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Atmospheric Model at JSpOC

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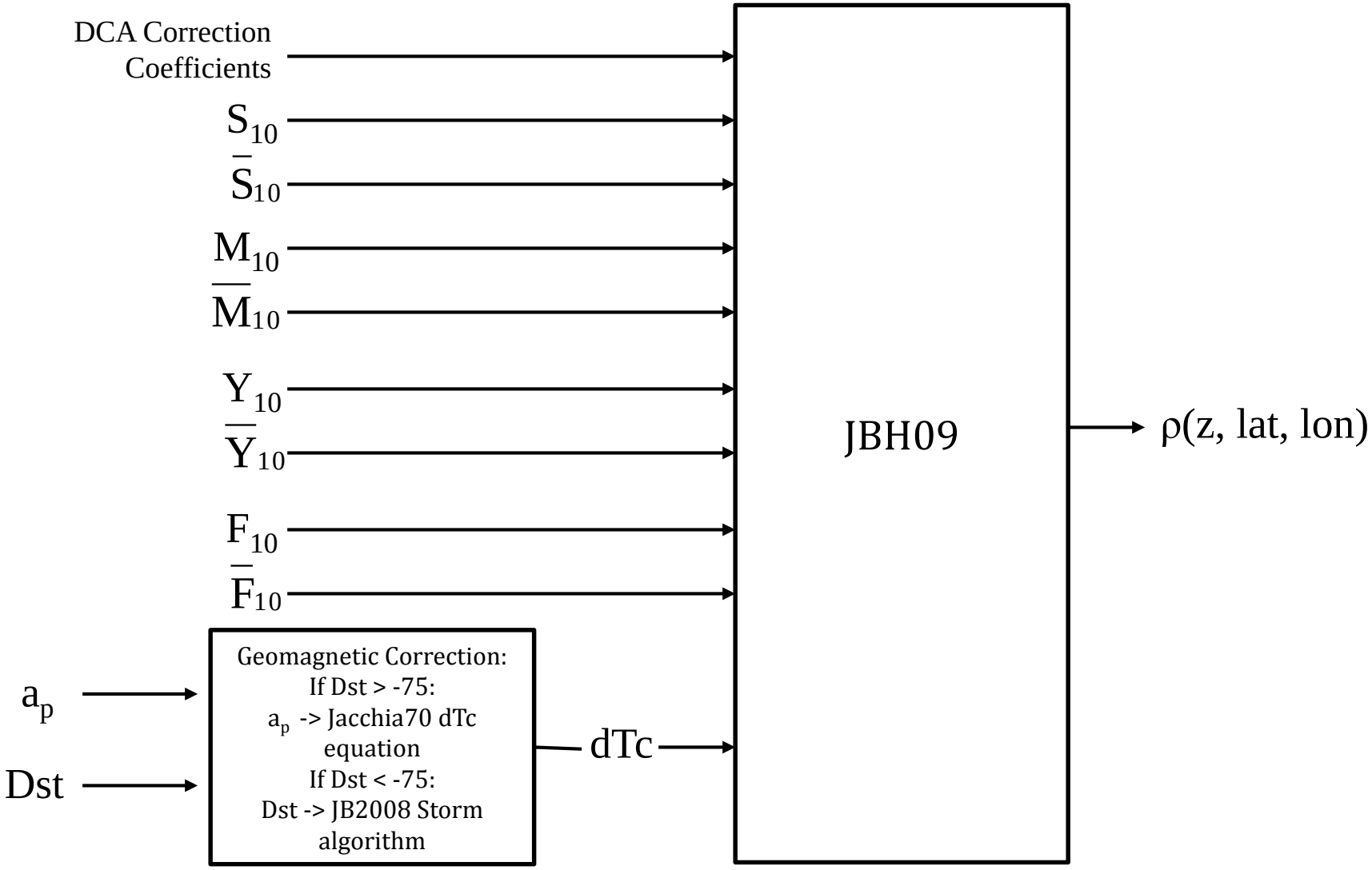
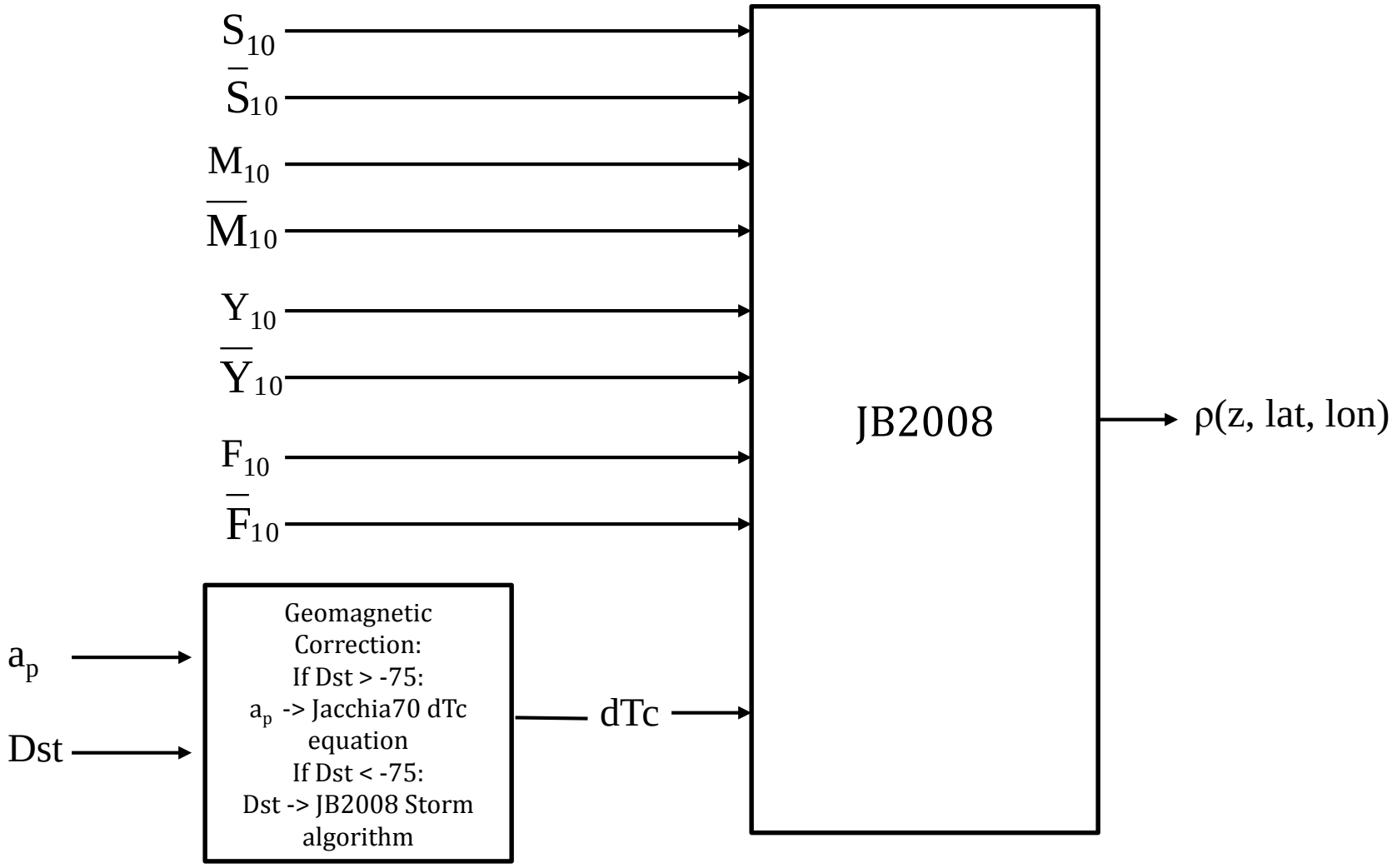
Atmospheric Model Introduction

- **Atmospheric model used for ASW predictions composed of several stages working in sync**
  - JB2008 Model
    - Jacchia legacy
    - Driven by solar irradiance in extreme to far ultraviolet wavelengths
  - HASDM Dynamic Calibration Atmosphere
    - Uses calibration satellites to compute corrections to base atmosphere
    - Provides definitive atmosphere and 3 day predicted corrections
  - Anemomilos Dst Prediction Model
    - Provides 6 day prediction of Dst
    - Empirical relationships driven by x-ray flare observations
  - Solar Indices
    - Provides base inputs for model

JBH09


DCA Correction Coefficients
S_{10}
$\bar{S}_{10}$
M_{10}
$\bar{M}_{10}$
Y_{10}
$\bar{Y}_{10}$
F_{10}
$\bar{F}_{10}$
a_p
Dst
Geomagnetic Correction:
If Dst > -75:
a_p -> Jacchia70 dTc equation
If Dst < -75:
Dst -> JB2008 Storm algorithm
dTc
JBH09
ρ(z, lat, lon)

JB2008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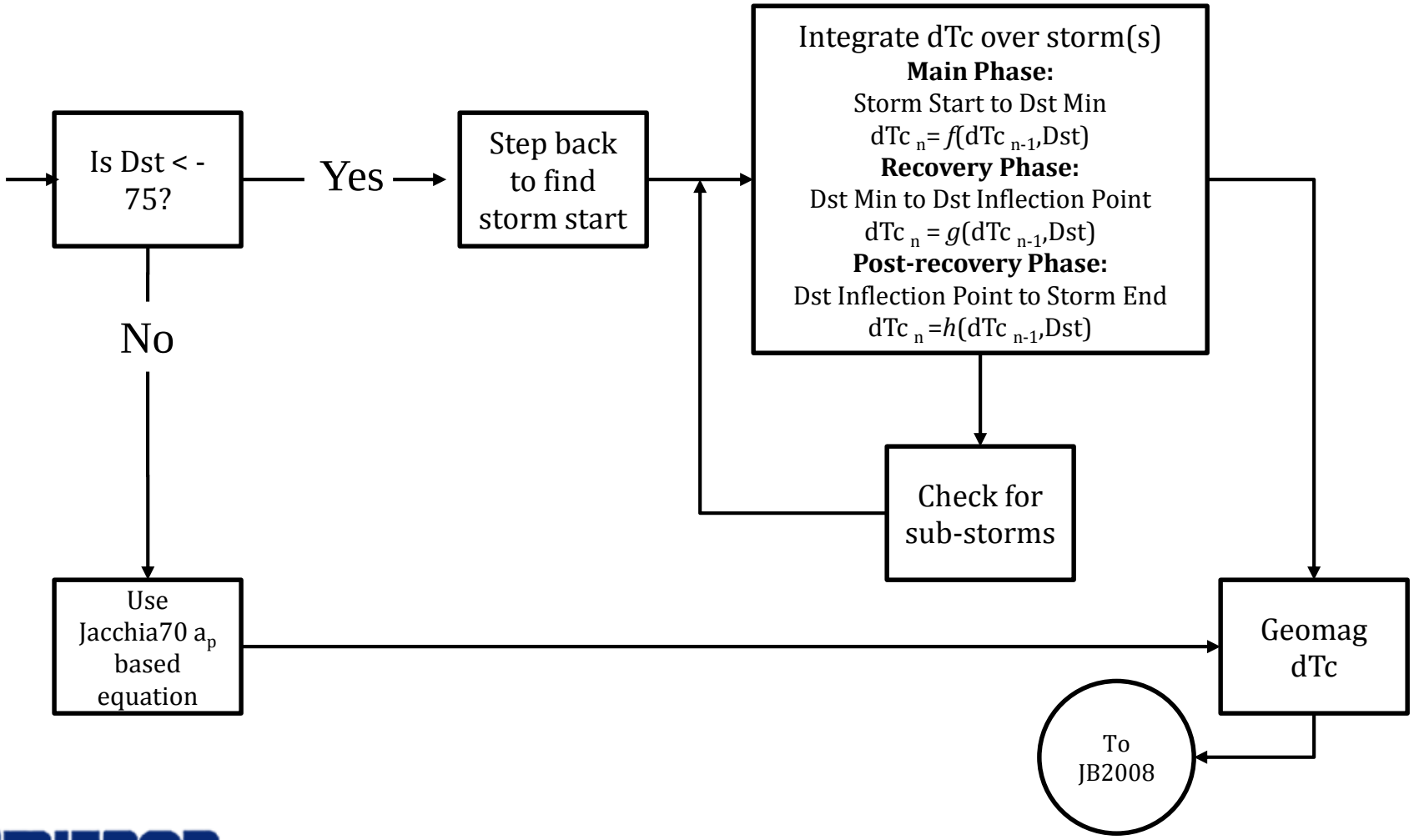
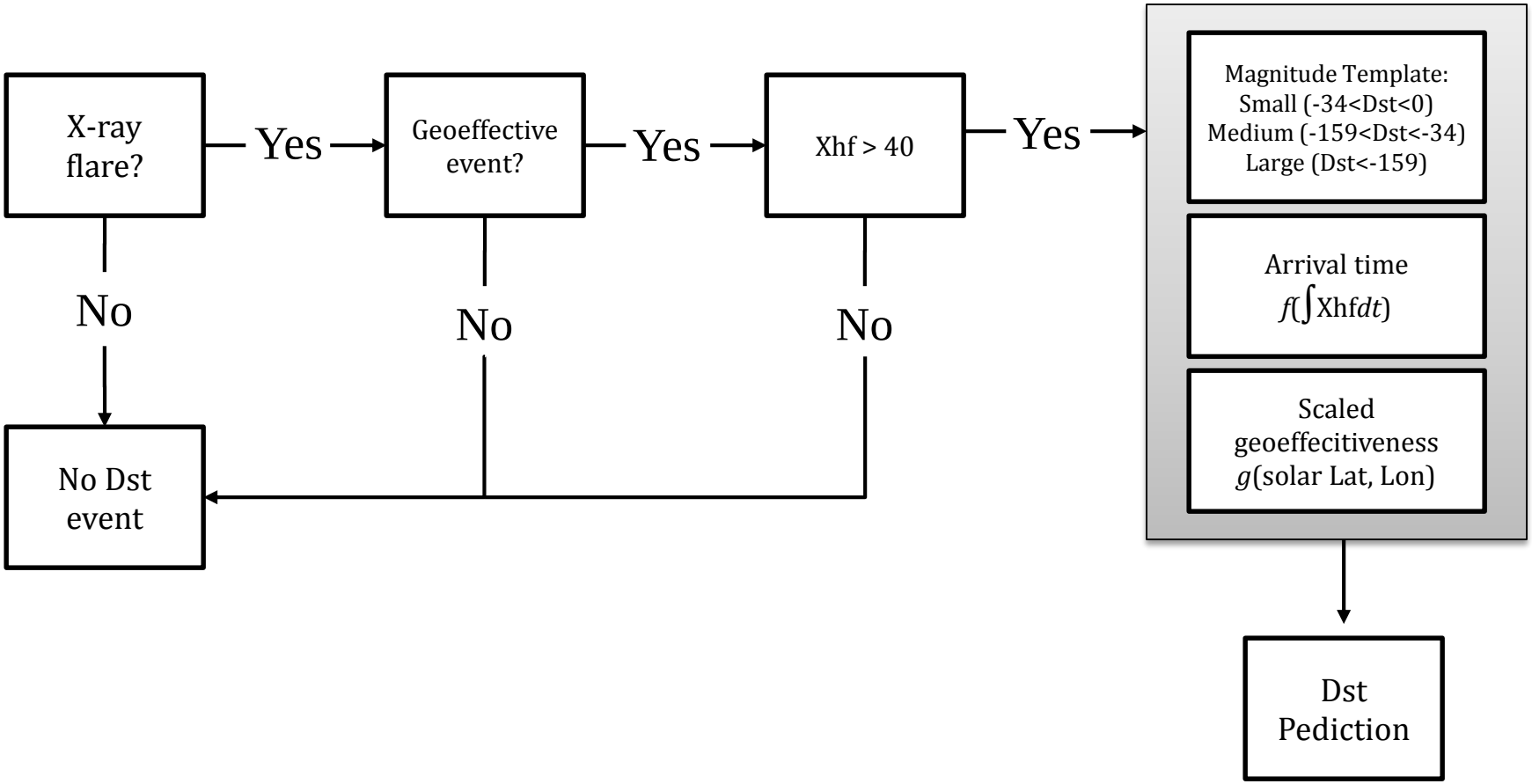
Geomagnetic Correction



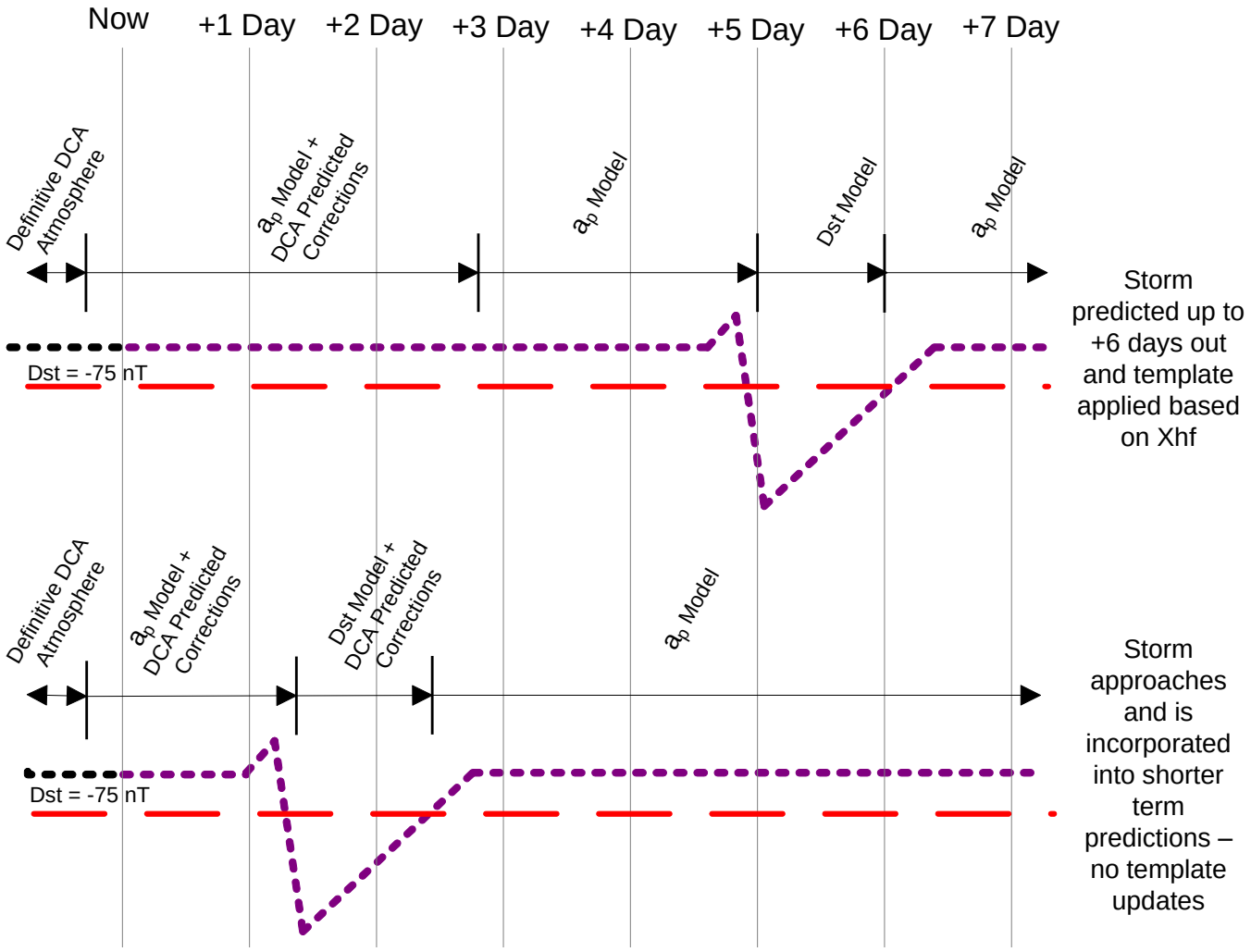
Anemomilos Dst Prediction



Solar Events

- **Solar events drive the geomagnetic correction to the model**
  - When the Disturbance Storm Time (Dst) measure is above -75 nT, model uses Jacchia's a_p based temperature correction
  - For Dst less than -75 nT, model applies Dst based equations and integrates over the storm to find temperature correction
- **Anemomilos model currently providing predictive Dst inputs to JSpOC model**
  - Watches for X-ray flares
  - Determines if event is geoeffective
  - Applies template based on magnitude of X-ray flux
  - Does not currently update storm prediction

Solar Event Timeline

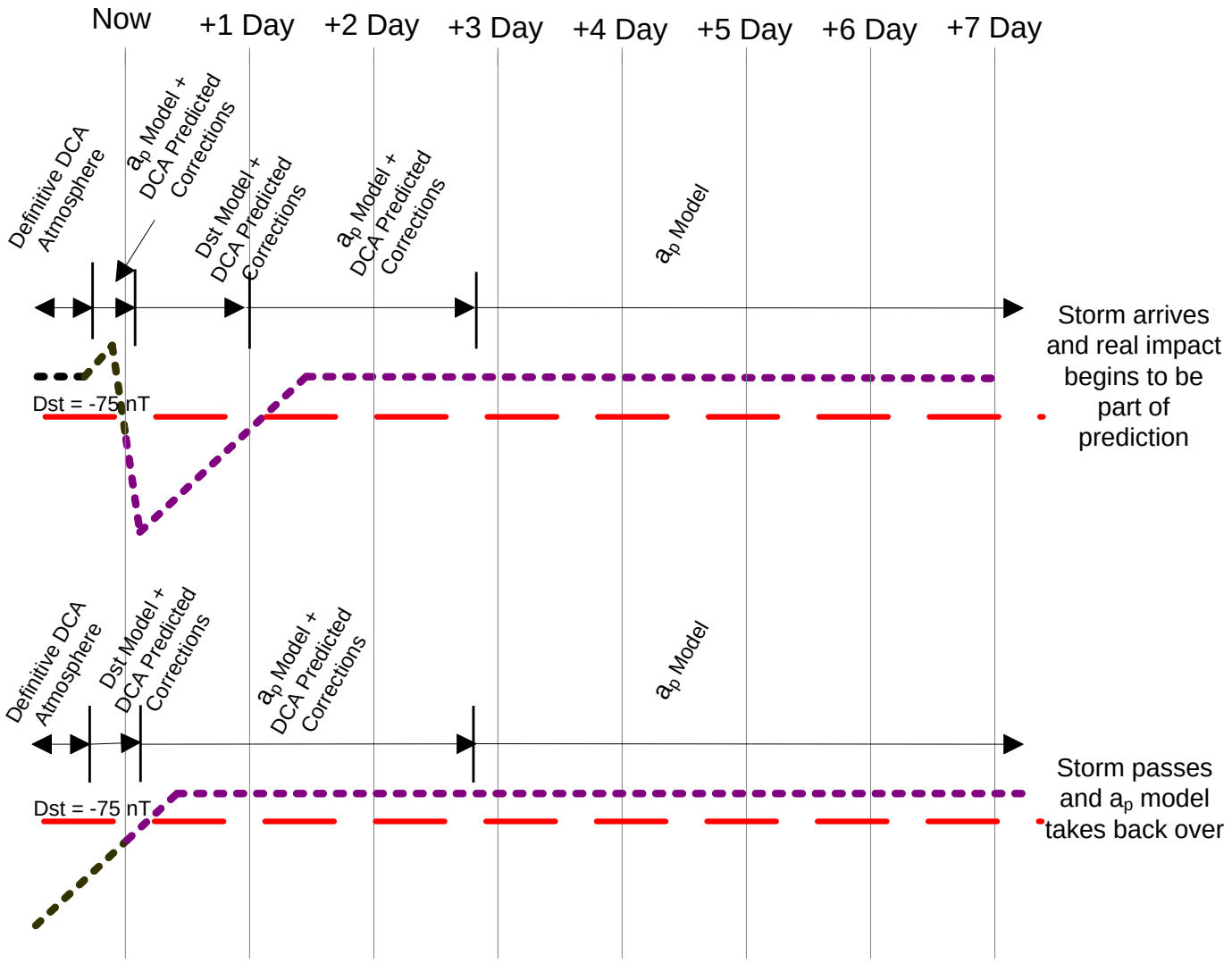


Prediction

Data

Notes:
Storm not to scale

Solar Event Timeline cont.



Prediction

Data

Notes:
Storm not to scale