A tribute to

Jean-François Geleyn

6 February 2020

Météo-France Conference Centre

Toulouse, France

A slideshow prepared by Pascal Marquet and many contributors, thank you all!

CURRICULUM VITAE

GELEYN Jean-François

French

Né le 22-01-1950 à Cousolre (Nord).

Totalement trilingue : français, allemand, anglais.

Ingénieur de la Météorologie depuis 1973, Ingénieur en Chef de la Météorologie depuis 1981.

1966 Baccalauréat C, mention TB.
1968 Admis à Ecole Normale Supérieure St Cloud (9ème),
Ecole Normale Supérieure Ulm (23ème)
et Ecole Polytechnique (36ème).
1971 Ingénieur de l'Ecole Polytechnique (rang de sortie = 8).
1973 Ingénieur de l'Ecole Nationale de la Météorologie (rang de sortie = 1).
1973/1975 Stage de recherche à l'Université de Mayence (RFA).
1975/1976 Affecté à l'Etablissement d'Etudes et de Recherches Météorologiques (EERM) de la Direction de la Météorologie Nationale (DMN).
1976/1982 Détaché au Centre Européen de Prévision Météorologique à Moyen Terme (CEPMMT), Département de la Recherche, Reading (Royaume Uni).
1983 Retour à DMN/EERM/ Centre de Recherches en Météorologie Dynamique (CRMD).
1985 Nommé chef du CRMD.

CURRICULUM VITAE

GELEYN Jean-François

English

Born 22-01-1950 in Cousolre - Nord - France.
1966 Baccalauréat C.
1968 Admitted to Ecole Normale Supérieure St Cloud,
Ecole Normale Supérieure Ulm
and Ecole Polytechnique.
1971 Ingénieur de l'Ecole Polytechnique (Paris).
1973 Ingénieur de l'Ecole Nationale de la Météorologie (Paris).
1973/1975 Guest student at University of Mainz (F.R. of Germany).
1975/1976 Working at EERM (research branch of the French Weather Service) (Paris).
1976/1982 Working in ECMWF's research department, Reading (U.K.).
1983 Back to EERM/CRMD (NWP research unit) (Paris).
1985 Head of EERM/CRMD.

Two old CURRICULUM VITAE written by Jean-François:

A levels/High school (Bac.) at the age of 16!

He joined Polythechnique at the age of 18!

(he was better ranked 23rd at the ENS-Ulm)

He chose the Météo in spite of his rank of 8th when leaving Polythechnique

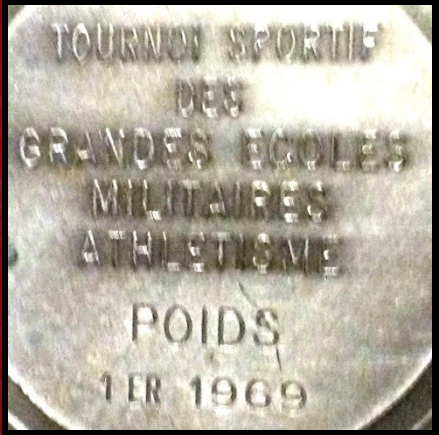
← Jean-François won a silver medal at 16 years old in judo (1966 European vice-champion)

Jean-François liked to play sports! (decathlon, and here judo)

Jean-François himself practicing judo

← He won a French Gold medal at 17 years old (1967)

(Radmila)



Jean-François himself → practicing shot put

A real athlete!

Jean-François was the 1969 champion of shot put (“lancer du poids”) at 19 years old and for Polythechnique

(French military high schools athletics competition)

An anecdote about the 4x100m :
the only place for Jean-François was on the opposite straight line (the second leg), because he was too heavy to start quickly… and to be a "bend runner" over the oval track!

Emanuel Legrand

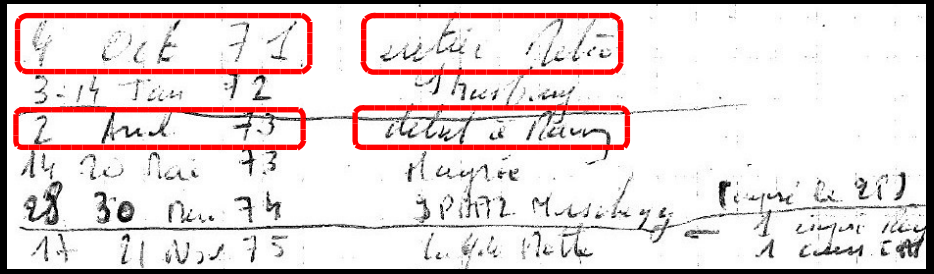
← Jean-François himself practicing the long jump

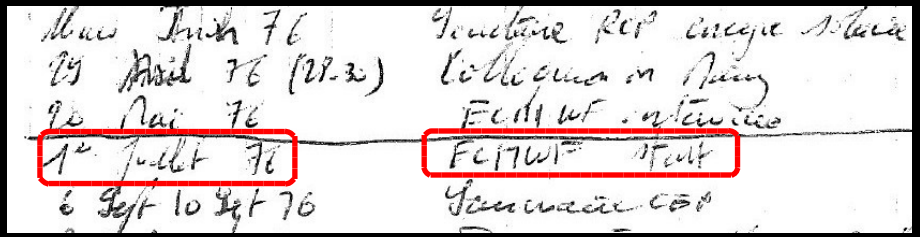
The rumor is confirmed:
Jean-François and his brother met
Guy Drut (the future Olympic gold medalist
in Montreal, also born in 1950 in Oignies,
in the same region in the north of France)…
they competed together in inter-club athletics!

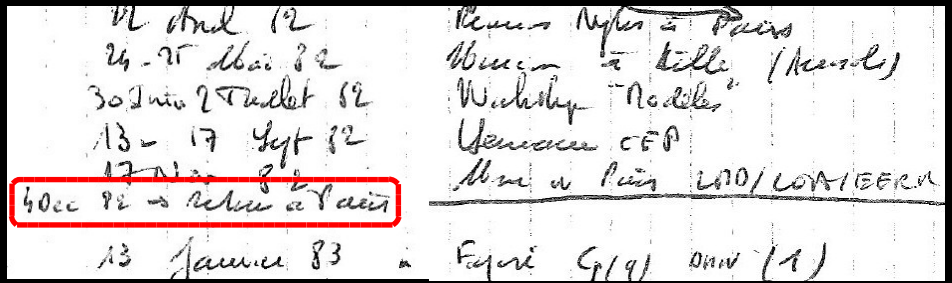
Dominique, Jean-François' Brother

Alain Craplet

He remembers that he and his classmates at the Polytechnic school, during a class with a view of the athletic track, were more fascinated by Jean-François' “pole vaulting” ("saut à la perche") trials than by what the teacher said!







A timeline maintained by Jean-François (starting in 1971)

← Entrance at the French "National Meteorology" (4 Oct. 1971, age of 21).

← 2 April 1973: start Guest student at the University of Mainz (Germany)

← 1st July1976: start ECMWF

← 4th Dec. 1982: back to France (Paris, CRMD)

The words and thoughts of Jean-François.

At the end of the polytechnic school (1971), I entered the French National Meteorology essentially because I wanted to be sure of doing scientific and technical work in a great State Agency and, if possible, with a strong international component.

I consider that I then lost any advanced specialization in a given field, having a rather particular profile from this point of view in the international NWP community.

At the University of Mainz (1973-75), I first specialised in radiation parameterisation, which remains one of my favourite subjects, then in one-dimensional models on the vertical, to gradually broaden my field of expertise to include all physical parameterisations, and then to the problem of numerical prediction taken as a whole.

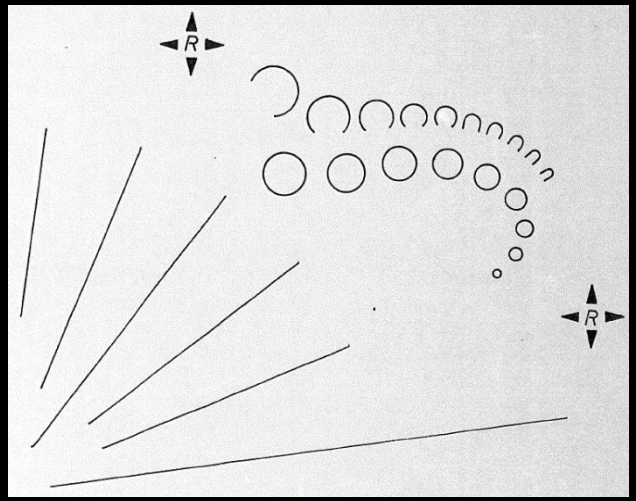
► COURS DE RAYONNEMENT ◄

▷ JEAN-FRANÇOIS GELEYN ◁

– 1975 –

ECOLE NATIONALE DE LA METEOROLOGIE

LE RAYONNEMENT EN METEOROLOGIE DYNAMIQUE



Jean-François became soon a specialist of the radiation codes: here his first course in 1975! (in French)

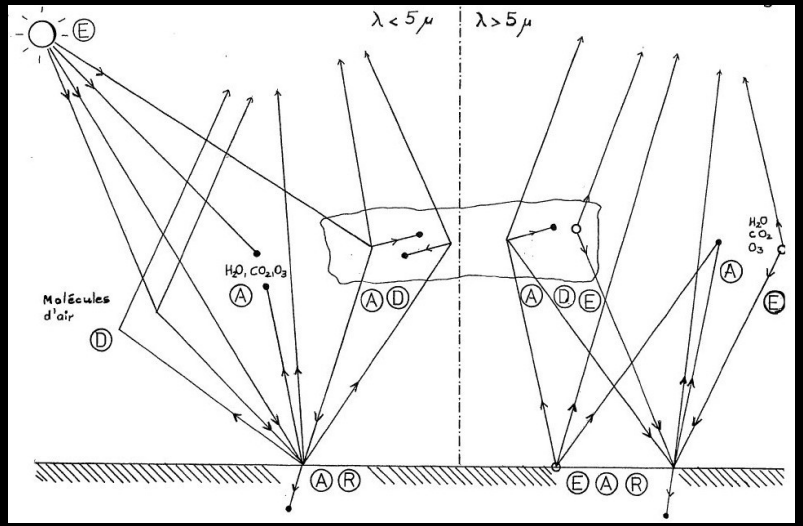
PLAN DU COURS page

CHAPITRE 1 INTRODUCTION À L'ÉTUDE DU RAYONNEMENT EN MÉTÉOROLOGIE

1.1. Pourquoi le rayonnement en météorologie?

La réponse à cette question est relativement simple au premier abord : le soleil est la seule source d'énergie impor-tante du système terre-atmosphère et les seuls échanges énergé-tiques que ce système peut avoir avec l'extérieur sont radiatifs. L'équilibre du bilan radiatif (rayonnement reçu = rayonnement émis) détermine par conséquent le budget énergétique de l'at-mosphère.

Mais lorsque l'on examine le problème de plus près, on s'aper-çoit que le rayonnement et les divers autres phénomènes météo-rologiques sont localement étroitement interdépendants et que nous ne possédons qu'une connaissance imparfaite des mécanismes d'action réciproque mis en jeu. Ceci explique qu'il est mainte-nant nécessaire d'introduire en détail les effets du rayonnement dans les modèles de prévision numérique pour passer du stade de la prévision à deux jours à celui hypothétique de la prévision à une semaine. Malheureusement ce problème, même séparé de son contexte météorologique, reste extrêmement compliqué, à cause d'un grand nombre d'effets physiques intervenant dans l'interaction rayonnement-matière. Nous ne pouvons y apporter que des solutions approchées pour lesquelles nous sommes confrontés au dilemme exactitude ou simplicité.



Jean-François became soon a specialist of the radiation codes: here his first course in 1975! (in French)…

Would you be interested in a copy?

MAI 1975 JF GELEYN

The words and thoughts of Jean-François.

Jean-François loved G.O.T., (Game of Thrones) and he could have given evil advice to writers !

Pascal Marquet

Don't try to convince someone with too much force, because either he will think about it afterwards with a time delay, and then it's not a bad thing that he had a bit of a bad conscience when he starts to change his mind, or he persists in his denial, and it would need such other things to make him change his mind!

MINISTÈRE DE L'ÉQUIPEMENT, DU LOGEMENT, DE L'AMÉNAGEMENT DU TERRITOIRE
ET DES TRANSPORTS

LE MINISTRE DÉLÉGUÉ
CHARGÉ DES TRANSPORTS

DIRECTION DE LA MÉTÉOROLOGIE NATIONALE

Boulogne le 19 OCT. 1987

ETABLISSEMENT D'ETUDES ET DE RECHERCHES MÉTÉOROLOGIQUES
007839 | 19 OCT. 87
ARRIVÉE

Affaire suivie par : C. PASTRE
Téléphone : 2630 43512
Référence à rappeler :

MN/DA

à

MN/D EERM/D
MN/EX CRMD/C
MN/PR SCEM/D
TTI/C
PREVI/C

MM. ROCHAS, GELEYN, JARRAUD, BÉTOUT, CLOCHARD, COIFFIER

Start of ARPEGE Project (1987)

Objet : Démarrage du projet ARPEGE

Vous êtes invités à participer à la réunion de lancement du projet ARPEGE le :

4 Novembre 1987 à 14 heures
salle 608 à Boulogne

- contenu du projet
- calendrier
- ressources
- organisation

M. ROCHAS, Chef de Projet désigné, fera parvenir directement aux destinataires de la présente convocation les documents de travail nécessaires.

Pour le Directeur de la Météorologie nationale
L'Adjoint au Directeur,

C. PASTRE

LANCEMENT DU PROJET ARPEGE

Start of the ARPEGE project in November 1987

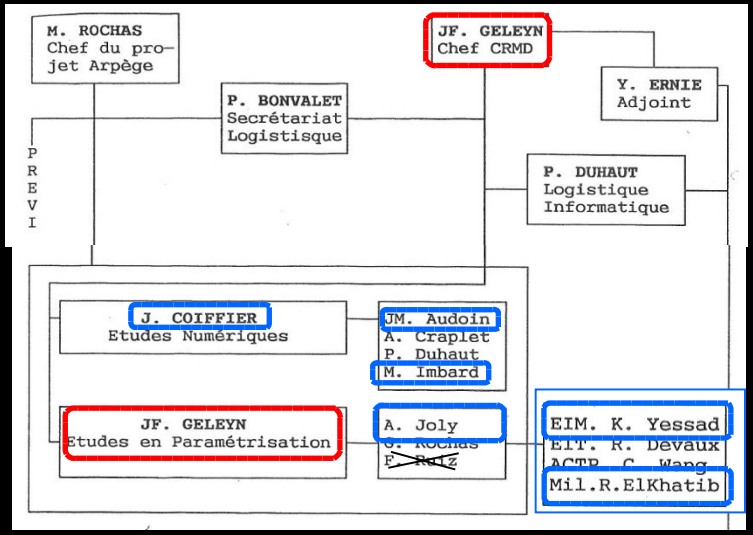
Le 1er Novembre sera la date officielle de mise en route d'un projet commun EERM/SCEM sur la prévision numérique, projet baptisé ARPEGE. Il s'agit de donner à cette occasion une plus grande spécificité à ce qu'on désignait jusqu'ici comme la phase 3 du Projet CRAY II.

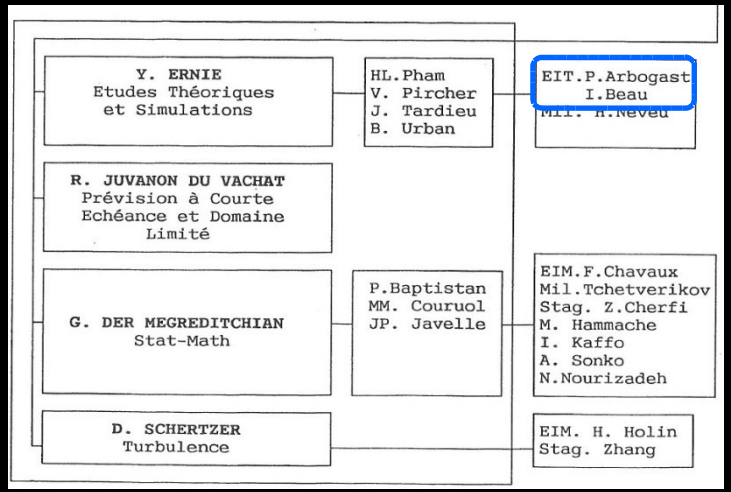
Already with the goals: 4D-Var, semi-lagrangian, full water cycle, standardisation, diagnostics

Une stratégie d'ensemble du projet s'est déjà dégagée sur certains points :

- Evolution progressive des systèmes d'analyse de l'interpolation optimale intermittente vers (à long terme) l'assimilation variationnelle continue ;
- Choix de la technique spectrale globale à résolution variable et de l'intégration semi-lagrangienne pour la dynamique ;
- Refonte de la paramétrisation du cycle de l'eau ;
- Banques de données indépendantes de la structure interne des modèles ;
- Standardisation poussée du nouveau système ;
- Système ambitieux de diagnostics opérationnels.

Le projet placé sous la direction de M. Rochas sera confié à une équipe mixte CRMD et Prévi sur le site de l'Alma qui travaillera en collaboration avec le CEPMMT, le LMD Paris et le CNRM.





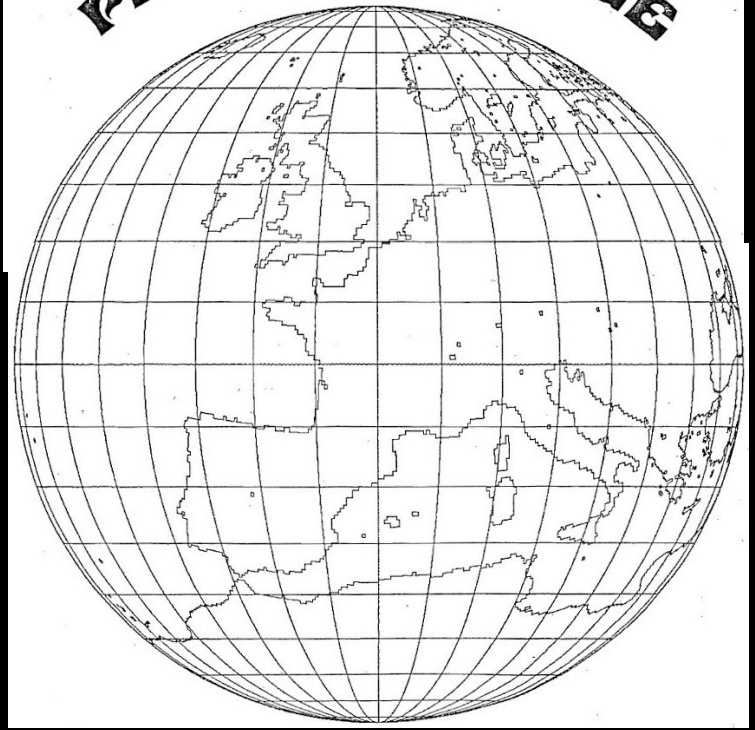
ORGANIGRAMME DU CRMD AU 1er JANVIER 1988

Jean-François was already the head of the CRMD and the effective head of the parameterization team… a little bit like in GMAP !

With already many people next at (or close to) GMAP: Alain Joly, Karim Yessad, Ryad El-Khatib, Jean-Marc Audoin, Philippe Arbogast, Jean Coiffier, Isabelle Beau, …

With many other people already at Prévi-Num or in next "CRMD/Prévi-Num" ARPEGE team (1989-91): Philippe Courtier (return from ECMWF in 1989), P. Moll, Y. Bouteloup, F. Rabier, C. Freydier, Ph. Caille, E. Bazile, J.-M. Piriou, J. Clochard, P. Marquet, R. Pelletier, P. Benichou, F. Dupont, M.-C. Pierrard, L. Labbé, S. Malardel, F. Taillefert, …

PROJET ARPEGE



DIRECTION DE LA METEOROLOGIE NATIONALE

Octobre 1987.

Le projet ARPEGE a pour but le développement d'un système destiné à servir à la fois de système opérationnel pour la prévision du temps à courte échéance et d'outil de recherche en analyse, en prévision numérique, pour la simulation à mésoéchelle et le climat.

La triple finalité du système:

- système opérationnel,
- recherche pour l'évolution du système opérationnel,
- recherche à mésoéchelle et climat

A 3D-Var as a transition toward the 4D-Var…
A risky idea: the variable-resolution model!
(with Schmidt's paper suggested by B. Machenauer)
Meso-scale and Climate, without limited area model

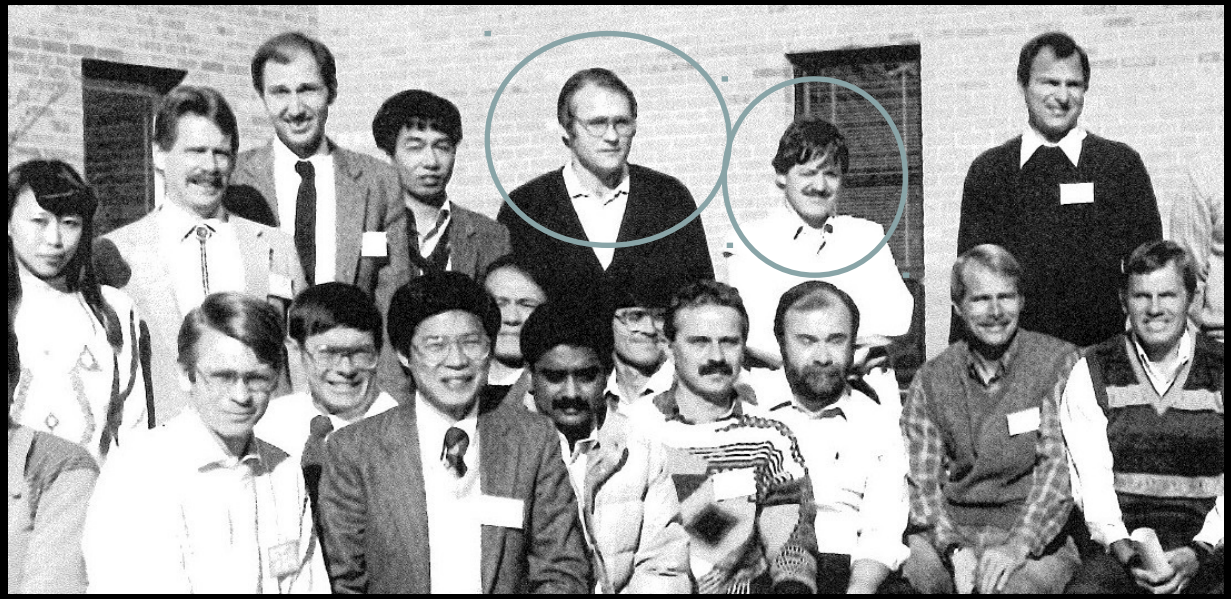
1. On vise le remplacement du système actuel d'analyse optimale par un système d'analyse variationnelle quadridimensionnelle. Cet objectif est ambitieux car une telle analyse ne pourra pas fonctionner sur un calculateur aussi peu puissant que le Cray 2. Une transition naturelle entre le système actuel et ce système futur est constituée par un système d'analyse variationnelle tridimensionnelle, s'appuyant éventuellement sur l'analyse optimale.

2. On vise le remplacement du couple Emeraude-Péridot par un modèle unique, pour lequel la résolution serait variable, proche de celle de Péridot sur la France, sans doute inférieure à celle d'Emeraude sur l'hémisphère Sud. Un tel modèle devrait assurer une transition plus continue que dans un système de modèles couplés, entre la grande maille et la petite maille.

3. La physique des modèles doit évoluer vers une meilleure description de l'eau atmosphérique pour ouvrir la voie de la prévision du temps sensible.

Catherine Freydier

We went down with Jean-François in the tunnels of Alma (Paris) to pick pallets of papers for Laser Printers... when we took one pallet, each, Jean-François took 3 pallets at once!



← Jean-François with Maurice Imbard at a workshop in 1988 (Boulder, Colorado, USA)

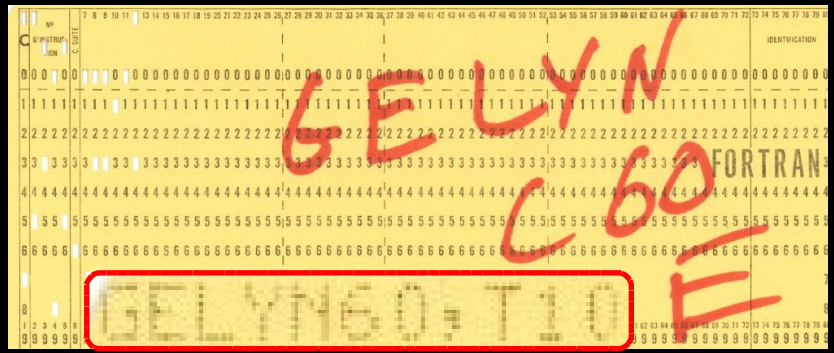
About the ancestor of ALADIN (PERIDOT) and a "new model" to come: **ARPEGE** !

JP Geleyn

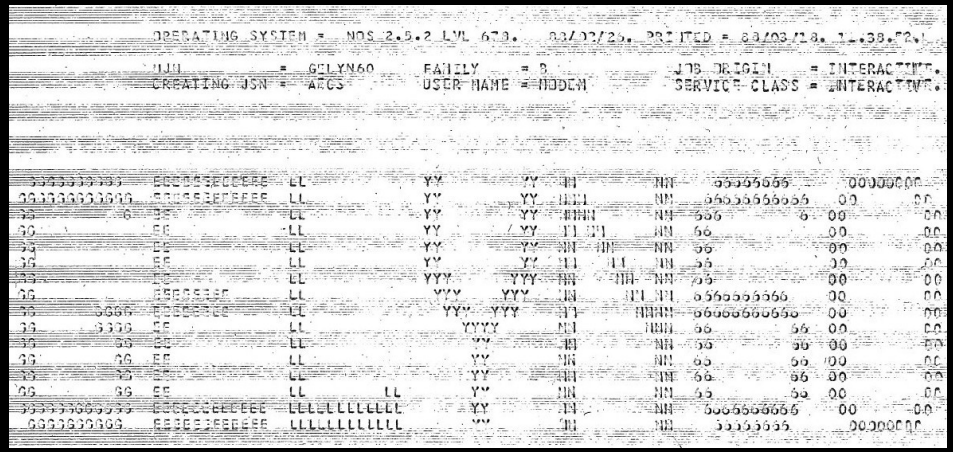
Proceedings

Workshop on Limited-Area Modeling Intercomparison

15 - 18 November 1988 Boulder, Colorado



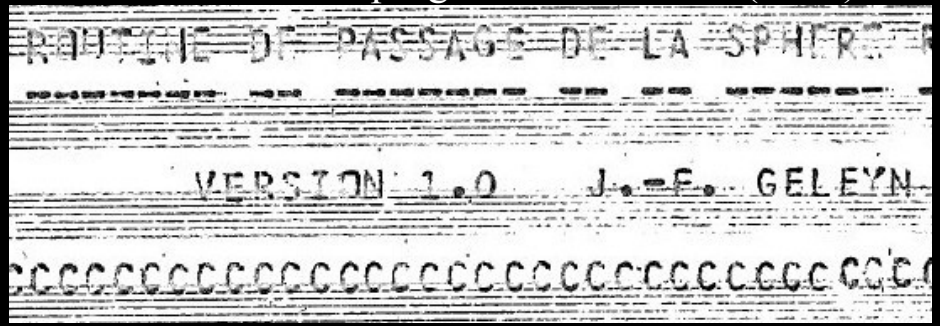
It was a time without Internet, without PC, without USB nor even floppydisk: only with “punch cards”!
(like this one from a program of Jean-François)



No PDF files: just LISTING with hundredth of pages!

The good old days?

Ex.: the start of a program “RETOCA” (1988) →



from the “real” sphere to the “computation” sphere

Bodo and Jean-François
(International Radiation Symposium
Lille on 18-24 August 1988)

When J.-F. visited my Professor W. Zdunkowski at Mainz in 1982, I was a student not even aware of ECMWF! However, J-F's enthusiasm was infectious and he trained me for the interview, and I got the job!

I can not stress strongly enough how my early years a scientist in the field of meteorology were influenced by Jean-Francois.

Bodo Ritter and J.-F. Geleyn (MWR, 1992) :
"A comprehensive radiation scheme…"

I

Bodo and Jean-François
(International Radiation Symposium
Lille on 18-24 August 1988)

I realy enjoyed working with J-F.
My personal impression was, and is, that J.-F.
was one of the most, if not the most important
developers of the ECMWF model at that time.

Bodo Ritter and J.-F. Geleyn (MWR, 1992) :
"A comprehensive radiation scheme…"

Jean-François was an extremely dedicated scientist,
overflowing with ideas, knowledge, experience
and willingness to share everything
with those people prepared to join him.
He was a kind of mentor for me.

```
C****                                                                   YTQSAT
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC YTQSAT
C                                                                     C YTQSAT
C     INITIALISATION DES GRANDEURS THERMODYNAMIQUES UTILES            C YTQSAT
C     ----------------------------------------------------            C YTQSAT
C                                                                     C YTQSAT
C                YTQSAT          G. ROCHAS 31/3/1989                  C YTQSAT
C                                VERSION 1.0                          C YTQSAT
C                                                                     C YTQSAT
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC YTQSAT
```

The aim of J.-F.: to transform the physics of EMERAUDE (here YTQSAT, G. Rochas, 1983) into the ARPPEGE (1989) project framework

```
C-------------------------------------------------------------------- YTQSAT
C     II- CALCUL DE L HUMIDITE SPECIFIQUE SATURANTE DU THERMO. MOUILLE  YTQSAT
C     DONT DEDUIT LA TEMPERATURE, PAR UNE METHODE DE NEWTON ETENDUE: VOIR YTQSAT
      DO 6 JK=1,NK                                                      YTQSAT
CBIB * IF NEIGE : CALCUL DE LA CHALEUR LATENTE SUIVANT TFS             YTQSAT
      DO 20  JI = KIDEB, KIUT                                           YTQSAT
      ZXLN(JI) = XL + XLF*(SIGN(0.5,TDO-TFS(JI,JK))+0.5)                YTQSAT
   20 CONTINUE                                                          YTQSAT
CBIB * ENDIF (NEIGE)                                                    PSD29A86
CBIB * IF -NEIGE UTILISATION UNIFORME DE XL                             YTQSAT
CBIB * ENDIF (-NEIGE)                                                   PSD29A86
      DO 10 JI=KIDEB,KIUT                                               PSG17A85
      XLSCPE(JI,JK)=ZXLN(JI)/CPH(JI,JK)                                 PSG17A85
   10 CONTINUE                                                          PSG17A85
      DO 7 NT=1,NBIT                                                    YTQSAT
      DO 8 JI=KIDEB,KIUT                                                YTQSAT
       ZEW = FOEW ( TW(JI,JK) )                                         YTQSAT
       ZEWSP = ZEW / PM(JI,JK)                                          YTQSAT
       ZDERI = FODE ( ZEW, TW(JI,JK) )                                  YTQSAT
       ZQOW = FOQS ( ZDERI, ZEWSP, PM(JI,JK) )                          YTQSAT
       ZQW = FOQS ( ZEWSP )                                             YTQSAT
      Z1QW(JI)=ZQW                                                      PSG02C84
      ZDELTAQ= ( ZQW-QW(JI,JK) ) /(1.+XLSCPE(JI,JK)*ZQW)                YTQSAT
      ZDELTAT=-XLSCPE(JI,JK)*ZDELTAQ                                    YTQSAT
      TW(JI,JK)=TW(JI,JK)+ZDELTAT                                       YTQSAT
      QW(JI,JK)=QW(JI,JK)+ZDELTAQ                                       YTQSAT
    8 CONTINUE                                                          YTQSAT
      IF(NT.NE.1) GO TO 7                                               PSG02C84
      DO 4 JI=KIDEB,KIUT                                                PSG02C84
      QSAT(JI,JK)=Z1QW(JI)                                              PSG02C84
    4 CONTINUE                                                          PSG02C84
    7 CONTINUE                                                          YTQSAT
    6 CONTINUE                                                          YTQSAT
      RETURN                                                            YTQSAT
      END                                                               YTQSAT
```

EMERAUDE

```
C****                                                                  YTQSAT
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC  YTQSAT
C                                                                  C   YTQSAT
C     INITIALISATION DES GRANDEURS THERMODYNAMIQUES UTILES         C   YTQSAT
C     ----------------------------------------------------         C   YTQSAT
C                                                                  C   YTQSAT
C     YTQSAT          C. POCHAS 31/3/1989                        C   YTQSAT
C                     VERSION 1.0                                C   YTQSAT
C                                                                  C   YTQSAT
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC  YTQSAT
```

The draft code of Jean-François →

```
C-------------------------------------------------------------------  YTQSAT
C     II- CALCUL DE L HUMIDITE SPECIFIQUE SATURANTE DU THERMO. MOUILLE YTQSAT
C     DONT DEDUIT LA TEMPERATURE, PAR UNE METHODE DE NEWTON ETENDUE: VOIR YTQSAT
      DO 6 JK=1,NK                                                     YTQSAT
CBIB  * IF NEIGE : CALCUL DE LA CHALEUR LATENTE SUIVANT TFS            YTQSAT
      DO 20  JI = KIDEB, KIJT                                          YTQSAT
      ZXLN(JI) = XL + XLF*(SIGN(0.5,TDO-TFS(JI,JK))+0.5)               YTQSAT
   20 CONTINUE                                                         YTQSAT
CBIB  * ENDIF (NEIGE)                                                  PSD29A86
CBIB  * IF -NEIGE UTILISATION UNIFORME DE XL                           YTQSAT
CBIB  * ENDIF (-NEIGE)                                                 PSD29A86
      DO 10 JI=KIDEB,KIJT                                              PSG17A85
      XLSCPE(JI,JK)=ZXLN(JI)/CPH(JI,JK)                                PSG17A85
   10 CONTINUE                                                         PSG17A85
      DO 7 NT=1,NBIT                                                   YTQSAT
      DO 8 JI=KIDEB,KIJT                                               YTQSAT
       ZEW = FOEW ( TW(JI,JK) )                                        YTQSAT
       ZEWSP = ZEW / PM(JI,JK)                                         YTQSAT
       ZDERI = FODE ( ZEW, TW(JI,JK) )                                 YTQSAT
       ZQW = FOQS ( ZEWSP, ZDERI, ZEWSP, PM(JI,JK))                    YTQSAT
       ZQW = FOQS ( ZEWSP )                                            YTQSAT
      Z1QW(JI)=ZQW                                                     PSG02C84
      ZDELTAQ= ( ZQW-QW(JI,JK) ) /(1.+XLSCPE(JI,JK)*ZDQW)              YTQSAT
      ZDELTAT=-XLSCPE(JI,JK)*ZDELTAQ                                   YTQSAT
      TW(JI,JK)=TW(JI,JK)+ZDELTAT                                      YTQSAT
      QW(JI,JK)=QW(JI,JK)+ZDELTAQ                                      YTQSAT
    8 CONTINUE                                                         YTQSAT
      IF(NT.NE.1) GO TO 7                                              PSG02C84
      DO 4 JI=KIDEB,KIJT                                               PSG02C84
      QSAT(JI,JK)=Z1QW(JI)                                             PSG02C84
    4 CONTINUE                                                         PSG02C84
    7 CONTINUE                                                         YTQSAT
    6 CONTINUE                                                         YTQSAT
      RETURN                                                           YTQSAT
      END                                                              YTQSAT
```

EMERAUDE

II - BOUCLE DE NEWTON POUR LE POINT "THERMOMETRE MOUILLE"

```
      DO 310  JIT = 1, NBIT
      DO 310  JD = NIDIA, NFDIA
      ZDCP  = RCPV - RCW
      IF (LNEIGE) THEN
        ZDCP = ZDCP +(RCW - RCS)* AMAX1 (0., SIGN (1., RTT - PTW (JD,JLEV)))
      ENDIF
```

```
      ZEW =      ( PTW ( JD,JLEV))
      ZQW =      ( ZEW / PAPRSF(JD,JLEV))          PZQWI(JD)=ZQW
      ZDEW =       ( ZEW, PTW (JD,JLEV))
      ZDQW =       (ZDEW, ZEW/PAPRSF(JD,JLEV), PAPRSF(JD,JLEV))
*     ZDELQ = (ZQW - PQW (JD,JLEV)) / (1. + ( PZLH (JD) / PZCP (JD)) * ZDQW )
      PZCP (JD) = PZCP (JD) + ZDCP * ZDELQ
      ZDELT = - ( PZLH (JD) / PZCP (JD)) * ZDELQ
      PZLH (JD) = PZLH (JD) + ZDCP * ZDELT
      PQW (JD, JLEV) = PQW (JD,JLEV) + ZDELQ
      PTW (JD, JLEV) = PTW (JD,JLEV) + ZDELT
      PLSCPE (JD,JLEV) = PLH( JD, JLEV) / PZCP (JD)
310   CONTINUE
      IF ( JIT. EQ. 1 ) THEN                    ← SAUVETAGE DE L'HUMIDITE
        DO 320 JD = NIDIA, NFDIA                  DE SATURATION APRÈS LA
        PQSAT (JD,JLEV) = PZQWI (JD)              PREMIERE ITERATION
320     CONTINUE
      ENDIF
330   CONTINUE
```

J.-F.'s code...

YTQSAT

EMERAUDE

```
C****                                                                YTQSAT
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC YTQSAT
C                                                                    YTQSAT
C       INITIALISATION DES GRANDEURS THERMODYNAMIQUES UTILES       C YTQSAT
C       ------------------------------------------------           C YTQSAT
C                                                                  C YTQSAT
C                                          G. POCHAS 31/3/1983     C YTQSAT
C                                          VERSION 1.0             C YTQSAT
C                                                                  C YTQSAT
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC YTQSAT
```

ACTQSAT

```
!OPTIONS XOPT(NOEVAL)
SUBROUTINE ACTQSAT ( KIDIA,KFDIA,KLON,KTDIA,KLEV,&
!------------------------------------------------------------------------------------------
! - INPUT  2D .
& PAPRSF,PCP,PQ,PT,&
! - OUTPUT 2D .
& PGEOSLC,PLH,PLSCPE,PQSAT,PQW,PRH,PTW )

!**** *ACTQSAT * - CALCUL DE SATURATION ET DU THERMOMETRE MOUILLE.
```

```
!     Auteur.
!     -------
!      89-12, J.F. Geleyn.

!     Modifications.
!     --------------
!      M.Hamrud      01-Oct-2003 CY28 Cleaning
!      K. Yessad (Jul 2009): remove CDLOCK + some cleanings
!      P. Marguinaud (Oct 2016) : Port to single precision
!------------------------------------------------------------------
```

```
III - BOUCLE DE NEWTON POUR LE POINT "THERMOMETRE MOUILLE"

      DO 310 JIT = 1, NBIT
      DO 310 JD = NIDIA, NFDIA
      ZDCP = RCPV - RCW
      IF (LNEIGE) THEN
        ZDCP = ZDCP + (RCW - RCS) * AMAX1(0., SIGN(1., RTT - PTW(JD,JLEV)))
      ENDIF

      ZEW =      ( PTW ( JD,JLEV))
      ZQW =      ( ZEW / PAPRSF(JD,JLEV))                   PZQWI(JD)=ZQW
      ZDEW =      ( ZEW, PTW (JD,JLEV))
      ZDQW =       (ZDEW, ZEW/PAPRSF(JD,JLEV), PAPRSF(JD,JLEV))
*  -> ZDELQ = (ZQW - PQW(JD,JLEV)) / (1. + (P2LH(JD)/P2CP(JD)) * ZDQW)
      P2CP(JD) = P2CP(JD) + ZDCP * ZDELQ
      ZDELT = - (P2LH(JD)/P2CP(JD)) * ZDELQ
      P2LH (JD) = P2LH(JD) + ZDCP * ZDELT
      PQW(JD,JLEV) = PQW(JD,JLEV) + ZDELQ
      PTW (JD,JLEV) = PTW (JD,JLEV) + ZDELT
      PLSCPE(JD,JLEV) = PLH(JD,JLEV) / P2CP(JD)
  310 CONTINUE
      IF (JIT.EQ.1) THEN           <-- SAUVETAGE DE L'HUMIDITE
        DO 320 JD = NIDIA, NFDIA       DE SATURATION APRES LA
        PQSAT(JD,JLEV) = PZQWI(JD)     PREMIERE ITERATION
  320   CONTINUE
      ENDIF
  310 CONTINUE
```

J.-F.'s code...

ARPEGE

```
      ZEW= FOEW (PTW(JLON,JLEV),ZDELTA)
      ZESP=ZEW/PAPRSF(JLON,JLEV)
      ZQW= FOQS (ZESP)

      ZDQW= FDQW (ZESP, FODLEW (PTW(JLON,JLEV),ZDELTA))

      ZQWI(JLON)=ZQW

!     INCREMENTATIONS.
!     INCREMENTATIONS.

      ZDCP=ZCPVMW+ZDELTA*(ZCPVMS-ZCPVMW)
      ZDELQ=(ZQW-PQW(JLON,JLEV))*ZCP(JLON)/(ZCP(JLON)+ZLH(JLON)*ZDQW)
      ZCP(JLON)=ZCP(JLON)+ZDCP*ZDELQ
      ZDELT=-ZDELQ*ZLH(JLON)/ZCP(JLON)
      ZLH(JLON)=ZLH(JLON)+ZDCP*ZDELT
      PQW(JLON,JLEV)=PQW(JLON,JLEV)+ZDELQ
      PTW(JLON,JLEV)=PTW(JLON,JLEV)+ZDELT
      PLSCPE(JLON,JLEV)=PLH(JLON,JLEV)/ZCP(JLON)
      PGEOSLC(JLON,JLEV)=PTW(JLON,JLEV)*(ZCP(JLON)+ZLH(JLON)*ZDQW)&
      & /(1.0_JPRB+ZLH(JLON)*PQW(JLON,JLEV)/(PTW(JLON,JLEV)*RD&
      & *(1.0_JPRB+RETV*PQW(JLON,JLEV))))
    ENDDO
```

Credit: Kerrry Emanuel

I was so upset to hear about Jean-Francois's passing.

He hosted me on my sabbatical at Météo-France at CNRM/GMAP in 1992, and before that had visited me (here) in Cambridge in 1990.

Kerry Emanuel

Cambridge MIT (fall of 1990)

Cas $\delta_m = 0$

Flux d'eau

$F_w = PFPLSL + PFPLSN + PFPLCL + PFPLCN + PDIFCQ + PDIFTQ$

Flux de quantité de mouvement

$F_u = PSTRCU + PSTRTU + PSTRDU$

$F_v = PSTRCV + PSTRTV + PSTRDV$

Flux d'enthalpie "effective"

$F_h = PFRSO + PFRTH + PDIFCS + PDIFTS$

$- L^v_{eff}{}^d\,(PFPLSL) \quad - L^v_{eff}{}^c\,(PFPLCL)$

$- L^s_{eff}{}^d\,(PFPLSN) \quad - L^s_{eff}{}^c\,(PFPLCN)$

avec $* L^v_{eff}{}^c = L^s_{eff}{}^c = L_{surf}(T_{surf}) + (C_{pv} - C_{w/c})(T - T_{surf})$

$- (C_{pv} - C_{pa})\,T$

$* L^v_{eff}{}^d = L_v(T) - (C_{pv} - C_{pa})\,T$

$* L^s_{eff}{}^d = L_s(T) - (C_{pv} - C_{pa})\,T$

Example of hand-written old computations of Jean-François (1988-89 or so) dealing with the moist-air thermodynamics, with "effective enthalpy fluxes"…

Equations

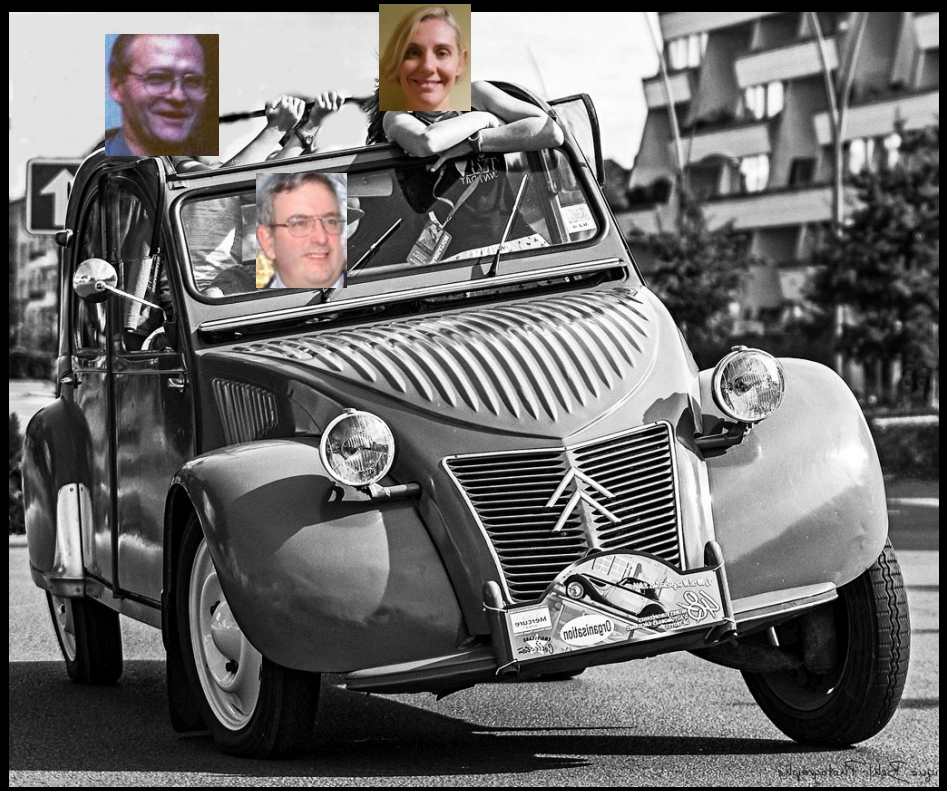
$$\frac{\partial q}{\partial t}\phi = -g\frac{\partial}{\partial p}F_w \;(1) \quad ; \quad \frac{\partial u}{\partial t}\phi = -g\frac{\partial}{\partial p}F_u \;(2) \quad ; \quad \frac{\partial v}{\partial t}\phi = -g\frac{\partial}{\partial p}F_v \;(3)$$

$$\frac{\partial}{\partial t}\left(\left(C_{pa} + (C_{pv} - C_{pa})\,q\right)T + \frac{u^2+v^2}{2}\right) = -g\frac{\partial}{\partial p}F_h \;(4)$$

(1) (2) et (3) donnent q^+ u^+ v^- de sorte qu'il ne reste plus que T^+ comme inconnue dans (4). Une fois T^+ calculé on a

$$\frac{\partial T}{\partial t}\phi = \frac{T^+ - T^-}{2\Delta t} = F_T$$

$\vec{F}_v$ et $\vec{F}_q$ viennent de (1) (2) (3) et $F_m = 0$ pour le moment ($\delta_m = 0$)



Catherine Freydier

Jean-François insisted on accompanying me for the oral defense of my DEA (the former name of M2) in 1990. He was accompanied by Philippe Courtier in his English 2CV ... but both of them on the same side of the car! … the impact of the weight of Science!

Credit:
William Bourke

Jean-François at a WGNE meeting.
Melbourne, Australia (1990)

During a tour to see
the “Twelve apostles” ⟶

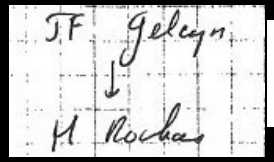
The words and thoughts of Jean-François.

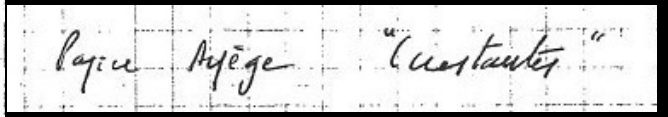
Jean-François wanted to avoid N.W.P. becoming a simple problem of work organization, and he wanted to believe that Science (with a capital S) could still intervene in it.

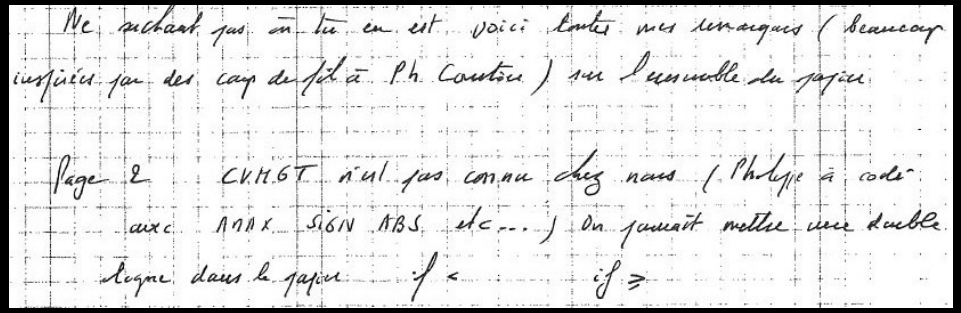
Jean-François was proud to have inspired the persiflage contained in the hijacking of the acronym :
"Direction de la Météorologie Nationale“,
in: MND = "Don't Model Nature"
(conference in Toronto).

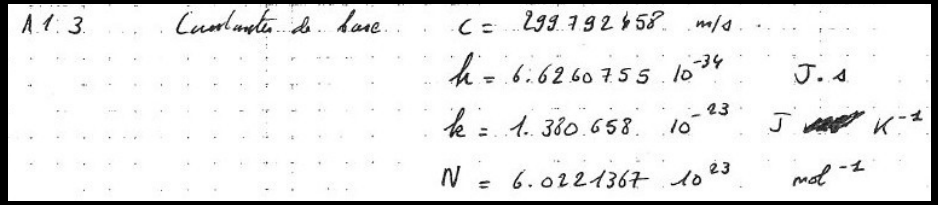
Jean-François was organizing both the definition of “relevant constants for ARPEGE” (1989? Michel Rochas asked him to do this) →

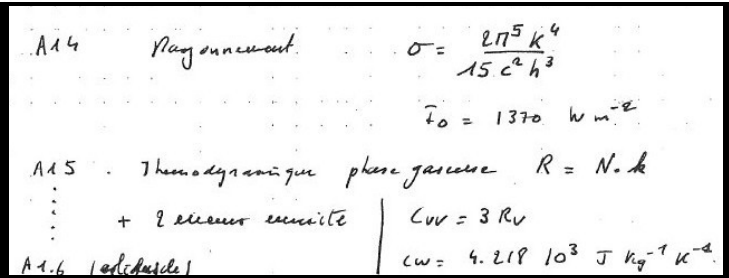
and a demand of the AG of CRMD for organizing separate “CRMD” and “ARPEGE” seminars!











PROJET ARPEGE

Tout à fait d'accord avec tes deux idées. Dans le même registre, suite à une décision majoritaire (mais non unanime) de l'AG. du CRMD, la n^{ième} tentative pour améliorer la communication interne au CRMD sera la suivante : réunions tous les quinze jours le vendredi matin à 9h30 avec soit discussion proposée sur un sujet choisi la fois précédente, soit discussion libre sur les sujets d'activité (pouvant être très brève s'il n'y a rien d'intéressant), soit (tous les deux mois) présentation plus formelle par une des 2 équipes. On peut aussi penser à la présentation par un volontaire d'un article important....

Comme le projet ARPEGE n'est pas le CRMD et, à mon avis, qu'il est souhaitable qu'ARPEGE se distingue du "climat" CRMD, je ne pense pas que les deux choses doivent être mélangées. Ces séminaires ARPEGE seraient donc à mon avis hors du cadre de ces rendez-vous du vendredi. Je pense qu'avec Ph. Courtier on pourrait faire le premier sur le spectral conforme F. Schmidt le 29 Juin sans trop de problèmes. Pour les notes j'aurai bientôt peut-être des choses à dire sur la physique simplifiée pour les modèles adjoints.

1st International Data Assimilation,Symposium. Clermont-Ferrand,France (1990).

Thank you for the organization of this 2020 day, *Jean-François fully deserves it!*

Jean-Noël Thepaut

Jean-François didn't blame me when I chose the 4D-var after school, despite his other proposals. And I remember his big smile when I showed him the first 4D-var runs of the 1989 storm! (runs that counted for 4D-var transition to operational use)

The words and thoughts of Jean-François.

Jean-François wanted
to continue to be considered
a "mathematician" by "physicists",
and a "physicist" by "mathematicians".

Jean-François did not want to totally neglect
the problem of publications,
but did not want to make it a priority.

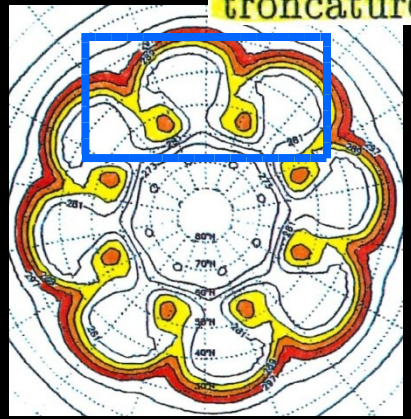
TEMPERATURE AU NIVEAU 1000 hPa APRES 6 JOURS D'INTEGRATION

Premières simulations avec la version étirée du modèle ARPEGE (Résolution T42, Facteur d'Etirement C3[illegible]) de développement d'une instabilité barocline. Pour comparaison les deux figures du bas montrent les résultats équivalents obtenus avec une résolution uniforme égale à la résolution minimale T42 et avec une résolution uniforme sensiblement moindre que la résolution maximale (T106 au lieu de T126).

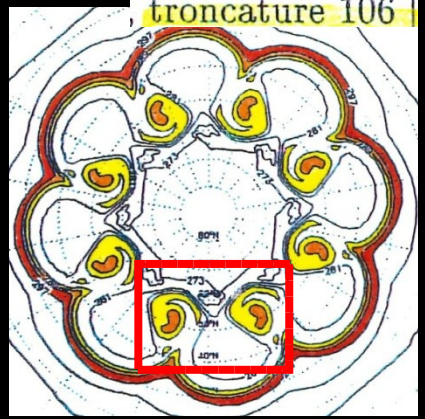
Credit:
Catherine Freydier
(internship with
Jean-François
1991)

An academic study widely used to justify (and reassure about) the "variable mesh" ! principle of Schmidt (1977) and Courtier & Geleyn (1988)

Maille uniforme, troncature 42

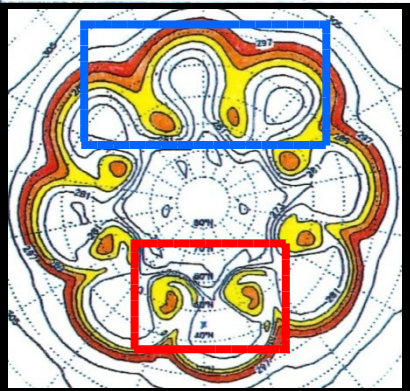


Maille uniforme, troncature 106



"variable mesh

Troncature 42, c=3



Credit: Ryad El Khatib

START of GMAP
at TOULOUSE.
in October 1991.

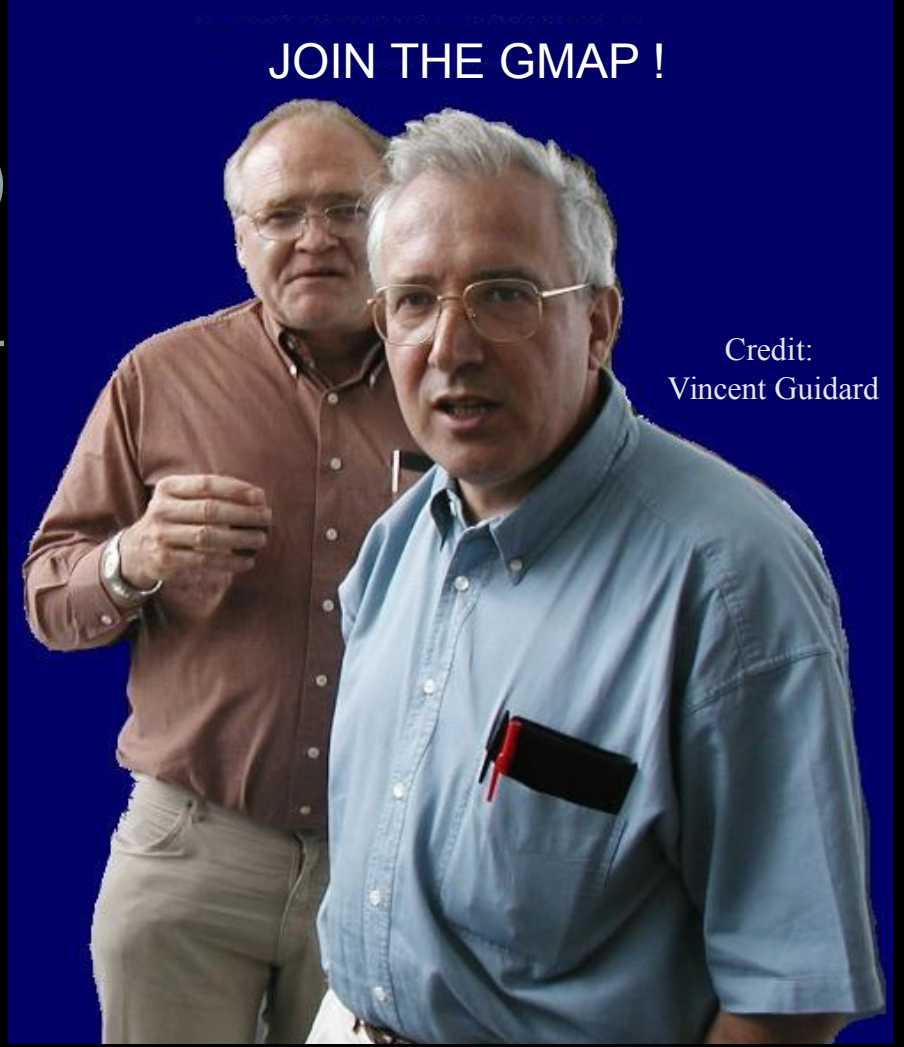
Jean-François became
the head of both GMAP
and the ARPEGE Project

Jean-François' office
at GMAP (Toulouse)...
... the more incredible thing
is that J.-F. can immediately
find the right folder
or piece of paper!

Jean-François had been an ardent defender of my end-of-study internship and the construction of my FCPLR subject.

Vincent Guidard

A picture during a ceremony at GMAP, with Jean-François and Jean Pailleux, a picture modified to make a wallpaper in the mode: *We want you!*



PROJET POUR UN NOUVEAU MODELE HYDROSTATIQUE, SPECTRAL POUR LA PREVISION, L'ADAPTATION DYNAMIQUE ET LA RECHERCHE A MOYENNE ECHELLE

A. JOLY et J.F. GELEYN, 6/9/91

Nom possible (mais improbable)

« **M**odèle et **A**ssimilation **L**imitées en **A**ire **B**asées sur **AR**pege »

The name "**ALADIN**" could have been...
M.A.L.A.B.AR?

MODELE et ASSIMILATION LIMITES en AIRE BASE sur ARPEGE

Malabar ("Strong Guy" in VO) is a superhero belonging to the Marvel Comics universe.

But Malabar is also a French chewing gum!

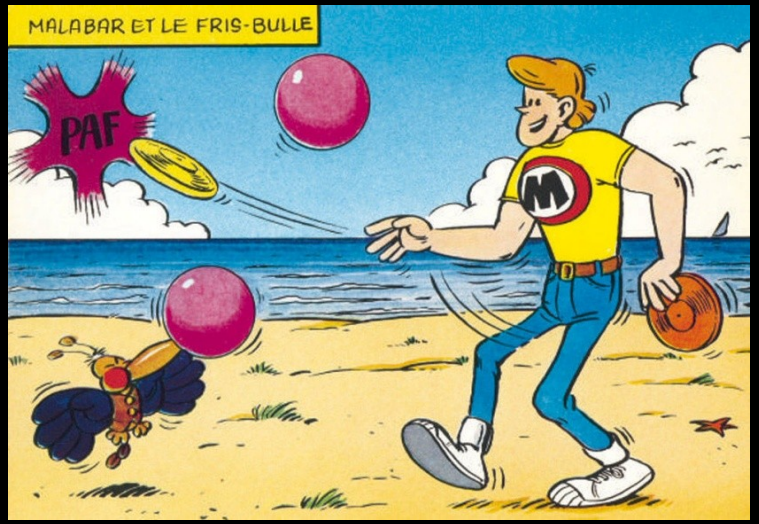
PROJET POUR UN NOUVEAU MODELE HYDROSTATIQUE, SPECTRAL POUR LA PREVISION, L'ADAPTATION DYNAMIQUE ET LA RECHERCHE A MOYENNE ECHELLE

A. JOLY et J.F. GELEYN, 6/9/91

Nom possible (mais improbable)

« **M**odèle et **A**ssimilation **L**imitées en **A**ire **B**asées sur **AR**pege »

The name "**ALADIN**" could have been...
MALABAR?



Vlad, Radmila, Jean-François and Dezső in front of Météo-France premises in Paris

The premises of ALADIN (Paris / spring 1991)

Florence Rabier

I greatly appreciated Jean-François's integrity, honesty and his ability to get the best out of each and every one of his collaborators.
He had no preconceptions about other people, judging them solely on their attitudes and abilities.
He was an excellent leader, inspiring generations of scientists with his vision and enthusiasm.

I had decided to return to Météo-France in 1998, with the challenge of making progress in assimilating satellite data.
But 2 months before my return there was no position for me, and Jean-François arranged to make me one (by delaying the arrival of another researcher, with his agreement).

I therefore owe a lot to Jean-François, not only for having welcomed me to do my thesis at GMAP but also for having made a special place for me on my return to France.

DOCUMENT DE CLOTURE DU PROJET ARPEGE

ETAT DES LIEUX AU 7/3/94

J.-F. Geleyn
CNRM/GMAP

Many "scientific testimonies" of Jean-François exist, such as those for the end of the ARPEGE project (1994, above)

and for his departure from GMAP (2003)

Petit testament à propos d'ARPEGE et d'ALADIN

J.-F. Geleyn, CNRM/GMAP
Août 2003

The invitation from André Lebeau (President of Météo-France) for a 1994 cocktail reception for the first "operational forecast of ALADIN".

Monsieur André Lebeau

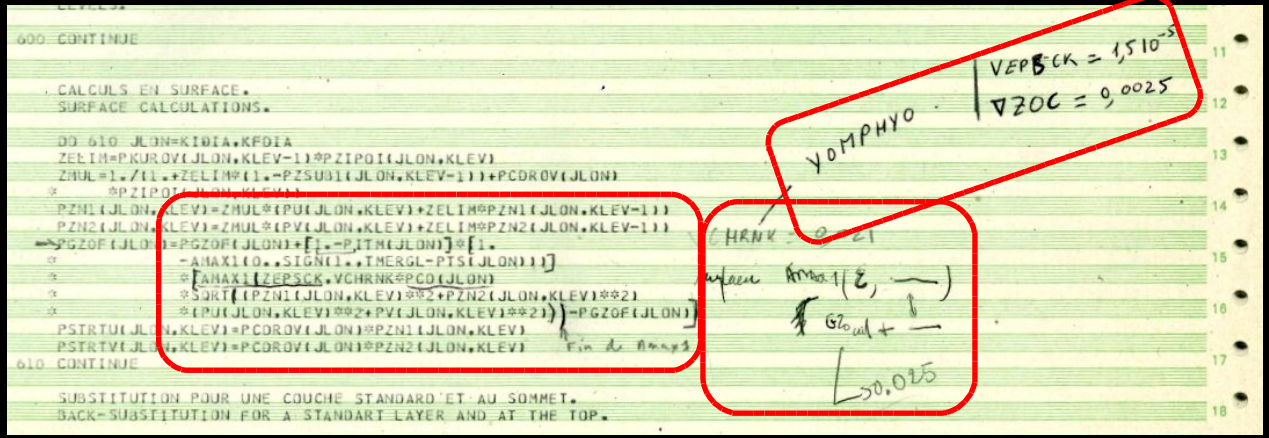
a le plaisir d'inviter M. Jean - François GELEYN

au déjeuner offert à l'occasion de la première application opérationnelle d'Aladin

le 31 mai 1994 à 12 H 30

Salle d'Hôtes au Restaurant du site.

```
ACDIFUS      351        ZMUL=1./(1.+PKUROV(JLON,KTDIA)*PZIPOI(JLON,KTDIA))
ACDIFUS      352  *     PZSUBI(JLON,KTDIA)=ZMUL*PKUROV(JLON,KTDIA)*PZIPOI(JLON,KTDIA)
ACDIFUS      353        PZN1(JLON,KTDIA)=ZMUL*PU(JLON,KTDIA)
ACDIFUS      354        PZN2(JLON,KTDIA)=ZMUL*PV(JLON,KTDIA)
ACDIFUS      355    510 CONTINUE
ACDIFUS      356 C
ACDIFUS      357 C      ELIMINATION POUR UNE COUCHE STANDARD.
ACDIFUS      358 C      ELIMINATION FOR A STANDART LEVEL.
ACDIFUS      359 C
ACDIFUS      360        DO 530 JLEV=KTDIA+1,KLEV-1
ACDIFUS      361        DO 520 JLON=KIDIA,KFDIA
ACDIFUS      362        ZELIM=PKUROV(JLON,JLEV-1)*PZIPOI(JLON,JLEV)
ACDIFUS      363        ZMUL=1./(1.+ZELIM*(1.-PZSUBI(JLON,JLEV-1)))+PKUROV(JLON,JLEV)
ACDIFUS      364  *          *PZIPOI(JLON,JLEV))
ACDIFUS      365        PZSUBI(JLON,JLEV)=ZMUL*PKUROV(JLON,JLEV)*PZIPOI(JLON,JLEV)
ACDIFUS      366        PZN1(JLON,JLEV)=ZMUL*(PU(JLON,JLEV)+ZELIM*PZN1(JLON,JLEV-1))
ACDIFUS      367        PZN2(JLON,JLEV)=ZMUL*(PV(JLON,JLEV)+ZELIM*PZN2(JLON,JLEV-1))
ACDIFUS      368    520 CONTINUE
ACDIFUS      369    530 CONTINUE
ACDIFUS      370 C
ACDIFUS      371 C*
ACDIFUS      372 C      ------------------------------------------------------------------
ACDIFUS      373 C      VI - CALCULS POUR LA QUANTITE DE MOUVEMENT : CONDITION DE SURFACE.
ACDIFUS      374 C      CALCUL DE "CHARNOCK" PUIS SUBSTITUTION AVEC CALCUL DES FLUX A TOUS
ACDIFUS      375 C      LES NIVEAUX.
ACDIFUS      376 C
ACDIFUS      377 C           COMPUTATION FOR MOMENTUM : SURFACE CONDITION, "CHARNOCK-TYPE"
ACDIFUS      378 C      CALCULATION THEN SUBSTITUTION WITH FLUXES' COMPUTATION AT ALL
```



```
600 CONTINUE

    CALCULS EN SURFACE.
    SURFACE CALCULATIONS.

    DO 610 JLON=KIDIA,KFDIA
    ZELIM=PKUROV(JLON,KLEV-1)*PZIPOI(JLON,KLEV)
    ZMUL=1./(1.+ZELIM*(1.-PZSUBI(JLON,KLEV-1)))+PCDROV(JLON)
    *     *PZIPOI(JLON,KLEV))
    PZN1(JLON,KLEV)=ZMUL*(PU(JLON,KLEV)+ZELIM*PZN1(JLON,KLEV-1))
    PZN2(JLON,KLEV)=ZMUL*(PV(JLON,KLEV)+ZELIM*PZN2(JLON,KLEV-1))
    PGZOF(JLON)=PGZOF(JLON)+[1.-PITM(JLON)]*[1.
    *          -AMAX1(0.,SIGN(1.,TMERGL-PTS(JLON)))]
    *          *[AMAX1(ZEPSCK,VCHRNK*PCO(JLON)
    *          *SQRT((PZN1(JLON,KLEV)**2+PZN2(JLON,KLEV)**2)
    *          *(PU(JLON,KLEV)**2+PV(JLON,KLEV)**2))-PGZOF(JLON)]
    PSTRTU(JLON,KLEV)=PCDROV(JLON)*PZN1(JLON,KLEV)
    PSTRTV(JLON,KLEV)=PCDROV(JLON)*PZN2(JLON,KLEV)
610 CONTINUE

    SUBSTITUTION POUR UNE COUCHE STANDARD ET AU SOMMET.
    BACK-SUBSTITUTION FOR A STANDART LAYER AND AT THE TOP.
```

Listings were important!

Eric Bazile

Documentations were often missing…
Sometimes we had to rely on footnote on listings to know what to do!

The words and thoughts of Jean-François.

What Jean-François didn't know how to do:

- reduce his activities to less than twenty things to deal with, more or less in parallel!

- deny his convictions, even when they lead him to deadlock and/or isolation at work

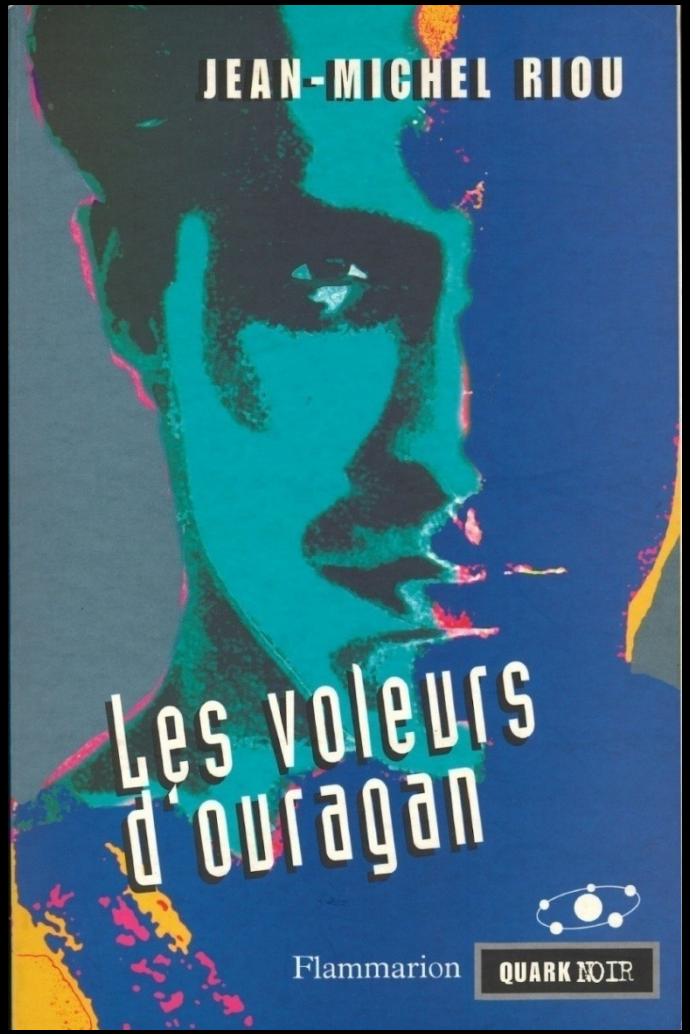
- avoid making comparisons and finding new subjects to work on, by putting together information that didn't necessarily want to meet!

The words and thoughts of Jean-François.

What Jean-François didn't know how to avoid doing (according to him):

- forget to “turn his tongue seven times in his mouth” when he did not agree with what was said in a meeting...

- to appear as a pain to people working on the same subjects!



(the book of Patricia)

Jean-François was a character in a book !
by Jean-Michel Riou (Flammarion, 2000)

À Jean-François Geleyn et Jean Pailleux, responsables du groupe de modélisation pour l'assimilation et la prévision à Météo-France Toulouse, pour m'avoir reçu avec chaleur et gentillesse, guidé dans les arcanes de la Météopole de Toulouse, éclairé et formé en m'offrant leur temps sans compter.

Jean-François was a mixed of "J.-F. Klein" (a forecaster) and "Guillaume Jeanfranc": "*a specialist in modelisation*", "*a tenor !*"

→ a real-life experience: *sneaking among piles of paper stacked on the floor, chairs an radiators!*

→ *a blackboard completely blackened with Jeanfranc's handwriting…*

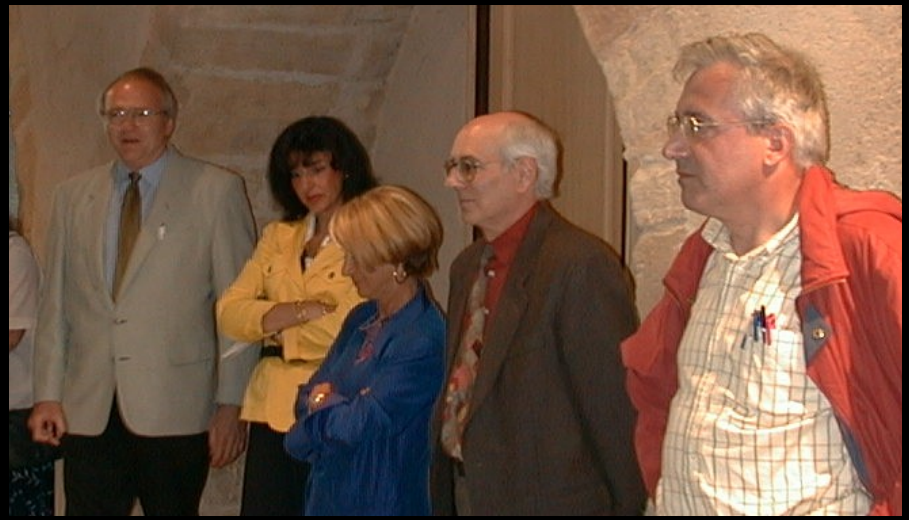
Jean-François at Reyjavik (2000) with Eric Bazile

(pouring days and trekking without rain clothes!)

ALATNET Radostovice / Czech Republic

15-26 May 2000

Seminar on High resolution modelling.



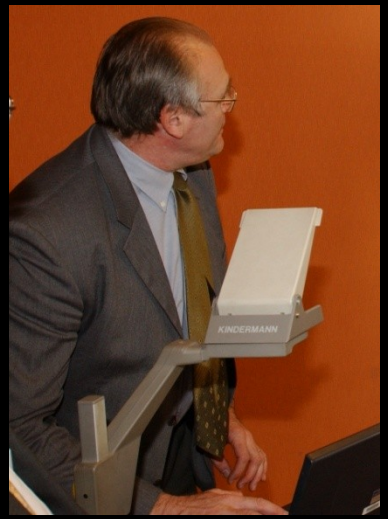
ALATNET Gourdon / France

11-22 June 2001

Seminar on Data Assimilation.

The caricature of Jean-François, among those made for many GMAP people in the 2000's

Jean-François at the 2002 General Assembly
of the “SMF”
(Société Météorologique de France)

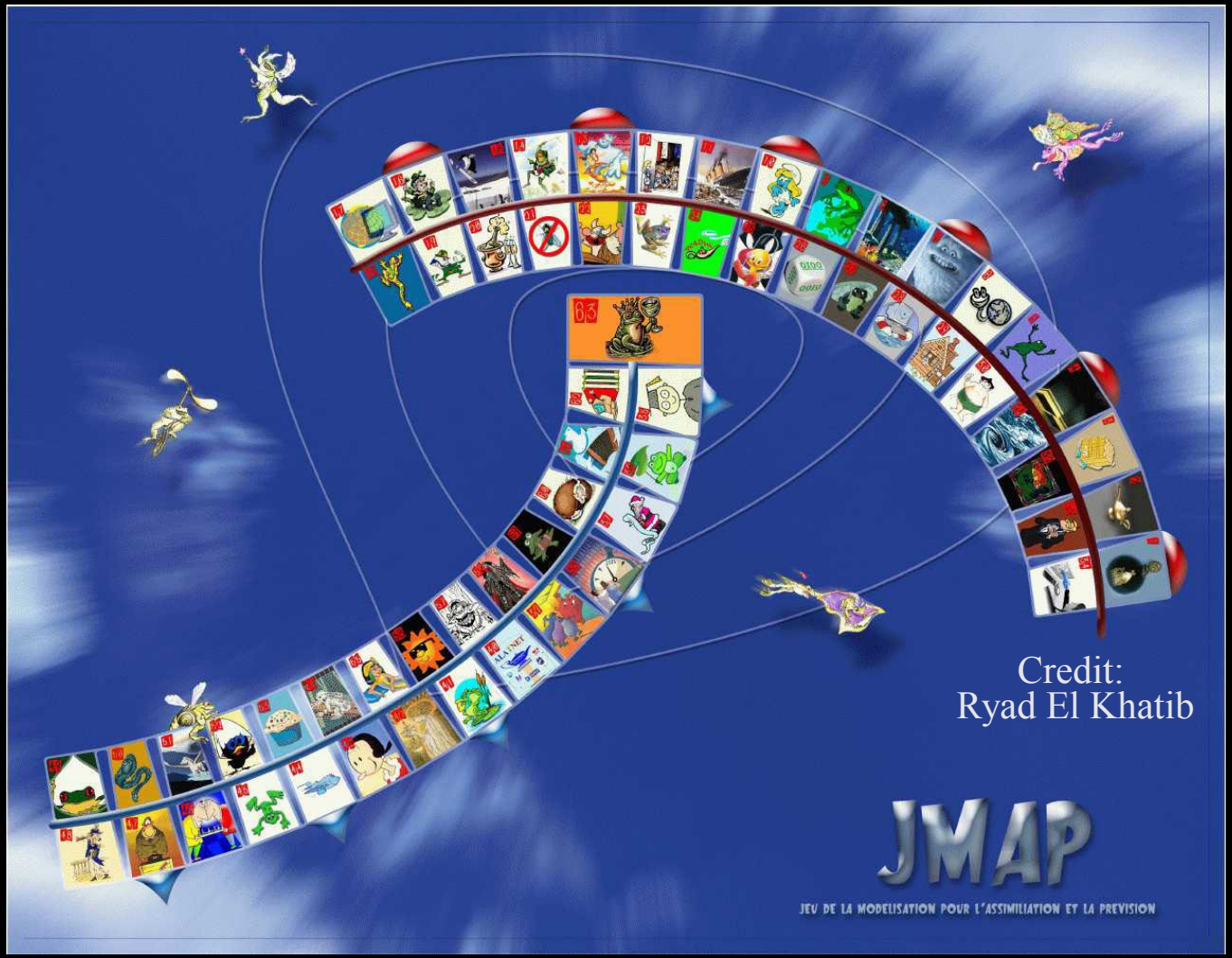


The words and thoughts of Jean-François.

You can't win every time when you're trying to see the scope of a new idea.

Pascal Marquet

“The denial of novelty is one of the best shared things in the world”, to parody another quote. (likely: « Le bon sens est la chose du monde la mieux partagée. » – Descartes)



Credit:
Ryad El Khatib

A photo of the "JMAP", a gift in the form of a GMAP "goose game" (and Shapiro's fronts)

offered in 2002 for Jean-François' departure to Prague

This is only a picture of the board, as the game itself is unique!

The words and thoughts of Jean-François.

When the faculty of Toulouse asked us to justify the “societal costs of searchers by the benefits they bring” ...

Jean Marcel Piriou

After some calculations, the answer of Jean-François was:
“ *The Numerical Weather Forecasting is very motivating, because we gain about one tenth of a second of Predictability per working day!* ”

27 May - 1 st June 2002

Seminar on Data Assimilation

17 October 2003

October 2002

(CHMI, Praha)

April 2004

(CHMI, Praha)

Bucarest
Romania
April 20, 2004

(Cornel
SOCI's PhD)

15th ALADIN Wk http://www.cnrm-game-meteo.fr/aladin/spip.php?article138

15° ALADIN workshop

June 2005

A photo of Jean-François from the Trombinoscope of ALADIN

Jean-François at Bruxells (2008) →

Credit: Eric Bazile

Jean-François happy at Toulouse (December 2008) at Le May restaurant with Jan Barkmeijer and Jean-Marcel Piriou

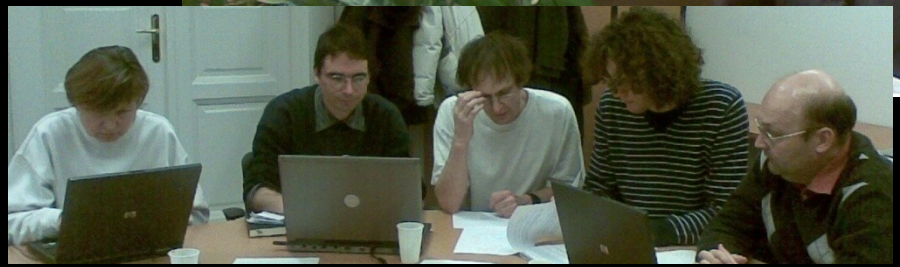
The words and thoughts of Jean-François.

Jean-François realized that his strengths lay more in a solid dose of Cartesian training and a good ability to synthesize than in intuition or working power!

Some people think that scientific work should take place in a "teddy-bear world", where everybody has to admire everybody, otherwise it's no fun...
But that's certainly not the way it works!

A dinner with Jean-François
at Prag, (2009)
during the COST-ES0905 program

ALARO-1 Working-Days
at Budapest (2010)



15th ALADIN General Assembly / Prague

14-15 Dec. 2010 / The new "MoU4" was signed

20th anniversary of the kick-off

of the ALADIN project.

Unfortunately I never had the opportunity to collaborate with Jean-Francois.

But I always was very impressed by his meticulous thermodynamic derivations as published in the literature!

Stephan de Roode

"It could have been worse !"

"Everything is under control !"

Prague / 14-15 Dec. 2010

the tribute to Jean-François Geleyn,

retiring from ALADIN after 20 years!

ALADIN

Jean-François was proud to become in March 2011 a professor at the department of Physics and Astronomy of Ghent University, Belgium.

On a general definition of the squared Brunt–Väisälä frequency associated with the specific moist entropy potential temperature

Q. J. R. Meteorol. Soc. 139: 85–100, January 2013 A

Pascal Marquet[a]* and Jean-François Geleyn[bc]
[a]*DPrévi/Labo, Météo-France, Toulouse, France*
[b]*CNRM, Météo-France, Toulouse, France*
[c]*Department of Physics and Astronomy, University of Gent, Ghent, Belgium*

It was in the spring of 2011, I was asked to give a presentation during the COST ES0905 meeting in Cambridge.

Lisa Bengtsson

I was hesitant to participate as my first-born child was only 4 weeks old, but I decided at the last minute to join for 2 days. Full of anxiety that comes with being a first-time mother leaving your newborn behind, I must have appeared quite emotional

Jean-Francois picked up on this, and after my presentation he gave me a bouquet of flowers as a token of appreciation. I was stunned by this kindness, and I will never forget it.

Jean-François (center) received on
14 September 2011 the EMS Silver Medal

from Dominique Marbouty
(on the left / the new EMS president)
and Fritz Neuwirth
(on the right / the former President)

(Radmila)

ALARO Working Days

Ljubljana, Slovenia / June 2012

The words and thoughts of Jean-François.

This confirms my suspicion that the difference is in the "*explicit unidirectionality of the parameterization of the stress in this scheme*."

… sometimes hard to understand ?

The correction I proposed proved to be inappropriate and, after analysis, it was the "traditional story" of the "sledgehammer and the fly"!

I am stupid! I made a big big bug!!

Credit: Eric Bazile

Jean-François had found that the origin of the name “Geleyn” was in Kallo close to Antwerp (Anvers) in Belgium. In March 2014 he asked me to drive him to Anvers. We search in the church … in the museum … finally he found the proof!

Piet Termonia

Credit: Pascal Marquet

The great cake for the

25th anniversary of GMAP!

(13 October 2016, CIC, Toulouse)

J.-F. should have appreciated it!