

(2)

4

Recent Development in Four-Dimensional Variational Data Assimilation

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4D-Var

가

(data assimilation)

(objective analysis; :

Cressman, 1959) (initialization; :

Miyakoda and Moyer, 1968)

4D-Var

가

가

“ Incremental 4D-Var ” (Courtier et al. 1994),
“ Poor Man’s 4D-Var ” (PMV; Huang et al. 1997),
“Inverse 3D-Var ” (I3D-Var; Kalnay et al. 2000) . “ Incremental 4D-Var ”

(analysis increment),

가

1950

Sasaki

(Sasaki, 1955, 1958) 4

(four-dimensional variational

data assimilation: 4D-Var)

4D-Var

ECMWF Meteo-France 1997

2000

PMV

(optimal interpolation; OI)

()

(J)

가

()

I3D-Var

J =

0

(J)

(quasi-inverse linear

(adjoint model - Errico, 1997)

model)

Newton
 (Kalnay et al., 2000)
 가
 가
 Leslie et al. (2000)
 3
 40
 95%
 4D-Var 가 I3D-Var
 Var가 4D-Var 8 가 I3D-
 4D-Var hybrid
 (Li et al., 2000; Park and Kalnay,
 2002). Li et al. (2000)
 (incremental method)
 4D-Var
 Park and Kalnay (2002) I3D-Var
 4D-Var 4D-Var
 2
 I3D-Var 4D-Var
 가 4D-Var
 (hybrid)
 I3D-Var
 4D-Var
 4D-Var
 4D-Var
 가

가 4D-Var
 가 가
 4D-Var
 가
 :
 (ARGO)
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