

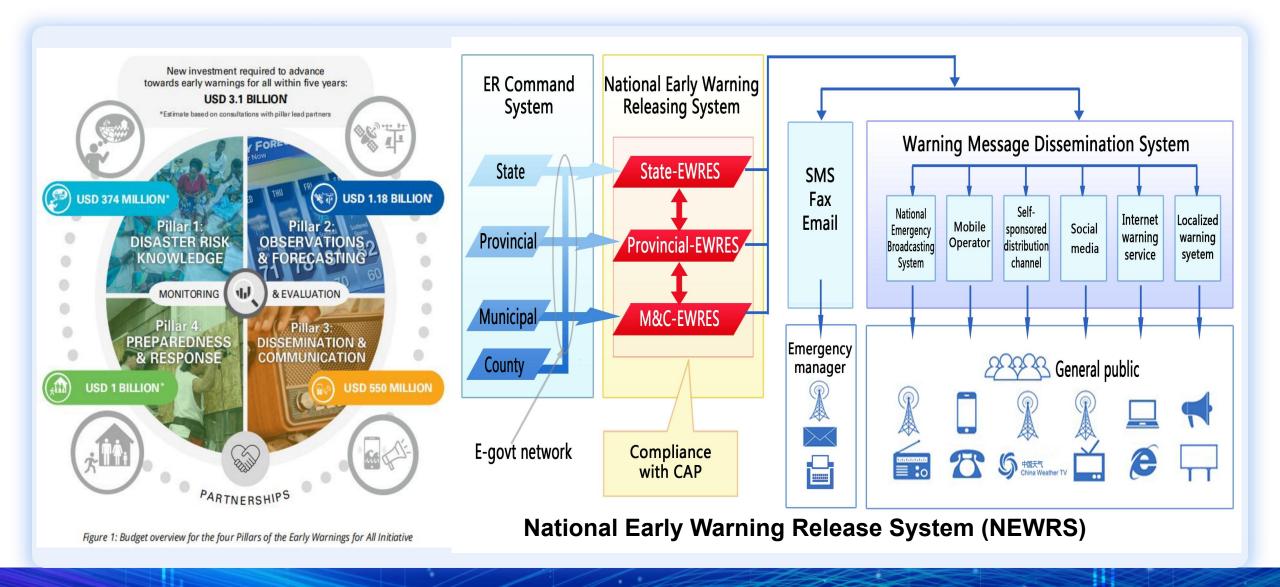
Building and Implementing a New LLM-Powered Paradigm for Meteorological Disaster Warning Dissemination

Wang Muhua

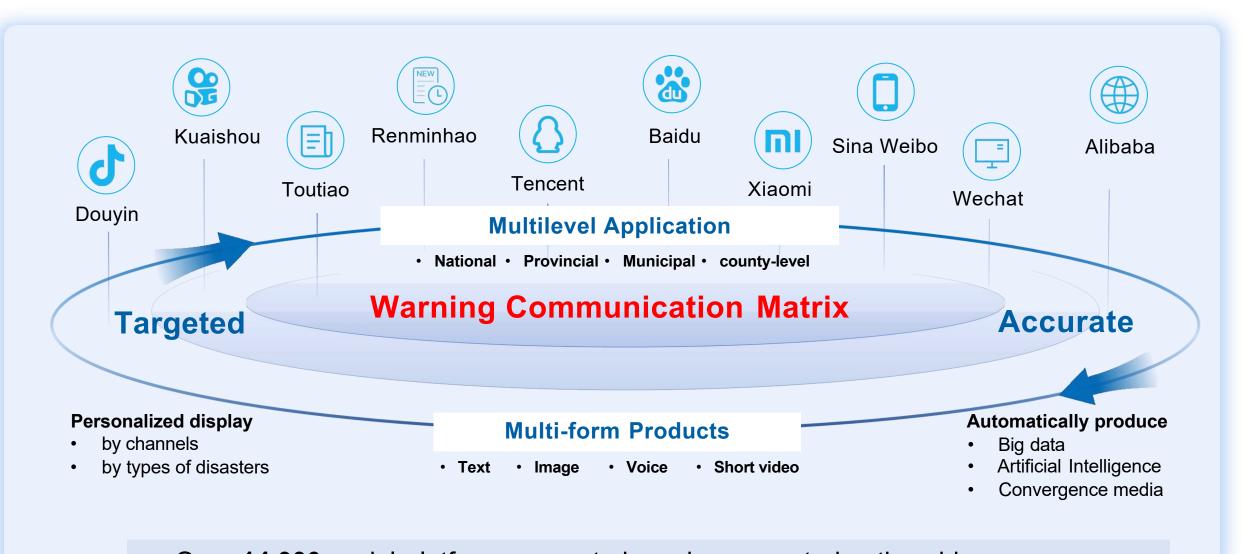
CMA Public Meteorological Service Center

Shanghai China 2025.7

Background: China's Practice in National Early Warning Release System All Marie Release System All Marie Release System All Marie Release System Release Sys



Background: China's Practice in National Early Warning Release System



Over **14,000** social platform accounts have been created nationwide.

Over **3 million** warning messages have been delivered to the public annually, reaching **7 billion** people.



The advantages of LLMs in Intelligent and Senario-based NEWRS











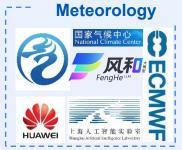




Domain LLMs







































Who is FengHe?





- Created by CMA and Tsinghua University.
- > The first 100-billion-parameter large language model for the vertical domain of meteorological services.
- > Integrating large-scale professional meteorological corpora.
- > Its misson become the 'central nervous system' for next-gen warning services.

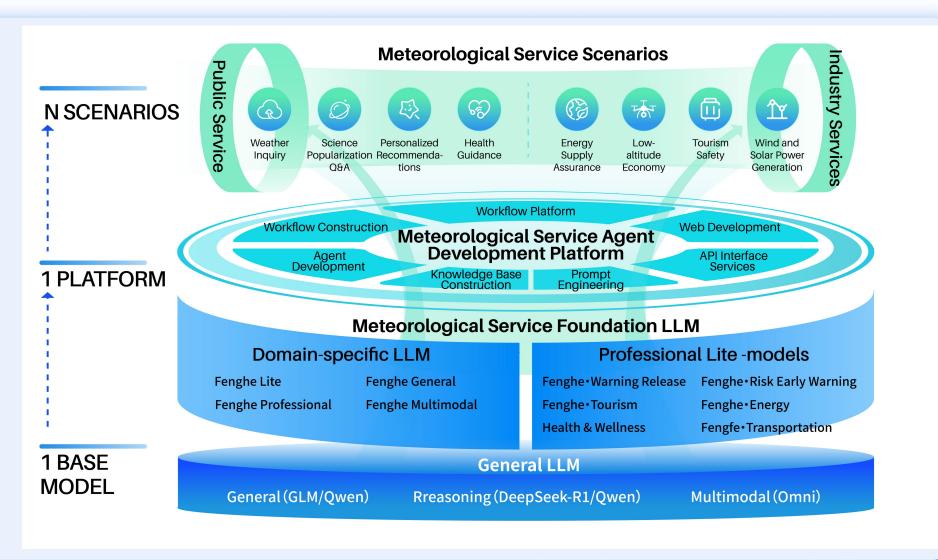


FengHe's Vision: "1+1+N" Architecture



- > 1 Base Model:

 Meteorological service
 foundation model.
- > 1Platform: Meteorologic al service Agent development platform.
- N scenarios: Energy,
 Transport, Tourism,
 Medical and Health care
 ect.



What can FengHe do?



① 气象服务需求理解 Understanding of meteorological service requirements

气象知识、气象标准的理解 Understanding of knowledge and standards

② 气象服务内容生成 Generation of meteorological service content

气象图表、文本、图形生成 多语钟翻译 Generation of meteorological charts, texts and graphics, and multilingual translation



③ 气象决策与推理 Meteorological decisionmaking and reasoning

常识推理、因果推理 Common sense reasoning and causal reasoning

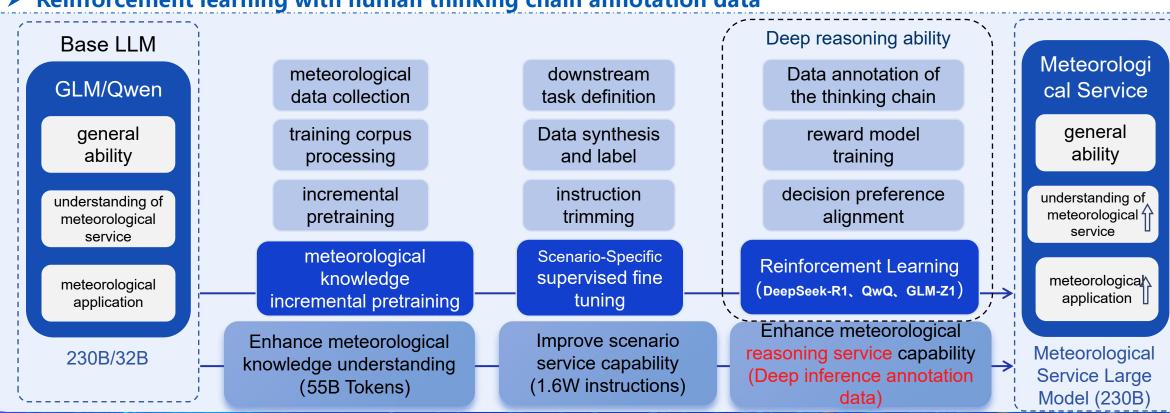
4 气象工具调用 Meteorological Function Call

提供多源气象数据和专业气象工具 Access real-time data from models like CMA Forecast and professional tools.

Core Technical Route



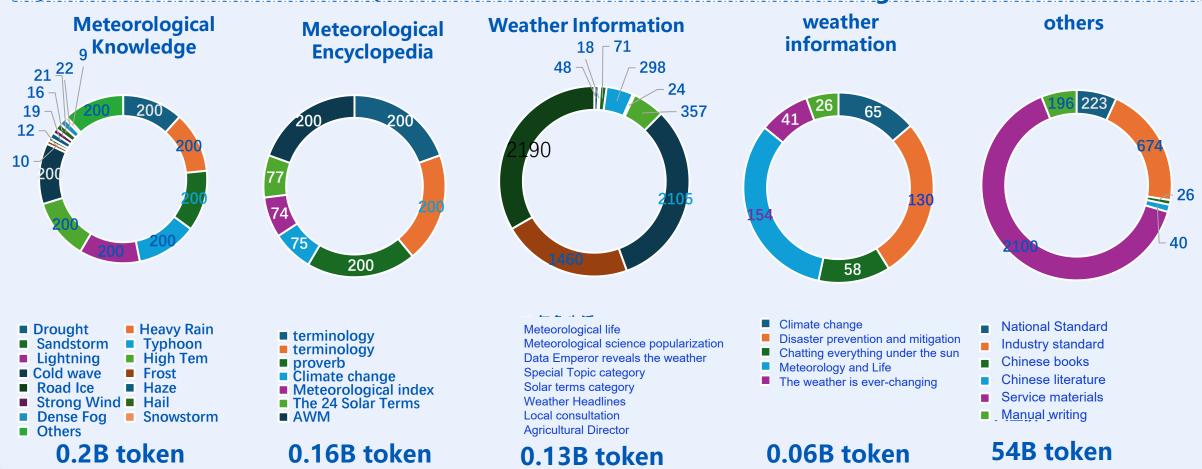
- > Lora-Based Meteorological Service Pretraining and Scenario-Specific Fine-Tuning Technology.
- > 55-billion-token meteorological corpus for incremental pre-training
- > 16,000 manually annotated instruction datasets for supervised fine-tuning
- > Reinforcement learning with human thinking chain annotation data



Corpus



Large-scale high-quality meteorological service corpus: Approximately 55 billion tokens (1token≈1.5 Chinese characters) to transform raw data to actionable insights.



Mho What How Case

Big meteorological data



More than 30 personalized and professional meteorological data products with different time scales, spatial resolutions and scenarios at any position in the world.

Global Weather: 12.5 km

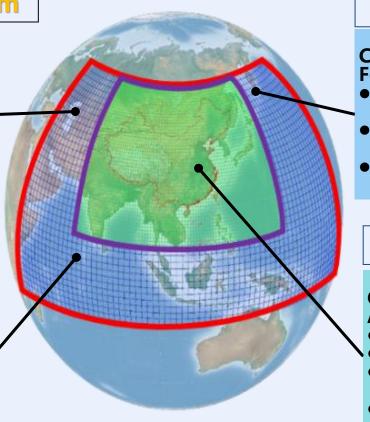
CMA-GFS:

- Vertical 87 layers, top layer reaches 0.1 hPa
- Global range 0.25° by 0.25° grid
- Assimilation System 4DVAR
- 10-day forecast (00, 12UTC)
- 5-day forecast (06, 18UTC)
- Tropical Cyclone Forecast for Global Seas

Global climate: 45 km

CMA-CPS: Global Climate Prediction System

- Vertical 56 layers, top layer reaches 0.1 hPa
- Global range 45 km resolution
- 1-60 Day forecast: 4 aggregate members run daily
- 1-13 Monthly Forecast: Running at the beginning of each month,
 21 ensemble members Global Ocean



Belt and Road: 9 km

CMA-TYM:(Regional Typhoon Forecasting System)

- Covering the Belt and Road area with a resolution of 9 km
- Longitude: 40-180, Latitude: 15S-60N
- 4 runs per day with 5-day forecasts

China Region: 3 km

CMA-MESO:(Regional Assimilation Forecast System)

- China Area Range 3 km
- 8 runs per day,
- 00,12UTC Forecast for the next 72 hours
- Other times forecast 36 hours ahead

conventional products historical extreme

Current weather

Short (2 hours)

Short (3 days)

Medium (15 days)

Long (45 days)

Index products

car wash index fishing index

Professional products

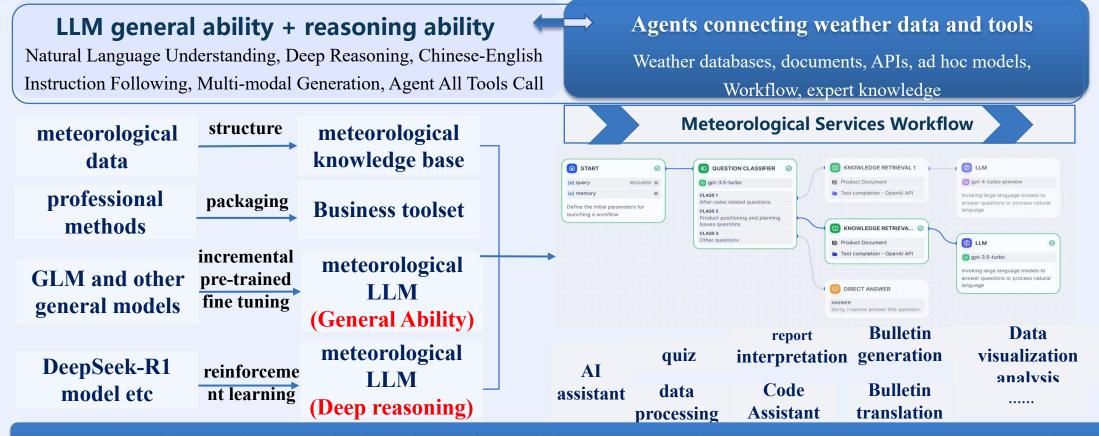
traffic weather

energy meteorology

Agent Platform based on FengHe



- > FengHe isn't just a model, it serves as the central nervous system of the brain.
- The agent acts as the limbs of the system, performing tasks by accessing meteorological data, knowledge, and tools.



Embed agents into various applications in the form of APIs, conversational bots, web pages, browser plug-ins, etc.

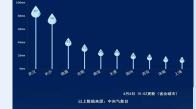
Who What How Case

大模型

预计,4月4日14时至5日14时,辽宁东部、湖南南部 采取适当措施,保证学生和幼儿安全: 3、驾驶人员应



过去24小时降水量排行榜



防御指南

政府及相关部门按照职责做好防暴雨准备工作

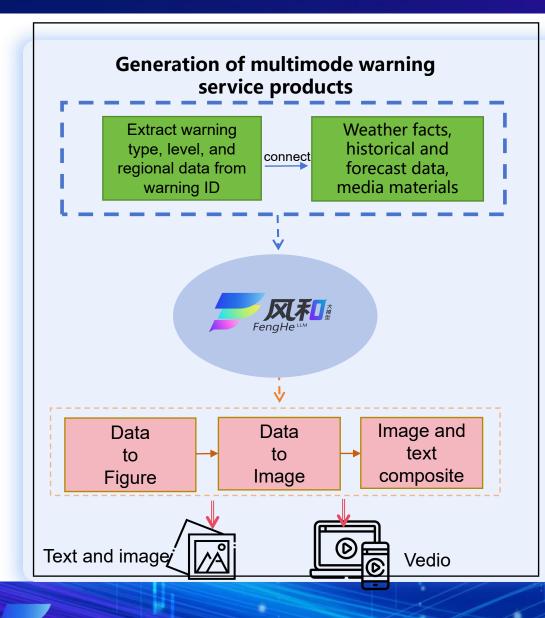
★ 检查城市、农田、鱼塘排水系统,做好排涝











Who

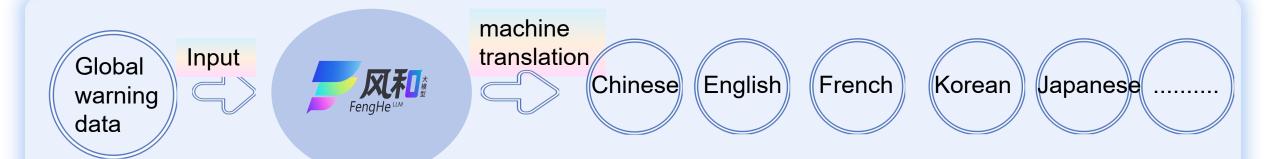
What

How



Multiple Application Senarios: GMAS-A Multilingual services









13 Asian WMO members' real-time warning data multilingual service

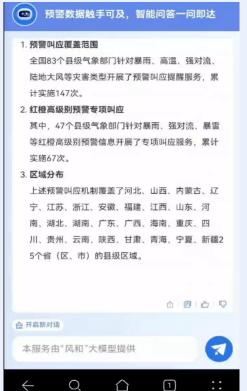
How Case

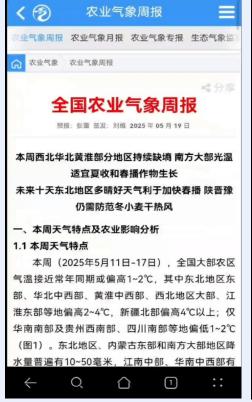
Multiple Application Senarios: Early Warning Agent



- > More than 130 application senarios to meet disaster prevention and mitigation needs.
- > The question-answer interactive service and multimodal service forms constructed a new paradigm for waring services.









Risk Reminder

Call-to-response

Agrcultural Product

Forest Risk warning

Transportation



Multiple Application Senarios: Tourism Agent



Question: We will travel from Shanghai to Baiyangdian for tourism by car in this weekend?

○ 气象爱好者

周末我要带家人从上海自驾到白洋淀游玩,帮我规划一下沿途路线,推荐一下本地特色

您计划在2025年6月14日(周六)从上海自驾到白洋淀游玩,我已经帮您规划好了路线。以下是沿途的路线规划和白洋淀的本地特色推荐:

沿途路线规划

由于具体的路线细节需要实时查询,我已为您启动了路线规划工具,您可以通过以下链接查看详细的驾车路线和预计所需时间:查看上海到白洋淀的驾车路线

白洋淀本地特色推荐

- 特产美食:
 - 白洋淀鸭蛋:以其个大、壳薄、油多而著称,是当地的特色美食。
 - **白洋淀鱼**: 淀区水质清澈,所产鱼类鲜美,尤其是荷花鱼,味道独特。
 - **莲子粥**:以当地新鲜莲子熬制,清甜可口,具有清热解毒的功效。
- 著名景点:
 - **白洋淀荷花大观园**:夏季荷花盛开时,景色宜人,是赏荷、拍照的好去处。
 - **白洋淀文化苑**:了解当地历史文化,感受水乡风情。
 - 嘎子印象: 以当地抗日英雄嘎子为原型,打造的实景演出,体验红色文化。

出行建议

- 自驾: 根据路线规划,预计行驶时间约为X小时,沿途可以欣赏不同的风景,适合家庭出游。
- 注意事项: 出发前请检查车况,确保油量充足,并准备好必要的旅行用品。

祝您和家人周末游玩愉快,享受白洋淀的自然美景和丰富的人文风情! 🍲 🚜 🗅





Thank you for your attention!

Contact: wangmuhua@cma.gov.cn