

# **Assessment of Ne Quick Model for Low Latitude Region**

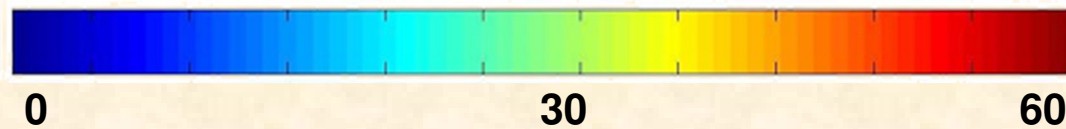
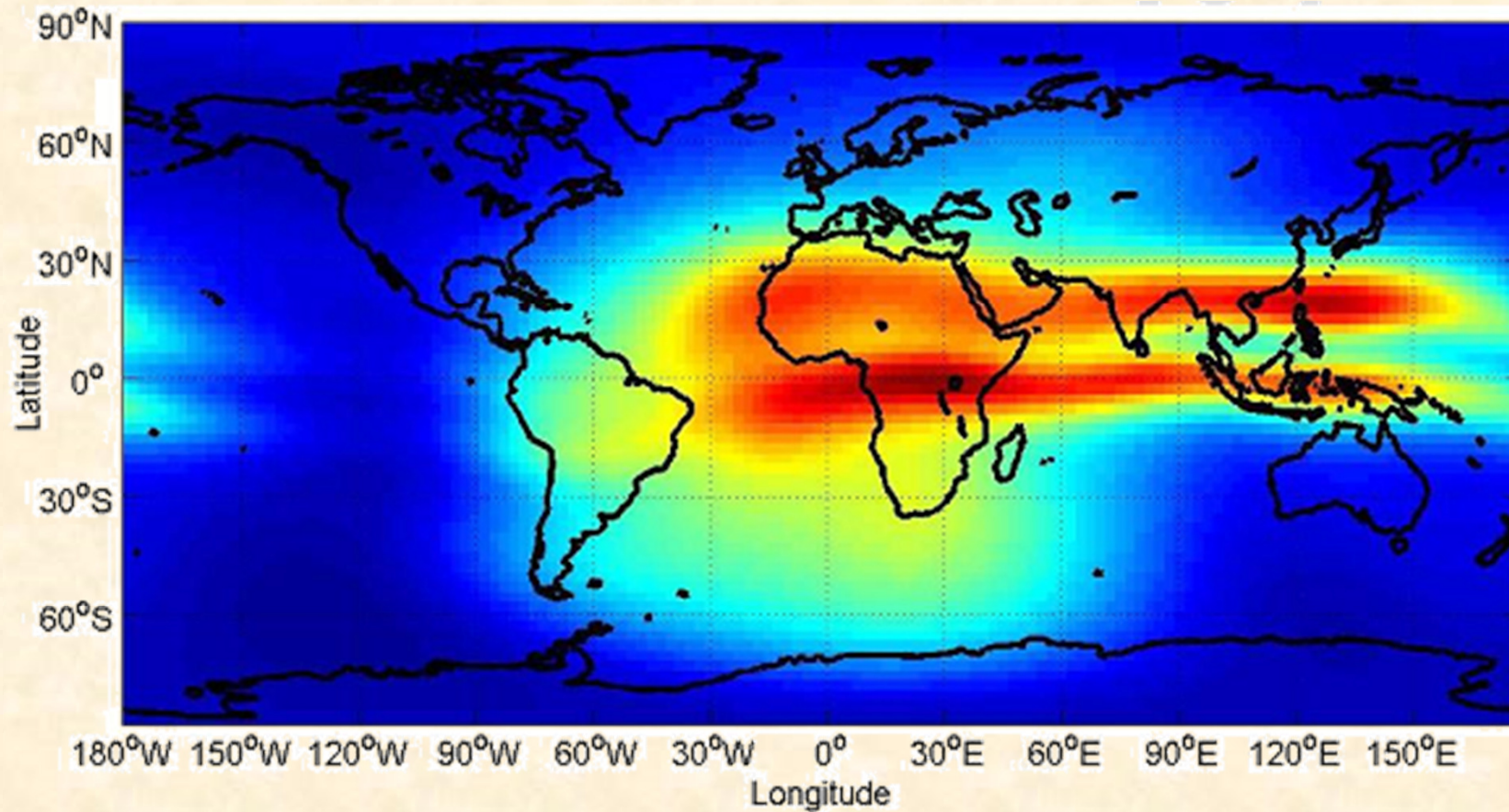
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ISRO, India**

**ICG-10, Boulder, Colorado, US  
Nov 1-6, 2015**

# Ne Quick Ionospheric Model

- The NeQuick is a Global electron density model and is adopted by Galileo as the single frequency ionospheric error correction algorithm

# Ne Quick Ionospheric Model

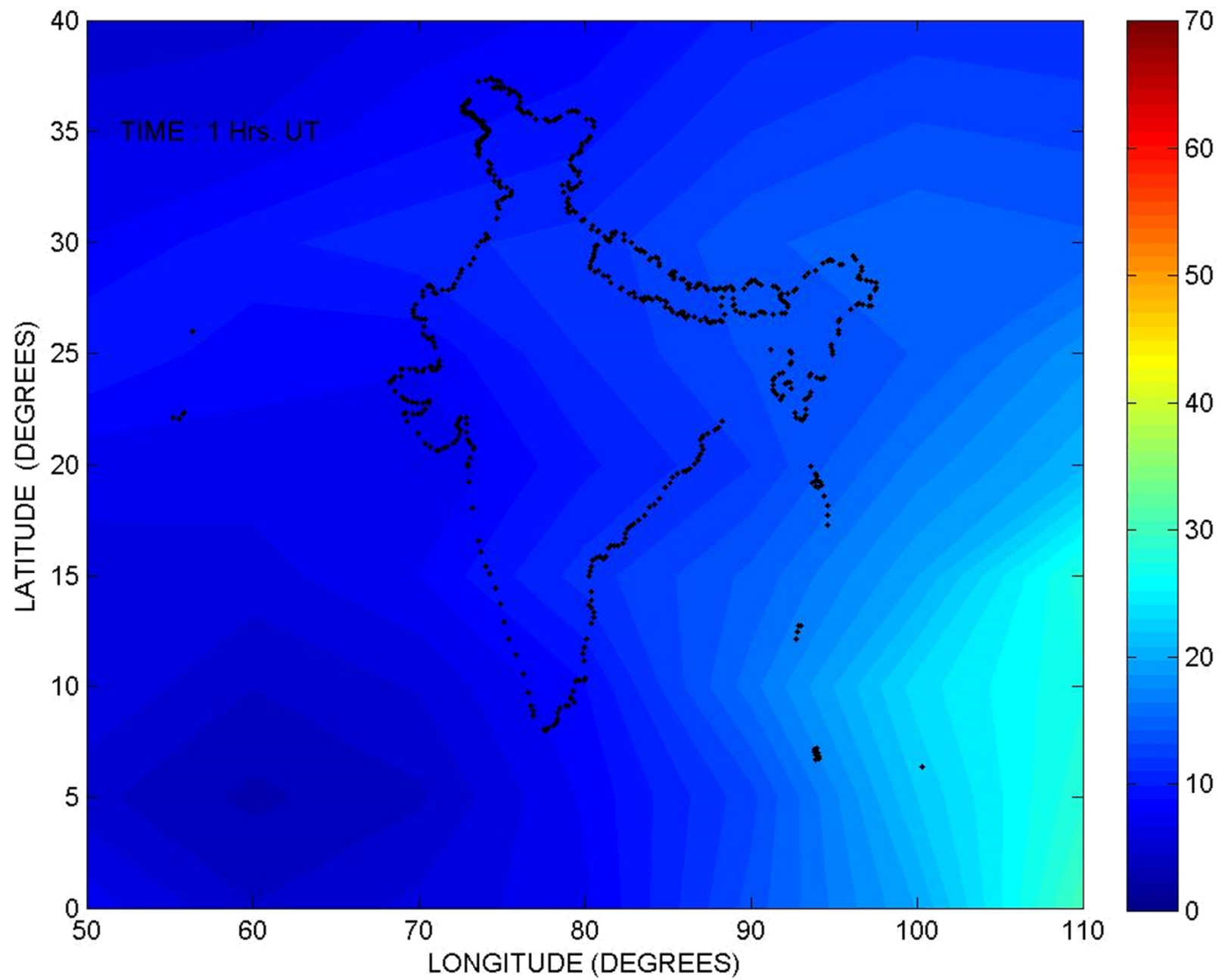


TEC in TECU

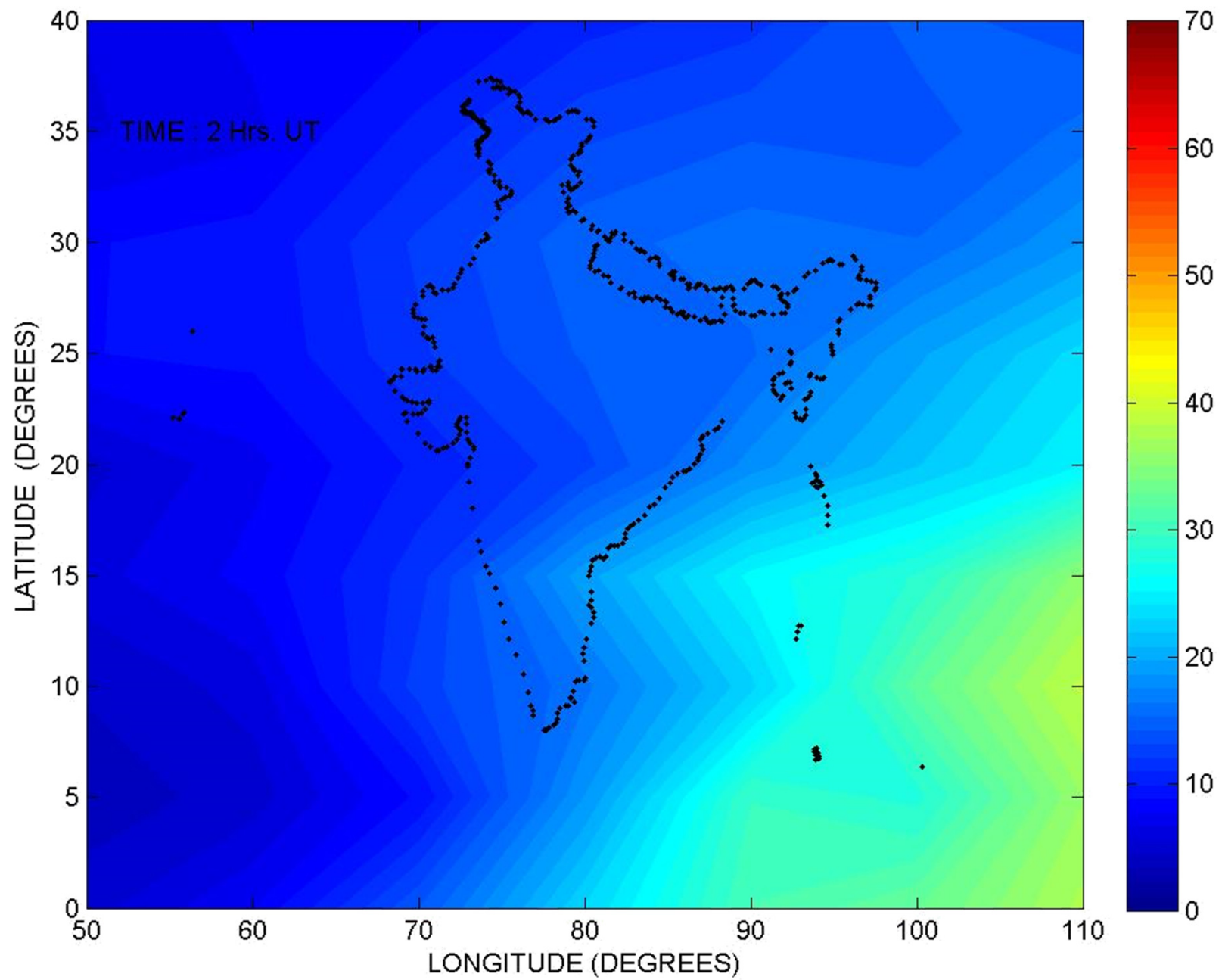
# Ne Quick Ionospheric Model

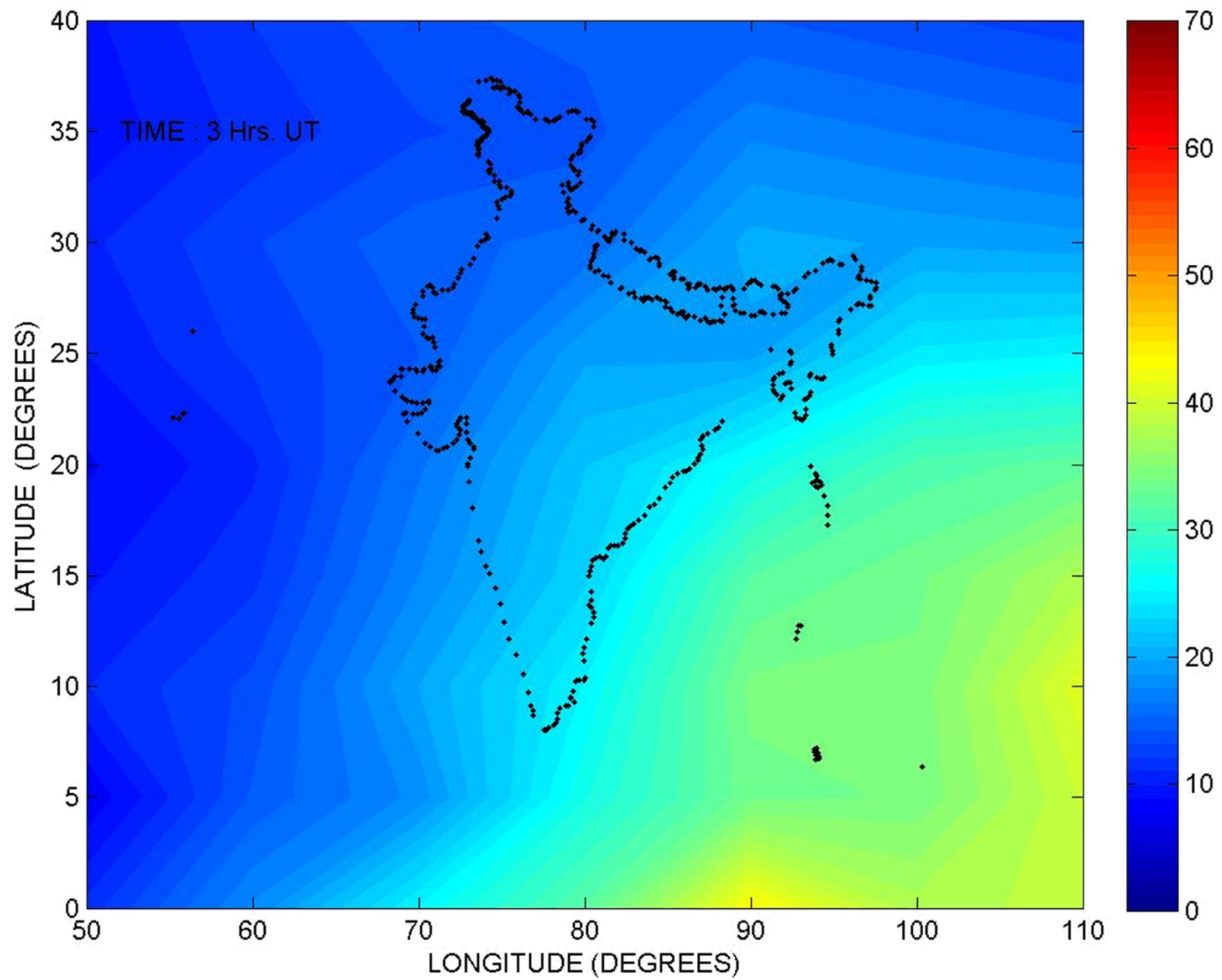
## Basics of Ne Quick (G)

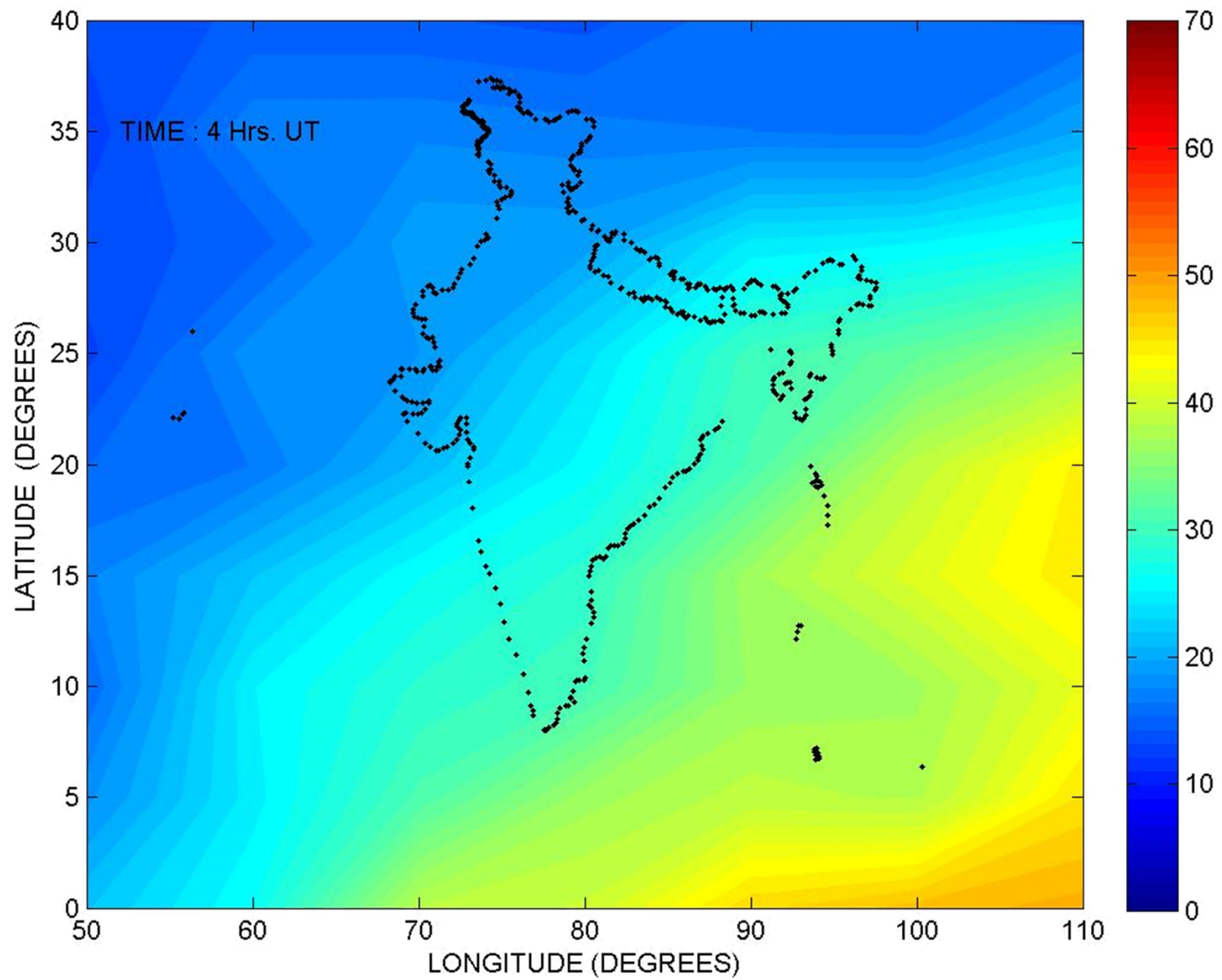
- Physico-empirical model
- Input :
  - 3 coefficients to derive Ionization factor  $A_z$
  - Location (Geographic coordinates)
  - Time in UT
- Output :
  - TEC (Integrated electron density)



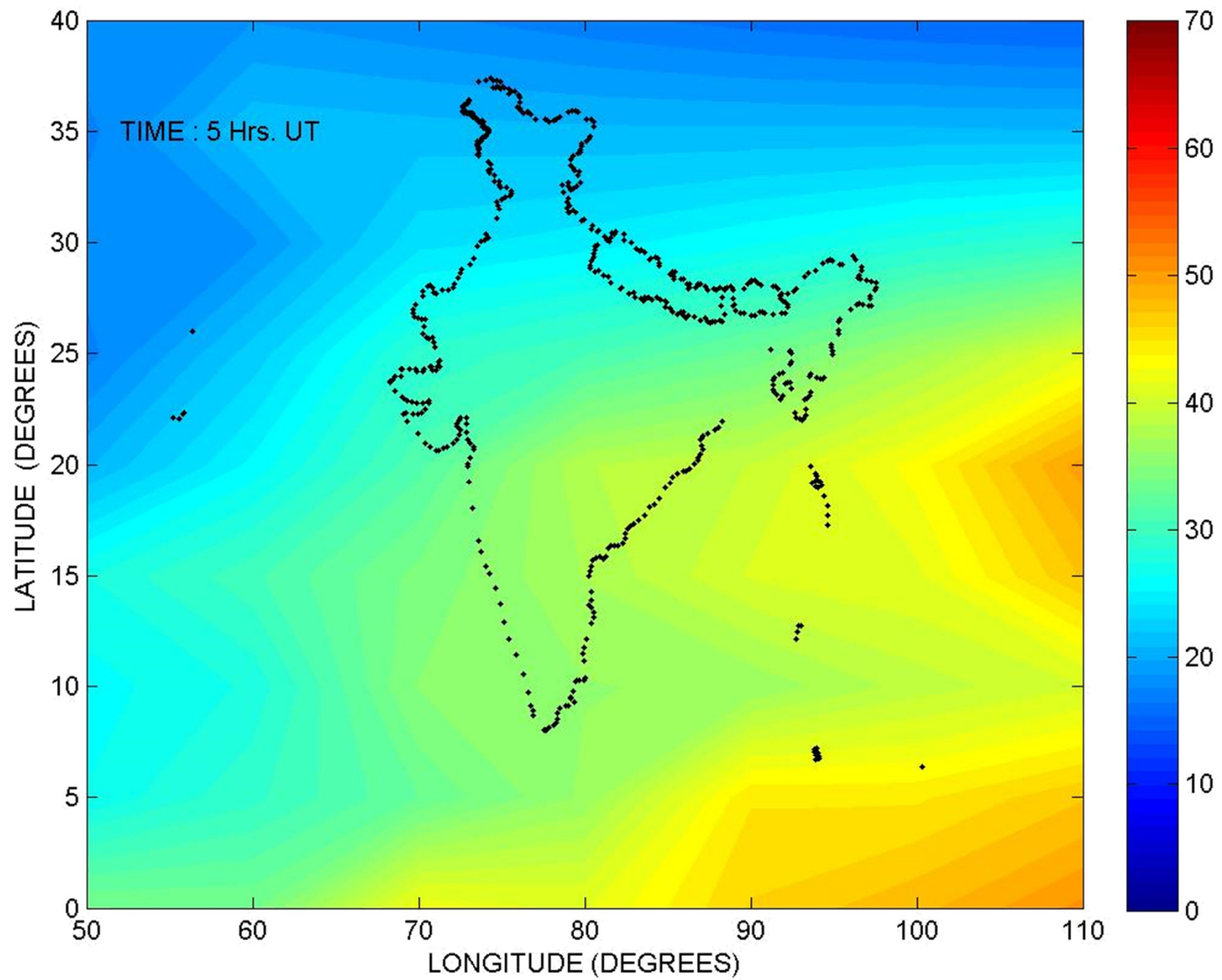


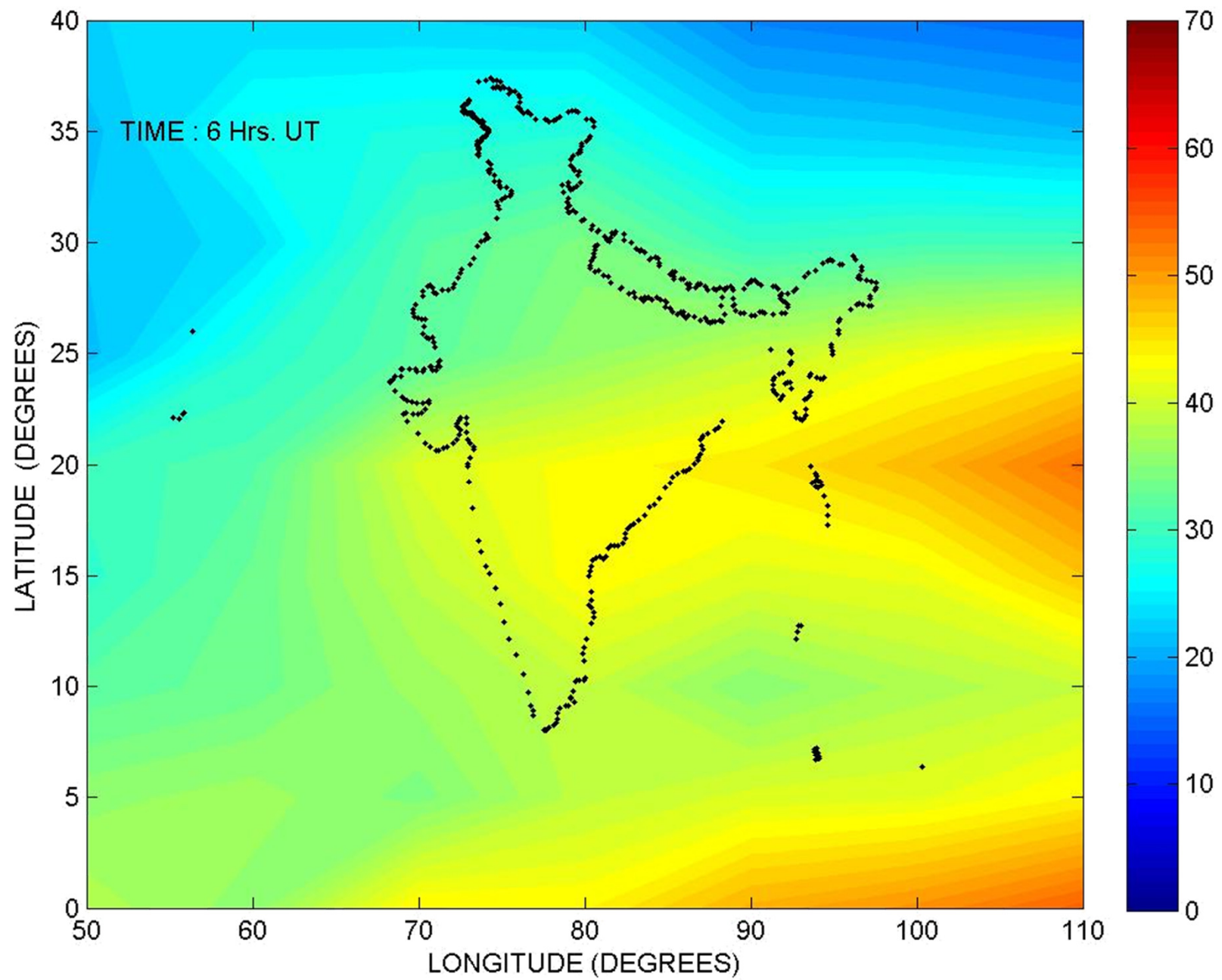


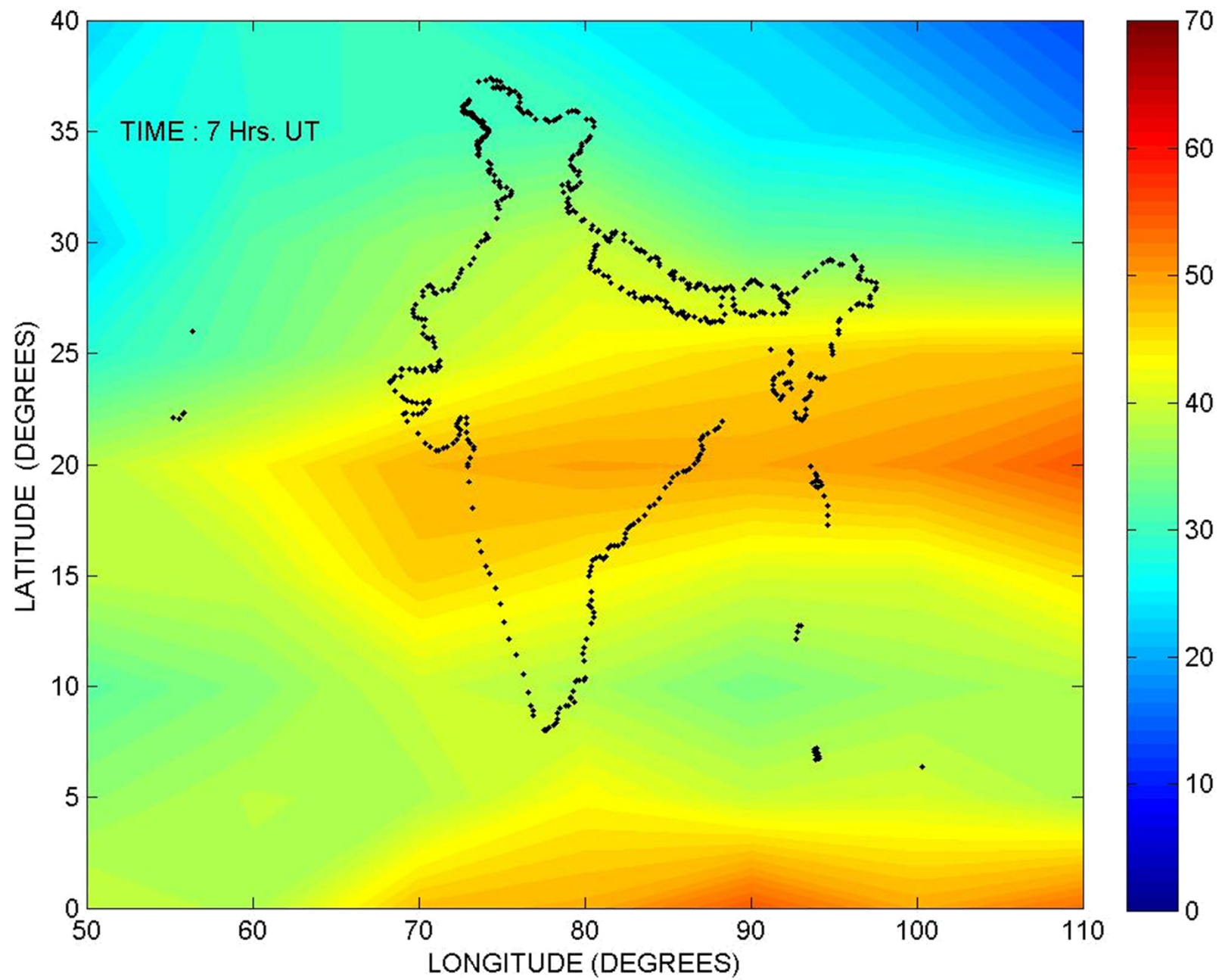




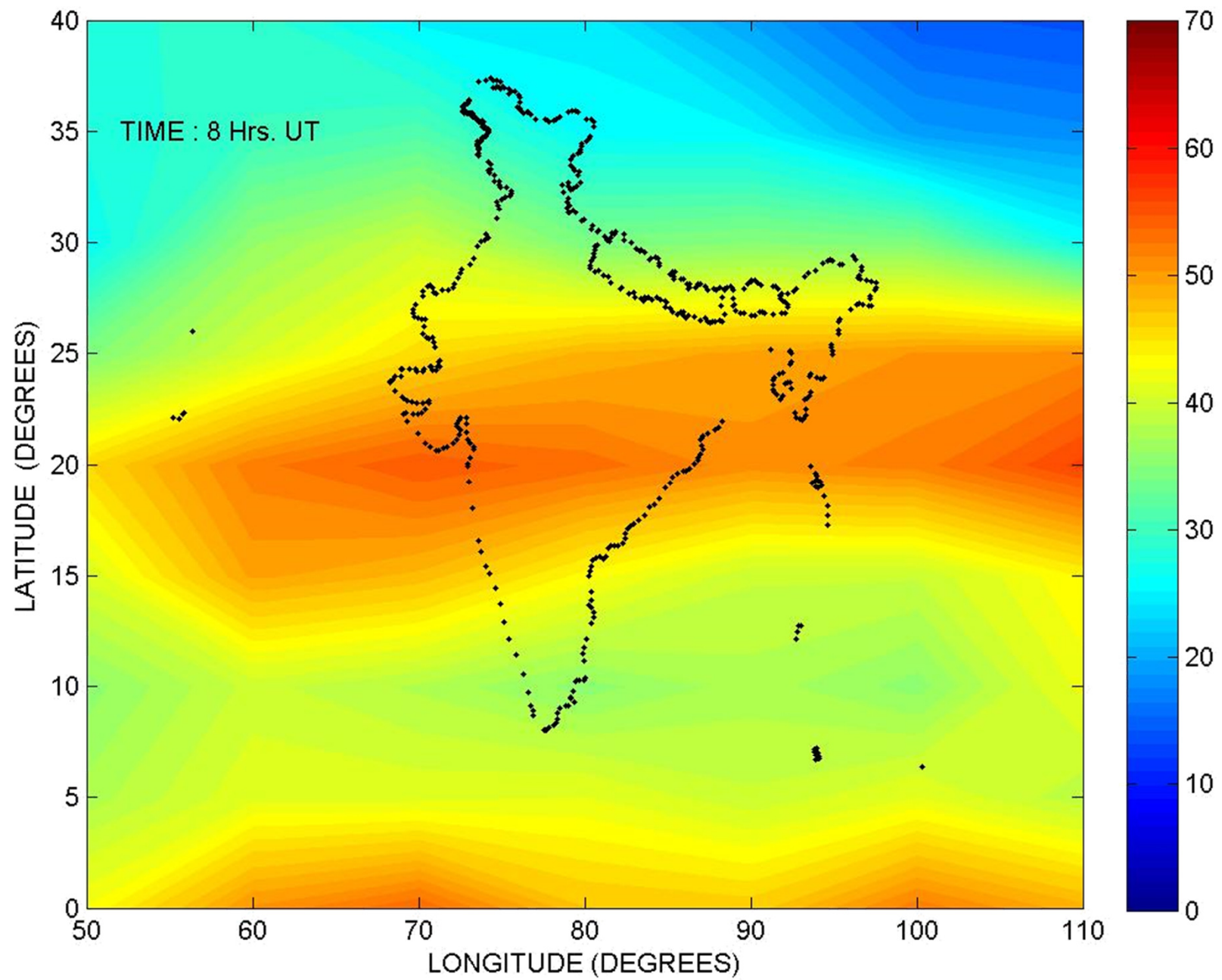


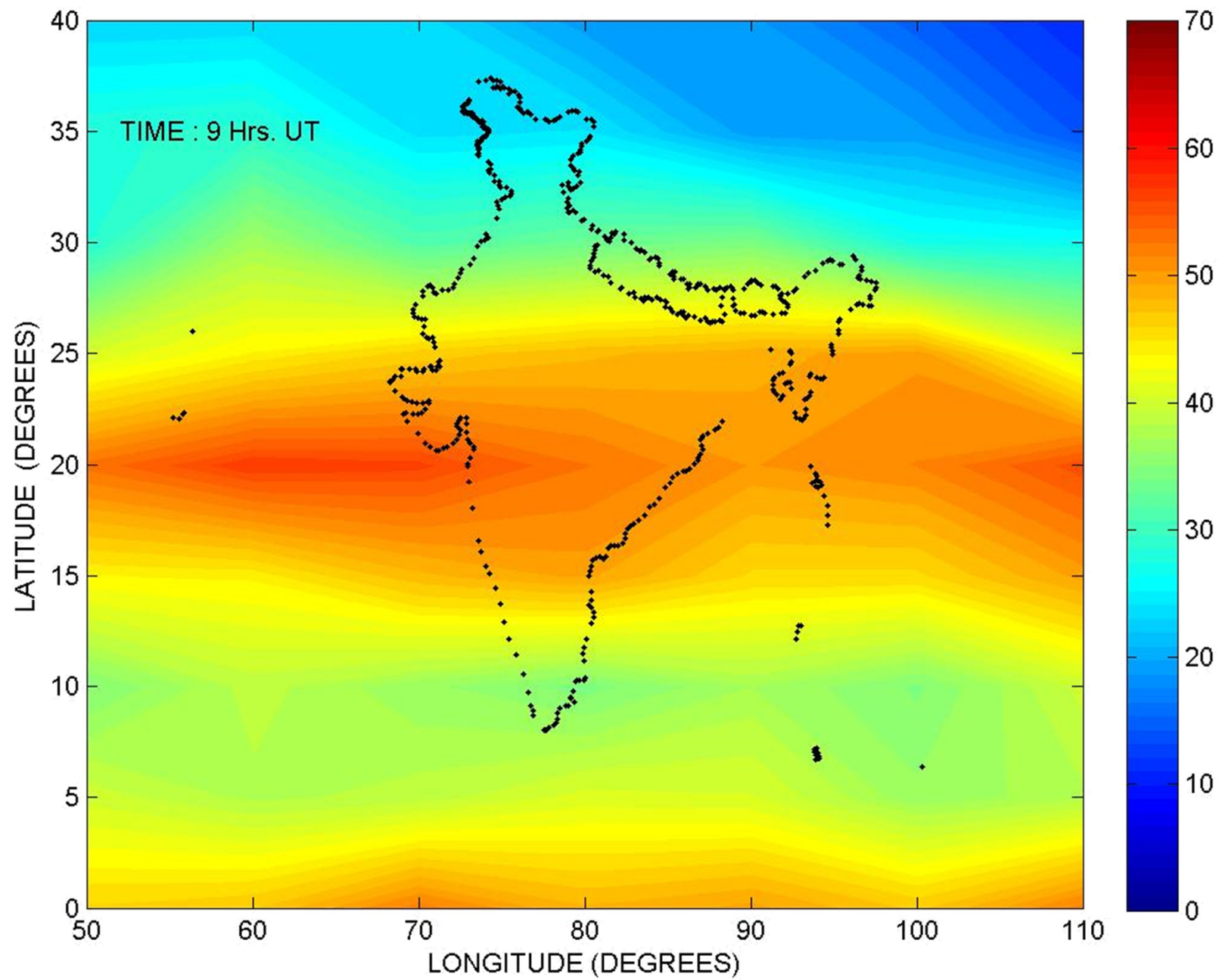




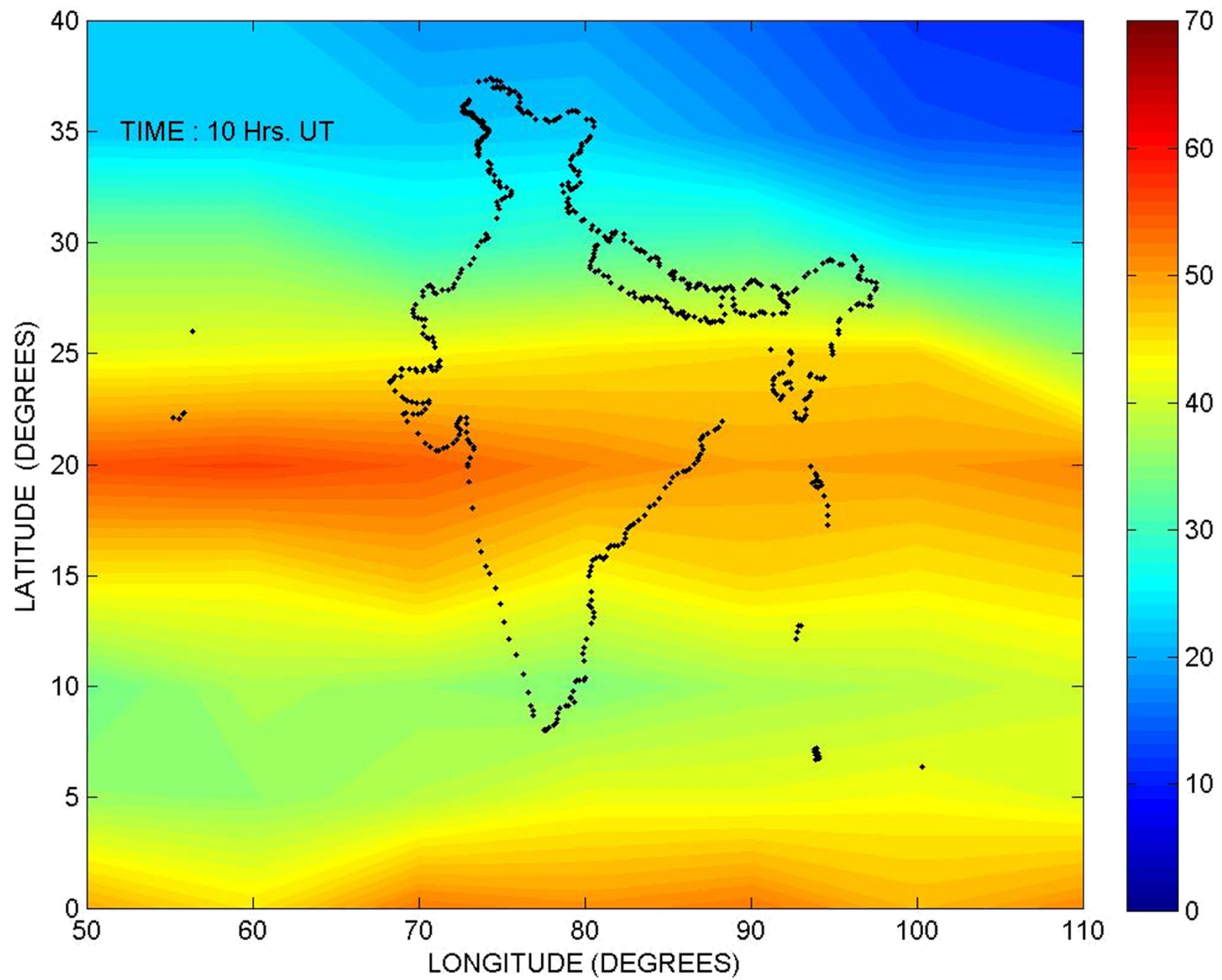


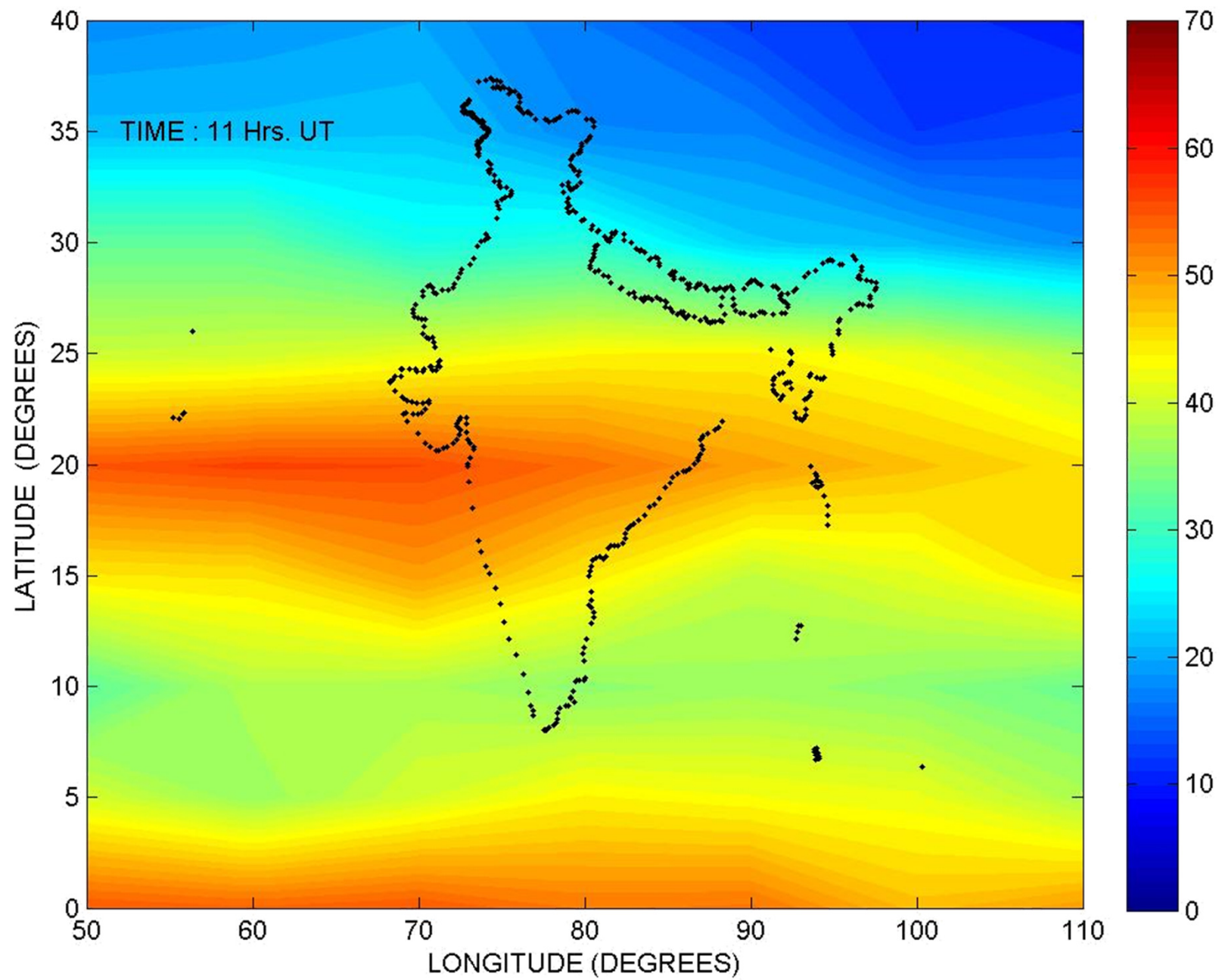


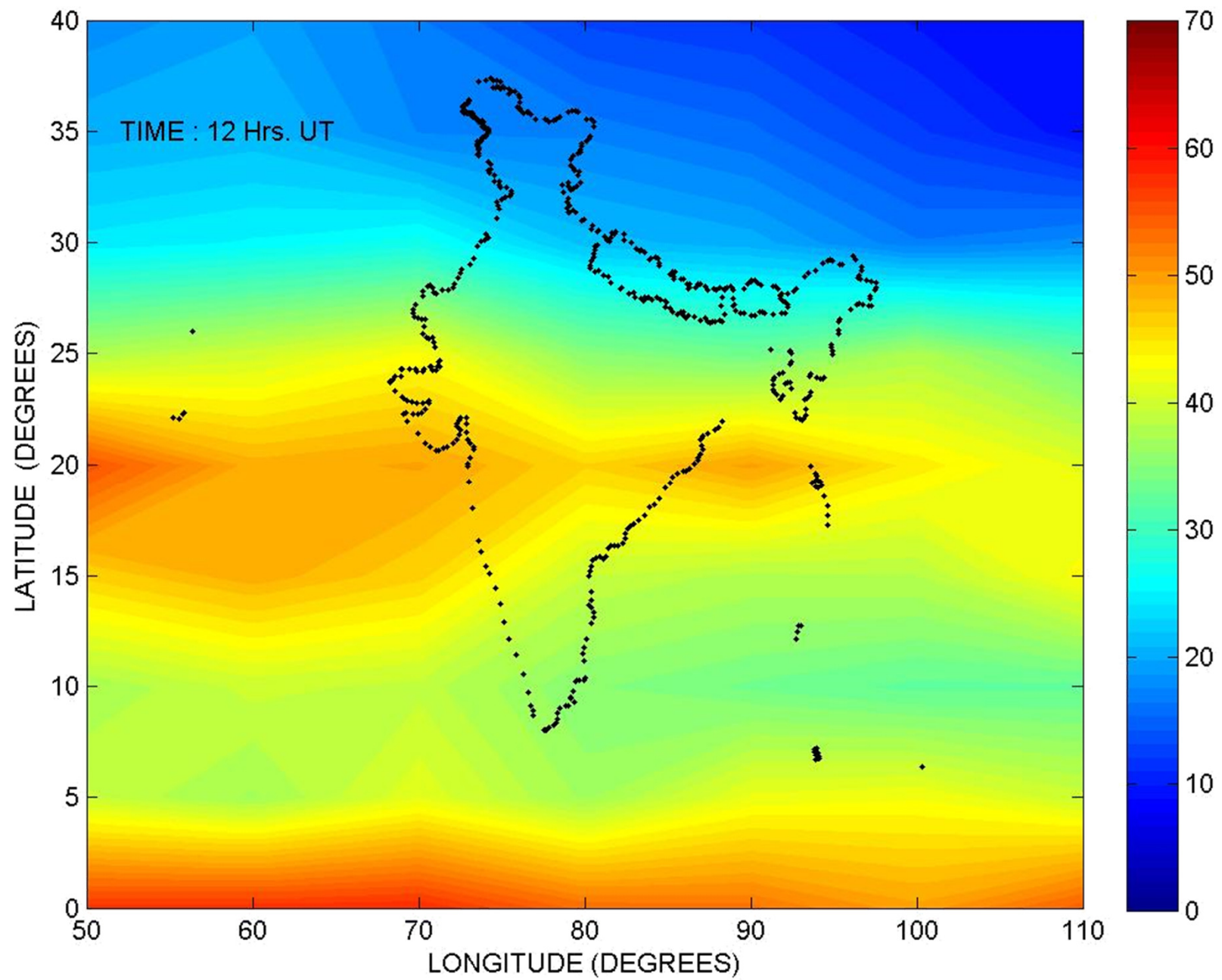




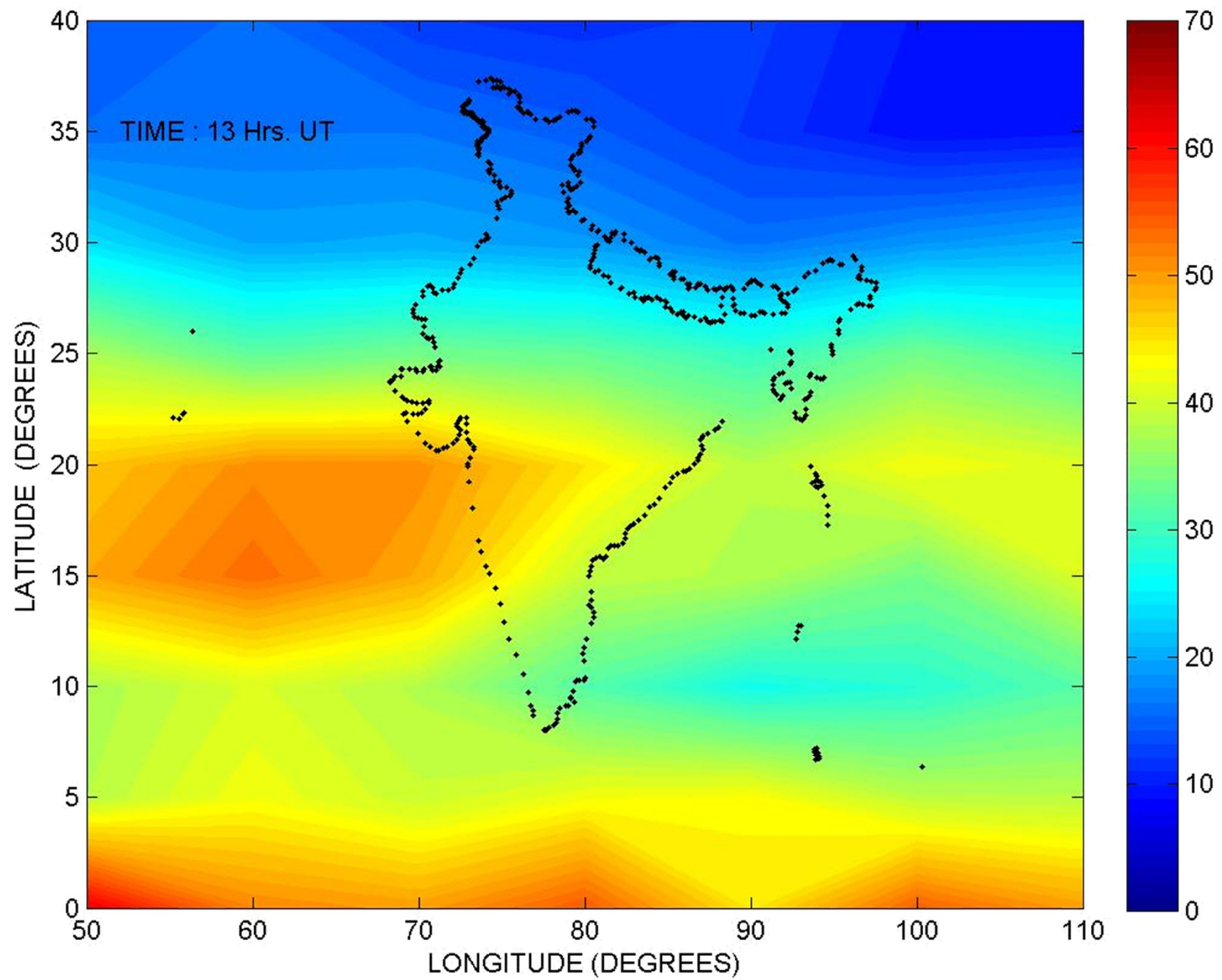


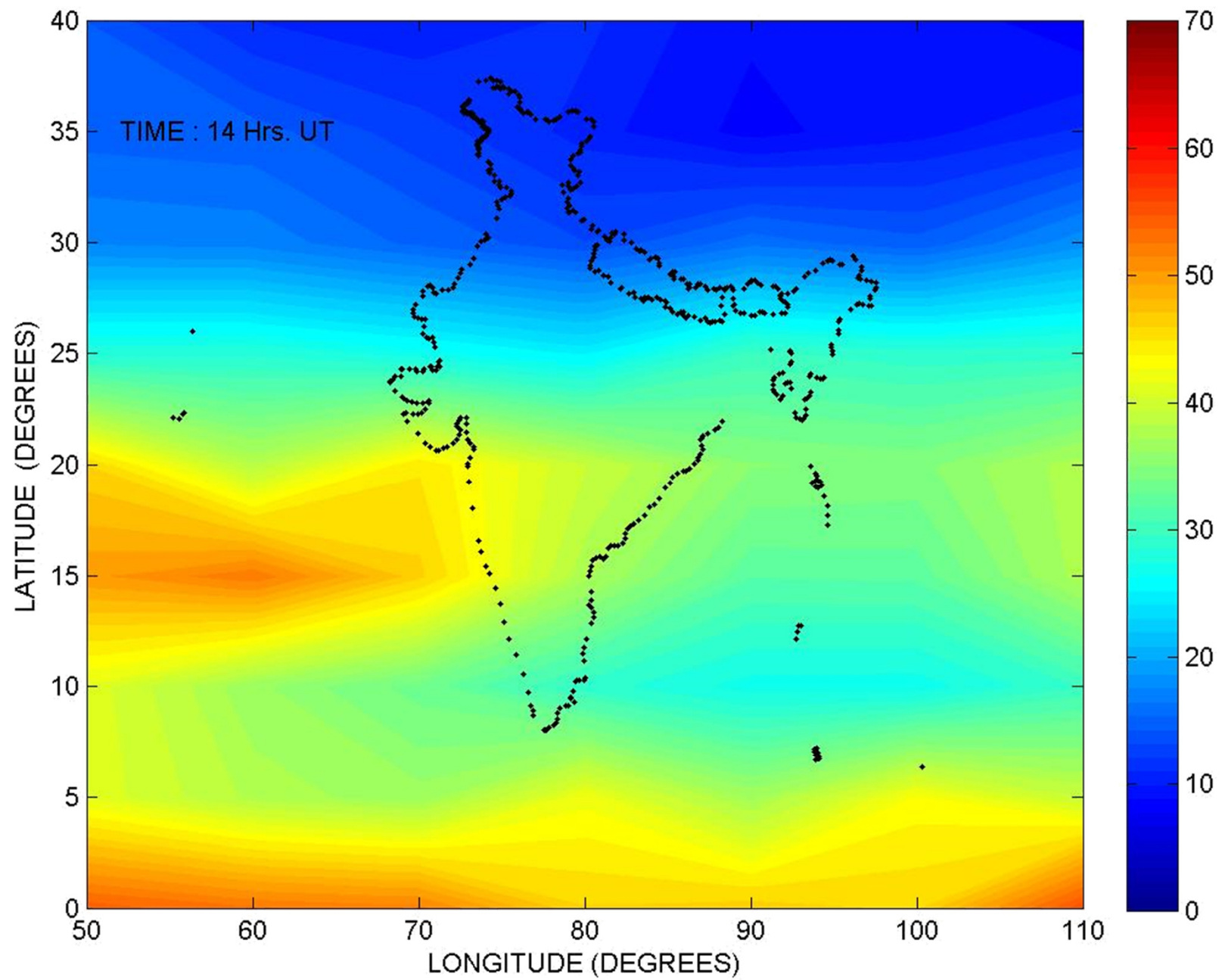






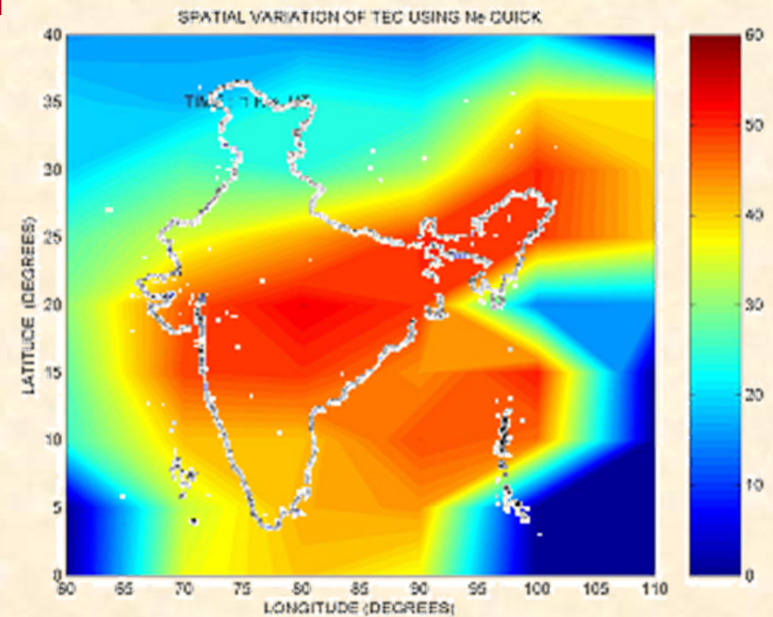
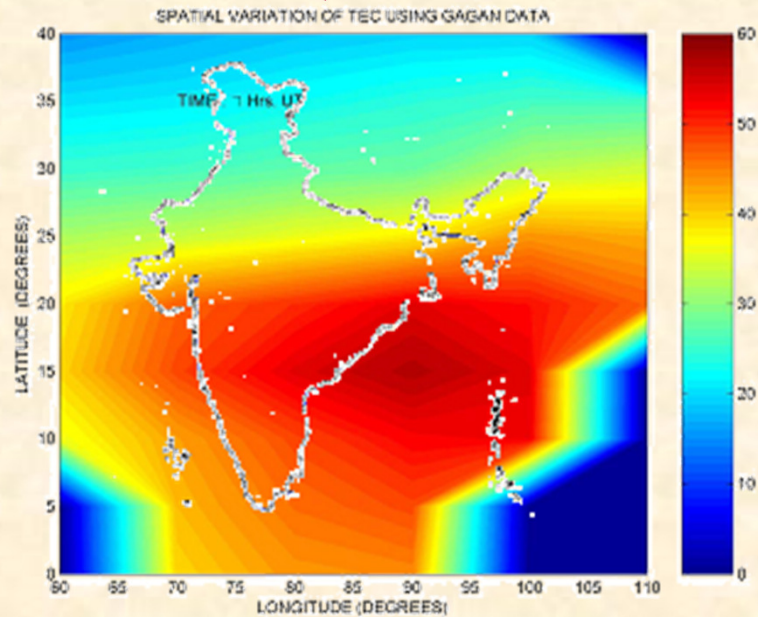








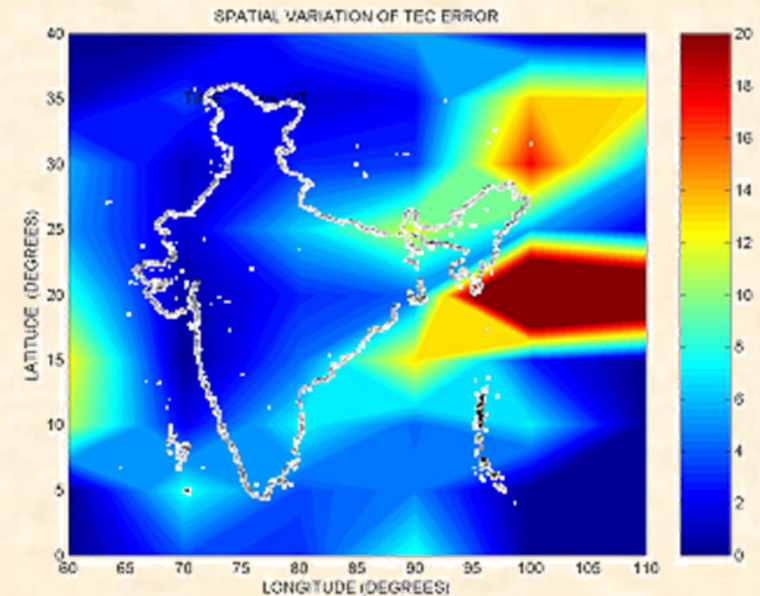
# Ne Quick Ionospheric Model



TEC derived using GAGAN data  
for 21.03.2012

TEC derived using Ne Quick  
Model

Error TEC



# Ne Quick Ionospheric Model

## Constraints :

Coefficients are not currently being transmitted by Galileo

## Way out approaches :

- Use Solar Activity parameter F10.7 instead of Az
- Derive Proxy Az

# Ne Quick Ionospheric Model

## Summary:

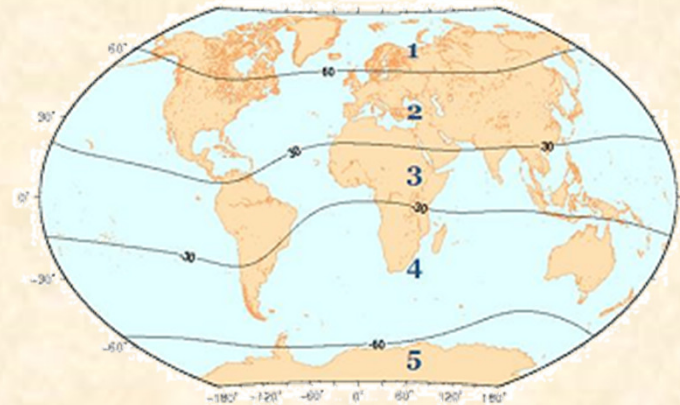
- GAGAN (SBAS) derived TEC compared with that obtained from Ne Quick Model
- Strong correlation is observed between the TEC obtained from two models
- Obtain coefficients in real time to run Ne Quick model (methodology to be established)

**Thank You**

# Ne Quick Ionospheric Model

## Basics of Ne Quick (Approach)

- MoDip is derived from geographic coordinates
- Effective ionization AzR is obtained from MoDip and coefficients
- Solar zenith angle derived using local time and location coordinates
- $f_0E$ ,  $f_0F1$  are derived using them and NmE and NmF1 are obtained





# Ne Quick Ionospheric Model

## Basics of Ne Quick (Approach)

- $f_0F_2$  and  $NmF_2$  : Sensitive to solar activity, have seasonal dependence and contribute most ; hence precisely derived
- 2 sets of predetermined coefficients for spherical harmonics are used; one for high and other for lower solar activity for each month
- These coefficients are interpolated using current  $AzR$  to obtain the set of spherical harmonics appropriate for current solar activity
- Spherical harmonics used to derive 6 modal components of  $f_0F_2$  and 4 of  $M(3000)F_2$
- The modal components are then used to get the  $f_0F_2$  and  $M(3000)F_2$  values for a given place for a given time.  $NmF_2$  is obtained from that

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# Ne Quick Ionospheric Model

## Basics of Ne Quick (Approach)

- Characteristic thickness for all the three layers, viz. E, F1 and F2 are obtained separately for top and bottom side
- Effective amplitudes are obtained from Nm parameters separately for each E, F1 and F2 layers
- Electron density profile is then determined from these values for given heights. Top side of F2 remains unaffected by lower layers
- Electron density integrated over the path to get TEC

# Ne Quick Ionospheric Model

- Results: The first plot

