



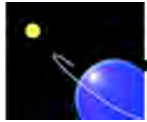
NAIRAS Operations Report 1 August 25, 2008

SET NAIRAS Ops Team

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<http://sol.spacenvironment.net/~nairas/index.html>



Tasks

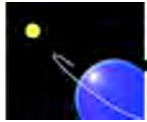
- **Data I/O requirements and data definitions**
- **NAIRAS web interface**
 - NAIRAS team access
 - Commercial aviation access
 - Public access



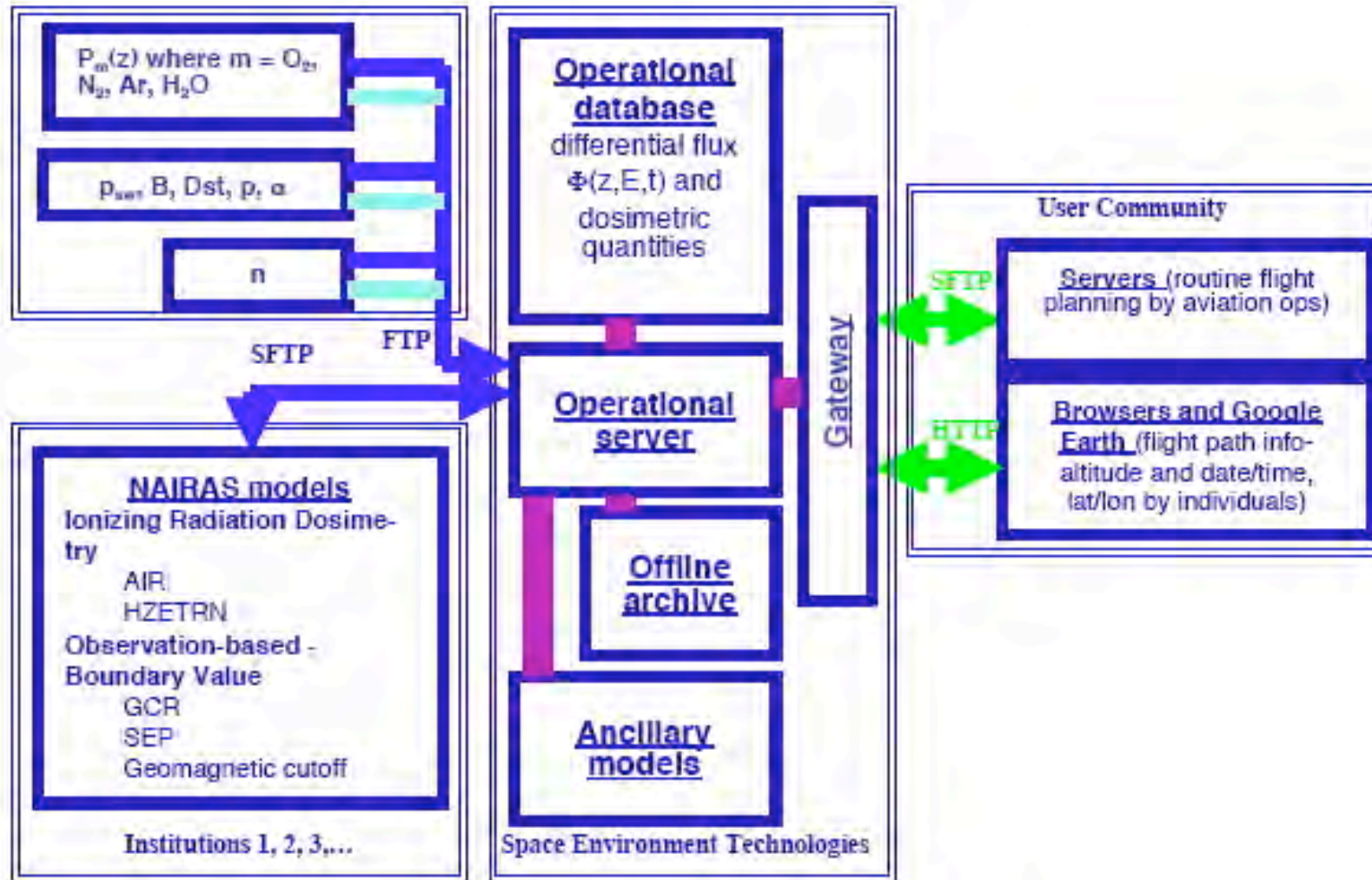
7 operational principles

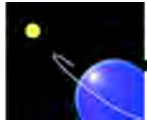
1. **Time domain definitions** – past, present, and future are clearly demarcated with identifiable granularity, cadences, and latencies starting with recognition of the current epoch
2. **Information redundancy** – information redundancy is clearly established using multiple data streams
3. **Data reliability** – quality output forecast data flows uninterruptedly regardless of subsystem anomalies
4. **System robustness** – an operational forecasting system is modular, manageable, and extensible using tiered architecture
5. **TRL evolution** – models and data achieve system-level maturity through evolution along TRL stages
6. **Geophysical validation** – output forecast represents the geophysical conditions within specified limits
7. **Operational verification** – output forecast meets the intent of the requirements

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Original proposal concept





Data and model requirements

Metadata

1. Model

- Specification: name, version designator and version history
- Point of contact (author name, address, phone, email, institution)
- Documentation: publication references or manuals
- Dependencies: programming language, operating system requirements, run-time ordering restrictions

2. Data input and output

- Expected file size (100KB), format (ascii)
- Description of data (e.g., geomagnetic cutoff rigidity)
- User(s) of data (other models)
- Threshold use (only get data under certain conditions)

3. Data tracking, validation and verification

- Timetags: model run-time, data time
- Validation thresholds: max and min values
- Self-validation flag: binary ("I am/am not valid") or status (red-yellow-green)

Data

4. Latency, cadence, granularity (in minutes)

- Model run-time duration, start/end time scheduling restrictions
- Data input/output

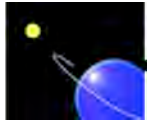
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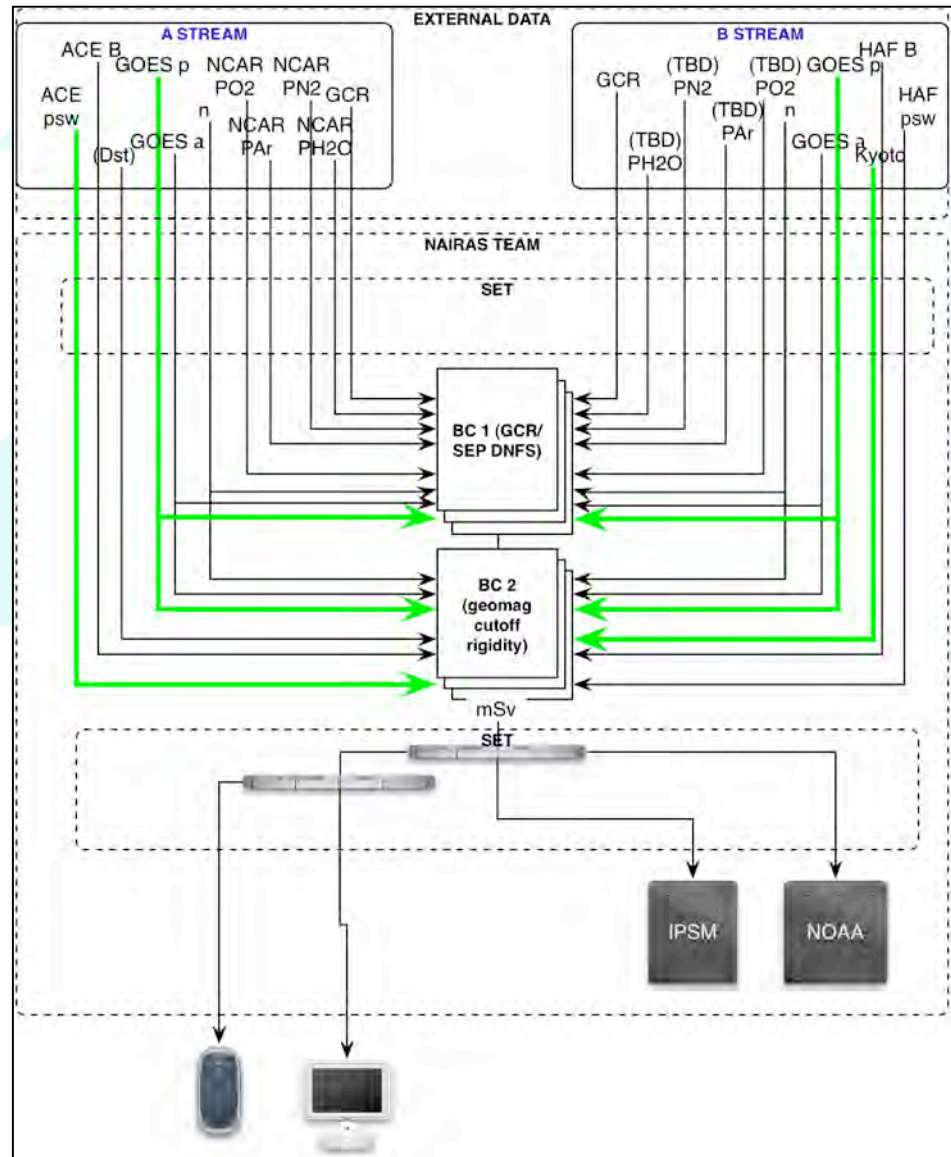
Data I/O Table

NAIRAS DATA TABLE: I/O REQUIREMENTS AND DATA DEFINITIONS										
I/O type	data	definition	source	used by	cadence (minutes)	latency (minutes)	granularity (minutes)	threshold	stream	aging (hrs)
OPS INPUT	$\Phi(Z,t)$, $E(Z,t)$	galactic cosmic ray particle flux and energy	Badhwar & O'Neill	HZETRN		0		N	A	48
	$I_b(R,t)$, $F_i(E,t)$	galactic cosmic ray particle rigidity and energy spectra	IS 15390	HZETRN		0		N	B	48
	n	solar neutrons	WDCCR (Lomnický, Izmiran)	GCR, HZETRN, AIR	1	1	1	Y	A	48
	n	solar neutrons	Press et al.	GCR, HZETRN, AIR		0		Y	B	48
	p	proton differential and integral direction flux	GOES/SEM EPS & HEPAD P2-P10 & I2-I7	SEP, HZETRN, CMIT	5	5	5	Y	A	48
	p	proton differential and integral direction flux	GOES/SEM EPS & HEPAD P2-P10 & I2-I7	SEP, HZETRN, CMIT	5	5	5	Y	B	48
	α	alpha differential and directional flux	GOES/HEPAD A1-A7	SEP, HZETRN, CMIT	5	5	5	Y	A	48
	α	alpha differential and directional flux	GOES/HEPAD A1-A7	SEP, HZETRN, CMIT	5	5	5	Y	B	48
	Dst	Disturbance storm time index	(SET)	T05, CMIT, De Angelis, Wilson				N	A	48
	Dst	Disturbance storm time index	Kyoto	T05, CMIT, De Angelis, Wilson		60	60	N	B	48
	B	interplanetary magnetic field (IMF)	ACE	T05, CMIT	1	3	1	N	A	48
	B	interplanetary magnetic field (IMF)	(HAF, CCMC)	T05, CMIT				N	B	48
	psw	solar wind pressure	ACE	T05, CMIT	1	3	1	N	A	48
	psw	solar wind pressure	(HAF, CCMC)	T05, CMIT				N	B	48
	PO ₂ (z)	pressure (oxygen)	()	AIR, HZETRN				N	A	48
	PO ₂ (z)	pressure (oxygen)	NCAR NCEP Reanalysis	AIR, HZETRN	360	360		N	B	48
	PN ₂ (z)	pressure (nitrogen)	()	AIR, HZETRN				N	A	48
	PN ₂ (z)	pressure (nitrogen)	NCAR NCEP Reanalysis	AIR, HZETRN	360	360		N	B	48
	PAr(z)	pressure (argon)	()	AIR, HZETRN				N	A	48
	PAr(z)	pressure (argon)	NCAR NCEP Reanalysis	AIR, HZETRN	360	360		N	B	48
PH ₂ O(z)	pressure (water vapor)	()	AIR, HZETRN				N	A	48	
PH ₂ O(z)	pressure (water vapor)	NCAR NCEP Reanalysis	AIR, HZETRN	360	360		N	B	48	
INTERNAL XFER	$\Phi(Z,E,t)$	Boundary condition 1: GCR/SEP differential number flux spectrum (DNFS)	AIR, HZETRN	NAIRAS						
	R _c	Boundary condition 2: geomagnetic cutoff rigidity	Shea & Smart, Smart & Shea, IGRF, T05, LFM/CMIT, De Angelis, Wilson	NAIRAS						
OPS OUTPUT	Gy	Dose	NAIRAS	aviation (IPSM), NOAA SWPC					ftp, http, servlets, tools	
	mSv/hr, μ Sv/hr	Dose equivalent	NAIRAS	aviation (IPSM), NOAA SWPC					ftp, http, servlets, tools	

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Data Channels





NAIRAS team access to full database

1. Research Institutions

- LaRC
- NCAR/HAO
- Dartmouth

2. Operations Institutions

- SET/SWD
- IPSM
- NOAA/SWPC

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Commercial aviation access to dose products

1. SET/SWD

- **IPSM** is the preferred service provider of dose products to commercial carriers
- ISO POC

2. NOAA/SWPC

- SWPC operations
- FAA POC
- ICSWIAS POC
- ICAO POC
- ISES POC



Public access to dose products

1. SET/SWD

- Provider of dose products for frequent flyers
- Google Earth application

2. NOAA/SWPC

- Provider of dose products for public access