GEO Task He-09-02d "Global Observation System for Mercury"

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PoC

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GEO Health and Environment Community of Practice Workshop
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Centre National d'Études Spatiales (CNES)
Paris, France
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The International Framework related to Mercury

- GEO Task He-09-02d "Global Observation System for Mercury"
- UNEP Mercury Program – Global Partnership on Atmospheric Mercury Transport and Fate Research (F&T)
- Task Force on Hemispheric Transport of Air Pollutants (TF HTAP) under the UNECE-LRTAP conventions.

GEO Task HE-09-02d

Sub-task Number:	**HE-09-02d**
Sub-task Title:	Global Monitoring Plan for Atmospheric Mercury
Overarching Task:	Monitoring and Prediction Systems for Health
Area:	HEALTH
Related Communities of Practice:	Air Quality & Health, Atmospheric Chemistry (former IGACO), Biodiversity and Forest

Leads:

- Italy(PoC), CNR-IIA, Nicola Pirrone, pirrone@iia.cnr.it
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- Japan, NIES, Noriyuki Suzuki, nsuzuki@nies.go.jp
- South Africa, DEADP, Joy Leaner, jleaner@pgwc.gov.za

GEO Task HE-09-02d

Task Definition

- ✓ **Develop a global observation system for mercury** by harmonizing standard operating procedures for monitoring mercury and its compounds in air, atmospheric deposition, water, soil, sediments, vegetation and biota.
- ✓ The **sharing of data** from this network, allowing access to comparable and long-term data from a wide array of locations, will help understand temporal and spatial patterns of mercury transport and deposition to, and evasion from, terrestrial and aquatic ecosystems.
- ✓ The data produced will support the **validation of regional and global atmospheric mercury models** for use in evaluations of different policy options for reducing mercury pollution impacts on human health and ecosystems.
- ✓ **Build upon the contributions of**, among othersUNEP Mercury Programme, the Hemispheric Transport of Air Pollutants Task Force (TF HTAP), and the European Monitoring and Evaluation Program (EMEP).
- ✓ Moreover build upon the **GMOS Project, the US MercNet initiative and international monitoring and modelling efforts led by Italy, Japan and South Africa**.

GEO Task HE-09-02d Partnership

Type	Representing	Organisation	Name	Email Address
Lead (PoC)	Italy	CNR-Institute for Atmospheric Pollution	Nicola Pirrone	pirrone@iia.cnr.it
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Global Mercury Observation System
- GMOS –

Funded by:
European Commission – DG Research
(2010 – 2015)

GMOS

- ✓ **Funded by:** European Commission – DG Research (FP7)
- ✓ **Budget:** about 9.4 M€ / EC Contribution 6.88 M€
- ✓ **Coordinator:** Nicola Pirrone, CNR-IIA, Rome, Italy
- ✓ **Partnership:** GMOS involves 24 partners from all over the world.
- ✓ **Period:** 5 years (from 1st Nov. 2010)
- ✓ **Kick-off meeting:** 17-19 November 2010

GMOS partnership

Part. no.	Part. Organisation	Acronym	Contact	e-mail	Country
1.	CNR-Institute of Atmospheric Pollution Research	CNR-IIA	Nicola Pirrone	pirrone@iia.cnr.it	Italy
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21.	National Institute for Meteorology and Geophysics	INMG	Ester Araujo Brito	inmg.presidente@gmail.com	Capo Verde
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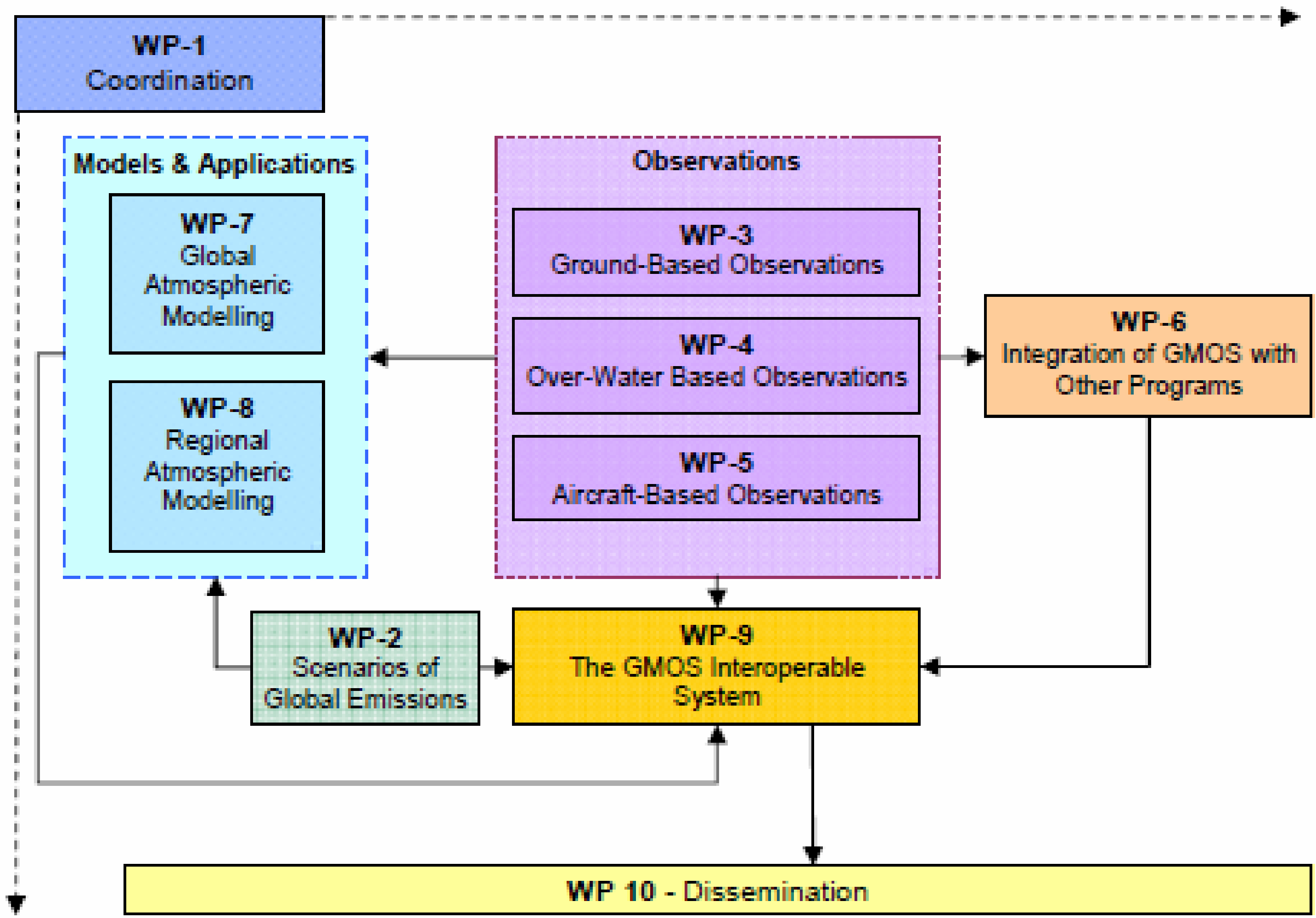
23.	University of Latvia	IAPS	Atis Skudra	askudra@latnet.lv	Latvia
24.	Saint Petersburg State University	SPBSU	Nikolay R. Mashyanov	nrm@lumex.ru	Russia

GMOS Overarching Objectives

- ✓ To establish a **Global Observation System for Mercury** able to provide ambient concentrations and deposition fluxes of mercury species around the world, by combining observations from permanent ground-based stations, and from oceanographic and tropospheric measurement campaigns.
- ✓ To validate regional and global scale **atmospheric mercury modelling systems** able to predict the temporal variations and spatial distributions of ambient concentrations of atmospheric mercury, and Hg fluxes to and from terrestrial and aquatic receptors.
- ✓ To evaluate and identify **source-receptor relationships** at country scale and their temporal trends for current and projected scenarios of mercury emissions from anthropogenic and natural sources.
- ✓ To develop **interoperable tools** to allow the sharing of observational and models output data produced by GMOS, for the purposes of research and policy development and implementation as well as at enabling societal benefits of Earth observations, including advances in scientific understanding in the nine Societal Benefit Areas (SBA) established in GEOSS.

GMOS Strategy



WP Leaders within GMOS

WP no.	Work Package	Partner	Country	Work Package Leader
1	Coordination	CNR-IIA	Italy	Nicola Pirrone
2	Current and future global emissions	NILU	Norway	Jozef Pacyna
3	Ground-based Observation System	CNR-IIA	Italy	Francesca Sprovieri
4	Over-water observation system	JSI	Slovenia	Milena Horvat
5	Aircraft-Based Tropospheric Program	GKSS	Germany	Ralf Ebinghaus
6	Integration of GMOS with Other Programs	IVL	Sweden	John Munthe
7	Global Scale Atmospheric Modelling	MSC-E	Russia	Oleg Travnikov
8	Regional Scale Atmospheric Modelling	GKSS	Germany	Volker Matthias
9	GMOS Interoperable System	CNR-IIA	Italy	Sergio Cinnirella
10	Dissemination	CNR-IIA	Italy	Nicola Pirrone

GMOS Strategy

GMOS includes the following programs:

✓Ground-Based Observation System

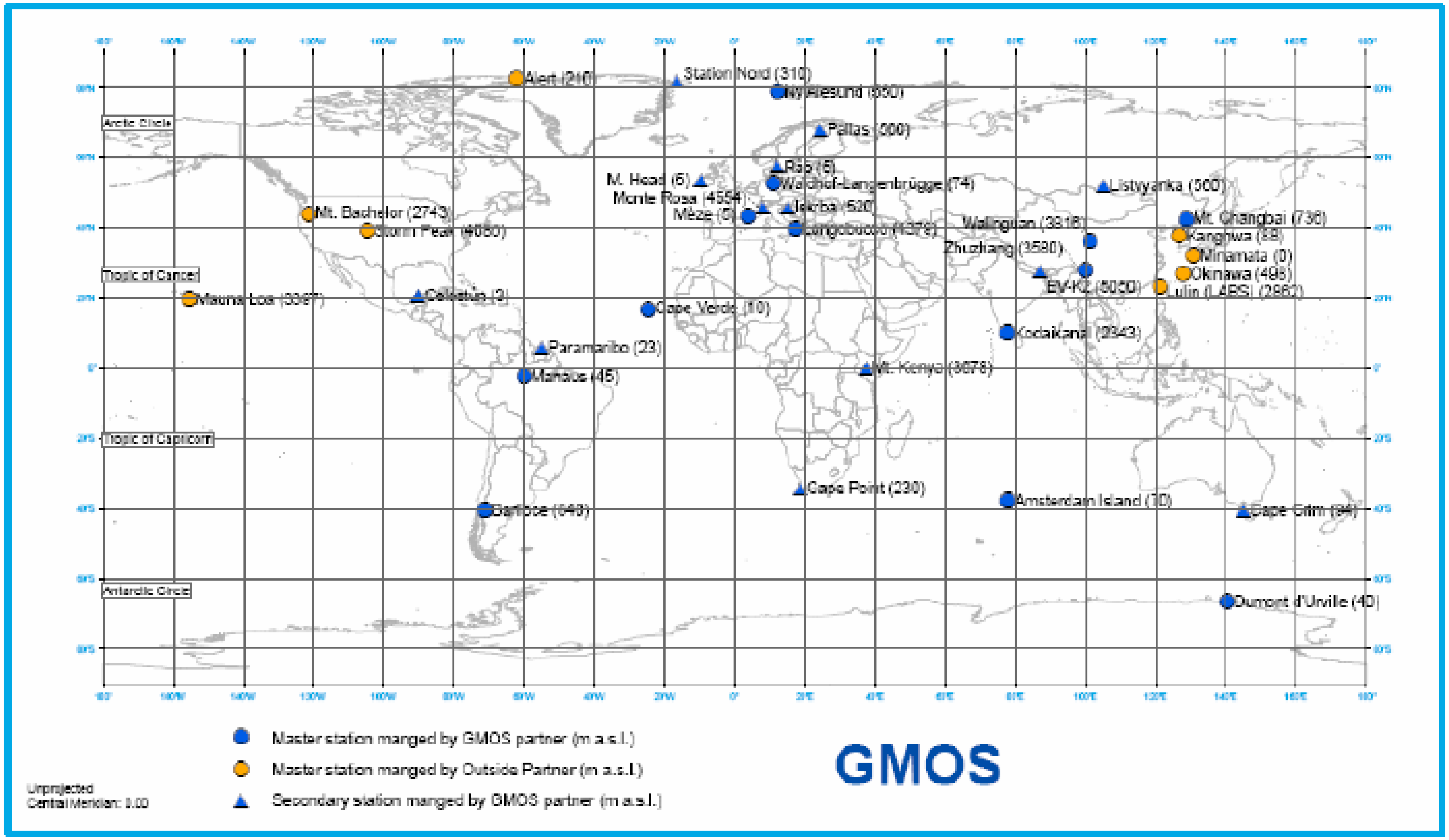
✓Oceanographic Observation program which will include:

- **Cruises over the Pacific Ocean**
- **Cruises over the Atlantic Ocean**
- **Cruises over the Mediterranean and North/Baltic Seas**

✓Aircraft program which will include:

- **Intercontinental Flights in the Upper Troposphere / Lower Stratosphere**
- **Regional scale flights (Europe and USA) up to the mid Troposphere**

GMOS Ground-Based Observation System



GMOS Ground-Based Observation System

Table I - Master and Secondary Ground-Based Sites in GMOS

Running sites are those where Hg meaurements are already on-going. New Sites are those where Hg measurements would be started as part of GMOS. (**) **M: master sites** (GEM, RGM, Hgp, Hg in pricip); **S: Secondary sites** (TGM, Hg in pricip)

Monitoring Site	Elevation (m asl)	Latitude	Type	Station Type (**)	Running Sites by Outside Partners (*)	Running Sites by GMOS Partners	New Sites by GMOS Partners	Responsible GMOS Partners
GMOS Sites								
Alert, Canada	210	82.5° N	GAW	M	X			NADP/AMNet
Station Nord, Greenland	310	81.6	AMAP	S		X		AU
Ny Alesund, Norway	550	78.9	GAW	M		X		NILU
Pallas, Finland	560	68.0	EMEP	S		X		IVL
Rao, Sweden	5	57.4	GAW	S		X		IVL
Mace Head, Irland	5	53.3	GAW	S		X		GKSS
Waldhof, Germany	74	52.8	EMEP	M		X		GKSS
Listvyanka, Russia	560	51.9	GAW	M				SPBSU
Monte Rosa, Italy	4554	45.9		S			X	UNIVE
Iskrba, Slovenia	520	45.6	EMEP	M			X	JSI
Mt. Bachelor, WA, USA	2743	44.1	NOAA	M	X			UoW
La Seyne, France	20	43.4		S			X	IFREMER
Mt.Changbai, Located in the boundary area of China and North Korea in Jilin province, China	736	42.4	GAW	S		X		IGCAS
Longobucco, Italy	1379	39.8	EMEP	M		X		CNR-IIA
Storm Peak, CO, USA	4086	39.3	DRI	M	X			DRI
Kanghwa Island, Korea	88	37.7		S	X			KNU
Waliguan, China	3816	36.3	GAW	M		X		IGCAS
Ev-K2, Nepal	5050	28.0	GAW	S			X	CNR-IIA
Zhuzhang Observatory, Northwest of Yunnan province, China	3580	27.8	GAW	S		X		IGCAS
Cape Hedo, Okinawa, Japan	498	26.8		M	X			MoE
Minamata, Kyushu islands, Japan		32°12”		M	X			MoE
Lulin, Taiwan, China	2862	23.5	GAW	M	X			UoT
Mauna Loa, Hawaii, USA	3397	19.5	GAW	M	X			NADP/AMNet
Villahermosa, Tabasco, Mexico	20		GAW	S			X	JRC
Cape Verde Obs., Capo Verde	10	16.9	GAW	S			X	UoY / INMG
Kodaicanal, India	2343	10	GAW	M			X	IOM-AUC
Paramaribo, Suriname	23	5.8	GAW	S			X	INTEC
Mt. Kenya, Kenya	**3678**	**0°**	GAW	**M**			**X**	**KMD**
Manaus, Brazil	45	2.6	GAW	M			X	APLBA
Cape Point, South Africa	230	34.4	GAW	S		X		SAWS
Amsterdam Island	70	37.8	GAW	M			X	UJF
Bariloche, Argentina	840	40.4	GAW	M			X	INIBIOMA
Cape Grim, Australia	94	40.7	GAW	S			X	IVL
DOME-C, Antarctica	40	66.7° S		S			X	CNR-IIA / UJF

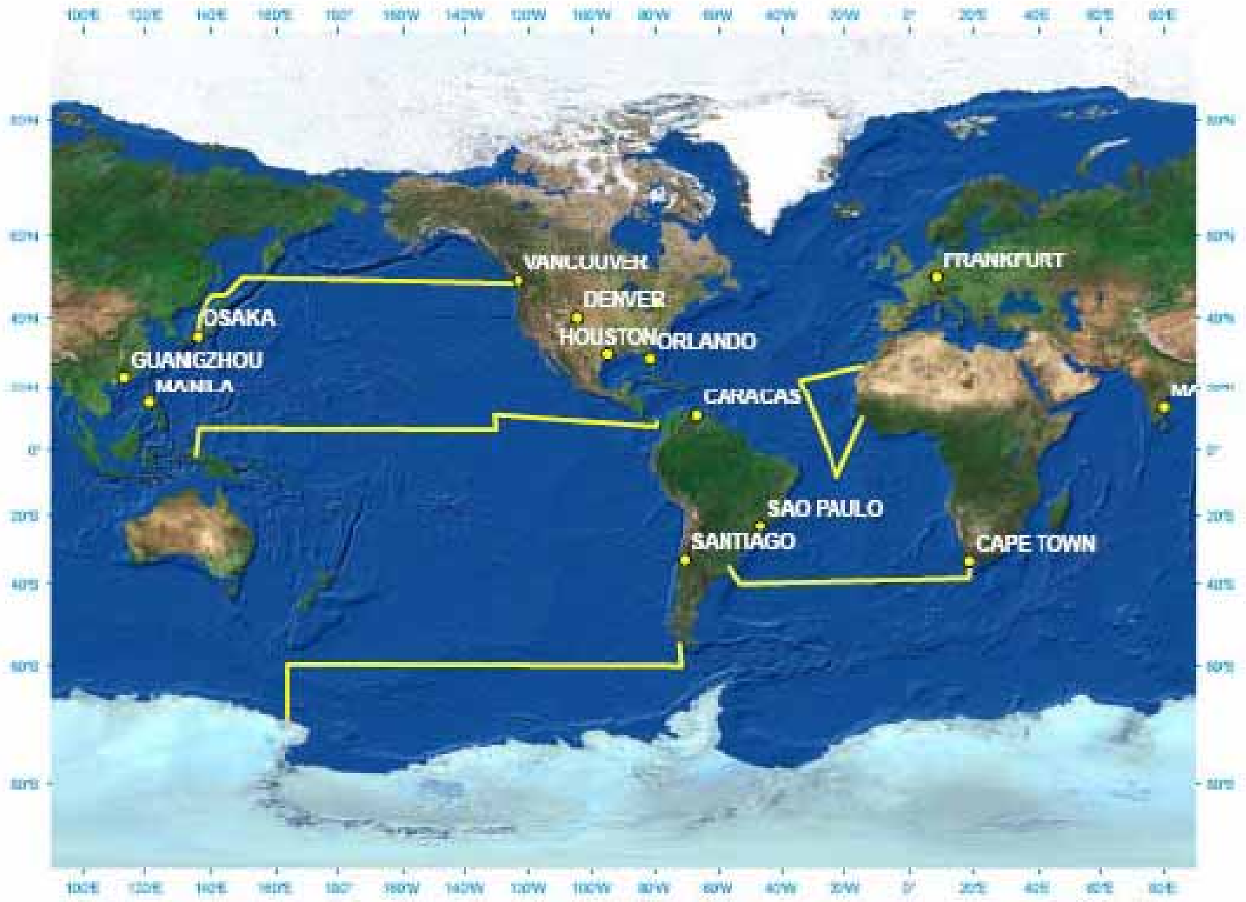
GMOS External Partners

- As part of the GMOS Steering Board -

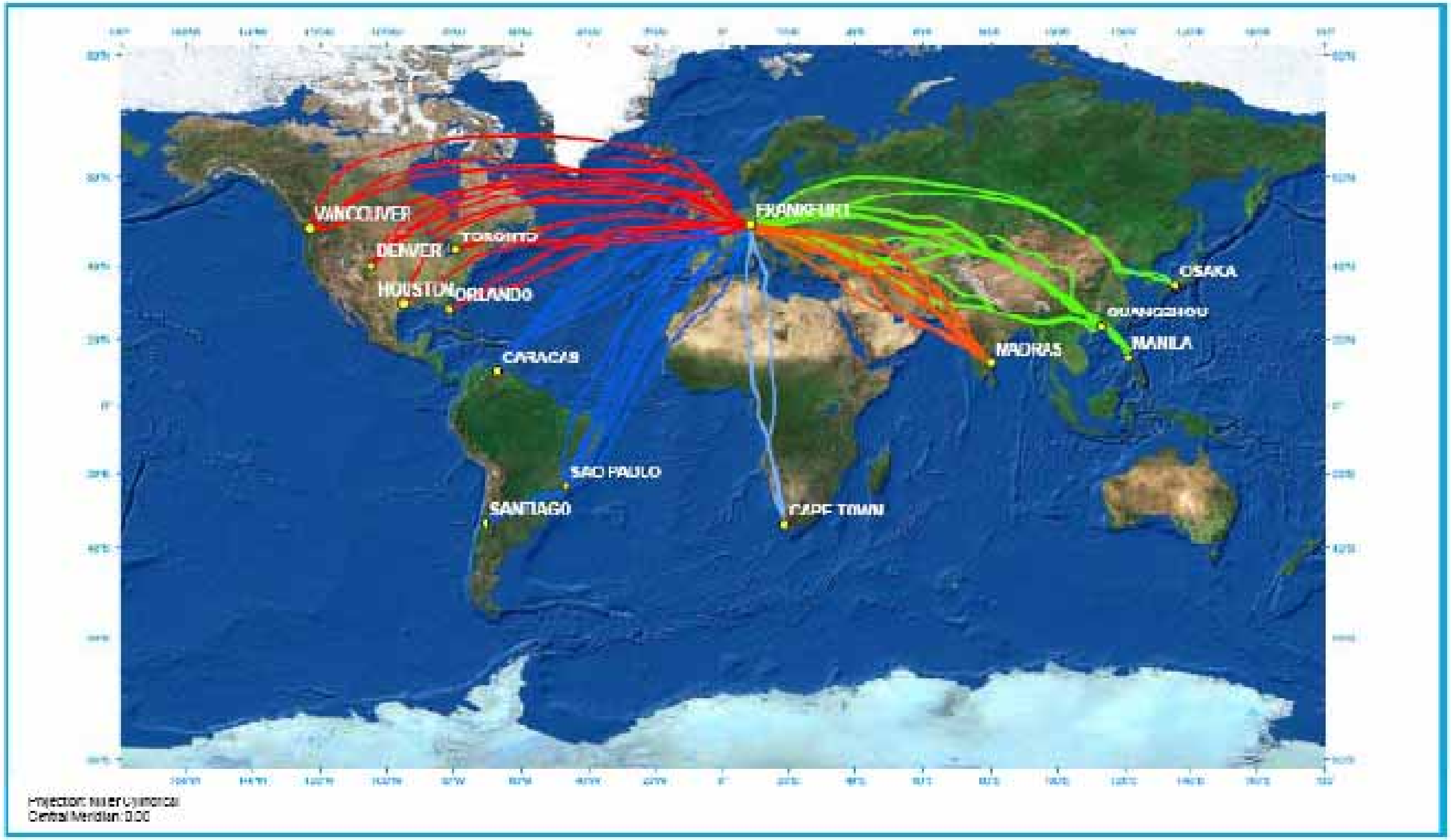
Representatives of existing regional programs and networks:

- MERCNet, USA
- AMNet – NADP, Joint USA-Canada program
- Storm Pick Station (CO), USA, Dr. Daniel Obrist
- Mauna Loa (Hawaii), USEPA, USA, Dr. M. Landis
- Mt. Bachelor station (WA), USA, Prof. Daniel Jaffe
- Cape Hedo, Okinawa, Japan
- Kangwa Island, Korea
- ....more during project development.....

GMOS Oceanographic Program



GMOS Aircraft-Based Program



Innovative Aspects of GMOS

The proposed project will provide a substantial contribution to the **advancement of science** in general, and to the objectives defined in the GEO Task HE-09-02d as well as to goals of on-going programs (i.e., UNEP Mercury Program, GEOSS) and conventions (i.e., TF HTAP of the UNECE-LRTAP). **Major innovative aspects of the proposed project are:**

- For the first time, a coordinated **Global Mercury Observation System** will be established which will include observations from continuous ground-based stations, ad-hoc over-water observation programs, and aircraft-based tropospheric programs.
- For the first time **vertical profiles of tropospheric mercury concentrations** at different latitudes and time of the year will be provided by coordinating the efforts of GMOS with those of other on-going international programs (i.e., CARIBIC, NAAMEX) in Europe and North America.
- For the first time a **full validation of global and regional scale atmospheric mercury models** will be performed on the basis of observations that are representative of the different regions, locations of natural and anthropogenic sources, terrestrial and aquatic receptors, and meteorological conditions and atmospheric transport patterns.
- For the first time **fully validated** regional and global scale atmospheric models, will be used to evaluate spatial and temporal patterns of ambient concentrations, and re-emission rates from and deposition fluxes to aquatic and terrestrial receptors for **different scenarios of mercury emissions** at regional and global scales.
- The outcomes of **GMOS will support the achievement of goals and objectives of key international programs** including the GEO Task HE-09-02d "Global Observation System for Mercury", the UNEP F&T, and TF HTAP of the UNECE-LRTAP convention.

More about GMOS will be available at...

www.GMOS.eu

the official GMOS web portal will provide all the information concerning the project development, field campaigns, atmospheric modelling and major findings

Thanks….