

## **CNES/GRGS software of space geodesy**

- **Installed on IBM computer at CNES with direct links from a few GRGS centres...**
- **With access to a secure and daily actualized data base on a CNES server (STAF)**
- **Installed as well on Dec- $\alpha$  at OCA (Grasse) and at ORB (Bruxelles) with a partial backup data base**
- **Available (under request) on PC with an INTERNET access to a centralized backup data base at OMP (Toulouse)**

# Software

*GIN* :

1965

(Géodésie par Intégration Numérique)

*GINs* :

1994

(Géodésie par Intégrations Numériques Simultanées)

*GINs-PC* :

2007

# Observations

*Optique* :

1962 - 1971 ( $\sigma \sim 2''$ )

*TRANET* :

1984 - 1987 ( $\sigma \sim 2 \text{ mm/s}$ )

*Laser\** :

1967 - ( $\sigma \sim 15 \text{ m} - 2 \text{ mm}$ )

*Altimétrie\* / Xover\** :

1975 - ( $\sigma \sim 20 - 1 \text{ cm}$ )

*DORIS\** :

( $\sigma \sim 0,3 - 0,1 \text{ mm/s}$ ) 1990 -

*PRARE* :

( $\sigma \sim 1 \text{ cm} - 0,1 \text{ mm/s}$ ) 1994 - 2001

*GPS\** :

( $\sigma \sim 1 \text{ cm} - 5 \text{ mm}$ ) 1992 -

*VLBI\** :

( $\sigma \sim 1 \text{ cm} - 5 \text{ mm}$ ) 2000 -

*GRACE KBR\** :

( $\sigma \sim 1 \mu\text{m} - 0,1 \mu\text{m/s}$ ) 2002 -

*DSN\** :

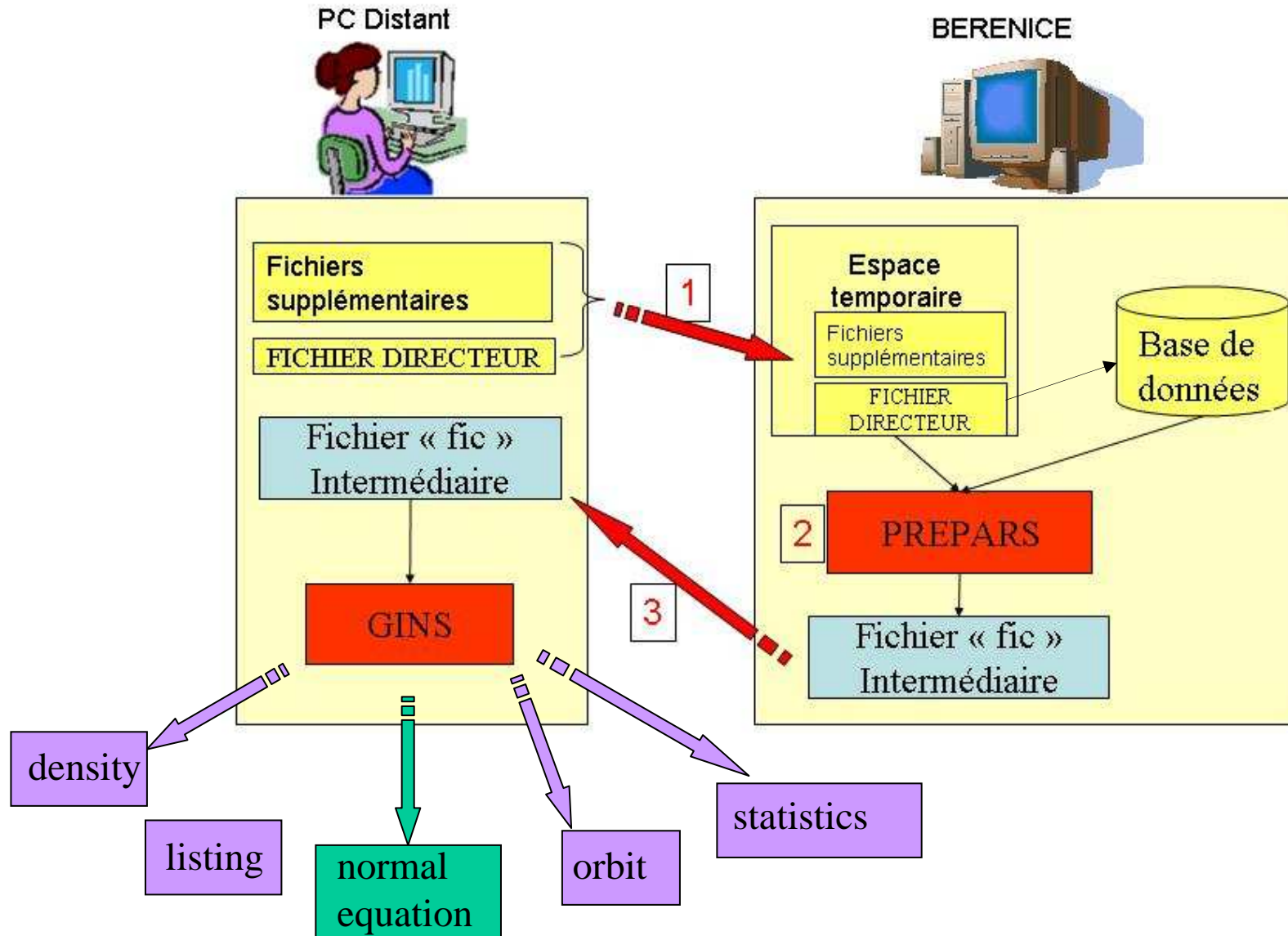
1970 - ( $\sigma \sim .1 - .01 \text{ mm/s}$ )

*GOCE\** :

( $\sigma \sim 3 \text{ mE}$ ) 2008

(\*: simulation possible)

# GINS-PC: scheme of data flux



# Functionalities :

- **Numerical orbit computation around any body of the solar system**
- **Determination of geodetic/geophysics parameters such as :**
  - *Gravity field harmonic coefficients*
  - *Ocean tides harmonic coefficients*
  - *Love's numbers*
  - *Mean sea surface (from altimetry)*
  - *Thermospheric coefficients (temperature, gas density)*
  - *Satellite thermo-optical coefficients*
  - *ERP and nutation parameters*
  - *Station position and velocities, geocenter*
  - ...

# DYNAMO: example of EOP/TRF processing

