The 5th Research Meeting of Ultrahigh Precision Meso-scale Weather Prediction Program

Development and basic research for the ultrahigh precision regional models

－高精度領域大気モデルの開発とそれを用いた基礎研究－

Fujio Kimura JAMSTEC

Development and basic research for the ultrahigh precision regional models

K-Computerでは降水過程などの物理過程の詳細な再現や空間詳細なシミュレーションができる。

“K Computer” allows to simulate the physical processes in much more detail than the conventional numerical weather prediction models.

たとえば下層大気の乱流過程や降水系における雲物理などを詳細に再現できる。

The typical examples are the turbulence in the lower atmosphere and the cloud physics in the precipitation systems.

乱流過程はこれまでの方法とは異なり、極めて空間解像度の高い数値モデルにより乱流を直接再現し、乱流が大きな流れに及ぼす効果を算定すること(**LES)**ができる(仮定が少い)。

Turbulent process can be simulated directly by extremely high spatial resolution numerical model(LES).

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降水過程についてはこれまでの雲物理の高度化に加えて、BINモデルでは雲粒の成長過程や雨粒や切片への変換をより直接的に計算できる。

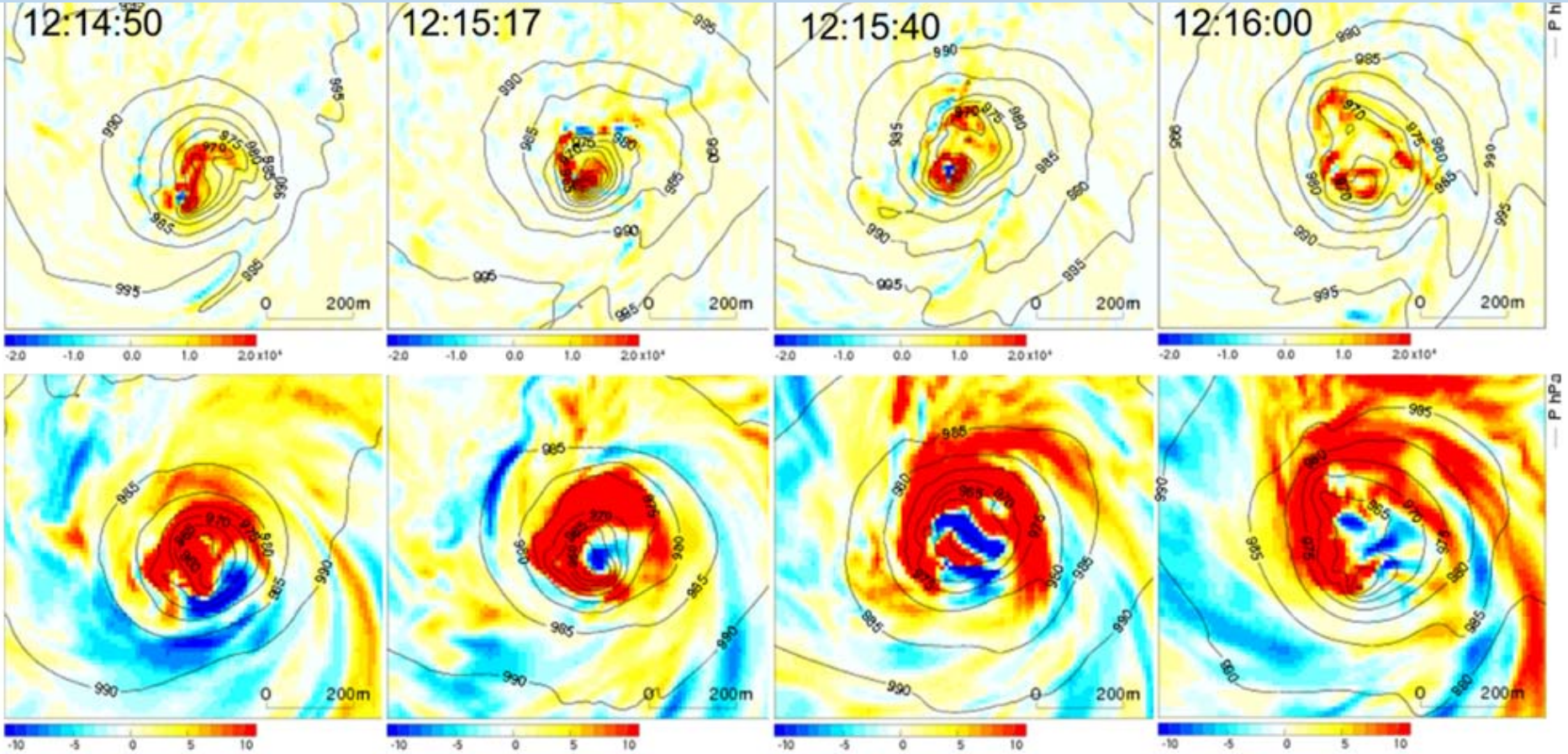
For the precipitation process, BIN method allows to directly estimate conversion between cloud particles, rain droplets and snowflakes.

これらの物理過程はこれまでの計算資源では、直接的に扱うことができず、仮定を含んだいわゆる「パラメタリゼーション」で実施されていた。超高速計算機による計算と**これまでの手法と比較することにより、数値モデルの向上に寄与できる。**

Since these physical processes were difficult to directly simulate by the past computer systems, the effects of these processes were estimated by the simplified methods, so called 'parameterizations'. Comparing with the detail simulation by K-computer, we are going to evaluate the error in the parameterizations and improve the mesoscale numerical models.

Super high-resolution simulation of the Tsukuba Supercell Tornado

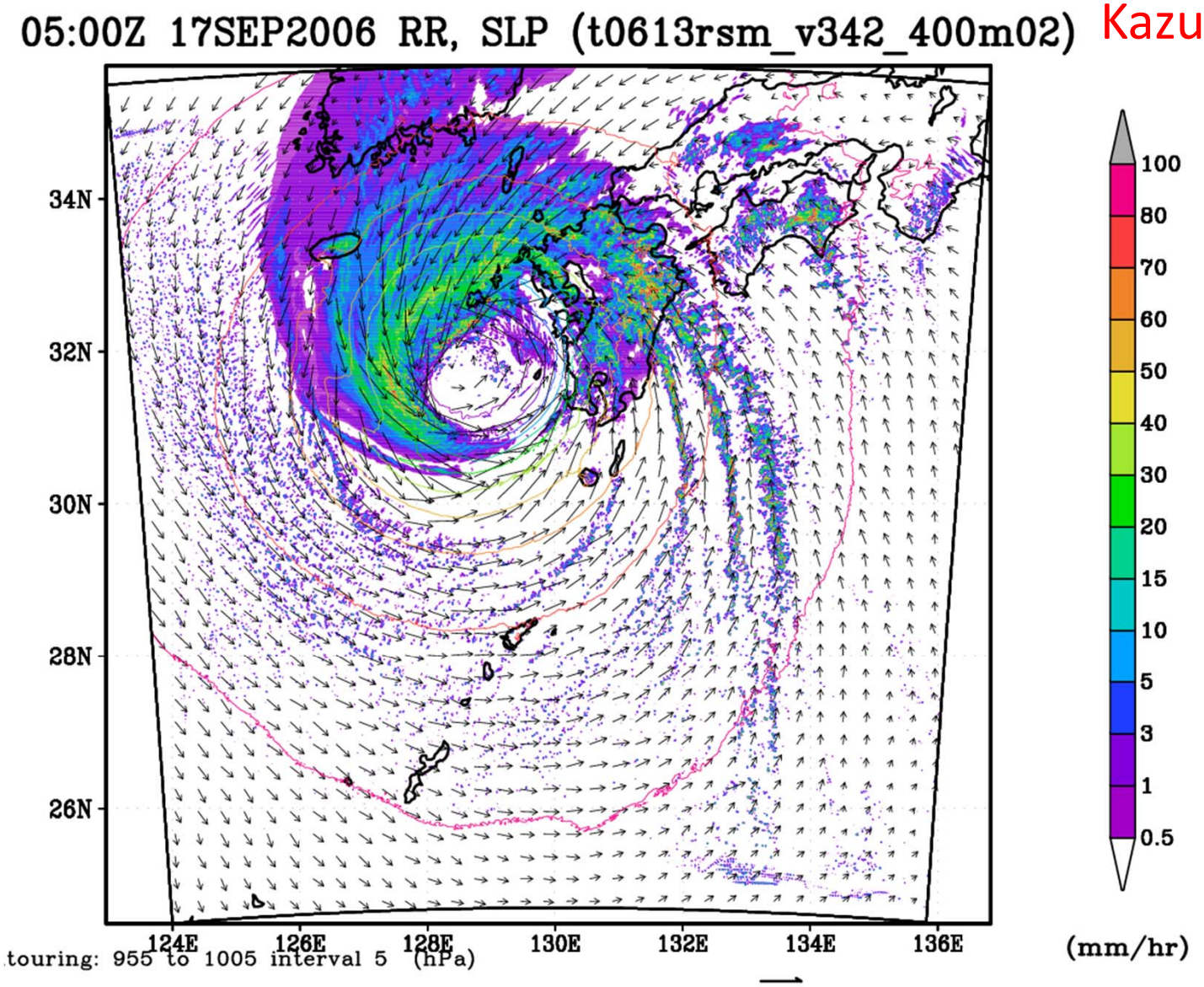
Wataru Mashiko (MRI)



The vertical vorticity at height of 26m (top)
Vertical velocity at height of 79m (lower)

Typhoon T0613(Shunshun) simulated in a 400m resolution numerical model

Kazuhisa Tsuboki



ビン法雲微物理モデルを用いた貿易風帯積雲境界層の数値実験

海洋研究開発機構　中村晃三

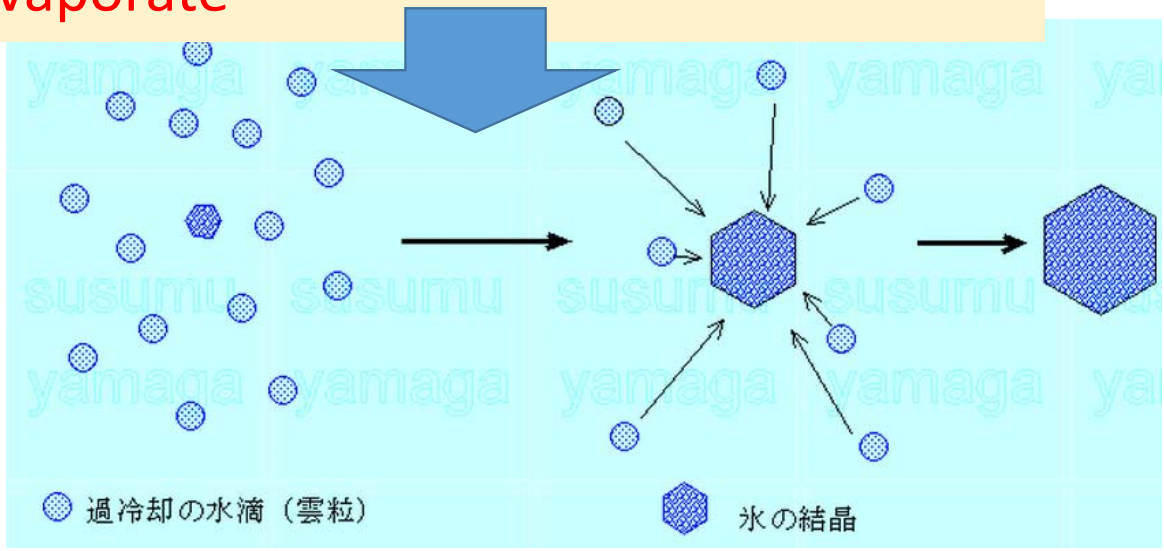
In Clouds

Cloud droplets form from water vapor

Cloud particles growth by water vapor

Raindrops form by Merging of cloud particles

Ice crystal growth water and Droplets evaporate



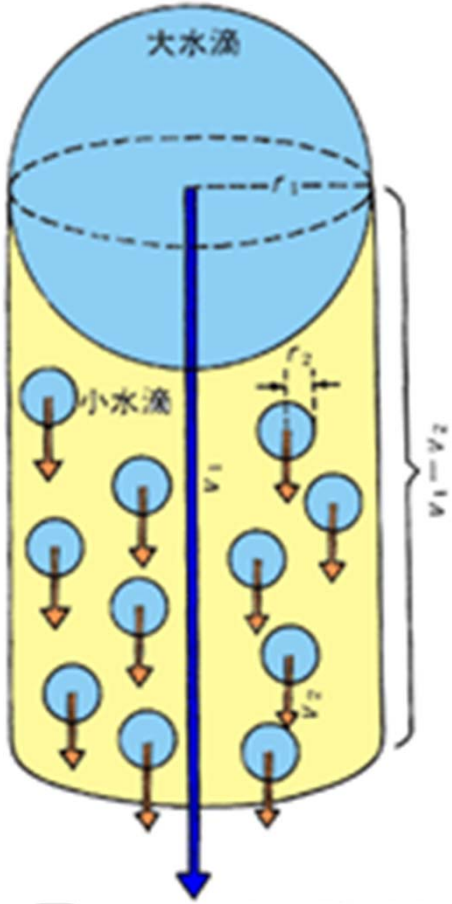


図１　併合過程の説明図

14:30-17:20	**Development and basic research for the ultrahigh precision regional models** (Chair: Fujio Kimura, JAMSTEC) (Conference hall)
	Future development for the ultrahigh precision regional models Fujio. Kimura (JAMSTEC)
	Super high-resolution simulation of the Tsukuba Supercell Tornado (2012): Structure and dynamics Wataru Mashiko (MRI)
	Explicit prediction experiment of tornadoes associated with a typhoon using a cloud-resolving model Kazuhisa Tsuboki (Nagoya Univ.)
	Dynamic energy efficiency of tropical cyclones with long-lived concentric eyewall in numerical simulation Satoki Tsujino (Nagoya Univ.)
15:20-15:40	**Coffee Break**
	Large eddy simulation on whole tropical cyclone using K-computer Junshi Ito (AORI)
	Cumulus convection scheme for gray zone Masato Sugi (MRI)
	The effects of moisture conditions on the organization and intensity of mesoscale convective systems in near moist-neutral stability Tetsuya Takemi (DPRI)
	Resolution dependency of mountainous snow cover simulated by Non-hydrostatic Regional Climate Model (NHRCM) Akihiro Kawase (MRI)
	The effects of the topography on the reproducibility of the Non-Hydrostatic Regional Climate Model Shinya Nosaka (MRI)
	Cloud simulation with multi-dimensional bin-microphysics model Akihiro Hashimoto (MRI)
	A comparative experiment of warm rain bin schemes using kinetic driver Kozo Nakamura (JAMSTEC)

New Chair Kozo Nakanura