Item #4

TPB Version 2.3 travel model on the 3,722-TAZ area system: Corridor-level sensitivity tests

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Dusan Vuksan and Feng Xie

National Capital Region Transportation Planning Board (TPB)
Metropolitan Washington Council of Governments (MWCOG)

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Acknowledgements

- Mark Moran and Ron Milone, for their contributions to the presentation (including slide preparation)

Background

- Nine other sensitivity tests were presented at the July TFS meeting
- This test is a small departure from previous sensitivity work in that it tries to mimic a major corridor-level project planning study

SENSITIVITY TESTS

Why do sensitivity testing?

- Another approach to validate the model
- Provides a “feel” for the model’s response to changes in inputs or assumptions
- Points to possible problems in the model specification that need to be addressed – it aids in heading off unexpected surprises

Typical tests to consider

- Operational or capacity changes to the highway or transit system
- Land use changes
- Transportation policy changes
- Model specification changes such as the traffic assignment convergence threshold or the number of gravity model iterations

Expectations

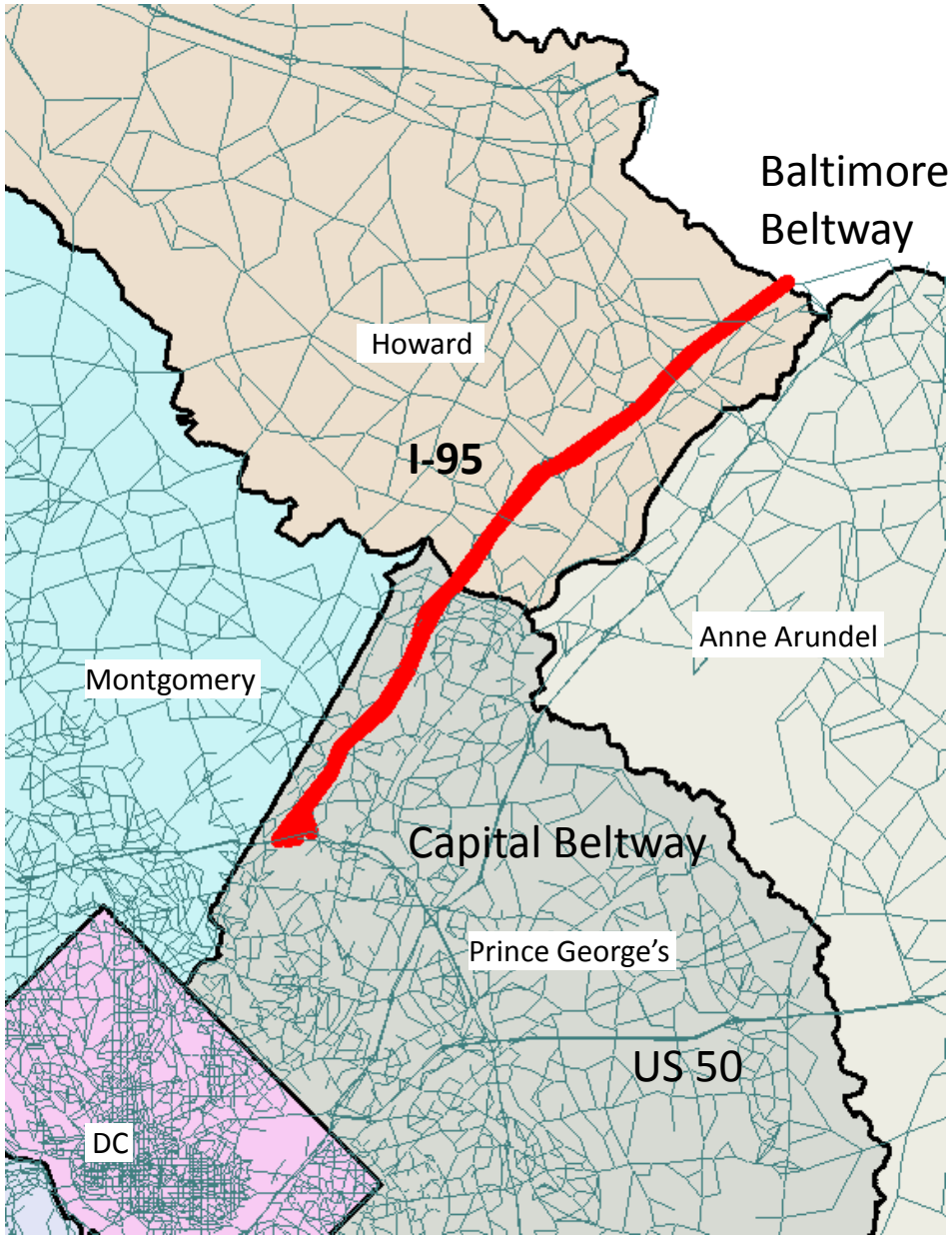
- Changes reasonable and mainly confined to the “study area”
- No significant changes outside of the “study area”

Notes about the sensitivity tests presented today

- Based on the Version 2.3 specification (2.3.27) and inputs
- **Focuses on changes to the *2007 base scenario*** ("Pseudo Round 8.0" land use)
- The 2007 network is based on information in the 2010 CLRP, not the 2011 CLRP update that is being currently used in this year's AQC determination

Test 1: Sensitivity test case scenario: I-95 in Maryland

- Corridor-level test designed to be comparable to typical project planning studies
- Add one lane in each direction on I-95 in MD "between the beltways"
- Mechanical exercise; easy to execute due to current simple nature of the facility (GPLs only)
- Right-of-Way and current plans for the facility not considered

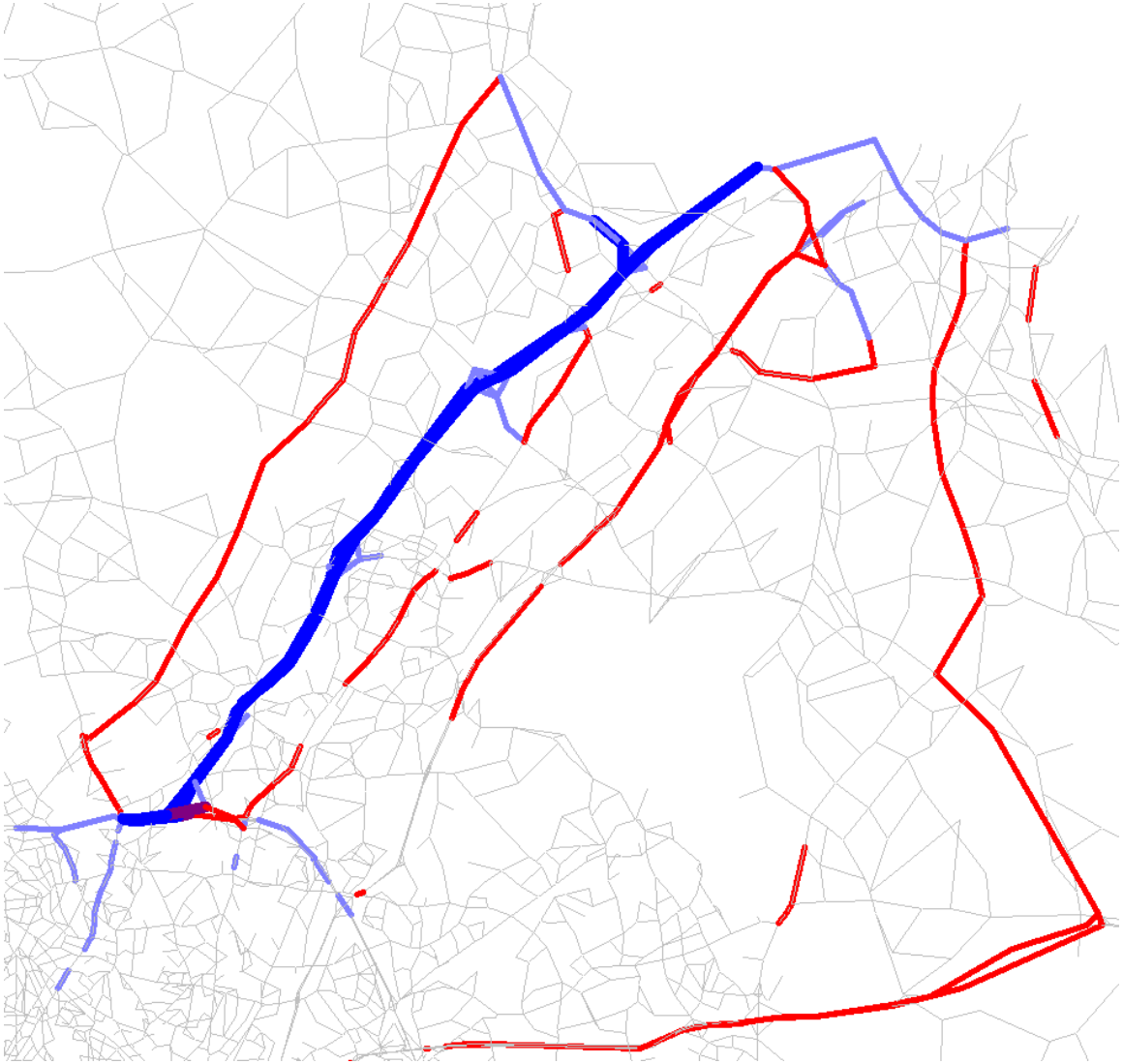


Test 1 Assumptions

Red: one additional general purpose lane in each direction on I-95 between the two beltways

Test 1: V2.3.27, 2007, Build minus No Build (Daily)

Relative gap threshold: 10^{-3}



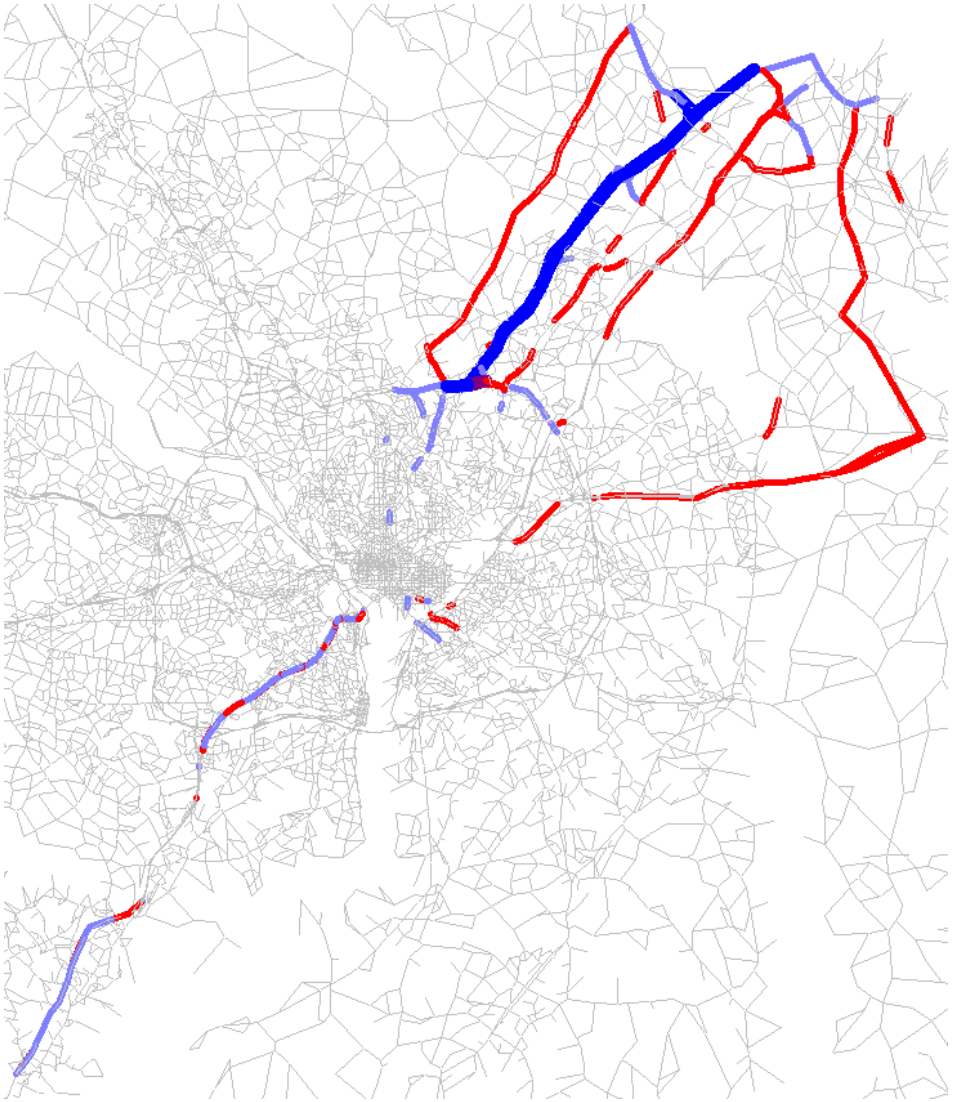
Red: Decrease in Volume
Blue: Increase in Volume
Tolerance: +/- 2000 vehicles

Large increases (dark blue) on I-95

Moderate decreases (red) on parallel roadways (US 29, US 1, MD 295, US 50 & I-97)

Test 1: V2.3.27, 2007, Build minus No Build (Daily)

Relative gap threshold: 10^{-3}



Red: Decrease in Volume
Blue: Increase in Volume
Tolerance: +/- 2000 vehicles

Some “noise” observed away from I-95 in MD

Volume changes outside of the study area mainly between 2-3k daily (out of 100k)

When GPL and HOV links are combined in VA, net difference mainly within tolerance

Test 1: Add one lane to I-95 in MD between the beltways

Tripmaking

- Greatest changes in trip distribution occur in the corridor – Prince George's, Montgomery, Anne Arundel and Howard
- Intra-jurisdiction trips decrease as more travelers are willing to travel farther using the new capacity

Test 1: Add one lane to I-95 in MD between the beltways

VMT

- Regional VMT increases (+0.1%)
- VMT increases in Prince George's (+ 1.0%) and Howard (+3.7%) where the improved facility is located
- VMT decreases in Montgomery (-0.3%) and Anne Arundel (-1.8%), which neighbor the jurisdictions that contain I-95

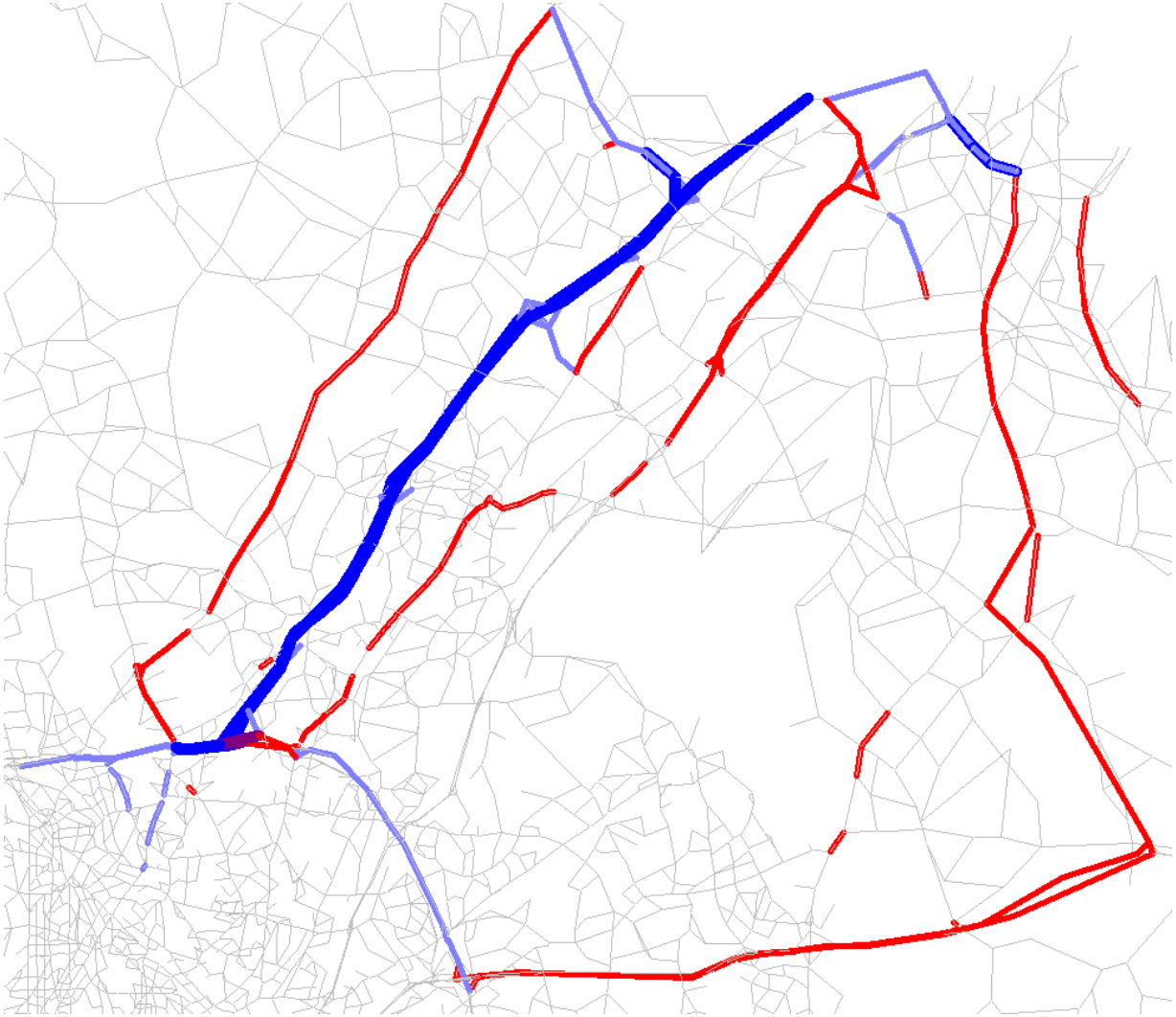
Test 1: Add one lane to I-95 in MD between the beltways

VHD

- Model not validated to speeds – relative VHD differences only considered for the test
- Regional VHD decreases (-2.7%)
- VHD decreases in Prince George's (-3.1%), Howard (-8.4%), and Anne Arundel (-13.8%)

Test 2: V2.3.27, 2007, Build minus No Build (Daily)

Relative gap threshold: 10^{-4}

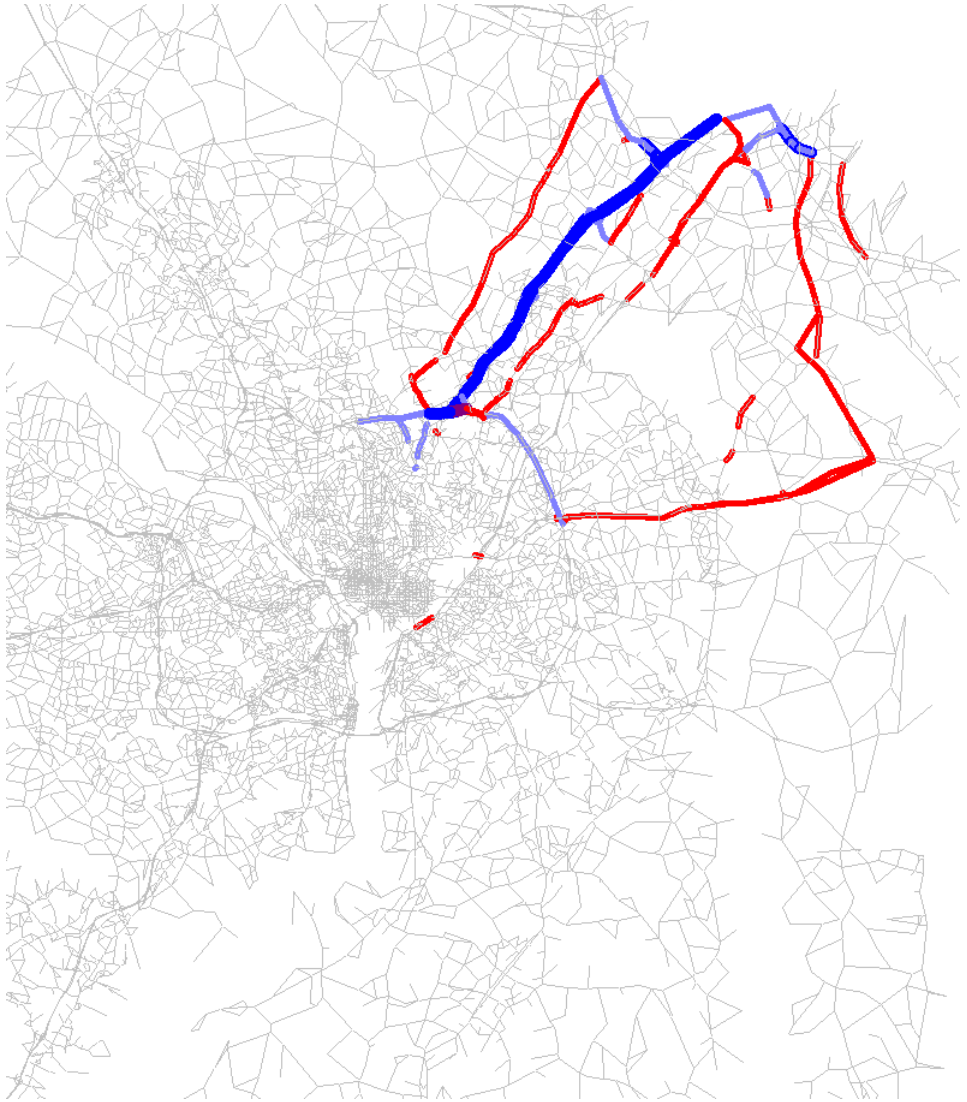


Red: Decrease in Volume
Blue: Increase in Volume
Tolerance: +/- 2000 vehicles

Similar to the pattern in Test 1; large increases (dark blue) on I-95 with trips diverted from parallel roadways

Test 2: V2.3.27, 2007, Build minus No Build (Daily)

Relative gap threshold: 10^{-4}



Red: Decrease in Volume
Blue: Increase in Volume
Tolerance: +/- 2000 vehicles

Most of the volume differences confined to the study area when relative gap is set to 10^{-4}

Convergence improves at the expense of greater model run times (**36 versus 56 hours**)

Test 2: Relative gap threshold 10^{-4}

Tripmaking

- Similar to Test 1, greatest changes in trip distribution occur in the study corridor – Prince George's, Montgomery, Anne Arundel and Howard
- Intra-jurisdiction trips decrease as more travelers are willing to travel farther using the new capacity

Test 2: Relative gap threshold 10^{-4}

VMT

- Regional VMT increases (+0.2%)
- VMT increases in Prince George's (+ 1.0%) and Howard (+3.7%) where the improved facility is located
- VMT decreases in Montgomery (-0.3%) and Anne Arundel (-1.8%), which neighbor the jurisdictions that contain I-95

Test 2: Relative gap threshold 10^{-4}

VHD

- Regional VHD decreases (-2.7%)
- VHD decreases in Prince George's (-3.1%), Howard (-8.4%), and Anne Arundel (-14.1%)

Conclusions: Sensitivity Tests

- The model response to system changes makes sense and meets our expectations
- Increasing freeway capacity in a major corridor diverts traffic to the improved facility
- VMT increases; VHD decreases
- Trips become longer

Conclusions: Sensitivity Tests

- When looking at some of the difference plots, it is evident that there is still some degree of noise in the system, due to the fact that the traffic assignment is still not fully converged
  - A relative gap threshold of 10^{-3} (which is the default value used in the Ver. 2.3 model) is probably sufficient for regional analyses, such as the AQC analysis
  - **A smaller relative gap threshold may need to be considered for corridor studies that require a minimum degree of noise in the traffic assignment (greater run times)**
  - Both the relative gap threshold and the max. no. of UE iterations can be easily set in the highway assignment script

Other conclusions

- The TPB Version 2.3 Travel Model remains in beta release
- The Ver. 2.3 model will not become the official TPB model until the TPB approves the Air Quality Conformity Determination of the 2011 CLRP (expected November 2011)
- Between now and Nov. 2011, the model may undergo changes