Agenda discussion future of AeroCom

New experiments explanation

Formatting issues

IGAC/WCRP initiative « Atmospheric Chemistry & Climate » AC&C

Working group structure & coordinating committee

Brain storming for each working group
(except indirect forcing und direct forcing+aerosol-climate simulations)

4) **Which new experiments do you find useful?**
4b) **In which would you eventually participate?**

Questionnaire part II

AeroCom D
(as AeroCom A but revised model versions and diagnostics for purpose
of further analysis of problems found earlier in AeroCom)

HTAP experiments SR1 and SR6 and SR7
Hemispheric transport of air pollution analysis of source receptor relationships
Diagnostics PM and AOD (and gases), Reduction by 20% of anthropogenic
Emissions in Asia, Europe and N-America, CO passive tracer experiment.

AeroCom F
Fixed monthly 3d removal rates (and emissions) prescribed,
to eliminate diversity due to differing removal process parameterisations

Reanalysis of 4th AR IPCC experiments
Radiative forcing calculation for coupled model versions used for AR4.
Rerun of a characteristic pre-industrial and present year with full RF diagnostics
Coherent diagnostics with AeroCom database

AeroCom Indirect II
Follow up of Penner et al. 2006 experiment suite. Re-designed diagnostics.

Reanalysis of aerosol (and climate) evolution in 20th century
Compute all or segments of 20th century until 2005 with analysed meteorology
or transient climate model

Future median/high/low aerosol emission scenarios with aerosol-climate interactions
In preparation of the 5th AR IPCC;

ANY other proposition for a joint experiment?

5) **Would you like to suggest priorities for AeroCom work**?

Requirement for automatization:
AeroCom data harmonization and future output format requirements

…in connection to HTAP

netCDF but…

CF convention expanded by aerosol/chemistry names
Standard names, metadata requirements fixed

CMOR (Climate Model Reformatting) library
(coordinate axes information, sign conventions, allowed range for the variables, ...)
tools adapted for HTAP experiments

Example fortran 90 programs available

(eventually even udunits and cdms for unit/time conversions)

Ideas for what to try to accomplish within the AC&C Initiative of relevance for AeroCom:

1. How does chemistry effect radiative forcing and its spatial pattern of radiative forcing? (lifetime, abundances)
2. Can we reproduce the historical record of Global surface temperature using a single well understood set of forcing agents in more than one climate model? What are the critical agents or component processes?
3. Can we discern a signature of the chemically active forcing agents on the temp trend and other climate variables over the last few hundred years?
4. Correlations between relative humidity fields and aerosol concentrations, and how this might be altered under climate change, with consequences for radiative forcing. Also how aerosol hygroscopicity might change (i.e. with smaller or larger relative contributions from different components).
5. How do aerosol properties/fields change when you remove anthropogenic species? Are components “additive” or are there non-linearities? (an example: SO2 and other pollutants adsorbed by desert dust, so radiative impact of these species is less than it would be in the absence of dust; also this affects the properties (single scatter albedo) of “remaining” pollutant aerosol).
6. What is the impact of climate on AQ (surface ozone and aerosols), especially on short timescale (2030) and regional differences, variability? What processes are important for the connection? (change in transport, water vapor, natural emissions, lightning etc)
7. Changes in climate -> changes in air quality. Does this in turn affect climate or is it one way?
8. What are the relative impacts of changes in precursors vs. changes in climate on the future air quality?

Ideas for what to try to accomplish within the AC&C Initiative II

1. Can we quantify the different processes that connect composition and climate and prioritize them? And which of these lead to feedbacks?
2. Stemming out of the recent workshop: What is the role of convection vs. chemistry on determining the chemical composition in the Tropical Tropopause Layer? (work w/ workshop attendees)
3. What is the influence of aerosols on the composition of the troposphere i.e. via chemical reactions/interactions on/in aerosols and also via radiative flux impacts on photolysis rates.
4. Impact of episodic events (e.g. large boreal forest fires) on Arctic climate, vs. impact of other changes.
5. How do the same deep convective processes affect ozone vs. aerosol distributions?

DECISION: organize AC&C science by these **three categories**:

Composition impacts on climate

Climate impacts on chemistry

Climate impacts on air quality (surface-level ozone and aerosols)

Working group structure & coordinating committee

Emissions	Bond	U. Illinois/ US
Absorption	Koch	GISS / US
Dust	Ginoux	GFDL / US
Vertical profiles	Ferrare	NASA / US
Transport and Removal	Textor	CNRS / France
Use of satellite data for models	Kinne	MPIM / Germany
Closure at super sites	Wilson	JRC / Italy
Air quality	Chin	NASA / US
Indirect forcing	Penner	UMI / US
Clear Sky forcing	Myhre	UIO / Norway
Aerosol-climate simulations	Schulz	LSCE / France
Aerosol Dynamics & Size ?		

Should we have cochairs for working groups
e.g. Yu, Ming, Balkanski , Quaas, Nozawa, Takemura, Stier, Rotstayn, Boucher/Haywood, Bates, Anderson, Nenes ++?

Working group structure & coordinating committee

Emissions	Bond	U. Illinois/ US
Closure at super sites	Wilson	JRC / Italy
Air quality	Chin	NASA / US
Aerosol Microphysics & Size	Liu	
Dust	Ginoux	GFDL / US
Vertical profiles	Ferrare	NASA / US
Transport and Removal	Textor	CNRS / France
Absorption	Koch	GISS / US
Direct forcing	Myhre	UIO / Norway
Indirect forcing	Penner	UMI / US
Aerosol-climate simulations	Schulz	LSCE / France
Use of satellite data for models	*Kinne*	*MPIM / Germany*

Should we have cochairs for working groups

Responsability of working groups

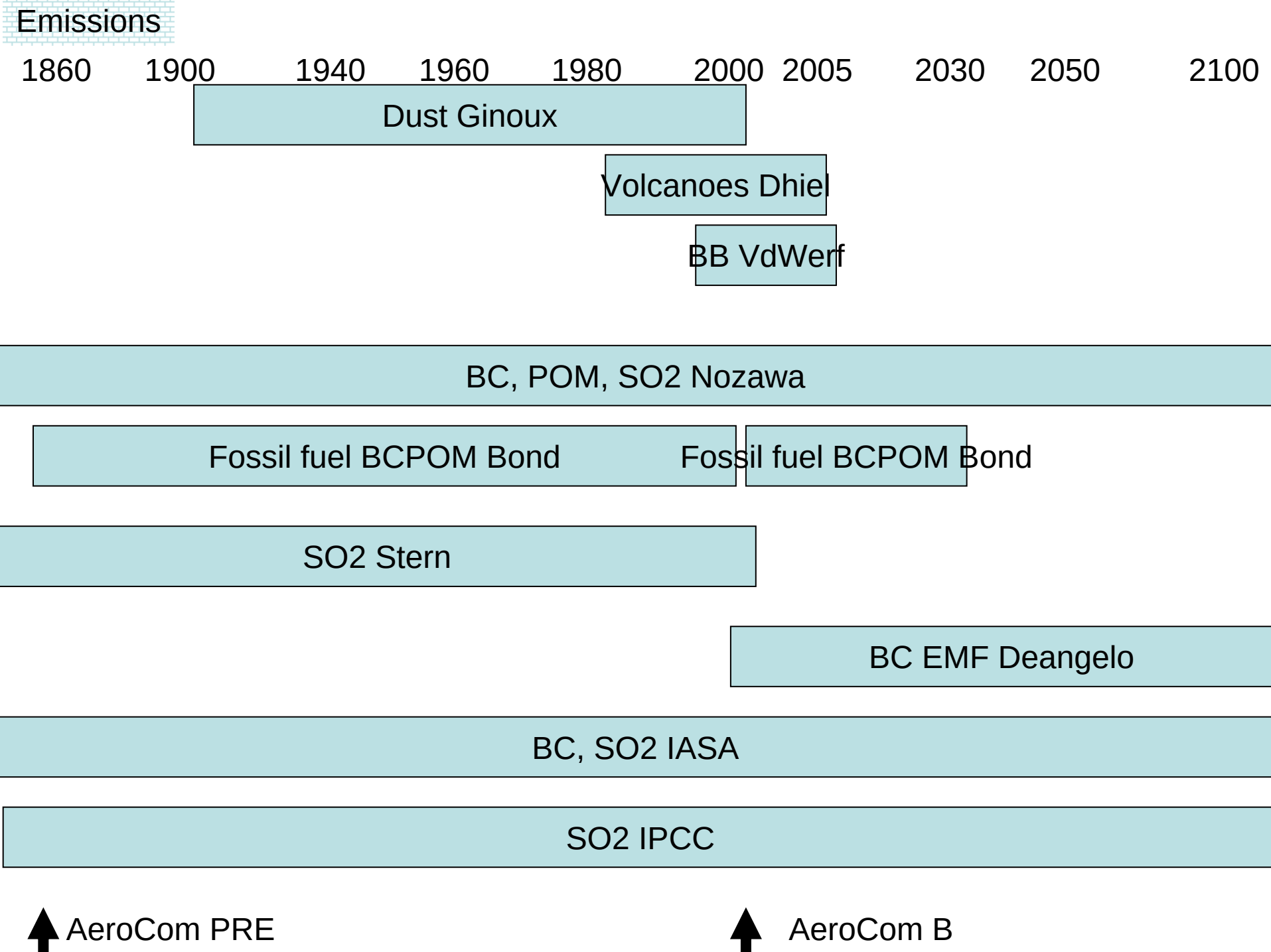
Discussion of short-term and long-term goals

Preparation of recommendations for implementation

Design of experiments and diagnostics

Preparation of standard benchmark tests / Preparation of data
Coordination with AeroCom work-up procedures
Help in maintaining AeroCom database

Joint analysis & publication


Emissions
1860
1900
1940
1960
1980
2000
2005
2030
2050
2100
Dust Ginoux
Volcanoes Dhiel
BB VdWerf
BC, POM, SO2 Nozawa
Fossil fuel BCPOM Bond
Fossil fuel BCPOM Bond
SO2 Stern
BC EMF Deangelo
BC, SO2 IASA
SO2 IPCC
AeroCom PRE
AeroCom B

Recommendations

Deviating from former IPCC scenarios an updated publicly available emission scenario for all aerosol species and precursors is needed for three time periods

- preindustrial to present
- satellite observation period (1979-2005)
- preindustrial to future

A median, a minimum and maximum scenario is recommended to best fulfill the need to explore uncertainty with respect to emissions.

Sector related emissions are needed to differentiate anthropogenic and economic sector related emissions.

A preliminary version is required to be available for the year 2007 to produce at an early stage an aerosol climatology of concentrations for realistic aerosol-climate runs

AeroCom working group Emissions

Participants for analysis: Bond, Nozawa, Dentener, Textor

Goals: range of values, future scenarios, 2030, 2100; determine constraints for model inputs

Processes and possible Diagnostics:

Short-term actions/experiments: min, max, median?
Express interest, desired emissions, be the link to other groups (e.g. EMF)
Aerosol sizes of emissions – relate to microphysics
How to implement emissions consistently through models?
Number fluxes
Separate physical properties at emissions and transport

Data to look at:

AeroCom working group Closure at super sites, air quality, Aerosol Microphysics & Size

Participants for analysis:
Participants experiments:

Goals:

Processes and possible Diagnostics:

Parameterization, data representativeness

Hygroscopic growth

Short-term actions/experiments: HTAP, look at anthropogenic and natural, separate experiment for dust,

Select sites – build on HTAP

Surface, PBL, troposphere

Look at different regions

Data to look at: AERONET, satellite, compositional, supersite data, IMPROVE, regional data?, look for global sites, maritime regions

AeroCom working group dust, Vertical profiles, Transport and Removal

Participants for analysis:
Participants: coordinate with CALIPSO science team

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments: use ground-based networks,
Relation between aerosol and clouds??
Passive tracer – passive CO (HTAP)
PBL vs. Troposphere, look at mesoscale models

Data to look at: lidar backscatter (corrected), extinction; how to use MISR?, aircraft campaigns

AeroCom working group Absorption, direct forcing

Participants for analysis: Participants experiments:

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments:

Data to look at:

AeroCom working group Vertical profiles

Participants for analysis: Ferrare, Winker, Schulz, Textor
Participants: Koch

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments:

Data to look at:

AeroCom working group Transport and Removal

Participants for analysis: Textor, Vignati, Mann, Stier
Participants: Takemura, Mann, Stier, Montanaro

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments:

Data to look at:

AeroCom working group Use of satellite data for models

Participants for analysis: Kinne, Winker, Kahn,

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments:

Data to look at:

AeroCom working group Air Quality

Participants for analysis:
Participants:

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments:

Data to look at:

AeroCom working group aerosol dynamics

Participants for analysis: Mann, Stier, Textor
Participants: Bauer, Vignati, Stier, Liu

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments:

Data to look at:

AeroCom working group Closure at super sites

Participants for analysis: Wilson
Participants: Mann

Goals:

Processes and possible Diagnostics:

Short-term actions/experiments:

Data to look at:

Analysis of HTAP experiments SR1 and SR6
Protocol and registration http://aqm.jrc.it/HTAP/

Determine maximum impact of long range transported aerosol to regional PM
Exp SR6: 20% reduction in three continental source regions / 2001 (and 2004)

…not all HTAP experiments are yet defined
Which experiments are desired?

Synergy with AeroCom:
SR1 could serve as basis for « AeroCom D » simulation
Joint development of tools
Joint analysis on tracer transport problems with reactive gas community

The TF HTAP has as an objective to prepare an assessment report by 2009 to inform the CLRTAP about its findings on HTAP and particularly on the source-receptor relationships for transcontinental transport of air pollution. In addition to this 2009 report, the TF is expected to provide an interim report on its findings in 2007 to inform the CLRTAP in its review of the 1999 Gothenburg Protocol, which addresses tropospheric ozone, acidification, and eutrophication. Both reports are to be accepted by the TF annual meetings (2007 and 2009) and reported to the fall EMEP Steering Body for adoption and communicated to the CLRTAP Executive Body. The reports will be published in the UNECE series for traceability and transparency.

HTAP model experiment description

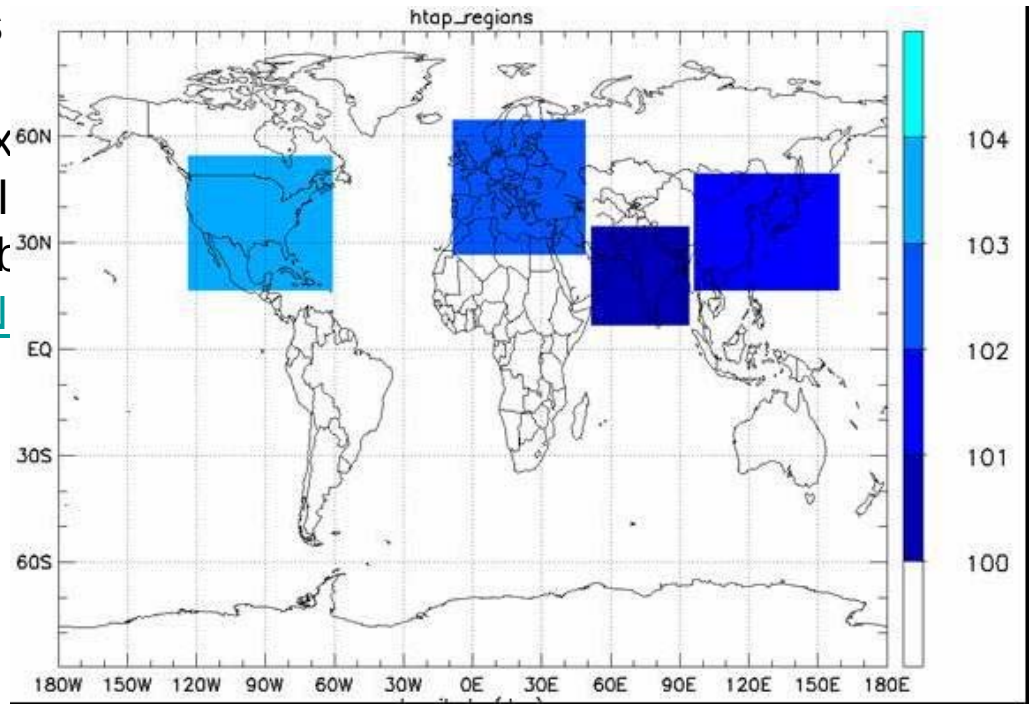
Experiment SR1 – base run

***Purpose**:* The base case simulation establishes a reference against which the perturbation experiments can be compared. It is also required in order to evaluate the models with observational data and to verify the emissions data that were used. The base simulation will be compared to measurement and checked for compliance with the output specifications.

Experiments SR6 – combined perturbations including aerosol

***Purpose**:* Evaluate the non-linearities emissions simultaneously.

***Description of model set-up**:* The ex same manner as SR1, only that the al methane) shall be reduced uniformly b different regions (Asia, Europe, and N perturbed at one time.



HTAP
Experiment TP1 – Passive CO tracer run

Purpose: Evaluate the transport characteristics of individual models and establish a link between ozone models, aerosol models, and mercury or POP models.

Description of model set-up*:* A simple passive tracer with prescribed surface emissions (CO_direct) and a fixed, globally uniform lifetime of 25 days shall be introduced into the model. Surface emissions and common parameterizations shall be adopted from the common data sets provided on the HTAP web site (see section 3.1 above). 4 additional tracers shall be defined to label “CO” from sources in East Asia, South Asia, Europe, and North America (CO_AS, CO_EU, and CO_NA). Where possible, another five additional tracers to simulate anthropogenic and biogenic NMVOC emissions (aVOC and bVOC) and the CO produced from their oxidation (CO_aVOC, CO_bVOC) and from the oxidation of methane (CO_CH4) should also be defined. A sample FORTRAN subroutine implementing this set-up into the ECHAM model will be provided on the HTAP web pages. If not all tracers can be defined in your model, we ask you to at least participate in this experiment with the simulation of the global CO tracer from direct emissions.

Other ideas:

Share of parameterizations in form of code
for test of effect of combination of different parameterization
In one model framework??
Pick most extreme parameterizations to test in one model?

Documentation and share of model code to allow
for better analysis and exchange of parameterizations?

Produce an aerosol climatology just from AeroCom
as input to climate and weather forecast models?

Automatization of model documentation
Maintenance of AeroCom database
Formatting standards
http://wiki.esipfed.org/index.php/Air_Quality/Chemistry_Naming_Conventions

Analyse wet deposition preocess with data from deposition
and concentration fields, contribute to wet scavenging
Workshop organised by Rasch and Rodriguez?

Questionnaire part I

1**) To which AeroCom working group would you like to contribute?**
1b) How do you want to eventually participate?
Experiment participation? (put an *Exp* behind working group)
Analysis participation? (put an *A* behind working group)
Task of any AeroCom working group:
Analyze Literature and AeroCom model output
Propose experiments or diagnostics for common experiments
Develop benchmark test based on data for constraining process modeling
Publish & Recommend range of best modeling practice
Absorption
Indirect effects
Direct Radiative forcing
Coupled aerosol climate simulations
Dust
Emissions
Transport & removal
Aerosol dynamics
AeroCom products and database (technical development)
NEW: Use of satellite data for models - validation, initialization, and assimilation
2) **Would you like to propose any other working group proposed?**
(Where could a joint analysis by an AeroCom team be successful and beneficial?)
3) **Would you like to have direct access to the AeroCom database?**
3b) **How**?: Account on LSCE machine?
File retrieval possibility?
Image catalogue retrieval?
Redo AeroCom analysis for your new model version?