Methodology (Continued)

4. Kalman Filter Time Update:
   • Geocentric Coordinate Decomposition: \( X = (x', y', z', \gamma') \quad X = X_{\text{sun}} \)
   • Equation of Dynamics:
     \[\begin{align*}
     x'' &= 0 \\
     y'' &= 0 \\
     z'' &= 0 \\
     \gamma'' &= 0 \\
     \end{align*}\]
   • Time Update or State Transition:
     \( E_{\text{OP}} = E_{\text{OP}} + \Delta \omega \Delta t \)
   • Co-motion Constraints Are Applied in Two Different Ways:
     - Velocities, \( \delta u \), \( \delta v \), of co-located stations constrained in the first week
     - Process noises of co-located stations are constrained to be the same through the \( Q \) matrix
   • Position or velocity breaks are realized through large process noise updates \( \epsilon \) or \( \xi \)

5. Kalman Filter and RTS Smoother

Conclusions

• Consistent and accurately defined and realized TRF is essential for global change monitoring
• Experimental TRF realized by nearly instantaneous geocentric time series and weekly combinations
• Kalman filter and RTS smoother offer power and flexibility for time-dependent parameter constraints
• KALREF applied to ITRF2005/2008 input data and linear solutions yield good agreement with ITRF
• Unifies fragmented time series with co-locations from 4 geodetic techniques in the same geocentric frame