

Attributes of the ICRF

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IERS Workshop on Conventions

September 20 – 21, 2007

International Celestial Reference System (ICRS)

The ICRS is the idealized barycentric coordinate system to which celestial positions are referred. It is **kinematically nonrotating** with respect to the ensemble of distant extragalactic objects. It has **no intrinsic orientation** but was aligned close to the mean equator and dynamical equinox of J2000.0 for continuity with previous fundamental reference systems. Its orientation is **independent of epoch, ecliptic or equator** and is realized by a list of adopted coordinates of extragalactic sources.

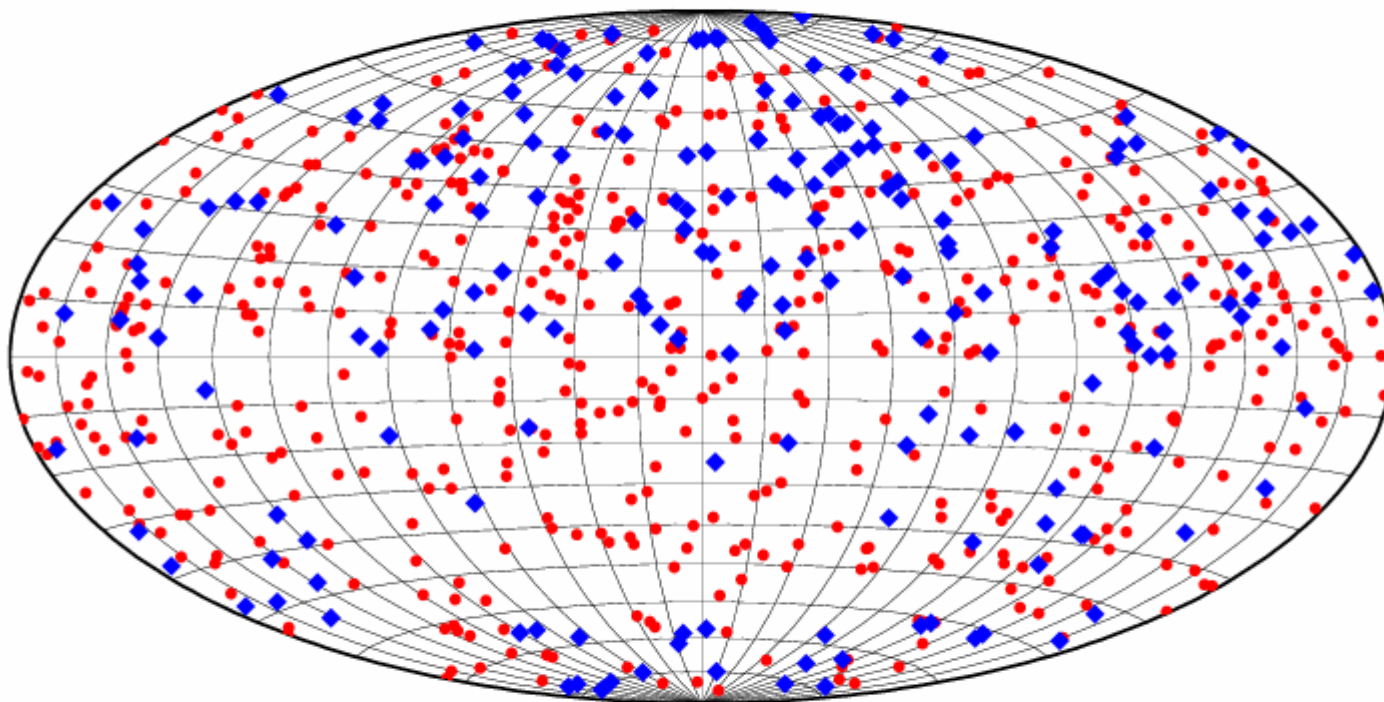
International Celestial Reference Frame (ICRF)

The ICRF is a **set of extragalactic objects** whose adopted positions and uncertainties **realize the ICRS axes** and give the uncertainties of the axes. It is also the **name of the radio catalog** whose 212 defining sources are currently the most accurate realization of the ICRS. Note that the orientation of the ICRF catalog was carried over from earlier IERS radio catalogs and was within the errors of the standard stellar and dynamical frames at the time of adoption. Successive revisions of the ICRF are intended to **minimize rotation from its original orientation**. **Other realizations of the ICRS** have specific names (e.g., the Hipparcos Celestial Reference Frame).

ICRF

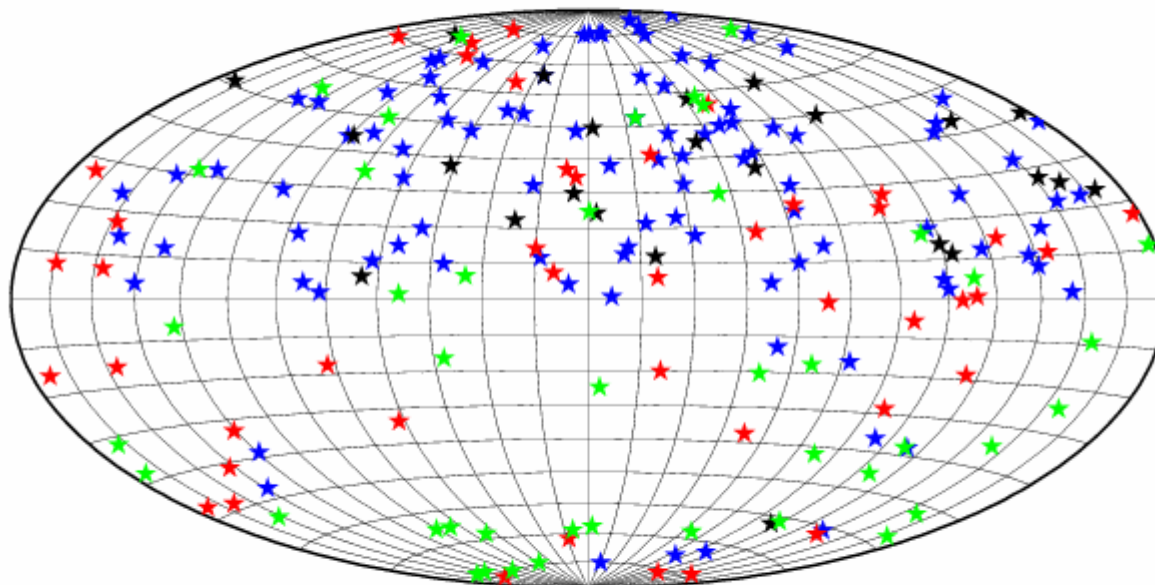
- S/X data and analysis through 1995
- ICRF-Ext.1, ICRF-Ext.2
- 212 defining sources
- Position uncertainty $\geq 250 \mu\text{as}$
- Accuracy of axes $\sim 30 \mu\text{as}$

ICRF Ext.2 Sources



◆ 212 defining • 505 non-defining

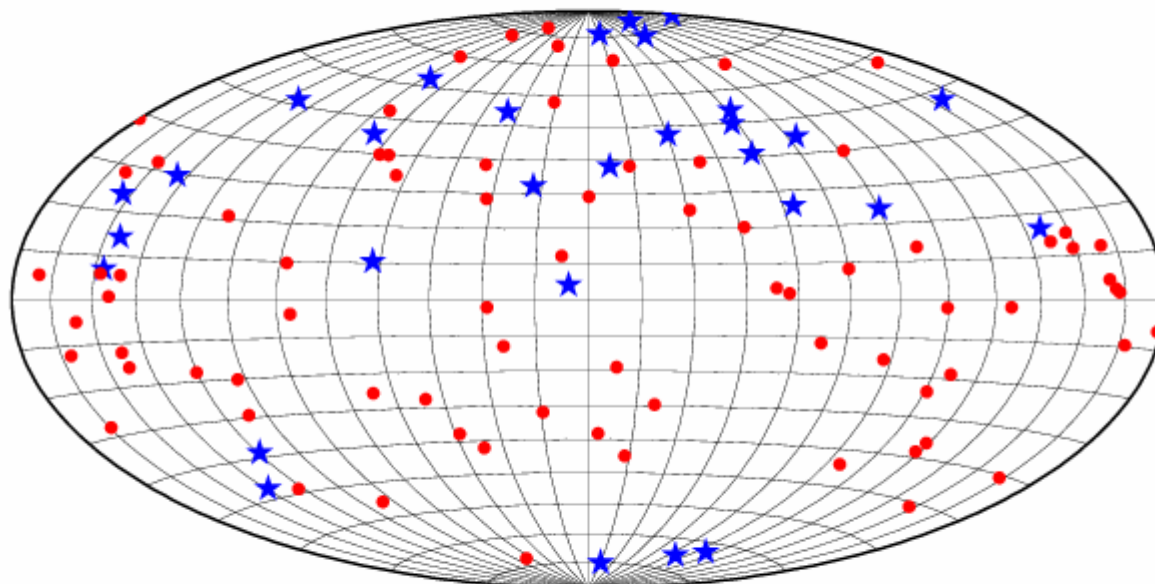
ICRF Defining Sources



★ 101 Stable
★ 44 Unstable

★ 24 Potentially Stable
★ 43 Too little data

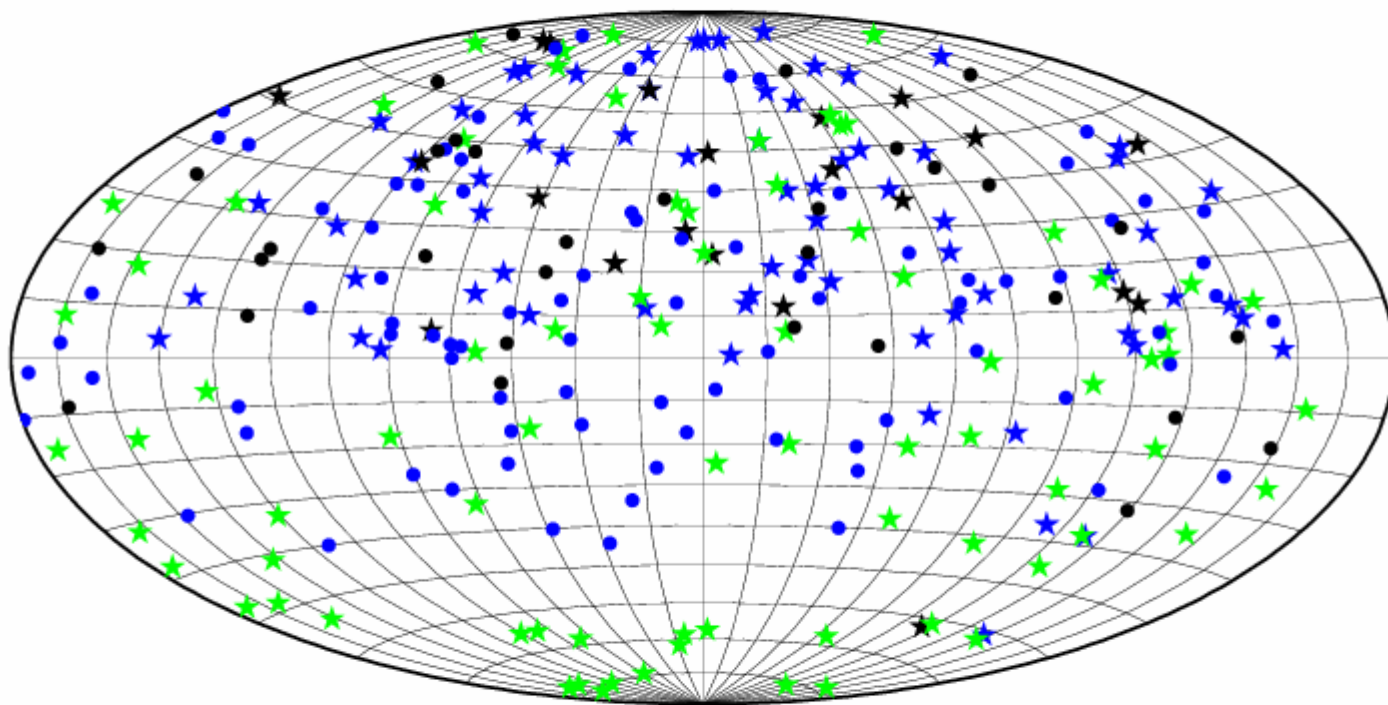
Geodetic Sources



★ 30 ICRF Defining

● 77 others

Total CRF Monitoring Sources



★ 74 Stable ICRF

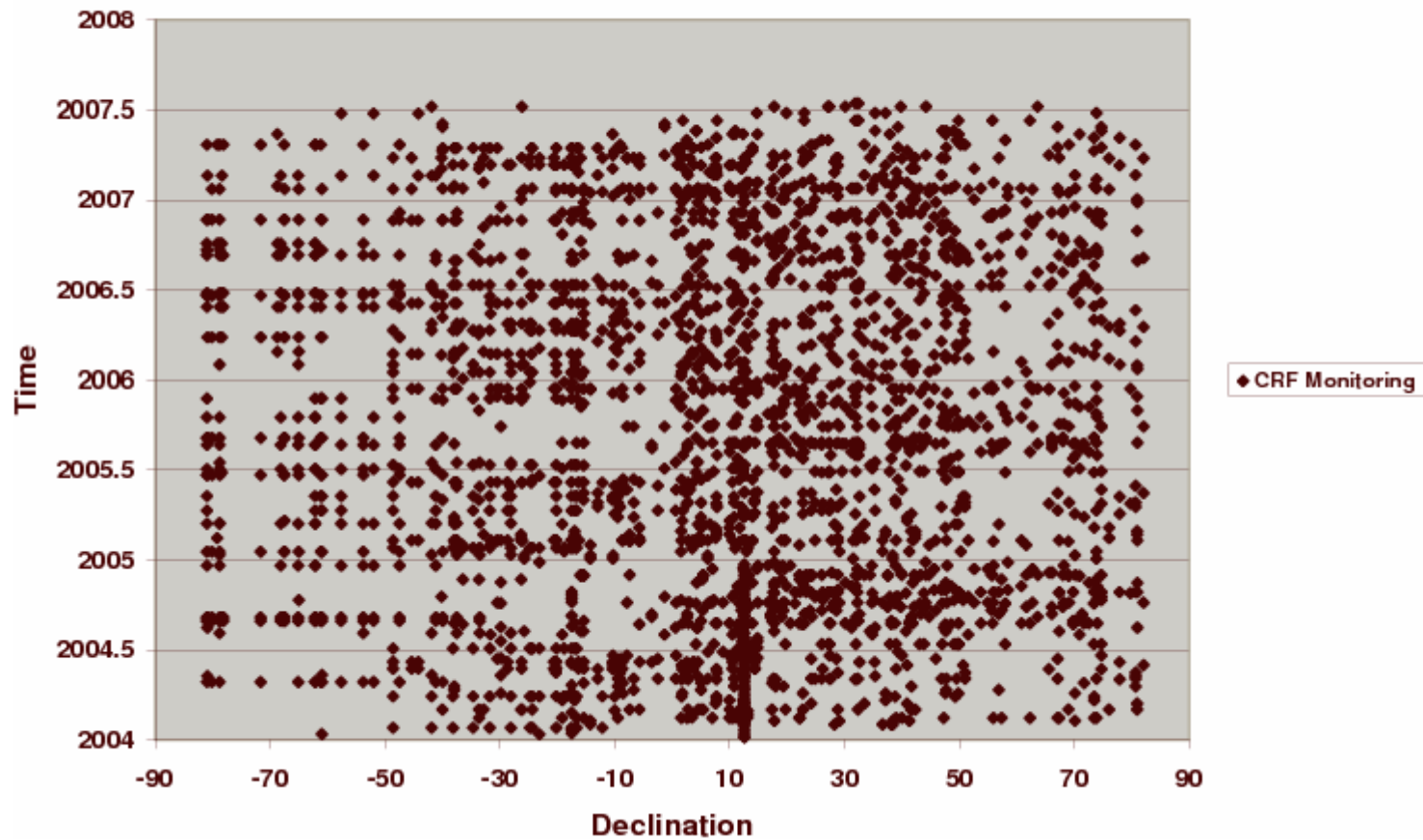
● 89 Stable other

★ 25 Potentially stable ICRF

● 36 Potentially stable other

★ 83 Other ICRF defining

Sky Coverage for CRF Monitoring Sources, 2004-2007



IERS/IVS Working Group for the 2nd Realization of the ICRF

The purpose of the working group is to generate the second realization of the ICRF from VLBI observations of extragalactic radio sources, **consistent with the current realization of the ITRF and EOP data products**. The working group will apply state-of-the-art astronomical and geophysical models in the analysis of the entire relevant S/X astrometric and geodetic VLBI data set. The working group will carefully consider the selection of defining sources and the mitigation of source position variations to improve the stability of the ICRF. The goal is to present the second ICRF to relevant authoritative bodies, e.g. IERS and IVS, and submit the revised ICRF to the IAU Division I working group on the second realization of the ICRF for **adoption at the 2009 IAU General Assembly**.

Membership:

O. Titov, Australia
R. Heinkelmann, Austria
G. Wang, China
F. Arias, France
P. Charlot, France
A.-M. Gontier, France
S. Lambert, France
J. Souchay, France
G. Engelhardt, Germany
A. Nothnagel, Germany
V. Tesmer, Germany
G. Bianco, Italy
S. Kurdubov, Russia

Z. Malkin, Russia
E. Skurikhina, Russia
J. Sokolova, Russia
V. Zharov, Russia
S. Bolotin, Ukraine
D. Boboltz, USA
A. Fey, USA
R. Gaume, USA
C. Jacobs, USA
C. Ma, USA
L. Petrov, USA
O. Sovers, USA

Issues for the next radio ICRF

- Selection of defining sources
- Treatment of source position variations
- Improvement of geophysical and astronomical modeling
- Selection of data
- Integration of ICRF, ITRF and EOP
- Generation of final catalogue

Source Position Time Series

Geoscience Australia

Paris Observatory

BKG (Germany)

DGFI (Germany)

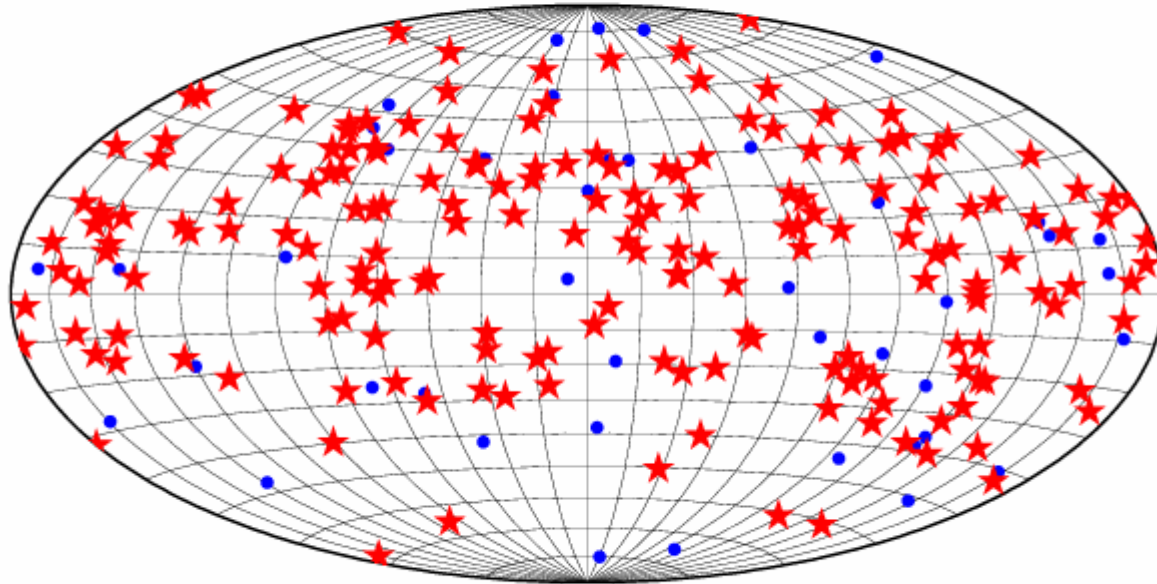
Institute of Applied Astronomy (Russia)

Main Astronomical Observatory (Ukraine)

Goddard Space Flight Center (USA)

U.S. Naval Observatory

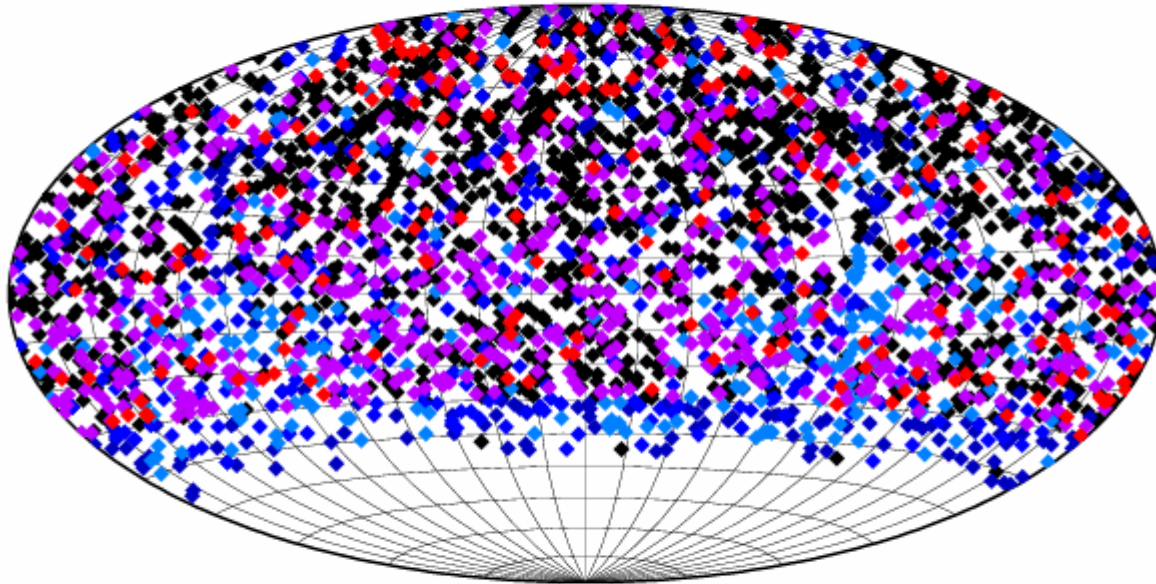
Proposed Geodetic Sources



• 43 original

★ 187 additional

VCS Sources



◆ 1576 VCS1 ◆ 241 VCS2 ◆ 308 VCS3
◆ 261 VCS4 ◆ 590 VCS5 ◆ 215 VCS6

X/Ka (8.4/32 GHz results: 312 Sources detected

Distribution of 312 Sources

