New geometry setup for ALADIN and FULPOS

Martin Janoušek
CHMI

Geometry setup

- definition of projection and domain
- for ALADIN (all configurations) and FULLPOS (e927, ee927)
- parameters of projection and domain + software EGGX (Joly, 1991)
- projections must be conformal
- calculation of latitude/londitude of GP, map factor, north pole direction, horizontal resolution

EGGX definition (1)

- basic projection definition by ERPK, ELAT0, ELON0
  - Mercator: ERPK=0
  - Lambert: ERPK between 0 and 1 - the cone parameter; ELAT0 defines one secant latitude; ELON0 the vertical longitude
  - stereographic: ERPK=1; ELON0 is the vertical longitude

EGGX definition (2)

- size of the domain (NDLUX,NDGUX)
- corners of the domain ELON1, ELAT1, ELON2, ELAT2 (they can be further modified by EGGX in case of rotation and/or isotropy)
- additional rotation: ELATR, ELONR, EBETA
- force isotropy: NSOTRP=1
- optimization of projection: set ERPK=10 and wonder

EGGX definition (3)

- very general, very complex
- sometimes unexpected results when using advanced options
- only limited subset (of simple cases) really used
- some possible but never used cases are complicating life

=> time for change

New geometry software

- Jean-Daniel Gril, 2000
- survey on used domains and projections
- development of new geometry package
- limited subset of projections and domains:
  - no additional rotation
  - only tangent Lambert
- more predictive definition of domain
- implementation in CY26

New projection definition

ELON0, ELAT0

~~ERPK~~

~~ELONR, ELATR~~

~~EBETA~~

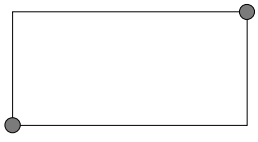
~~NSOTRP, NGIV0~~

New domain definition

EGGX:

ELON1, ELAT1
ELON2, ELAT2
NDLUX, NDGUX

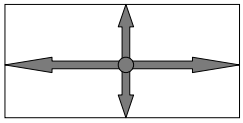
EDELX, EDELY
GELAM, GELAT, GM



EGGPACK:

ELONC, ELATC
EDELX, EDELY
NDLUX, NDGUX

GELAM, GELAT, GM



EGGPACK

- FORTRAN 90 module procedures
- conversion functions (latlon<->xy)
- MAKDO – replacement of EGGX (input in TYPEs)

```
USE EGGPACK
...
TLKRES%LON      = ELON0*ZRDTODG
TLKRES%LAT      = ELAT0*ZRDTODG
TLCENT%LON      = ELONC*ZRDTODG
TLCENT%LAT      = ELATC*ZRDTODG
TLKRES=ANGLE_DOMAIN(TLKRES,RPI,'+-','D')
TLCENT=ANGLE_DOMAIN(TLCENT,RPI,'+-','D')
TLDEL%ONX       = EDELX
TLDEL%ONY       = EDELY
TLNB_PTS%ONX    = NDLUXG-NDLUNG+1
TLNB_PTS%ONY    = NDGUXG-NDGUNG+1

CALL MAKDO(TLKRES,TLCENT,TLDEL,TLNB_PTS,TLGRID_LOLA,&
       &ZGRID_MF,TLGRID_PGN,TLGRID_INFO,TLERR,.TRUE.,.TRUE.,&
       &RPI,RA,NULOUT)

TLMODDOM=TLGRID_INFO%INFO_PROJ
ERPK = TLMODDOM%KL
ELON1= TLGRID_LOLA(1,1)%LON
ELAT1= TLGRID_LOLA(1,1)%LAT
ELON2= TLGRID_LOLA(TLNB_PTS%ONX,TLNB_PTS%ONY)%LON
ELAT2= TLGRID_LOLA(TLNB_PTS%ONX,TLNB_PTS%ONY)%LAT
```

Implementation in the ARPEGE/ALADIN

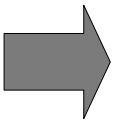
- in AL25T1: ald/module/eggpack.F90, ald/module/eggangles.F90
- problem I: namelist changes
- problem II: compatibility of namelist and input/output file cadres (echien-like consistency checks)
- model can read and write files in both new and old format (except exceptions)

Namelists changes

- **NEMGEO**:
  ELON0, ELAT0,
  ELONC, ELATC, EDELX, EDELY
- **NAMFPG**:
  FPLON0,FPLAT0
- **NAMFPD**:
  RLONC(NDOM), RLATC(NDOM),
  RDELX(NDOM), RDELY(NDOM)

New file *CADRE* definition

NROTEQ	**-1**
ELONR	ERPK
ELATR	ELON0
ELON1	ELAT0
ELAT1	ELONC
ELON2	ELATC
ELAT2	EDELX
ELON0	EDELY
ELAT0	ELX
ERPK	ELY
NSOTRP	EXWN
NGIV0	EYWN
ELX	ELON1
ELY	ELAT1
EDELX	ELON2
EDELY	ELAT2
EXWN	*free*
EYWN	*free*



Output file *CADRE* format

- namelist NAMOPH controls the output file cadre formats
  - NCADFORM=0: old cadre format
  - NCADFORM=1: new cadre format

Migration notes

- good convertors (namelists and files) wanted!
- make a project or a deal
- call the model with command-line parameters allowing NEMGEO empty
- convert NAMFPD and NAMFPG in e927/ee927 namelists
- keep NCADFORM=0 as long as all downstream applications (tools and **model**) can handle the new format of cadre
- convert climate files to new format or generate them with new 923 (NCADFORM=1)
- patch all tools using FA files on input (chagal, gribeuse, edf, frodo, tempgen, …)

Consequence on the postprocessing tools

- after CALL FACIES different parsing of PSINLA array
- replace CALL EGGX by CALL MAKDO

Excercise

- port EGGPACK and EGGANGLES
- write convertor of NEMGEO, NAMFPD, NAMFPG from old to new
- write convertor of a file cadre from old to new