Information Products

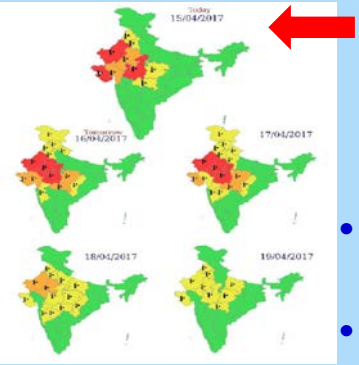
Forecasts/Warnings: NWP+ based (WRF 3 km, GFS 12 km)

1. Seasonal Outlook (twice in the season), Monthly
2. Extended Range FC (every week, 4 weeks, Spatial)
3. Short & Medium Range (sub-Division, District, City)

FC to Power Sector for assisting in Heat Wave Management



Dissemination www, TV, Radio, Press, Health, DM, IMA, Red Cross, Special, CAP, AMFU CITIES+



Main National Level FC product issued around 1600 IST. Contains past 24H obs, their deviations, areas under HW/SHW, descriptive FC for 5 Days. Also a FC for the day is issued at 0800 for action.

- **Similar bulletin for districts issued by State Meteorological centres + Daily Tmax/Tmin forecast for ~600 cities (7 days)**
- **Heat Wave FC is also part of multi hazard EWS around noon.**

DATE	FC	COLOUR CODE
01	42	
02	41	
03	42	
04	42	
05	40	
06	41	
07	41	
08	41	
09	43	
10	43	
11	42	
12	44	
13	44	
14	44	
15	44	
16	44	
17	45	
18	46	
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20	46	
21	43	
22	43	
23	43	
24	42	
25	41	
26	42	
27	41	
28	42	
29	41	
30	41	
31	41	

Other Issues / Challenges

- Defining Heat Wave, Thresholds, User specific customization and advisories:
  - Not Multi-stages (during the season) and multi-target (for actions by different nodes/different lead period/different severity levels). Targeted Dissemination
- Limited involvement of Stakeholder (power, water education, construction, children/women welfare), Interpretation of warnings, vulnerability assessments
- Lack of Data: total, cause/age/group specific, private practitioners.
- Cities performing better (due to better coordination) than the states. Limited involvement of National Health Department AND Non-uniform reporting.
- Location specific and micro climatic (Heat Island) data AND Lack of research staff at local levels for coordination & analytical work

Lessons Learnt

- Involvement of all stakeholders and the local & political leadership is important
- Central Coordination – NDMA, IMD, Academics (IIPH), M/O Health
- Use of local hospital admission, OPD, mortality data to arrive a the threshold for the warning system.
- Sustained Advocacy (NRDC) AND Use of local expertise to facilitate analysis and the process - for example, what IIPHG did in Ahmadabad.
- Dissemination: NDMA, SDMAs, IRCS, IMA, AMFU AND User Awareness/Publicity

Plans for future developments

- Prime Minister's council on climate change and national action plan on climate change (8 missions). State Action plans in 32 states.
  - protecting the poor and vulnerable sections, ecological sustainability, mitigation of GHG emissions,
- National Mission on Strategic Knowledge for Climate Change: better understanding of climate science, impacts, and challenges, improved climate modeling and private sector initiatives to develop adaptation and mitigation technologies
- Annual Revision of National Guidelines incorporating feedbacks
- State level workshops and trainings in all Heat prone States.
- Vulnerability assessment, Revision of State/District/City HAPs.
- Awareness, Publicity, mid-season reviews, real time reporting,
- Threshold development for more cities. ZERO CASUALITY
- More cool roofs, energy efficient buildings, clean energy.
- National Health Mission: Prevent and reduce mortality & morbidity from communicable & non- communicable diseases, Intergrated Disease Surveillance Programme of NCDC – disease reporting